Becoming a dentist: characteristics, experiences and performance of students in the early years of the Adelaide dental course

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Abstract

The aim of this longitudinal study was to explore factors influencing the performance of a group of Australian undergraduate dental students during the early years of their education (1998-2001). Factors related to becoming a dentist and a selection of non-academic experiences were examined via closed- and open-ended survey questions and focus group discussions. Relationships between selected pre-admission variables and outcome variables were examined using tests of association and logistic regression analyses. Students' perceptions of factors believed to contribute to success and difficulties were examined using open-ended survey questions and analysed using content analysis. Levels of success of dental students associated with changes in learning and teaching practices and admission practices were also investigated.

Most students had chosen dentistry as their first-career choice. Despite their demanding lifestyles, the majority of first-year students were successful. Second year was more demanding for some students however most progressed into third year. Academic failure was the main reason why some students were unsuccessful. No single factor or group of factors characterised a successful student. Good secondary school academic achievement, having previous tertiary educational experience and being a local student, predicted good academic performance in first year but not subsequent years. Performance on an admission interview had some predictive ability for subsequent academic success. In addition, academic achievement in some first-year dental subjects predicted subsequent academic success. Study behaviours, external motivating factors, having supportive peers and positive student-staff interactions were perceived to have contributed to success. Personal difficulties, a demanding workload, negative student-staff interactions and adjusting to first-year university studies, were perceived to have contributed to difficulties.

This thesis contributes to a growing body of knowledge about factors that influence academic success of university students, including those in health profession faculties. The results should be of particular interest to dental schools, both internationally and nationally, that have adopted multifaceted admission processes and/or have changed from conventional to more student-centred dental curricula.

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Dimitra Lekkas and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Dimitra Lekkas

Dated this……day of …….. 2009

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'The road to success is always under construction' Arnold Palmer

1.1 Introduction

Becoming a dentist can be a challenging experience and not all dental students are successful academically, especially in the early years. There are important implications for the individual involved, the institution, and society in general when dental students are unsuccessful or do not graduate in a timely manner.

This thesis addresses the question of why some dental students encounter difficulties and others achieve success. In the dental or medical education literature to date, there has been limited use of a specific theoretical framework to underpin empirical studies which have investigated factors related to students' academic success. Furthermore, previous investigations have often focussed on validation of admission processes or retrospective examination of the accuracy of admission variables, to predict future dental or medical school performance instead of investigating key aspects of students' experiences.

This longitudinal prospective study investigated the characteristics, experiences, academic progress and academic success of four cohorts of dental students at the University of Adelaide who commenced their studies during the period 1998-2001. The study focussed on the first three years of the five-year Adelaide Bachelor of Dental Surgery (BDS) course. The students were admitted by a multifaceted process and experienced a problem-based approach to learning in the course. The characteristics and experiences of students, the performance of students, and factors (pre-and post-admission) associated with/or predictive of academic success were examined retrospectively. In addition, performance of students linked to changes in learning and teaching practices and admission processes, was also investigated.

1.2 Why do students choose to study dentistry?

Professional status, financial rewards, interesting work, regular work hours and being self-employed have been cited internationally as common motivating factors for those seeking a career in dentistry (Barnard et al. 1967; Coombs 1978; Over et al. 1984; Brand et al. 1996). Parents have often encouraged their children to choose a dental career (Coombs 1976; 1978; Rice et al. 1999) and most UK, US and Australian dental students consider a career in dentistry during their secondary education (Kruger 1962; Over et al. 1984; Morris 1992) or during or after tertiary education (Coombs 1976) rather than earlier in their lives. A good reputation of a dental school has been reported to be influential in the choice of dental school by US applicants (Whitehead et al. 2002). Given that dentistry is a stressful profession (Myers and Myers 2004; Rada and Johnson-Leong 2004) and one's working life may be quite long, it would be useful to have some exposure or work experience in the practice of dentistry (Hiiemae 1977). However, there are students who have been admitted into dental courses who have had no such experience (Hiiemae 1977; Whittaker 1984). It has been common internationally and

nationally, for those admitted into dental courses not to have chosen dentistry as their first-preference career option (Hiiemae 1977; Sivanesawaran and Barnard 1992; Gietzelt 1997), with medicine often being the first-preference career choice (Morris 1992; Rice et al. 1999; Gietzelt 1997). Almost half of the Adelaide dental students who were selected solely on previous academic achievement had not selected dentistry as their first-choice career, with most students having selected medicine as their first choice (Cannon and Makinson 1983). Poor career choice may impact on dental students' academic success (Coombs 1978) (this will be discussed further in Chapter 5, section 5.2.4.3).

1.3 Admission to dental school

The aims of a dental school admission process are to select students who are most likely to cope with an academically demanding curriculum, and those most likely to go on to become successful practitioners (Röding 1997). Conventional admission processes are typified by assessing applicants' previous academic achievement in secondary school eg, the Advanced Level General Certificate of Education (A-level) in the UK or the matriculation Tertiary Education Rank (TER score) in Australia. In cases where applicants have completed or partially completed tertiary studies prior to applying for dental school (eg, North American dental schools), previous achievement in college or university is used ie, the undergraduate Grade Point Average (uGPA). Cognitive (aptitude) admission tests may also be used as a further way to evaluate cognitive abilities of dental applicants. Such tests include the Dental Admission Test (DAT) in North America, and the Undergraduate Medicine and Health Sciences Admission Test (UMAT) and the Graduate Australian Medical School Admission Test (GAMSAT) in Australia. The UMAT will be discussed further in section 1.3.2.1 and cognitive admission tests will be discussed in Chapter 5, section 5.2.4.2.

Issues such as high demand for entry to dentistry (Drummond and Duguid 1997; Newton et al. 2003), the changing nature of the profession, and the introduction of student-centred learning approaches to dental curricula have given rise to a broadening of dental admission processes. Due to limited availability of positions, selection processes based solely on previous academic achievement have often resulted in only those with the highest levels of academic achievement gaining entry. Thus, less academically able students, but possibly those with similar potential to make good students and dentists, are often excluded (Hoad-Reddick and Macfarlane 1999; Röding 1997). It is also desirable for dentists to be more than just 'drillers and fillers' eg, to possess good communication skills (Simon and Chambers 1992; Tedesco 1995; Sanders 1996). Furthermore, in Problem-Based Learning (PBL) style curricula, students need to be able to: cope with being active learners; be responsible for their own learning; participate effectively in group work; and have a high degree of self-motivation (Hoad-Reddick and Macfarlane 1999; Fincham and Schuler 2001). Although academic achievement or aptitude tests may evaluate the cognitive abilities of a potential dental student, they do not necessarily evaluate the

personal characteristics required to be a successful student in a student-centred curriculum. To overcome these perceived shortcomings, broader or multifaceted admission processes were introduced by several dental schools internationally in concert with changes from conventional to PBL style curricula (eg, Hoad-Reddick and Macfarlane 1999; Pereira 1998). Multifaceted admission processes include the evaluation of personal characteristics via the use of interviews, personal/autobiographical letters and letters of reference, in addition to assessing cognitive abilities. Final selection (eg, weighting of various components) of the most suitable applicants for a particular dental course will depend on local admission committee decisions. No two dental schools have identical processes. Appendix Table 1.1 describes the various admission processes utilised by Australian dental schools.

1.3.1 Admission to the Adelaide dental course prior to 1996

Until 1996, admission to the Adelaide dental course was on the basis of secondary school academic achievement (TER score) for school leavers or on previous tertiary achievement (uGPA) for non-school leavers (Appendix Table 1.2). A quota was applied for admission, as there were more applicants than places. Thus, due to the competitive nature of admission, school leavers with high aggregate marks would be those who were admitted into the course (Cannon and Makinson 1983). Adelaide School of Dentistry staff and members of the profession started to raise concerns about an admission process based only on prior academic achievement (Cannon and Makinson 1983). Suggestions for improving the admission process included use of an admission interview concurrent with an assessment of attributes such as motivation to study dentistry; personal attitudes and aptitudes; physical and emotional fitness; and social orientation (Cannon and Makinson 1983).

1.3.2 Admission to the Adelaide dental course from 1997

Reflective of change in the Adelaide dental curriculum to a PBL style course, a new broader admission process was introduced in 1996 for entry in 1997. Apart from the fact that admission based solely on prior academic achievement (prior to 1996) had resulted in many dental students being 'unmotivated' (ie, 'second preference') (Cannon and Makinson 1983), there were other reasons for changing the admission process. An increased demand for places was resulting in an oversupply of school leavers who had exceeded the cut-off score for entry (prior to 1996). It was therefore becoming increasingly difficult to decide who should or should not be made an offer. Hence, many potentially excellent dental students or future dentists with very good matriculation scores were missing out. Furthermore, in a course with a small quota of students and a high cost per full-time student, withdrawal (for academic and non-academic reasons) of even a few students has significant resource implications (Mullins et al. 2003). Therefore, the overall aim of the new Adelaide admission process was to select applicants who were highly motivated to study dentistry and who displayed attributes that would enable

them to succeed in a PBL environment and in dental practice on graduation (Mullins et al. 2003). The new multifaceted (3-step) admission process involved: consideration of performance in a written cognitive admission test (UMAT); a 45 minute structured interview; and a threshold TER score (school leavers) or a threshold uGPA (non-school leavers) (Appendix Table 1.2). The subsequent two sections will discuss in more detail the UMAT and the structured interview used in the Adelaide admission process, to provide background information to enable the findings of this research to be placed in context.

1.3.2.1 Undergraduate Medicine and Health Sciences Admission Test (UMAT)

The University of Newcastle, in collaboration with The Australian Centre for Educational Research (ACER), developed the UMAT. UMAT scores are used in the selection of Australian students into medical and health science degree courses at undergraduate level in Australian universities. As of 2008 (ie, for entry to 2009 courses), most Australian dental schools that have dental or oral health courses (eg, Adelaide, Griffith, Melbourne, Queensland and Western Australia) utilise the UMAT as part of their admission process. Sydney is a graduate-entry dental course and thus the GAMSAT is used (Appendix Table 1.1). Unlike the UMAT, the GAMSAT assesses applicants' prior academic knowledge in the biological and physical sciences (ACER 2009). Two new Australian dental schools at LaTrobe University and Charles Sturt University are not using an admission aptitude test as part of their selection process. Adelaide was one of the first dental schools to use the UMAT as part of a multifaceted admission process and has used it for admission of students since 1997. In addition, the various Australian dental schools may use the UMAT as part of the admission process for certain types of applicant only eg, the Adelaide School of Dentistry only requires Australian applicants to undertake it. International applicants for entry between 1998-2001 were not required to undertake the UMAT (refer to Appendix Table 1.2).

The UMAT is a series of three tests which are designed to assess general attributes and skills gained through prior experience and learning rather than prior or accumulated content specific academic knowledge (eg, science, mathematics). During 1998-2001 the three broad qualities that were assessed by the UMAT included critical thinking and problem solving, interaction skills and abstract non-verbal reasoning. These qualities were considered to be relevant and important to the study and later practice of health professionals (eg, doctors and dentists) (UMAT Pty Ltd 2000).

The questions in the UMAT are in multiple-choice format. The questions have equal value and no marks are deducted for an incorrect answer. Each section of the UMAT is timed and the total allocated test time is two and half hours. The authors of the UMAT also recommend that no specific preparation or academic knowledge is required to undertake the UMAT and the test uses language of a senior secondary school standard (UMAT Pty Ltd 2000). The authors of the UMAT state that the test

questions are developed to rigorous professional and technical standards and are revised annually. The test questions are trialled and reviewed in terms of content, style and duration. They are also examined to minimise gender, ethnic, cultural or religious bias (UMAT Pty Ltd 2000; ACER 2006). The UMAT test data are reported to be analysed statistically to check validity and reliability (UMAT Pty Ltd 2000; ACER 2006; Mercer and Chiavaroli 2007), but there are no published data on these analyses available. According to ACER (2006), the UMAT tests differ slightly in difficulty from year-to-year. The maximum possible UMAT score can differ from one section of the test to another and from one year to another. The UMAT results are reported as scaled scores to take into account differences in test difficulty between years (ACER 2006).

Results of each section of the UMAT are reported on their own scale and a percentile rank, which is the relative position of the UMAT candidate in relation to the other candidates within that given year. The resultant scores derived from each UMAT section are used to make up a composite score and a composite percentile rank (ACER 2006).

Each Australian university that uses the UMAT as part of its admission process determines how the results of the UMAT will be used in admission decisions. Annually each university sets its own UMAT cut-off scores, which are often based on the number of applicants and the quota of places available. These are the minimum UMAT scores acceptable for consideration by the admissions committees and they vary from one university to another and between courses (ACER 2006). Appendix Table 1.1 outlines the various admission processes for Australian dental schools and how they utilise the UMAT as part of their admission process.

1.3.2.2 The Adelaide structured admission interview

The aim of the Adelaide structured admission interview (oral assessment) is to assess a range of personal characteristics deemed necessary for applicants to be successful dental students and professionals (Mullins et al. 2003). Six personal characteristics are evaluated: motivation to become a dentist; compatibility with the dental course; tolerance of ambiguity; perseverance; supportiveness and encouraging behaviour; and communication and personal effectiveness. The interview is highly structured.

During 1997-2003, 45 minutes were spent on evaluating the six individual categories with the applicant. A further 15 minutes were allocated to rate the applicant after the interview was complete. At interview the only information the panel members had was the applicant's first name and an application number for reference purposes. Applicants were only given the first names of the panel members. The assessors each had a folder which contained an outline of the desirable personal characteristics and questions for each category. There was also an individual rating sheet and in one of the two folders a joint rating sheet. At the end of the interview, once the applicant had vacated the room, each assessor

individually rated the applicant on each of the six categories. They were encouraged to write written comments first and then rate the applicant along a six point rating scale, from 1 (highest rating) to 6 (lowest rating). Each assessor then decided on an overall (global) rating of the applicant on a five point categorical scale, from an 'excellent' candidate to a 'very unsuitable' candidate. The two assessors then conferred and completed a joint assessor form via the same process. The final joint ratings were not an average of the two ratings but rather a common agreed rating between the two.

Each pair of assessors comprised one faculty and one community representative. The faculty representative was an academic staff member, part-time staff member, or visiting research fellow of the School of Dentistry. Community representatives were non-academic staff members from broad backgrounds. Assessor pairs were gender balanced.

All Australian applicants had face-to-face interviews. International candidates applying for entry to the Adelaide dental course were also required to undertake an admission interview. At the time of this study the admission interview for international applicants was conducted in one of three ways: face-to-face in Adelaide; face-to-face in an overseas location; or via telephone (from Adelaide) with one or two assessors (most often faculty members). The criteria used to assess Australian applicants were used for international applicants.

1.4 Higher education in Australia

There have been several major changes to the contemporary Australian higher education landscape. Key changes in government policies have resulted in markedly increased numbers of students attending university. In 1987, 394,000 students attended University whereas in 2001, 726,000 (local and international students) (McInnis and James 2004). Concomitant with the marked increase in student numbers there have also been major changes to funding of higher education institutions. Specifically, there has been a reduction in public funding of universities and a shift towards private funding, with a substantial increase in the number of fee-paying international students. Universities have also been allowed to allocate places for full fee-paying local (Australian) students (McInnis and James 2004; Trewin 2005).

At the turn of the new millennium, a new generation of students ie, the 'Millenial' generation or 'Generation Y' (those born after 1982) (Oblinger 2003) started to attend university. Research indicates that 'Generation Y' tertiary students exhibit different characteristics to previous generations of university students. They have been described as being multitaskers, sociable, optimistic, confident, collaborative, civic-minded and goal orientated (Raines 2002). They exhibit distinct learning preferences such as teamwork, experiential activities, structure and the use of technology (Raines 2002; Oblinger 2003). A large national Australian study (Krause et al. 2005) compared the experience of first-year tertiary students who attended university during 2004 with those from the previous decade (1994) (Generation

X). It was observed that the new generation ('Generation Y') of students exhibited fundamental differences in how they experienced university. They were clearer about why they went to university; considered themselves clients being served by the university; spent less time on campus; were engaged in paid work (10 to 15 hours per week); spent at least eight hours per week online for study or recreation; were less likely to borrow books from the library; less likely to photocopy journal articles and notes; and were more connected with others in group work and team settings (Krause et al. 2005).

1.5 Characteristics of dental students

Numerous characteristics of dental students have been researched in relation to validating admission processes or exploring factors that may be related to academic success in dental school. Such characteristics include gender, previous educational experience, type of secondary school attended and permanent place of residence.

Over the last two decades the number of females studying at university (DEST 2002) and dental courses in the UK (Duguid and Drummond 2000), the US (Scarbecz and Ross 2002) and Australia (Gietzelt 1997) has increased from less than 5% in the 1960s-70s to between 38-50% in the late 90s and early 2000s (Barnard et al.1967; Gietzelt 1997; Duguid and Drummond 2000; Scarbecz and Ross 2002). The number of school leavers and non-school leavers who undertake dental studies varies depending on the type of dental course and/or admission policy. In North America, dental students are typically non-school leavers ie, they have entered dental studies after the completion of a college/undergraduate degree. This is in contrast to Australia, where the majority of dental schools have undergraduate entry courses that predominantly admit school leavers ie, those who have completed secondary school. However, depending on local admission policies, a small proportion of non-school leavers (ie, those who have completed or partially completed a previous tertiary course) may also be admitted. During the 1990s there was an increase in the number of Australian school leavers studying dentistry who had attended a non-government secondary school (Gietzelt 1997). Following changes to funding and the globalisation of higher education, there has been a substantial increase in the number of international fee-paying students studying in UK and Australian universities (Bennell and Pearce 2003).

Knowledge about the characteristics of dental students is important for numerous reasons. For example, admission processes may influence the type of students applying for entry into dentistry and their performance on admission criteria. The profile of dental students also has workforce implications (these two issues will be discussed further in Chapter 4). In addition, student characteristics may be one category of factors that could influence academic success of dental students (this will be discussed further in Chapter 5).

1.6 Learning and teaching in dental schools

The education of dental students varies widely both in terms of the type of entry mode and the curriculum design. Two common types of dental curricula are teacher-centred ('conventional') or student-centred eg, PBL and its variants. In Northern America, where most dental schools have graduate-entry courses, there are either conventional or student-centred curricula. In the UK, European Union, South-East Asia and Australia there is considerable variation in curricula design within and between countries.

Conventional dental curricula are typically designed in a linear and hierarchical fashion with the basic sciences taught in the early years and clinical learning in the later years (Tedesco 1995; Divaris et al. 2008). This has led to a separation of the practice of dentistry from the scientific basis, and a lack of integration and relevance for students. Furthermore, conventional dental curricula tend to be densely-packed with a high number of contact hours (Tedesco 1995; Divaris et al. 2008). There is a tendency for students to focus on memorising facts and atttaining technical skills, with insufficient time for understanding and self-directed learning (Tedesco 1995; Fincham and Schuler 2001; Divaris et al. 2008).

During the 1990s, many dental schools internationally replaced their conventional curricula with curricula based on a student-centred, PBL pedagogy (Howell and Maitlin 1995; Ferguson and Rutishauser 1997; Fincham et al. 1997; Townsend et al. 1997; Lantz and Chaves 1998; Rohlin et al. 1998; McGrath et al. 2006). PBL aims to establish a learning environment that enables integration and co-ordination of theoretical and clinical material and the development of skills in logical reasoning, critical thinking, communication and self-directed learning (SDL). Within a PBL environment, students should ideally engage in different study behaviours compared with conventional curricula ie, 'memorisation and reproduction' should be replaced by 'conceptualisation, reflection and meaning' (Newble and Clarke 1986; Schmidt et al. 1987; Barrows 1998; Albanese and Mitchell 1993). These study behaviours which PBL aims to foster have been associated with learning for meaning and higher levels of performance (Ramsden 1992; Vu et al. 1998; Prosser and Trigwell 1999).

The following two sections will provide a description of the conventional Adelaide dental curriculum prior to 1993 and the new hybrid PBL curriculum which was introduced in 1993. This discussion is provided to place the findings of the current study into context.

1.6.1 Previous conventional Adelaide dental curriculum

The Adelaide dental course is a five-year full-time professional degree. During the 1980s and up until 1993, the curriculum consisted of discipline-oriented subjects. In the early years (years 1 and 2), subjects were predominantly basic and applied science subjects with minor exposure to clinical work. In the latter years, subjects included the dental clinical disciplines. The course was seen by students as

being dominated by a large workload which was unbalanced, overcrowded, perceived to lack relevance and involved duplication of material (Townsend et al. 1997). There were also a high number of formal contact hours eg, 30 contact hours per week in first year and 38 contact hours per week in third year. Whilst students received a vast volume of information and facts, there was concern that students lacked the ability to both integrate and apply theoretical and clinical knowledge (Townsend and Burgess 1993).

1.6.2 Hybrid Problem Based Learning (PBL) Adelaide dental curriculum

In 1993 there was a major revision of the Adelaide undergraduate dental curriculum, with the introduction of a more co-ordinated, hybrid PBL curriculum. In fact, Adelaide was one of the first dental schools in the world to introduce a curriculum with an overall PBL philosophy. In addition to negative feedback from students, factors that led to the curriculum being revised included: the increase of knowledge in dentistry leading to new philosophies and new techniques; changes in the patterns of dental disease; and advances in the field of teaching methodology. The aim of the new Adelaide dental curriculum was to provide an enjoyable experience for students and staff to promote a desire in students for life-long learning, and to prepare them to be oral physicians in the 21st century (Townsend and Burgess 1993; Townsend et al. 1997). The Adelaide hybrid PBL course still has an overriding PBL philosophy running throughout the curriculum. It consists of a combination of PBL sessions (within the Dental and Health Science subjects) and more conventional lectures, supported by learning laboratories, tutorials, online learning resources or modules and clinical practice (beginning in first year). The PBL sessions have been chosen to drive the curriculum and co-ordinate topics across subjects (Winning and Townsend 2007). Students are engaged in contextual and experiential learning via the PBL sessions, including the use of text based, audiovisual and computer aided learning, collaborative group work and independent study (Mullins et al. 2003).

From 1993, students have been provided with a handbook at the commencement of each academic year that outlines the educational philosophy of the course (Wetherell et al. 1996). The handbook also provides details on learning outcomes (for each year and each subject), and subject outlines that include aims, objectives and assessment methods for each subject, in addition to information on key university and Adelaide School of Dentistry academic policies.

The hybrid PBL curriculum consists of three major subjects that are integrated horizontally and vertically (Figure 1.1). There is also a General Studies subject that includes a number of smaller units (communication and learning, chemistry, physics, computing, evidence-based dentistry and social context of dentistry) that is presented during the first two years of the course (Wetherell et al. 1996). Appendix Table 1.3 provides further details on each subject (Years 1 to 3) of the Adelaide hybrid PBL curriculum.

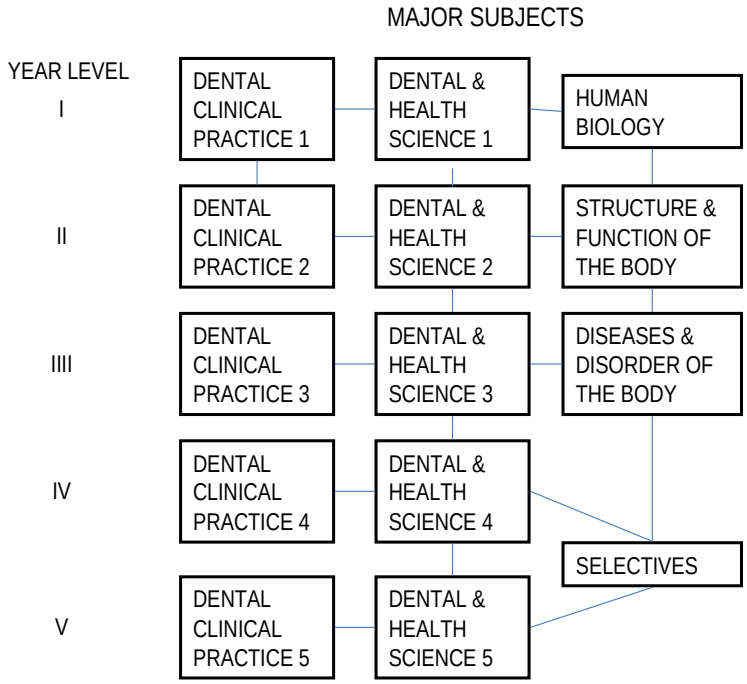

Figure 1.1 The major subjects of the Adelaide School of Dentistry hybrid curriculum and their relationship to each other (Wetherell et al. 1996)

Associated with the change in curriculum structure there was a reduction in formal contact hours, especially in the early years. In first year, it was planned that each subject should have an equal distribution of contact hours (approximately seven hours) in addition to four hours in the General Studies subject, giving a total of 25 hours approximately of contact time per week. This reduction in contact hours was to allow students to have time within the week to meet with other students, to undertake group work, and for independent study (Townsend and Burgess 1993; Mullins et al. 2003). Over the years since the introduction of the curriculum, there have been further changes in contact time within subjects but the overall time allocations are similar to those planned originally.

1.6.2.1 Adelaide dental course assessment methods

Prior to 1993, assessment methods used in the Adelaide dental course comprised conventional methods such as end-of semester written examination papers and end-of-year clinic and laboratory assessment (Smales 1977). Examinations typically were three-hour, paper-based, short answer or essay style questions that relied on the memorisation and reproduction of facts. Clinical and laboratory assessment was based on a final tutor assessment at the end of the year.

With the implementation of PBL into the Adelaide dental course in 1993, assessment tasks were altered to reflect the change in the learning approach. A broader range of assessment methods

was introduced. These methods were designed to assess achievement of the goals of PBL (Mullins et al. 2003). Assessment in each subject was linked to the objectives of the subject. Assessment tasks include written papers, essays, assignments, computer-based assessments and continuous assessment of performance in clinics or tutorials. Examinations were introduced that assess the integration of basic and clinical sciences and the development of clinical reasoning skills. The format of examinations includes scenario-based questions for Dental and Health Science (DHS) during the early years and station-based clinical examination in Dental Clinical Practice (DCP) in first year. Assessment in the clinic component of DCP includes assessment of students' management of patients, and continuous weekly student assessment of performance in the clinical session based on evaluations by tutors in relation to defined criteria (Wetherell et al. 1999). In addition, first-year students keep a reflective journal. At the end of each year the overall clinic grade for each student is combined with their respective examination results to provide the final overall result in the DCP subject (Mullins et al. 2003). Appendix Table 1.3 provides further details on the assessment components in each subject during the early years of the course. In addition, Appendix 1.1 provides details of undergraduate student assessment processes utilised in the Adelaide School of Dentistry.

1.7 Dental student experiences and academic success

Dental students are expected to develop the knowledge, skills and attitudes that will enable them to become dentists. They are required to spend a considerable amount of time gaining a sound theoretical knowledge of the scientific and biological basis of modern dental practice. Knowledge acquired must then be applied in the clinical context. Dental students usually begin practising their clinical skills by performing basic dental procedures in a preclinical laboratory setting and/or on each other in a clinical setting. Students then proceed to provide direct patient care whilst interacting with supervising tutors, who are also assessing their performance. Many of the dental procedures performed are in a confined, wet environment and are often irreversible (Fugill 2005; Divaris et al. 2008). These learning experiences can be stressful for dental students (Heath et al. 1999; Sanders and Lushington 1999).

The main measure of success in health profession/dental courses is 'quantitative' academic success. This may be described as 'academic progress' ie, being able to achieve academic requirements and proceed from one year to the next in a timely fashion, and hence, being able to complete the course on time. Alternatively it can be described as 'academic performance' ie, achieving

high or low grades at the end of the academic year or simply it can be described in terms of pass or fail rates (refer to Chapter 5, section 5.2).

Historically the academic success of dental students undertaking conventional dental courses and who have been admitted solely on academic merit has been variable. Students have often had to repeat a year, thus taking longer to complete the course, while others have not completed their course (Barnard and Siu 1966). In Adelaide, the failure and withdrawal rates in the conventional dental course prior to 1993 were also relatively high eg, only 58.1% of students who entered the course in 1983 completed first year successfully at the first attempt and only 28.6% of the 1983 intake proceeded to fifth year without failing (Cooper and Spencer 1987). Furthermore, students undertaking the course often expressed dissatisfaction (Townsend and Burgess 1993; Wetherell et al. 1996). Significantly, the proportion of dental students encountering difficulties in the early years was greater than those encountering difficulties in senior or later years (Scheetz 1987; Jacobsen 1987).

Within the literature there is some evidence that dental students who are admitted via a broad admission process rather than one based on academic scores (Röding 1997), as well as having undertaken a PBL course rather than a conventional course (Susarla et al. 2003), are more successful academically. Initial evaluation of the first intake of Adelaide dental students admitted via a multifaceted admission process showed that they performed at least as well as students admitted on academic merit alone (Mullins et al. 2003). This thesis will provide a more comprehensive picture of students' performance in the Adelaide dental course.

1.7.1 Factors relating to academic success of dental/university students

Within academia there has been a long history of seeking to determine which factors may be related to the academic success of university/health profession/dental students, with studies dating back to the early part of the 20th century. However, the majority of the medical/dental research has been atheoretical. In general, research conducted in the health profession education field has focussed on factors derived from admission data. Such factors include: characteristics of students (eg, gender); prior academic achievement (in secondary school or college/previous university studies); cognitive ability (as measured by cognitive admission tests); and personal characteristics (as measured by admission interviews). These factors are discussed in further detail in Chapter 5, section 5.2 and are referred to as 'pre-admission' factors.

The predictive utility of pre-admission factors in explaining differing levels of academic success remains unclear. Several studies have concluded that the factors most predictive of academic success in the early years or in science-based subjects of a dental course are, prior academic achievement (Kress and Dogon 1981; Lynch et al. 2006) and/or admission (cognitive) test performance (Kramer 1999; Smithers et al. 2004). However, these factors have been shown by other researchers to correlate

only weakly with academic success in clinical components of a dental course (Sandow et al. 2002; Smithers et al. 2004; Lynch et al. 2006). Admission interview scores have also been shown to be associated with dental school success (Röding 1997; Hoad-Reddick and Macfarlane 1999). Furthermore, the predictive utility of pre-admission factors in explaining differing levels of academic success may be limited as these factors do not take into account the environment undergraduates experience once admitted to university ie, the teaching-learning context (curriculum design, teaching methods and assessment) (Ramsden 1992; Biggs 1999; McInnis et al. 1995). Pre-admission factors also do not take into account students' personal experiences once admitted into a tertiary course eg, involvement in paid work, extracurricular activities, living arrangements and sources of support (Tchen et al. 2001; McKenzie and Schweitzer 2001; McInnis et al. 2000a; Beekhoven et al. 2004; Krause et al. 2005; Svanum and Bigatti 2006). Involvement in paid work and extracurricular activities, living arrangements and sources of support and their influence on academic success will be discussed in Chapter 6 (section 6.2) and Chapter 7 (section 7.2) respectively.

Other student factors of potential relevance include academic preparedness (study habits and time management) and motivation (Pargetter et al. 1998). Course factors such as course characteristics, course expectations and learning and teaching activities (Pargetter et al. 1998) have also been found to influence academic success. There is no commonly agreed nomenclature when discussing these factors collectively. They may be referred to broadly as qualitative factors (Pargetter et al. 2008) or non-academic factors (Pritchard and Wilson 2003). For the purpose of the current project, these have been termed 'post-admission factors'. There have been few studies on post-admission factors that may influence the success of dental students. This thesis aims to explore both pre- and post-admission factors identified as contributing to academic success, in some detail.

1.8 Gaps in knowledge of factors related to academic success of dental students

Educational changes in dental schools over the past decade or so, including a greater focus on student-centred approaches to learning and broadening of admissions processes, coupled with generational changes in student attitudes, have heightened the need to investigate factors influencing the success of dental students. Within the School of Dentistry, University of Adelaide, a comprehensive study that examines factors relating to academic success of students has not been undertaken for more than 25 years. Whilst there have been other Australian studies conducted during the period from the 1960s to the 1990s, these have only reported success rates and not factors relating to success. The majority of studies of this type have been performed in the US but they have generally not used a theoretical framework to inform study design. In addition, cross-sectional studies have been the norm (Scheetz 1987; Sandow et al. 2002; Curtis et al. 2007). There has been no longitudinal study, as far as this researcher is aware, that has explored factors that dental students themselves perceive to be

related to their success or difficulties during their dental studies and to track these longitudinally. In addition, multifaceted admission processes are often resource and time intensive and it is important that their effectiveness, in terms of subsequent student success, is evaluated. There have also been no published reports on performance of Australian dental students who have been selected using criteria additional to previous academic performance.

There are several important consequences of dental students being unsuccessful academically. There are the direct effects on the student including stress, financial and emotional difficulties. Concurrently there are significant ramifications on the dental school. Funding is lost when students drop out. Resources are required for counselling of students who fail. Bridging programs need to be organised and remedial programs provided for other students encountering difficulties placing further considerable strain on limited school resources. Failure of students to complete their degree also leads to fewer graduating dentists, causing workforce planning issues (Drummond and Duguid 1997). Thus, it is important to monitor the progress of dental students over time and to identify factors to maximise academic success.

1.9 Aims, research questions and conceptual framework

The main aim of this longitudinal research study was to investigate the characteristics, experiences, and academic success of students (1998-2001) in the early years of the Adelaide dental course. In addition, factors that may be associated with/or predictive of academic success were examined. In light of changes in learning and teaching practices and admission processes at the Adelaide School of Dentistry, the characteristics and performance of students of two former groups of students (1983-86 and 1993-96) were compared with the main study group.

Based on a review of the literature (relevant detailed literature reviews are presented in Chapters 3-7) and in response to changes in the Adelaide School of Dentistry curriculum and admission process, this thesis attempts to answer six research questions as outlined in Table 1.1. For each of the main research questions there are sub-questions and hypotheses. These are elaborated in Chapters 3, 4, 5, 6, and 7.

Table 1.1 Research questions

	Research Question
1	What factors are related to students choosing to become dentists?
2	What are the characteristics of students in this study and how do students perform on admission criteria?
3	What is the academic success of students in the early years?
4	What factors are associated with/or predict academic success in the early years?
5	What are the non-academic experiences of students prior to, and during, the early years and do these influence academic success?
6	What factors do students perceive to contribute to success and difficulties during the early years?

It is acknowledged that many factors are liable to influence tertiary students' academic success (a detailed literature review is provided in Chapters 5, 6 and 7), however a subset of specific factors derived from the literature, was chosen for investigation. Factors chosen were those deemed to be particularly relevant to the admission process at the Adelaide School of Dentistry. A selection of pre-admission factors and post-admission factors were hypothesised to influence dental academic progress and performance during the early years of the course. In addition, factors that students themselves perceived related to their success and difficulties were also investigated. These factors were used to construct the conceptual framework used in this research (Figure 1.2).

1.10 Potential outcomes of this research

This thesis contributes to a growing body of knowledge about factors that influence academic success of university students, including those in health profession faculties. The results should be of particular interest to dental schools, both internationally and nationally, that have adopted multifaceted admission processes and/or have changed from conventional to more student-centred dental curricula. Admission processes in dentistry/medicine/physiotherapy all involve high stakes decisions and the results from this study can help other admission committees make informed evidence-based decisions. Moreover, it is anticipated that the results of the study will help academic staff better understand their students and improve students' experiences at university. Furthermore, the identification of factors that optimise the chances of success of students in the early years of university courses should facilitate the modification, of curricula and the provision of additional support and resources for students to enhance their academic success. Finally, from the student perspective, understanding which factors influence academic success should be of value in an active learning environment.

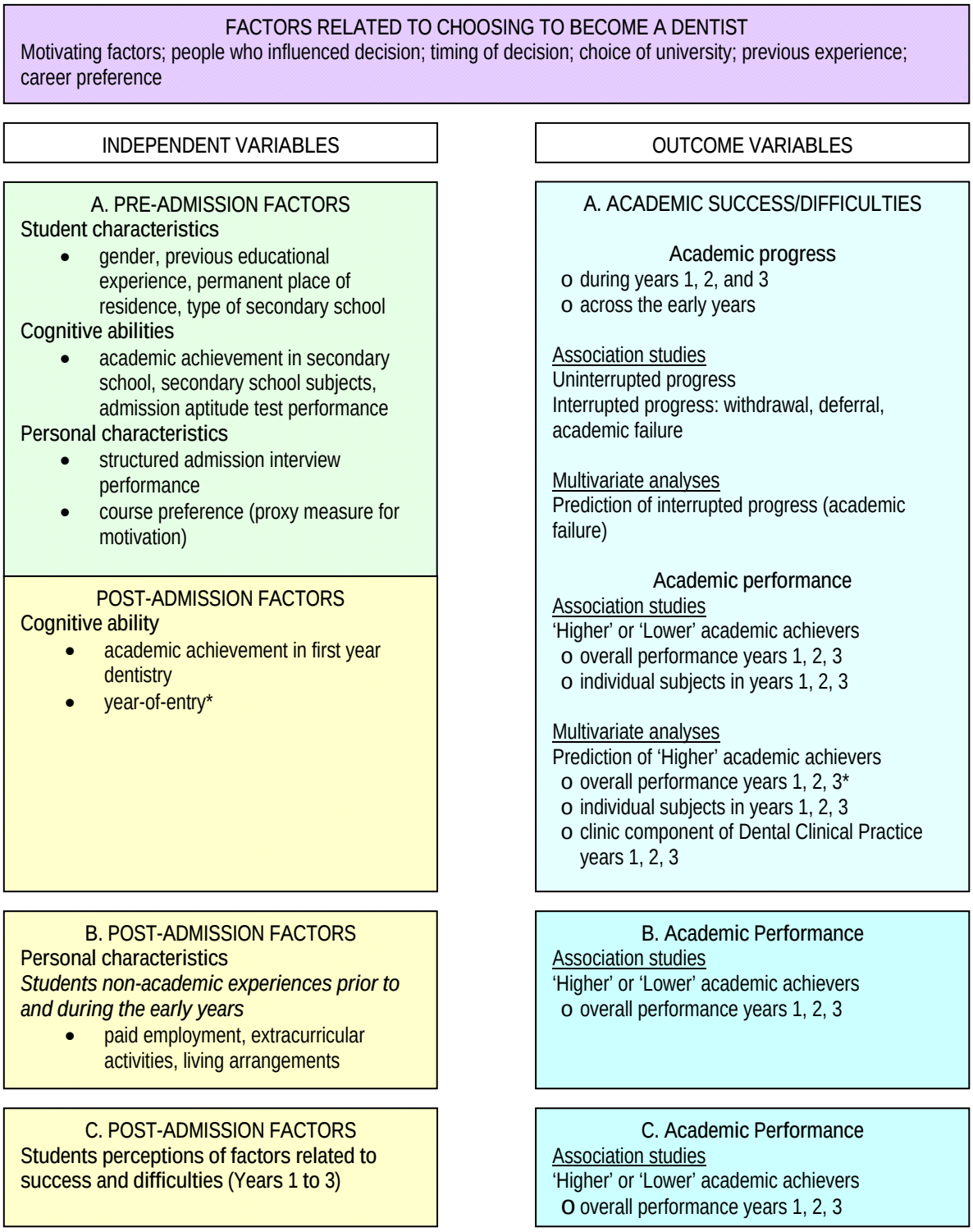

Figure 1.2 General conceptual model for the analysis of academic success of dental students

- No arrows have been included in this figure to demonstrate that prior to analysis being taken it was not known which independent variables would be associated with/or predictive of outcome measures

- * Year-of-entry (ie, 1998, 1999, 2000, 2001) was an independent variable in some multivariate analyses (ie, overall performance years 1, 2 and 3)

1.11 Format of the thesis

This thesis is presented as eight chapters. The first chapter provides an overall introduction, including a conceptual framework on which this research work was based. Rather than having the entire literature review in a single chapter, separate literature reviews related to each of the research questions will be covered in Chapters 3, 4, 5, 6 and 7. The second chapter outlines the methods used in this project. Chapters 3, 4, 5, 6 and 7 present results of this study. Specifically, Chapter 3 discusses factors related to choosing to become a dentist (Research Question 1). Chapter 4 discusses data on Adelaide dental student characteristics and their performance in the Adelaide admission process (Research Question 2). Academic success during the early years and factors that may be associated with/or predictive of academic success during the early years are discussed in Chapter 5 (Research Questions 3 and 4). Non-academic experiences of students prior to commencing and during the early years of the course are explored in Chapter 6 (Research Question 5). Students' perceptions of the factors that contributed to their success and difficulties during the early years are presented in Chapter 7 (Research Question 6). The chapters reporting results include six sections: a literature review; aims, research questions and hypotheses; methods (relevant to the part of the project discussed in the particular chapter); results; a discussion of the results; and conclusions. In the discussion sections of Chapters 3, 4, 5, 6 and 7, blue font is used to highlight whether hypotheses formulated were supported or not supported. The final chapter, Chapter 8, presents an overview of the strengths, limitations, key findings, implications for practice, suggestions for further research and general conclusions. A list of references is provided at the end of this thesis. A list of achievements during the PhD candidature, a Glossary of Terms and Chapter Appendices are presented in a separate volume. The following chapter discusses the methods used in this study.

2.1 Introduction

This chapter discusses the research design, the study groups involved and ethical considerations related to this project. There is also discussion of data coding, data collection and analytical methods.

2.2 Research design

For the purposes of this research an observational comparative study design was employed. Explicitly, available historical data from two distinct groups of dental students (Group 1 and 2) were compared and contrasted with data derived from the longitudinal, prospective observation of another group (Group 3).

Group 1 comprised four cohorts who commenced first year from 1983-86, who were admitted using a conventional admission process and who had undertaken a conventional dental course (CACC). Group 2 included four cohorts who commenced first year from 1993-96, who were also admitted using a conventional admission process but who had undertaken a hybrid PBL dental course (CAHPBL). Group 3, the principal focus of this research, comprised four cohorts who commenced first year in 1998, 1999, 2000 and 2001, who were admitted using a multifaceted admission process, and who had undertaken a hybrid PBL dental course (MAHPBL). Details of the admission processes as well as the conventional and the hybrid Adelaide dental curricula are provided in Chapter 1 (Sections 1.3.1, 1.3.2 and 1.6.1, 1.6.2 respectively).

The research was divided into five parts. Table 2.1 provides an outline of the five parts of the project and the study groups related to each part. Further details of methods used will also be provided in each chapter.

The methods chosen to address the research questions fitted within the 'analytical-empirical-positivist-quantitative' research paradigm. The analytical aspect of this paradigm reflects a "belief in a mechanistic, deterministic reality whereby parts can be separated from wholes and cause and effect relations amongst parts can be revealed" (Reeves 1996 p1). The empirical aspect refers to "the goal of inquiry being the definition, prediction and control to explain physical phenomena as revealed through experience (induction) or experimentation (deduction)". This research paradigm is positivist because it represents "a faith in the scientific process" (Reeves 1996 p1). It is also quantitative as it seeks to analyse relationships between measured variables and uses statistical methods to describe these relationships. Finally, this paradigm is also hypothesis driven (Reeves 1996 p1). The reason for choosing to situate this research project within a quantitative paradigm was that the majority of studies on medical/dental student success use this paradigm, although it is often not explicitly stated.

In an attempt to identify factors that may relate to tertiary student academic success, two main types of 'analytical-empirical-positivist-quantitative' approaches may be used (Yorke and Longden 2004). One approach is the analysis of data sets in order to identify correlates of student behaviour, whereas another approach is the testing of theoretical models (which are often quite complex). This latter approach combines results from standard inventories, other experimental measures and demographic data. This research project uses the former approach, as this has been a common approach taken in medical/dental education research and theoretical models specific to academic success had not been reported at the commencement of this project.

Table 2.1 Summary of thesis chapters, related topics of investigation and study groups

Thesis Chapter	Topic of investigation	Study group
3	Factors related to students choosing to become dentists (RQ1)	Group 3: MAHPBL
4	Characteristics of students and performance on admission criteria (RQ2)	Group 1: CACC Group 2: CAHPBL Group 3
5	Academic progress and performance during the early years (RQ3)	Groups 1, 2 and 3
	Factors associated with/or predict of academic success during the early years (RQ4)	Groups 2 and 3
6	Non-academic experiences of students prior to, and during, the early years and the influence of these experiences on academic success (RQ5)	Group 3
7	Factors perceived by students to contribute to success and difficulties during the early years (RQ6)	Group 3

RQ: relates to Research Question (numbered 1 to 6)
CACC: Conventional admission, conventional curriculum; CAHPBL: Conventional admission, hybrid PBL curriculum
MAHPBL: Multifaceted admission, hybrid PBL curriculum

2.3 Study groups

This thesis investigated experiences (prior to, and during, the early years of the Adelaide dental course) of three groups of students. Students in the early years of the course are an appropriate group to study because differences in performance are usually more marked early in the course (Jacobsen 1987; Scheetz 1987) than in the final years. Furthermore, potential differences in academic success during the early years, in particular first year, may be more directly related to admission variables (De Clercq et al. 2001) (refer to Chapters 5 and 7, sections 5.2 and 7.2). The study focussed particularly on Group 3. Groups 1 and 2 were used to compare trends found in Group 3.

2.3.1 Group 1: 'Conventional admission and conventional curriculum' (CACC)

This group included four cohorts who had commenced first year from 1983-86 (n=117) and were admitted solely on previous academic achievement and undertook a conventional curriculum. Limited historical data for these students were obtained from a report to the Adelaide School of Dentistry by Cooper and Spencer (1987).

2.3.2 Group 2: 'Conventional admission and hybrid PBL curriculum' (CAHPBL)

This group comprised four cohorts who had commenced first year from 1993-96 (n=177) and were admitted solely on previous academic achievement and undertook a new hybrid PBL curriculum. Retrospective data were collected for Group 2.

2.3.3 Group 3: 'Multifaceted admission and hybrid PBL curriculum' (MAHPBL)

The main group consisted of four cohorts who had commenced first year from 1998-2001 (n=173) and who were admitted via a multifaceted admission process and undertook a hybrid PBL curriculum. These four cohorts were labelled as Cohort A (commenced in 1998), Cohort B (commenced in 1999), Cohort C (commenced in 2000) and Cohort D (commenced in 2001). Prospective data were collected for Group 3. As this study commenced mid-way through 1999, Cohort A had already commenced first year. In spite of this it was decided to include this cohort in the study, as collection of data from four contemporary sets of dental students was deemed necessary to provide adequate sample sizes for statistical purposes and to monitor trends over the designated observational period. Some data however from Cohort A were excluded and this will be discussed further in relevant sections in this chapter.

Inclusion criterion included students who had enrolled in the first year of the Adelaide dental course for the first time. Exclusion criteria were: repeating; transfer; later-year entry; deferred-entry students; and students not admitted via the multifaceted process eg, MATE students (refer to Glossary of Terms). In addition, for Group 3, those students not admitted via the new multifaceted admission process (ie, students in Cohort A who had deferred-entry or were repeating) were excluded. Table 2.2 provides a summary of the study groups who were involved in this project and the relevant sample sizes.

Table 2.2 Study groups

	Group 1: CACC	Group 2: CAHPBL	Group 3: MAHPBL
Commenced first year	1983-86	1993-96	1998-2001
Number of students	117	177	173#
Cohort Year commencing dental studies Number of students			Cohort A 1999 (n=36) Cohort B 2000 (n=46) Cohort C 2001 (n=47) Cohort D 2002 (n=44)

CACC: Conventional admission, conventional curriculum; CAHPBL: Conventional admission, hybrid PBL curriculum
MAHPBL: Multifaceted admission, hybrid PBL curriculum
total eligible sample size was 175; 2 students did not consent to participate in the current study

2.4 Ethics approval and ethical considerations

The involvement of students from Group 3 in the research project was approved by the University of Adelaide Human Ethics Committee (H/06/99). Appendix 2.1 includes the consent form and information sheet distributed to students on recruitment to this study. Students who commenced their studies in 1999, 2000 and 2001 were recruited into the study at the commencement of first year. Those who commenced in 1998 were recruited during their first-year of dental studies. Access to confidential student records was required. All academic results that were gathered formed part of the standard assessment system. All data collected were kept in a secured location and kept strictly confidential by the candidate. Students were informed that they could withdraw from the project at any time. Students were advised that their education would not be influenced whether they participated or not. A supervisor (G Mullins) was involved in the recruitment of students, as he was not involved with the teaching or assessment of dental students. Of the 175 students (from all four cohorts) who were eligible to participate in this study, only two did not consent to participate.

2.5 Data coding

University identification numbers were requested from students in Group 3 at the commencement of the study to allow for matching of student admission records and academic results with survey data. Thereafter an assigned student code was used to label all surveys and analyses in order to retain student anonymity throughout the project. This was completed by a supervisor (G Mullins) who was not involved in teaching or assessment of dental students. Following this, all data were coded by a volunteer assistant who was also not involved in teaching or assessment of the students.

2.6 Data collection

Data collected concerned six types of factors and were either quantitative or qualitative in nature. Quantitative data, which were categorical in form, were attained for: factors that related to becoming a dentist; student characteristics; achievement on admission criteria; factors (pre-admission) that may influence academic success during the early years of the course; non-academic experiences (prior to and during the early years of the course); and factors perceived to have contributed to success and difficulties during the early years of the course. Qualitative data were obtained for students' non-academic experiences and students' perceptions of factors that contributed to success and difficulties.

Of note, data concerned with pre-admission factors were not universally available for students in Groups 1, 2 and 3. This was due to differences in the type of admission processes, curriculum, access or availability of data from university student records and the historical nature of the data (ie, for Group 1). Table 2.3 summarises the pre-admission factors that were available and investigated for each study group and for each of the sub-group of students (South Australian, other Australian and international) in Group 3. Specific details of data collection for each major factor will be discussed in the following sections.

2.6.1 Pre-admission factors

Four groups of pre-admission factors were chosen for investigation: factors related to becoming a dentist; student characteristics; cognitive ability measures; and personal characteristics. These factors were relevant to Adelaide dental students (due to the specific nature of the admission process) and have been used commonly in medical/dental education research (refer to literature review in Chapters 4 and 5, sections 4.2 and 5.2). As mentioned, there were differences in some of the factors investigated for each of the study groups depending on availability of data and/or the nature of the research questions under investigation and these will be highlighted (where relevant) in the subsequent discussion.

2.6.1.1 Factors related to becoming a dentist

Motivational factors that influenced career choice, people who influenced career choice, timing of career choice, reasons for choice of dental institution, previous experience within the field of dentistry and career preference were examined for students in Group 3 (1998-2001). Data were collected via survey (commencement survey, refer to Chapter 2, section 2.6.3.1) and admission records. Specifics about these methods are provided in Chapter 3, section 3.4.

Table 2.3 Availability of data for pre-admission factors

	Group 1 CACC	Group 2 CAHPBL	Group 3 MAHPBL	
			Australian school leavers	International students
Student characteristics				
Gender: male, female	limited	yes	yes	yes
Permanent place of residence 1: South Australian, other Australian, international	limited	yes	yes	yes
Permanent place of residence 2: Australian state of origin Victoria, New South Wales, Queensland, Tasmania, Western Australia, Australian Capital Territory, Northern Territory	no	yes	yes	NA
Permanent place of residence 3: Australian locality - metropolitan, rural	no	no	yes	NA
Permanent place of residence 4: international Malaysia, India/Other Asia, Singapore, New Zealand, Korea, Hong Kong, Canada, Europe/Africa	no	no	NA	yes
Previous educational experience: school leaver, non-school leaver	limited	yes*	yes	yes*
Type of secondary school: non-government, government	limited	no	yes	NA
Cognitive abilities				
Previous academic achievement in the final year of secondary school: TER score	no	no	yes#	NA
Subjects studied in final year secondary school: biology, chemistry, physics	no	no	yes	NA
Admission aptitude test (UMAT) overall performance ie, UMAT composite percentile band	NA	NA	yes#	no
Personal characteristics				
Structured interview performance: Overall rating & ratings for 6 individual categories	NA	NA	yes#	yes
Course preference (as indicated on admission application): Proxy 'motivation': dentistry first preference, second preference	limited	yes#	yes#	yes

CACC: Conventional admission, conventional curriculum; CAHPBL: Conventional admission, hybrid PBL curriculum
MAHPBL: Multifaceted admission, hybrid PBL curriculum

NA: not applicable/not available. International students were excluded from analyses that were specific to school leavers as they did not have data available that were equivalent to Australian school leavers eg, TER score

* = there were some missing data (from institutional records) related to previous educational experience of international students
# = there were some missing data (from institutional records)

2.6.1.2 Student characteristics

Four groups of characteristics were selected: gender; previous educational experience; permanent place of residence; and type of secondary school. There were missing data (from institutional records) relating to student characteristics (Table 2.3).

Gender of students was classified as male or female. Data were obtained from historical data (Group 1) and institutional records or self-report (Groups 2 and 3). Previous educational experience was classified into two categories: those who had completed secondary school ('school leaver') or those who had some tertiary experience ('non-school leaver'), prior to commencing dental studies.

Students enrolled in the Adelaide dental course are not all residents of South Australia. For the purpose of this research, students' permanent place of residence referred to their usual place of residence prior to enrolling in the Adelaide dental course (as stated on their admission application form). Four types of categories were used to define students' permanent place of residence. The first categorisation involved classifying students into South Australian, other Australian and international students (Groups 2 and 3). Australian students were those students who were Australian citizens or permanent residents. These students were eligible for Commonwealth Supported university Positions (CSPs). During 1998-2001 there were also a few Australian fee-paying positions held by students. International students were classified as non-Australian citizens or Australian residents who had applied as international applicants and thus been allocated full fee-paying positions in the course. For the purpose of this current study, students from New Zealand were classified as international students. Students from New Zealand are eligible for CSPs and are not required to pay fees but they were classified as international students in this current study as they had completed all of their schooling/previous tertiary education in New Zealand.

The second type of categorisation organised Australian students (Group 3) according to the state/territory of Australia which was their permanent place of residence. Australian students (Group 3) were also further classified as to whether they were residents in a metropolitan area or a rural town/centre/area. Metropolitan areas in Australia are classified as capital cities and towns with a population of 100,000 or more. Rural and regional areas are classified as towns or centres with a population of 10,000–100,000, whereas remote areas have populations less than 10,000 (National Rural Health Alliance 1999). Australia Post postal-codes were used to classify students into two categories (metropolitan and rural) (Appendix 2.2). In Australia, approximately 80% of the population live in metropolitan areas and the remaining 20% are dispersed widely across the Australian continent. Persons residing in rural areas are thought to be at some disadvantage in terms of access to education (Williams and Carpenter 1991). The final categorisation (for students in Group 3) indicated the various countries in which international students had previously resided permanently.

For Australian school leavers (Group 3), data were collected on the type of secondary school attended. In Australia there are three types of secondary schools: government; Catholic; and independent schools (Williams and Carpenter 1991). Government schools are funded by Australian federal and state/territory education departments. Catholic and independent schools are supported by fees charged to parents and by state and federal funds (Williams and Carpenter 1991). For the purpose of this study, Catholic and independent schools were pooled and labelled as 'non-government' schools and thus type of secondary school was categorised as government or non-government. This approach was consistent with Marino et al. (2006) in their contemporary study of the socio-demographic characteristics of Australian and New Zealand dental students.

2.6.1.3 Cognitive ability

Three measures of cognitive ability for Australian school leavers (Group 3) were selected: previous secondary school academic achievement; subjects studied in the final year of secondary school; and performance in the admission aptitude test (UMAT). There were missing data (from institutional records) relating to cognitive ability measures for Australian school leavers (Table 2.3).

For admissions to Australian university courses, all tertiary admission centres in each state/territory of Australia produce an overall measure of their students' secondary school academic achievement. Each Australian state/territory uses different acronyms for their indices but for simplicity, TER score will be used throughout this report. In South Australia, the TER score is used to select students for South Australian university degrees. The TER score is essentially a percentile ranking and the ranking position of students is reported in the range of 0 to 99.95 (SSABSA 2006). South Australian school leavers who applied to enter the Adelaide dental course (during 1998-2001) needed to have a minimum TER score of 90.00 to be eligible for selection.

Non-South Australian students, who commenced dental studies in Adelaide in 1998, had completed their secondary schooling in 1997. At this time in Australia, each state had different methods of summarising academic achievement in the senior years of secondary school. Non-South Australians needed to have an equivalent level of achievement to the South Australian TER score of 90.00 or above. However, the scores from non-South Australian secondary school examination boards were not converted to a South Australian TER score in 1997 (Marks et al. 2001). Thus, non-South Australian school leavers in Group 3, Cohort A did not have data available on achievement in the senior years of secondary school that could be used for statistical analyses in this study and hence they were excluded from analyses that examined relationships between cognitive ability (TER score) and academic success. From 1998, Australian secondary students applying for entry into Australian universities have had a common index that enables comparisons to be made across states/territories and across time (Marks et al. 2001). Thus TER data from Groups 3, Cohorts B, C and D were pooled. For the purpose

of this study in which logistic regression was used, previous secondary school achievement was categorised into two groups: 'very high achievement' (TER scores 95.00-99.95) and 'high achievement' (TER scores 90.00-94.99).

As international students studying at Adelaide had often completed their secondary schooling overseas, many had completed the Advanced Level General Certificate of Education (A-levels). For admission to the Adelaide dental course, A-level scores needed to be equivalent to a minimum of a 90.00 TER score. However the A-level score was not converted to a TER score. Thus international students (Group 3) did not have data available on their secondary school performance that could be used for statistical purposes in this study and hence they were excluded from analyses that examined relationships between pre-admission factors related to cognitive ability ie, previous secondary school achievement and academic success. International students have been excluded from other studies evaluating the relationship between previous school academic achievement (university admission scores) and tertiary student performance, due to their entry pathway not being identical to Australian students (Dobson and Skuja 2005).

Students who applied for entry to the Adelaide dental course after completion of part or an entire tertiary degree were selected on the basis of academic achievement in their previous tertiary degree. As such no equivalent TER score is calculated and these students were excluded from analyses that examined cognitive ability (TER score, type of secondary school subject and UMAT performance) and academic success of Australian students.

Data (from Australian school leavers: Group 3) were also collected on the number of students who studied chemistry, physics and biology in their final year of secondary school. These subjects were chosen as previous studies have shown positive associations between completion of these subjects and performance in medical/dental school (reviewed in Chapter 5, section 5.2.4.2). Furthermore, all Adelaide dental students are assumed to possess knowledge of chemistry and physics. A background in biology has also been recommended as being advantageous (Adelaide University 2001).

As aforementioned, the UMAT is an admission aptitude test that assesses general attributes and skills gained through prior experience and learning. Cognitive abilities assessed by the UMAT, during the period 1998-2001, included critical thinking and problem solving, interaction skills and non-verbal reasoning. These were assessed in three separate examination booklets. For admission to the Adelaide dental course, Australian school leavers and non-school leavers were ranked on the overall performance on the UMAT. Top performers were invited to undertake an admission interview. As such there was no 'cut-off' score for achievement on the UMAT.

Composite scores and composite percentile bands (a combined score and combined percentile rank from the three individual UMAT booklets) were collected. Students who had commenced the Adelaide dental course in 1998 Group 3 (Cohort A) did not have a comparable UMAT percentile band

ranking to students who commenced the dental course in 1999, 2000 and 2001 and thus were excluded from analyses that examined relationships between pre-admission factors (UMAT) and academic success. For the purpose of this study in which logistic regression was used, achievement on the UMAT test was categorised into two groups: 'higher' and 'lower' achievers. Thus, the composite percentile band was used rather than the composite scaled score to make comparisons between the cohorts on performance in the UMAT. The maximum possible UMAT score does differ from one year to the next (ACER 2006), hence categorising the composite scores would be difficult. In addition, several composite percentile bands were collapsed together to increase the numbers in each category for statistical purposes. The two categories created were: 'higher' achievers on the UMAT (composite percentile bands: 71-75; 76-80; 81-85; 86-90; 91-95; 96-100), and 'lower' achievers on the UMAT (composite percentile bands: 41-45; 46-50; 51-55; 56-60; 61-65; 66-70).

International students studying dentistry at the University of Adelaide at the time of this project were not required to undertake the UMAT as part of the admission process. Thus, these students (Group 3) were excluded from analyses that examined relationships between pre-admission factors (UMAT) and academic success. This approach was similar to that taken by Turnbull et al. (2003) who excluded international medical students studying at the University of Adelaide from their analyses as they had not undertaken the UMAT.

2.6.1.4 Personal characteristics

Two groups of personal characteristics were selected: performance in the structured admission interview and course preference. There were some missing data (from institutional records) relating to personal characteristics (Table 2.3).

Studies that have investigated the relationships between performance on an admission interview and academic success in university, have used the overall (or global) interview score (Powis et al. 1988; Röding 1997; Hoad-Reddick and Macfarlane 1999), individual ratings (Murden et al. 1978) or assessor comments (Powis et al. 1992; Elam et al. 1997). This current study chose to use both the overall rating and the individual ratings.

For performance on the structured admission interview, ratings (ie, 1 to 6, with rating of 1 being the highest rating) for the six individual categories and the overall ratings (ie, excellent, good, adequate, barely adequate and unsuitable) were collated for all students (Australian and International). Several categories were combined together to increase the numbers in each category for statistical purposes. For the overall interview rating, a small number of students (n=4) who had been rated as 'barely adequate' were combined with the 'adequate' category. For the individual categories, those who rated '5' or '6' (n=1 to 2) were combined with rating '4'.

When students applied for admission to the Adelaide School of Dentistry, an admission application form was completed. On this form students indicated the preferred South Australian university degree course they had selected (with a maximum of five preferences). Students' course preference as indicated on their admission application was classified into two groups: dentistry first preference and dentistry second preference. Course preference was used as a proxy variable for student motivation to become a dentist. Data on course preference for Group 1 were collected from an existing report by Cooper and Spencer (1987). Data on course preference for Groups 2 and 3 were collected from university student records.

2.6.2 Post-admission factors

Based on the literature (refer to Chapters 5, 6, and 7), three groups of post-admission factors were chosen: cognitive ability; non-academic experiences; and student perceptions of factors related to their success and difficulties during the early years.

2.6.2.1 Cognitive ability: performance in first-year dental studies

Performance in first-year university studies has been shown to be predictive of performance in later years of a course (Chapter 5, section 5.2.4.2). Academic achievement (ie, 'higher' or 'lower' achievers) in first-year dental subjects was used as an independent variable (Group 3).

2.6.2.2 Non-academic experiences prior to and during the early years

There were several types of data collected. Participation in paid employment and extracurricular activities (ECAs) prior to, and during, the early years of the course were collected for students in Group 3. Students' living situations during the early years were also collected. Data related to non-academic experiences prior to commencing the Adelaide dental course and during the early years were collected via surveys (ie, commencement survey and post-admission surveys respectively). Data related to non-academic experiences prior to commencing the dental course were collected to compare trends with non-academic experiences during the course. After initial data analysis regarding students non-academic experiences further data collection was warranted in light of recent findings in the literature. A follow-up survey (follow-up post-admission survey) was also conducted. The three surveys used in the current study are discussed in sections 2.6.3.1, 2.6.3.2 and 2.6.3.3 respectively. Specific details about these methods are also discussed in Chapter 6 (section 6.4).

Group 3, Cohort A had already completed the first year of dental studies at the commencement of this research and so data on non-academic experiences prior to commencing dental studies were not collected from this cohort. In addition, due to an administrative oversight, data on living arrangements

during the early years of the course were not available for students from Cohort A.

2.6.2.3 Student perceptions of the factors that contributed to success and difficulties

Factors that students perceived had contributed to their success and difficulties during the early years were collected from Group 3. Data were collected via a survey (post-admission survey, refer to section 2.6.3.2) and focus group discussions (refer to section 2.6.3.4). An overview of survey and focus group methods will be discussed in the following section. Specific details about these methods are also discussed in Chapter 7 (section 7.4).

2.6.3 Surveys and focus groups

To answer research questions 5 and 6 (refer to Table 1.1), qualitative methods were used. A series of surveys was used together with follow-up focus group discussions to collect data relating to the non-academic experiences of students and factors that students perceived contributed to their success and difficulties. Table 2.4 outlines the timing of data collection on students' non-academic experiences and factors students perceived contributed to their success and difficulties. In-depth interviews are an alternative method of data collection in many qualitative studies, however it was decided to use surveys and focus groups in this study for two reasons. Firstly these latter methods enable data collection from the entire sample rather than a smaller sub-set who may not have been representative of all students. Secondly, the candidate was concurrently actively involved in the clinical assessment of the students who were participants in this project. The anonymity of surveys therefore was considered important in order to ascertain open answers from the students.

All surveys were administered directly to participants during class time. A perceived advantage of this approach was that it would maximise the rate of participation (Polgar and Thomas 1995). Participation rates for surveys ranged from a low of 73.3% to 96.2% (refer to Chapters 3 and 6, sections 3.5.1, 6.5.1.2 and 6.5.1.3).

Open-ended questions were used to collect data on students' perceptions of factors related to success and difficulties (via the post-admission survey). The specific questions are discussed further in Chapter 7, section 7.4.2.1). Such questions encourage more detailed answers; free thought by the respondents; allow respondents to express themselves using their own words; and probe peoples' memories (Foddy 1993; Polgar and Thomas 1995; Wiersma 1995). They are useful for exploratory studies where the aim is to find the most salient aspects of the topic under investigation. However, the researcher needs to be mindful that open survey questions rely on past-experiences of respondents; may produce answers which may be variable in length and content between respondents; respondents cannot be probed to find out what they mean by particular responses; they also require more time

Table 2.4 Timing of data collection on students' non-academic experiences prior to and during the early years and factors students perceived contributed to their success and difficulties

Type of data collected	Method used		1999	2000	2001	2002	2003	2004
Non-academic experiences prior to commencing Adelaide dental course* -paid-employment -ECAs	'Commencement' survey		Cohort B	Cohort C	Cohort D	_	_	_
Non-academic experiences during the early years of the Adelaide dental course - paid-employment - ECAs - living arrangements**	'Post-admission' survey	Yr 1 experiences	Cohort A	Cohort B	Cohort C	Cohort D	_	_
	'Follow-up' survey on non-academic experiences		_	_	_	_	_	Cohorts C and D
Factors students perceived contributed to success and difficulties	'Post-admission' survey	Yr 1 experiences	Cohort A	Cohort B	Cohort C	Cohort D		_
		Yr 2 experiences	_	Cohort A	Cohort B	Cohort C	Cohort D	_
		Yr 3 experiences	_	_	Cohort A	Cohort B	Cohort C	Cohort D
	Focus group studies: follow-up on factors students perceived contributed to success and difficulties	Yrs 1,2 and 3 experiences	_	_	Cohorts B, C and D	_	_	_

Group 3:MAHPBL (Cohorts A to D)
MAHPBL: Multifaceted admission, hybrid PBL curriculum
*Cohort A had already commenced first year when this project commenced in 1999 and thus data on experiences prior to commencing the Adelaide dental course were not collected
** living arrangements not collected from Cohort A due to administrative oversight

consuming data analyses techniques (ie, categorisation and coding); and may be more difficult to analyse statistically (Foddy 1993; Cohen and Manion 1994; Polgar and Thomas 1995; Wiersma 1995). To overcome some of these issues, surveys were piloted. The commencement, post-admission and follow-up post admission surveys were piloted on a small group of students who were not participants in the project. Piloting serves to check for clarity and any ambiguity or confusion with survey items and is usually done with five to 10 people who are not involved as part of the main study group (Wiersma 1995). Pilot surveys (total n=20) were conducted with four small groups of students (second-; third-; fourth-; and fifth-year students) who were enrolled in the Adelaide dental course in 1999 and who were not involved in this research. Following the pilot there were some minor changes to wording on the cover sheet and some categories in the closed-ended questions were expanded. Students' pilot responses to the open-ended questions were found to be clear and informative. Furthermore, students did not seem to be reluctant to answer the question related to difficulties they experienced during the course. Focus groups were instituted to supplement information obtained from questionnaires. Focus group discussions are a method of group interview which explicitly includes and uses the group to generate data. The researcher does not ask participants to respond to a question, rather participants are encouraged to talk to another and comment on each others experiences (Pope and Mays 1999).

The final surveys,ie, commencement, post-admission, and follow-up post-admission surveys, took approximately 15, 20 and 20 minutes respectively to complete. The surveys were printed on different coloured paper to assist with distribution and collation (refer to Appendices 2.3 and 2.4). Students who were absent from class at the time of survey administration (for any of the three surveys), were issued with the survey at a subsequent date close to the original time of administration and asked to complete it in their own time (within a two week period) and then place it in a sealed box in the Adelaide School of Dentistry Administrative Office. Students who had not submitted a survey were not followed up further. The following four sub-sections will discuss further details related to each of the three surveys and focus groups discussion used in this study.

2.6.3.1 Commencement survey

Factors related to becoming a dentist and non-academic experiences prior to commencing dental studies (for Group 3) were collected via a series of closed questions specifically designed for this current study (refer to Appendix 2.3 for an example of the survey). Chapters 3 (section 3.4) and 6 (section 6.4) provide the rationale for the specific questions selected for inclusion. This survey collected data as close as possible to commencement of the first year of the Adelaide dental course to minimise the influence of other experiences students would have had once they had started dental studies. The only exception to this was for Cohort A (Group 3) who had already completed first year at the time this research had commenced. Cohort A was not asked questions that related to their non-academic

experiences prior to the dental course as the students had already commenced and completed their first year of dental studies.

2.6.3.2 Post-admission survey

Factors related to non-academic experiences during the early years of the course and factors students perceived related to their success and difficulties during the early years of the course (for Group 3) were collected via a purpose-designed survey using closed and open questions, respectively. Appendix 2.4 provides an example of the survey and Chapters 6 (section 6.4) and 7 (section 7.4) provide the rationale for the questions selected. Students from Cohort A were not asked questions that related to their living arrangements (due to an administrative oversight).

The post-admission survey collected data after students had completed the previous academic year. The survey was administered during the first few weeks of semester 1 of the subsequent year to minimise the influence of other experiences students would have once they had started the 'new' academic year. For example, students who had passed first year were asked about their non-academic experiences and factors they perceived contributed to their success and difficulties once they had commenced their second year of studies. Cohort A (commenced first year in 1998) was surveyed on their first-year experience in mid 1999, as this was the commencement point of this project. Scheduling difficulties (due to timetabling) also arose for students who had commenced fourth year and who were asked to reflect on their third year experience. This posed difficulties, such as the number of students present at the time of survey administration than for first- and second-year survey administration, thus survey responses may not reflect opinions of the entire class. There was also a larger gap between the end of the previous academic year and the time of survey administration, possibly distorting responses. Data for all cohorts were collected over a five year period from 1999-2004 (Table 2.4).

2.6.3.3 Follow-up post-admission survey

A follow-up post-admission survey collected additional data about non-academic experiences during the early years of the course (Group 3) (refer to Appendix 6.2 example of the survey and Chapter 6, section 6.4, for the rationale for the questions selected). The survey was administered in 2004 during semester 2. Students who participated in this survey were those who were in Cohort C and D during 2004. Students in Cohorts A and B had mostly graduated. Students from Cohorts B and C who had interrupted progress in the early years and were in fourth or fifth year in 2004 and were part of the study were included. Later-year entry and bridging students (see Glossary of Terms) were excluded.

2.6.3.4 Focus group discussions

Three structured focus group discussions were conducted with six to seven randomly selected students from Cohorts B, C and D to collect follow-up data relating to perceptions of the factors that contributed to success or difficulties. Focus groups were conducted during the fifth week of the first term of 2002 to collect data about experiences during first year (Cohort D), second year (Cohort C) and third year (Cohort B) in 2001. Students were given an invitation and information sheet, which clearly explained that confidentiality and anonymity of data collected would be maintained, and consent was obtained (Appendix 7.1). Those who participated received a $25 book voucher. The purposes of the focus group discussions were to seek further clarification and elaboration of the major issues identified from post-admission survey responses (after an initial analysis of the data during 2001). Specific questions used to guide focus group discussions are provided in Appendix 7.2. An independent interviewer (not involved in teaching or assessment of dental students) randomly selected students to participate and conducted the focus group discussions that were audio-taped and transcribed professionally. Students' names or any identifying information were removed from the transcripts by the interviewer prior to analysis by the candidate. Participants were provided with the opportunity to read and comment on the transcripts but none took up this offer.

2.7 Outcome measures: Student academic success and difficulties

Consistent with many studies in the medical and dental education fields, the current study used quantitative measures of academic success and difficulties (eg, course grades) rather than measures related to student learning (eg, deep or surface learning approaches). Outcome measures used in research exploring factors associated with student academic success and difficulties often take the form of existing outcome data eg, examination or clinical grades, which are generated in the normal way during the course of study. There were several advantages in using existing outcome data rather than imposed predictor tests of academic performance. End-of-year examination results or grades are:

- free of response-bias, inherent with imposed predictor tests of academic achievement (Lindsay 1998)
- considered the "lingua franca of the academic instructional world, the key to students understanding" (Svanum and Bigatti 2006 p396)
- widely regarded as sound indicators of academic success (Tickell and Smyrnios 2005)
- often used to make critical decisions about students (eg, passing or repeating)
- important in determining post-university pathways (McInnis and Hartley 2002) and employment opportunities (Svanum and Bigatti 2006)

- easily available or accessible by researchers via university administrative databases, hence decreasing the likelihood of missing data (Lindsay 1998; Tickell and Smyrnios 2005)
- generally numerical or categorical in form and appropriate for quantitative statistical analyses (Lindsay 1998)
- commonly used outcome measures in medical and dental education research (refer to Chapter 5, sections 5.2.1 and 5.2.2 and Appendix Tables 5.1 and 8.1).

Two global outcome measures were used in this project, academic progress and academic performance. Academic progress was categorised on the basis of whether a student had uninterrupted progress or interrupted progress. Interrupted progress was further categorised into academic failure, withdrawal and deferral. Students' academic performance was dichotomised into 'higher' or 'lower' academic achievement. The definition of 'higher' and 'lower' achievers used in this study is provided in sections 2.7.1 and 2.7.2. The binary categorisation of academic success and difficulties generated categorical data and facilitated the use of a logistic regression model for predicting outcomes. Use of a binary outcome measure aims to represent the two 'extremes' of academic outcomes of a dental course ie, those who succeed and those who encounter difficulties. In addition, the use of binary outcome measures of academic success and difficulties may allow for the identification of students with different difficulties and a need to be supported in different ways. For example, Burk and Bender (2005) reported that students with lower class rankings reported more severe problems compared with students with higher class rankings. Lower ranked students had higher severity ratings of substandard didactic performance, study skills, time management, transition issues and personal disappointment with performance compared with higher ranked students. Whilst not identical in the type of categorical ratings used to describe academic success of tertiary students as the current study, more recent studies have also used categorical ratings to describe academic success of dental (Curtis et al. 2007) and physiotherapy students (Utzman et al. 2007).

Academic performance was examined at various levels: overall academic achievement at the end of the year; achievement in individual subjects within each year level; and achievement in the clinical component of Dental Clinical Practice subjects in each year level. The rationale behind using more than one outcome measure of academic performance was that overall academic achievement at the end of the year represented a fairly coarse measure, combining achievement across a number of different subjects and not taking into account the differences in the assessment of individual components (McKenzie and Schweitzer 2001). Furthermore, some pre-admission factors have been shown to predict particular outcome measures eg, performance in science-based subjects rather than clinical subjects (Chapter 5, sections 5.2.4.2 and 5.2.4.3). Thus a variety of outcome measures were chosen to allow for a thorough analysis of factors that may be associated with/or predictive of academic success.

For Group 1, academic success was reported only in terms of academic progress. In particular, the number and percentage of students passing or failing were the only historical data available. For Group 2, historical results were able to be categorised into the various categories for academic progress only. For Group 3, data were categorised into the various categories representing both academic progress and academic performance.

2.7.1 Overall academic performance

As assessment procedures did not change significantly over the consecutive years, comparisons between four cohorts for Group 3 were feasible. Academic performance was based on academic performance at the end of the year (ie, average year mark [AYM]: the final mark for each of the three subjects was added and then an average mark calculated (0 to 100%) as well as level of performance in each of the three subjects. Assessment of each subject consisted of two end-of-semester examinations and performance in other assessment tasks depending on the subject eg, tests, assignments, laboratory work, clinic and preclinical laboratory performance.

Each student's overall academic performance for a given year was categorised into one of two groups. 'Higher' achievers were those who had an AYM of greater or equal to 61% and who had a mark greater or equal to 61% for each subject. 'Lower' achievers were those who had a AYM of 60% or less and 60% or less for each subject, including those who had less than 50% AYM and failed the year. Students who had withdrawn or deferred part way through the academic year could not have their academic performance categorised as they had incomplete academic results. In addition, there were some students who had exemptions ie, in Human Biology during first year (n=16) and in Structure and Function of the Body during second year (n=1), due to their previous tertiary experience. These students were included in the sample and were categorised based on performance in the two subjects in which they were enrolled, rather than the usual three subjects.

The threshold chosen as the cut-off between 'higher' and 'lower' achievers was selected as 61%. At the University of Adelaide a score of 85-100% indicates a 'high distinction level' of performance; 74-84% a 'distinction level'; 65-74% a 'credit' level; 50-64% a 'pass level' and less than 50% a 'fail'. Assessment in the Adelaide School of Dentistry is not norm-referenced. Due to the standards of assessment used, only a small proportion of students achieve high distinction or distinction levels. Adelaide dental students who are able to apply theory to practice and competently manage patients in the clinical setting tend to achieve 'credit' or 'high' pass levels (above 60%), whereas students who have had academic difficulties, tend to be those who achieve less than 60%. The cut-off point to describe different levels of student success is partially validated by findings from another Australian study which found that one characteristic of students who were at risk of withdrawing from university was that their level of academic attainment was a GPA of 60% or less (Krause 2005).

2.7.2 Academic performance in individual subjects during the early years

Similar to overall academic performance, for performance in individual subjects, each student in Group 3 was categorised as having achieved a 'higher' level of performance (greater or equal to 61%) or having achieved a 'lower' level of performance (60% or less; including students who failed). For performance in the clinic component of the Dental Clinical Practice (DCP) subjects, each student was categorised as a 'higher' achiever (greater or equal to 65%) or a 'lower' achiever (64% or less; including students who failed the clinic component). The cut-off point for 'higher' and 'lower' achievement in the clinic component of DCP 1, 2 and 3 varied from the other cut-offs because of the nature of grades achieved in this component of DCP. Most students achieved scores within a narrow range (60-64%). A description of each subject, the clinic component of DCP 1, 2 and 3 and the assessment procedures used are provided in Chapter 1. For the current study, the clinic component of DCP 3 only included the discipline of conservative dentistry (refer to Chapter 1, Appendix Table 1.3 for content and modes of assessment of subjects in Years 1 to 3).

2.8 Data analyses

Given the nature of the data (independent variables and outcome variables), quantitative statistical methods were utilised for most parts of this study. These included descriptive analyses (frequency counts), association studies (for non-parametric data) and predictor studies (multivariate analyses for non-parametric data). These will be discussed in detail in relevant chapters (Chapters 3, 4 5, 6 and 7). Content analysis was used to analyse qualitative data generated by surveys and focus group discussions. This is discussed further in the next section. Table 2.5 outlines the analytical methods used for this research.

Table 2.5 Type of data analyses used for each topic in this project

Chapter	Research Question	Analytical method		
		Descriptive analysis: frequency counts; patterns	Bivariate analysis for categorical data: chi-square tests	Multivariate analysis for categorical data: logistic regression analysis
3	Factors related to students choosing to become dentists	Group 3	Group 3	No
4	Characteristics of students and performance on admission criteria	Groups 2 and 3	Group 2 and 3	No
5	Academic progress and performance during the early years	Groups 1, 2 and 3	Groups 1, 2 and 3	No
	Factors associated with academic progress and performance during the early years	No	Groups 2 and 3	Group 3
	Factors predictive of academic progress and performance during the early years	No	Group 3	Group 3
6	Non-academic experiences of students prior to, and during, the early years and the influence of these experiences on academic success	Group 3	Group 3	No
7	Factors perceived by students to contribute to success and difficulties during the early years	Group 3	Group 3	No

Group 1: CACC: Conventional admission, conventional curriculum; Group 2: CAHPBL: Conventional admission, hybrid PBL curriculum; Group 3: MAHPBL: Multifaceted admission, hybrid PBL curriculum

2.8.1 Content analysis

Content analysis is often used to refer to "any qualitative data induction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings" (Patton 2002 p453). It involves identifying, coding, categorising, classifying and labelling primary patterns in the data. Several readings of the data may be necessary prior to commencement of coding. Use of colour coding makes it easier to track the source of the participants' quotes (Patton 2002). During content analysis, 'convergence' and 'divergence' must be taken into account. Convergence refers to determining which data fit together. The data are searched for recurring regularities which can then be sorted into categories. The researcher needs to take into account internal homogeneity ie, the extent to which data that belong together in a certain way hold together in a meaningful way, and external homogeneity ie, the extent to which differences among categories are clear.

The researcher then works back and forth to verify the meaningfulness and accuracy of the categories, and confirms the placement of data in categories (Patton 2002). Once the final category system has been devised it should be tested for completeness. The category system should:

- be integrated from within the category system, the individual categories should appear consistent.
- comprise a complete picture when viewed as a whole.
- be inclusive of the data and there should be absence of unassigned data.
- be reproducible by another competent judge. A second person should verify that the categories make sense in view of the available data and the data have been appropriately arranged in the category system.
- be credible to the participants who provided the information which the category system is presumed to assimilate (ie, member-checking) (Patton 2002).

Divergence refers to the 'fleshing out' of the patterns or categories (Patton 2002). Analysis then comes to an end once the "sources of information have been exhausted, when sets of categories have been saturated so that new sources lead to redundancy and when clear regularities have emerged that feel integrated" (Patton 2002 p466). Once the data have been thematised and coded and various frequencies counted the data can be grouped and compared (Bouma 2000).

A content analysis method (as described above) was used to analyse qualitative data in relation to non-academic experiences collected via open-ended post-admission and follow-up post-admission survey questions. It was also used to analyse student perceptions of factors related to success and difficulties collected via open-ended post-admission survey questions and focus group discussions.

For survey data, students' responses within each cohort were transcribed verbatim into electronic text documents. Each response was read carefully. Where there was more than one different

or specific concept within each sentence this was then broken down into two or three discrete concepts. Each concept was then labelled with a number to ensure it was appropriately classified and could be tracked back to individual students. The unit of analysis was at the class level ie, all individual responses within each cohort were pooled.

There were slight variations used in the method of classifying data derived from the surveys and the focus group discussions used in this study. This will be discussed in the subsequent sections. Classification of data were cross-checked between cohorts and between year levels to ensure identical responses were classified similarly. Steps were taken to minimise researcher bias by checking analyses with supervisors (Patton 2002). In addition, during these discussions, some time was spent exploring alternative explanations for the data and discussing of data that contradicted the explanation of the phenomenon under examination (Pope and Mays 1999).

2.8.1.1 Classification of student perceptions of factors contributing to success and difficulties: post-admission survey

Substantial amounts of data were generated from the administration of 12 surveys over a four-year period. Data from each of the four cohorts within each year level were pooled and subsequently analysed. Students' responses were not classified according to a pre-existing framework. It has been suggested that when analysing qualitative data the researcher should not read too much literature prior to analysis of the data to minimise "jamming data into preformed conceptual schemes" (Bogdan and Biklen 1998 p165). The data sets were searched for themes and categories ie, the categories developed were grounded in the data itself using a iterative process and devised through familiarity of the author with the data. Initially the classification began on large pieces of paper by writing down the different responses, grouping like ones together. The first framework of classification was then created and then all data for each student within a cohort were entered into electronic spreadsheets.

Classifications of responses were then cross-checked and refined using an iterative process moving between the cohorts within the same year level and between year levels. This first phase of analysis was completed at the end of 2002. Once all data were collected after 2004, the final phase of analysis was undertaken. All the data and the existing framework from 2002 were reviewed.

During the second phase of data analysis pertinent literature was read, which aided in refining the conceptual framework that described the data. Responses within the spreadsheets were colour coded for each of the cohorts within a given year level and were then cut and pasted into separate word documents (for each of the year levels) under the categories created from the initial classification. The classifications of data were then examined. The major categories remained the same. The sub-units and sub-categories were further refined, some were collapsed into larger ones, new subunits and subcategories were created and others removed. Analysis was complete once all data were saturated.

All responses fitted in one of the subunits that were created. The process of refining minor and micro-categories was undertaken four times to create the final framework which described responses. Ideally it is recommended that the final categorical system derived from qualitative data analyses should be checked with those who provided the information ie, member checking (Patton 2002). Due to timing of the majority of data analyses, participants in this study had graduated and were not available for follow-up. However, focus groups were conducted after the first phase of data analyses was completed and an initial category system had been developed. Several categories of factors related to success and difficulties were discussed with a small number (three groups of six to seven students) of students (Cohorts B and D) during the focus group discussions. Students did not make any comments about the categories that were discussed and had no difficulties in understanding the questions. In addition, the categorisation of data were discussed with supervisors on several occasions prior to the final framework being developed. Quantitative analysis was then undertaken (frequencies of responses were calculated and association studies). This is discussed further in Chapter 7, section 7.4.2.2.

2.8.1.2 Classification of student perceptions of factors contributing to success and difficulties: focus group discussions

The focus group discussions were transcribed independently. The final transcripts were sent to participants to check the content of the discussions. There were no requests by participants for any changes to be made. Participants did not indicate that any changes were required. The text within each manuscript (from each of the three focus group discussions) was colour-coded. Each manuscript was read several times so that the author could become familiar with the data. During data analysis consideration was given to identifying evidence that was common to several participants and that reflected the range and diversity of students' perceptions (Krueger 1998). More weight was given to responses that were specific and based on experience rather than vague responses (Krueger 1998).

Themes and categories were created and then refined using findings from the literature. Comparisons between data that emerged from the three focus groups were made so that categories common to each focus group were labelled similarly. The process of refining themes or categories was undertaken three times until data were saturated. The results of the analyses were then utilised to explain some findings that related to student perceptions of factors that contributed to success and difficulties.

One technique of seeking participant verification of focus group discussions is to allow participants to summarise thoughts or feelings during the sessions (Krueger 1998). The professional interviewer who conducted the focus groups asked participants for confirmation of discussions on several occasions. Due to the timing of the final data analyses and because some students had graduated (Cohorts B and C), the focus group analysis was not checked with the students themselves.

However, results of the focus group analyses were reviewed with supervisors to check consistency of coding between focus groups and to ensure that appropriate themes were identified. Any changes that were considered necessary were made and these verified with the supervisors.

2.8.1.3 Classification of non-academic experiences: follow-up post-admission survey

Data from the surveys that were administered to two cohorts (Cohorts C and D from Group 3) were pooled as there were no major thematic differences. Students' responses were classified initially into several categories. These were subsequently refined using findings from the literature. Quantitative analysis were then undertaken (frequencies of responses were calculated and association studies). This is discussed further in Chapter 6, section 6.4.2. The results of the analysis were then used to expand findings related to non-academic experiences.

2.8.2 Soundness of qualitative research methods

There are several criteria that are used for judging soundness of qualitative research methods: credibility, dependability, confirmability, transferability, attention to negative cases, objectivity, reflexivity and substantive significance. Credibility refers to establishing that the results are believable from the perspective of the participant ie, member checking (Trochim 2002). This was discussed in previous sections 2.8.1.1 and 2.8.1.2. Dependability (ie, reliability) in qualitative research (based on the assumption of repeatability) is not appropriate because if one tries to measure the same thing, twice, then one is measuring two different things (Trochim 2002). In qualitative research the researcher needs to provide details of the aims of the research, how the research was undertaken and the reasons behind key decisions, and account for any changes in the research setting as well as how any changes influenced the researchers approach to the study (Denscombe 1998; Trochim 2002). These issues have been addressed in this chapter and are also discussed in the methods sections in Chapters 6 and 7. In this PhD study there was no major change to the research setting from 1999-2004 (the period in which data were collected for the four cohorts who formed the main study group). Transferability (or comparability) refers to the degree to which the results can be generalised to other context or settings. In qualitative research this is the responsibility of the person doing the generalising. The researcher can enhance transferability by describing the research context and assumptions that were central to the research (Trochim 2002). Confirmability is the degree to which the results can be confirmed by others (Trochim 2002). The candidate has attempted to document the procedures used in data analysis (section 2.8.1) to minimise any potential bias or distortion. Attention needs to be given to negative cases (Pope and Mays 1999). This was addressed in section 2.8.1.

Personal experiences and values of a researcher might influence the research (Denscombe 1998). Hence, when using qualitative research methods some biographical details about the researcher

should be discussed to enable the reader to assess whether objectivity was maintained. In addition to discussing biographical details of the researcher who undertakes qualitative research, the issue of reflexivity also needs to be also addressed. This includes providing some about prior assumptions which may influence the research process (Pope and Mays 1999).

The candidate was an academic staff member during the time of this research. Specifically, she was a co-ordinator of one of the first-year subjects, tutored students in first and second year and was involved in assessment of students during the early years of the course. Her interest in this research topic stemmed from a personal desire to understand which factors accounted for varying success of dental students in their early years. Given her involvement with students, careful consideration was given in the design of the project and analysis of the data. The administration of all surveys, the conduct of focus groups, and the de-identification of data were carried out by independent personnel so as not to bias data collection and analysis. During the period of data collection (1999-2004), the candidate was careful not to discuss the project individually with participants unless they asked about the study and then only general feedback was provided. It was anticipated that use of open-ended questions about students' perceptions of factors related to success and difficulties would elicit a wide range of factors and that students would respond differently depending on their own experiences, motives and feelings. This would help to identify themes or key factors, which might not necessarily be applicable to each student but would be related to the collective group. It was assumed that students might tend to blame difficulties on the course and underplay self-related factors; and apportion success to their own efforts rather than course factors. However, during data analysis the candidate kept an open mind and did not seek to force data into any particular category based on prior assumptions.

In lieu of statistical significance, qualitative findings are judged by their substantive significance (Patton 2002). This includes to what extent the findings are: solid, coherent and consistent with the evidence in support of the findings; increase and deepen understanding of the phenomenon under investigation; are consistent with other knowledge; and are useful for their intended purpose (Patton 2002 p467). The following chapter discusses the factors that are related to becoming a dentist.

3.1 Introduction

There has been some research in Australia on factors that may be related to becoming a dentist. Hence, this part of the study was aimed at exploring factors that may influence the decision to become a dentist. Specifically, reasons for career choice, the type of people who influence career choice, the timing of the decision to become a dentist, choice of dental school, previous experiences within the dental field and career preference will be discussed. Furthermore, career preferences, before and after changes to the Adelaide dental admission process, were also investigated. The relationship between career preference and academic success is explored in the Results and Discussion sections of Chapter 5.

3.2 Literature review: factors related to becoming a dentist

This review will predominantly be restricted to a review of the dental literature. Being a dentist involves working in close proximity with people, requires good communication and interpersonal skills, as well as fine manual work which is performed in a confined space, and an ability to work in a team (Fugill 2005; Divaris et al. 2008). It is also a stressful occupation (Myers and Myers 2004; Rada and Johnson-Leong 2004).

The decision to become a dentist is often the sum of a wide variety of reasons and alternatives and may reflect perceptions of one's strengths and weaknesses, interests and desires (Zadik et al. 1997; Scarbecz and Ross 2002). Studies in the international dental literature have investigated this topic from the perspective of examining motivational factors influencing career choice, persons influencing the decision, timing of the decision, reasons for choice of dental institution and previous experiences within the field of dentistry. Commonly, opinions have been sought retrospectively from first-year students who have just commenced their dental studies (Morris 1992; Gietzelt 1997; Vigild and Schwarz 2001). Others have sought opinions of dental applicants (Whittaker 1984; Stewart et al. 2004) and students who have progressed through the dental course (Over et al.1984; Hallissey et al. 2000; Scarbecz and Ross 2002; Marino et al. 2006).

It has been reported that dental students and graduate dentists have expressed reservations about their decision to become dentists (Hiiemae 1977). Some (15%) Adelaide dental students in 1978 reported that they experienced regrets over their career choice in dentistry (Cannon and Makinson 1983), however, they persisted in completing their degree. In contrast, other students who have second thoughts about their career choice have considered withdrawing from their course (Coombs 1978). Dentists, once in the workforce, have had second thoughts about their careers in dentistry and felt they were not well informed (Meskin 1996), whilst 35% of Scottish general dental practitioners indicated they would not choose dentistry as a career if they had their chance again (Russell and Leggate 2002). Dental students who had not chosen dentistry as their first-choice career reported higher levels of

perceived stress compared with those who had chosen dentistry as their first-choice career (Al-Omari 2005; Sofola and Jeboda 2006). Thus, poor career choice can have negative outcomes. The subsequent sections will discuss various factors that have been investigated and reported in the literature.

3.2.1 Motivational factors that influence career choice

In the dental literature, questionnaires have been used to examine the motivational factors that influence the decision to become a dentist. Often the questions used were not derived from a specific theoretical framework, rather they were derived from the researcher's own experience or local context or a previous research study. Many factors have been revealed and these can be summarised into five categories: career; service; admission; education; and miscellaneous (Table 3.1).

In recent studies, the most commonly reported types of factors include 'career' (vocational, professional and socio-economic) and 'service' (social) factors. The factors that dominate vary between studies. Several studies have revealed that career factors are more important than service factors (Zadik et al. 1997; Crossley and Mubriak 2002). In these studies the majority of dental applicants or first-year dental students were motivated by professional status, financial rewards and security, regular working hours and being self-employed. Serving the public was rarely mentioned. In contrast, other studies have revealed that dental applicants or dental students are influenced by a combination of career and service factors. Irish dental students were primarily influenced by a positive perception of working conditions followed by altruistic motivations ('helping people' and 'improving their appearance') (Hallissey et al. 2000). Similarly, US dental students (years 1 to 4) were influenced by several vocational factors (financial and job security, greater freedom and flexible work arrangements, being self-employed and one's own boss) and social factors (wanting to work with and help people, wanting to be involved in a caring profession) (Scarbecz and Ross 2002). Likewise, UK dental applicants were motivated by a general interest in dentistry, a desire to help people and to work with their hands (Stewart et al. 2004). Variation in the reasons for choosing a career in dentistry observed in different studies may be due to the nature of the sample studied. For example, first-year dental students may have an idealistic view of dentistry as a profession, and lack insight and personal experience, whereas senior dental students may have acquired a more realistic impression of the profession via their experiences in dental school (Zadik et al. 1997; Rice et al. 1999). Motivating factors may also vary between individuals, cultures and changes in society over time (Marino et al. 2006). On balance of the literature reviewed, the decision to become a dentist seems to be influenced by both career and service factors.

Different aspects of the dental profession may be appealing to males compared with females or non-school leavers compared with school leavers. Males have been reported to be influenced by career

factors such as status, financial reward and working independently whereas females have been reported to be influenced by service factors ie, working with people (Coombs 1976; Over et al.1984;

Table 3.1 Motivating factors that may influence career choice as identified in the dental literature (1962-2006)

1. CAREER			
1.1 Vocational factors	**1.2 Socio-economic factors**	**1.3 Career opportunities**	**1.4 Personal skills**
- Interesting career/interest in work of a dentist/Job that is free from boredom and has variety/challenging and interesting career* [1,2,6,7,11,12,14,15,18,19,21,22]	- Remuneration/high income/money advantage of profession/financial rewards/financial security* [1,2,4,5,6,8,9,11,13, 14,15,16,18,19,20,21,22]	- Diverse career opportunities* [5,11,15]	- Requires manual skills/working with hands [2,3,7,8,9,11,15,16,18,19,20]
- Self-employment/be my own boss* [1,2,8,13,15, 16]	- Provides secure career/job security* [7,8,10,15,18,22]	- Flexibility of career [5,11, 15]	**1.5 Life balance**
- Regular work hours/flexible work hours* [3,7,8,9,13,14,15,16,22]	- Prestige/prestigious social standing/high professional status/ professional and personal recognition* [2,3,6,9,14,15,18,20,22]	- Good job opportunities (locally or abroad) [13,14, 19, 22]	- Compatibility with anticipated family commitments [6,8,16]
- Independent work [3,9,13,14,15,18,19,21,22]		- Availability and attractiveness of alternate careers [16]	- Attractive lifestyle [7]
- Responsible job [1,2,7,15,22]		- Opportunity to perform research work (on graduation) [15]	
- Put theory into practice [14]			
- Biological aspects [7,14,22]			
- Scientific aspects [8,9,14,15]			

2. SERVICE	3. ADMISSION	4. EDUCATIONAL	5. MISCELLANEOUS
- Opportunity to care for/help people/caring profession* [7,8,9,11,14,15,18]	- Failure to meet entrance score in medicine/failure to get into medicine [7]	- Positive perceptions of curriculum [14,17]	- Financial ability to undergo long training period [16]
- Likes working with people/ to work for and with people [1, 2, 6,7,13,15,16,19,21]	- Dentistry was second choice[12]	- Length of course [1,14,20]	- Poor teeth in own mouth [1, 2]
- Take care of teeth [20]	- Dentistry is best career because top students are accepted[10]	- Opportunity to perform research work (during study) [17]	- Family member or friend is a dentist [13]
- Teach hygiene and disease prevention [20]	- I achieved the marks required for entry into dentistry [10]		- Follow family profession [5, 22]
- Public health aspects[14]	- Better chance of entering and completing a dental course than another course [2, 21]		- Lifelong ambition [13]
- To treat/help people improve their appearance [13, 19]			
- Dentist-patient relationship [14]			

NB: * factors that were included in the current study

Kruger 1962[1]; Barnard et al. 1967[2]; Coombs 1976[3]; Wittemann and Currier 1976[4]; Coombs 1978[5]; Over et al. 1984[6]; Whittaker 1984[7]; Morris 1992[8]; Brand et al. 1996[9]; Gietzelt 1997[10]; Zadik et al. 1997[11] ; Rice et al. 1999[12]; Hallissey et al. 2000[13]; Vigild and Schwarz 2001[14]; Crossley and Mubriak 2002[15]; Scarbecz and Ross 2002[16]; Whitehead et al. 2002[17]; Stewart et al. 2004[18]; Bernabè et al. 2006[19]; Jover et al. 2006[20]; Marino et al. 2006[21]; Orenuga and da Costa 2006[22]

Bernabè et al. 2006; Marino et al. 2006). However, others have not found differences in reasons for career choice between males and females (Zadik et al. 1997; Rice et al. 1999; Hallissey et al. 2000; Vigild and Schwarz 2001; Crossley and Mubriak 2002; Scarbecz and Ross 2002). Indeed, Scarbecz and Ross (2002) found that both men and females rated vocational factors as important, perceiving that dentistry allowed them an equitable balance between work and family life. Differences in reasons for career choice between various groups of dental students eg, school leavers and students with previous tertiary experience, have not been reported.

Knowledge about what factors may motivate someone to become a dentist is useful for admission committees and perhaps for predicting students' subsequent academic success. Admission committees aim to select from a large pool of applicants those who are motivated to become dentists. The successful applicants who are admitted will hopefully then go on to graduate and serve the needs of the community. The type of admission process may send a message to prospective applicants. Conventional admission processes that rely on academic merit alone may encourage applicants who have achieved very high grades during their senior year examinations in secondary school but these types of applicants may not necessarily be motivated or have much knowledge about the dental profession. In addition, having some previous experience in the dental field can be advantageous in multifaceted admission processes. The Adelaide School of Dentistry admission process assumes highly motivated applicants would have such experiences, but admission documents do not make this explicit. Gaining an insight into the extent of experience in the dental field prior to commencing the course may also better inform admission committees. Furthermore, understanding some of the reasons why students may seek to become dentists and study at a particular dental school may help admission committees refine their processes and recruitment strategies.

3.2.2 People influencing career choice

The decision to become a dentist may be one that is self–motivated (Kruger 1962; Marino et al. 2006) or encouraged by various people, such as, family and friends (Rice et al. 1999; Stewart et al. 2004; Marino et al. 2006; Orenuga and da Costa 2006), dental professionals, school counsellors and teachers (Over et al. 1084; Rice et al. 1999; Marino et al. 2006; Orenuga and da Costa 2006). Parents have often been cited to have encouraged their children to enter the dental profession (Coombs 1976;1978; Rice et al. 1999). Discussions with a dentist (Morris 1992) and having siblings or relatives already undertaking dental studies (Stewart et al. 2004) were found to influence UK dental students' career decisions. There are also other sources of advice about choosing a career in dentistry. UK dental applicants reported university open days were useful and had a positive influence on career decisions (Morris 1992). The type of people who influence career choice of school leavers or non-school leavers has not been reported for dental students.

3.2.3 Timing of career choice

Recent investigation of when allied health students decided on their career intentions indicated this occurred at an early age (Baldwin and Agho 2003). In contrast, very few dental students, however, seem to have considered a dental career early in their lives. One study found 16% of dental students had considered becoming dentists when they were younger than 12 years of age (Morris 1992). For the majority, their decision was made either during secondary school (Kruger 1962; Over et al. 1984; Morris 1992) or during or after college education (Coombs 1976) (Table 3.2). The timing of the decision may vary depending on the entry path to dental school. In Northern America, entry to dental school occurs after the completion of an undergraduate (college) degree. Coombs (1976) reported that approximately two-thirds of US dental students considered dentistry as a career in the final two years of college or later. In Australia, the choice may vary depending on the mode of entry to the dental school ie, undergraduate or graduate-entry. School leavers who enter undergraduate dental courses may make their decision during their secondary education. Non-school leavers (who may have entered undergraduate or graduate dental courses) may also make their decision during their secondary education or during or after tertiary studies.

Gender differences have been noted in the timing of making a career decision. North American females were more likely to choose to pursue a dental career after undergraduate (college) studies compared with males (Coombs 1976). Students who had chosen dentistry as their second-preference career also left the timing of their decision later (after completion of secondary schooling during offer rounds) than those who had chosen dentistry as their first-preference career (Over et al. 1984). As the majority of these data are from studies from the 1970s and 1980s, the timing of decision of career choice in more recent cohorts of dental students requires further investigation to provide contemporary data.

Table 3.2 Timing of decision and reasons for choice of dental institution

TIMING OF DECISION
Prior to secondary school* [1,2,3]; early in secondary school* [1,2,3,4,7]; later in secondary school* [1,2,3,4,7]; after leaving secondary school* [1,2,3,4,7]
REASONS FOR CHOICE OF DENTAL INSTITUTION
Tangible factors
Tuition cost [5]; cost of living in an area [5]; location of school* [5]; financial aid availability* [5]; facilities at the school [5]; sibling attending same dental school* [6]
Intangible factors
Perceived reputation of school* [5]; personal contact [5]; individual attention given to applicant [5]; presence of collegial atmosphere [5]

NB: * factors that were included in the current study. Kruger 1962[1]; Barnard et al. 1967[2]; Coombs 1976[3]; Over et al. 1984[4]; Whitehead et al. 2002[5]; Stewart et al. 2004[6]; Marino et al. 2006[7]

3.2.4 Reasons for choice of dental institution

Choice of dental institution may relate to "tangible" (measurable) and "intangible" factors (Whitehead et al. 2002) (Table 3.2). North American dental applicants' main reason for choosing a dental institution was related to the perceived reputation of the school (intangible factor) (Whitehead et al. 2002). Information on the perceived reputation of a dental school may be gained from former alumni of the school or career and course advisors (Whitehead et al. 2002). These researchers also found that students not only chose a dental school on the basis of its reputation but on tangible factors such as the locality of the institution. The reasons for choice of dental institution of Australian dental students have not been investigated recently. Understanding reasons for choice of dental school can provide useful information for admission committees in designing recruitment strategies (Whitehead et al. 2002).

3.2.5 Previous experience within the field of dentistry

Dentistry is characterised as a stressful profession (Myers and Myers 2004; Rada and Johnson-Leong 2004) and some dental graduates go on to regret their career decision (Hiiemae 1977). Thus having some previous exposure or experience to the practice of dentistry is helpful when making a career decision. Exposure to the dental profession may occur in various forms ranging from real-life experiences such as observations and discussions with a dentist; working in a dental practice as a dental assistant, receptionist or auxillary; being a dental patient; having a family member or friend who works within the profession; attending university open days; and reading about dentistry in university course guides or career guides (Hiiemae 1977; Whittaker 1984; Morris 1992; Gietzelt 1997; Hoad-Reddick and Macfarlane 1999; Mentasti and Thibodeau 2006).

Work experience was a strong motivating factor in the career choice of UK dental students (Whittaker 1984; Morris 1992). In addition, admission committees may expect that applicants demonstrate an understanding of the dental profession and hence applicants may be advised to participate in work experience in a dental practice prior to applying to dental school (UK: Hoad-Reddick and Macfarlane 1999; USA: Mentasti and Thibodeau 2006). However, not all dental students have had previous experience with the dental profession prior to commencing dental studies. Several UK studies revealed that less than half of first-year students had spent any time in a general dental practice or had other personal knowledge of dentistry eg, family member a dentist (Hiiemae 1977; Whittaker 1984). However, in a more recent UK study, there were a greater number of dental students (66%) who had completed work experience in the field. This was most often in the form of observing a dentist at work, discussions with their own dentist or working as a dental assistant (Morris 1992). Experiences of being a dental patient and visiting the family dentist and/or an orthodontist from a young age may also inspire choice of vocation (Morris 1992).

Previous exposure to the dental profession varies between male and females. Fewer males than females were reported to have had prior experience in the dental profession (Coombs 1976; 1978). It has been suggested that females might have sought experience in the dental field to clarify doubts about entering a traditionally male occupation or that some females considered dentistry after working in the field part-time (Coombs 1976).

3.2.6 Course preference

A combination of motivational factors and people influencing career choice, timing of the decision, reasons for choice of dental institution and previous experiences within the field of dentistry can all lead to a decision to pursue a career in dentistry and thus application for entry into a dental institution. For some students pursuing a career in dentistry will be their one and only career goal. However for others it may be one of a shortlist of possible careers. There are dental students who embark on a dental career despite it not being their first choice. For example, only 58% (Hiiemae 1977) of UK students and 45% (Gietzelt 1997) and 42% (Sivaneswaran and Barnard 1992) respectively of Australian dental students had chosen dentistry as their first-preference career. For those whose first-preference career is not dentistry, medicine is commonly their first preference (UK: Morris 1992; Ireland: Hallissey et al. 2000; USA: Coombs 1976; Rice et al. 1999; and Australia: Barnard et al. 1967; Over et al. 1984; Sivaneswaran and Barnard 1992; Gietzelt 1997). These studies are consistent with previous Adelaide data eg, 55% of the 1978 entering class had indicated dentistry was their first preference and 39% had indicated medicine as their first-preference career (Cannon and Makinson 1983).

3.2.7 Course preference and admission process

The type of admission process may influence the type of applicant who is applying to a particular tertiary course. Conventional admission processes that rely solely on attaining high levels of academic achievement in secondary school may send a message to prospective applicants that doing well academically is the only prerequisite to gain entry and the only factor required to succeed as a dental student. Australian school leavers who excel academically at secondary school often apply for prestigious courses such as medicine (or dentistry), law and engineering (Dobson and Skuja 2005). However, conventional admission into medicine is highly competitive, with those most likely to gain entry needing to achieve very high TER scores (eg, TER score of 99.7 for entry into the Adelaide medical course in 1997: Turnbull et al. 2003). However, entrance requirements for dental courses that admitted students based on TER scores only, were not as high and were thus more achievable (Cannon and Makinson 1983; Sivaneswaran and Barnard 1992). Hence, it is not unexpected that many Australian school leavers (Cannon and Makinson 1983; Cooper and Spencer 1987; Sivaneswaran and Barnard 1992; Morris 1992; Gietzelt 1997) admitted via a conventional admission process had not selected

dentistry as their first preference.

Multifaceted admission processes that assess personal qualities (eg, motivation, communication skills and team work) may be more likely to attract applicants with stronger motivation to become a dentist and who have a more realistic understanding about their prospective career (Röding 1997; Hoad-Reddick and Macfarlane 1999; Pereira 1998; Mullins et al. 2003). Whilst other dental schools make work experience an explicit part of the admission process/admission interview (eg, Hoad-Reddick and Macfarlane 1999; Mentasti and Thibodeau 2006), the Adelaide School of Dentistry admission process makes this an implicit assumption. It may be postulated that because the admission process involves an interview, potential applicants who are highly motivated to study dentistry will have undertaken background research about their intended career eg, undertake work experience and had discussions with dentists, and will therefore have a better insight into the dental profession. It is unknown whether career preference is associated with better or poorer performance in other aspects of multifaceted admission processes such as cognitive admission tests (eg, UMAT) and previous academic achievement (eg, TER score).

3.2.8 Course preference and academic success

Tertiary students who are not strongly motivated or who have undertaken a course which was not their first choice are less likely to succeed. North American college students who had clear career orientation achieved higher grades and were less likely to withdraw compared with students who lacked a clear career goal (Himelstein 1992). First-year university students who were more academically successful had better knowledge of the type of occupation they wanted compared with those who were not successful (Pargetter et al. 1998). Some (20%) Australian university students considered changing courses after first year because of lack of initial information, poor course choice and failure to enter a course that was their first-choice course (McInnis et al. 2000a). Dental students who also doubted their career selection considered withdrawing (Coombs 1978).

Despite entering a dental course, not all students who have been admitted have necessarily chosen dentistry as their first-preference career choice. Whilst there was no significant difference in academic performance between those who had chosen dentistry as their first preference course choice compared with a lower preference in previous cohorts of Adelaide dental students (Cooper and Spencer 1987), there have been no recent studies since the change in curriculum (1993) or change in admission process (1997).

3.3 Aims, research questions and hypotheses

The overall aim of this part of the project was to investigate factors related to becoming a dentist among Adelaide dental students admitted by a multifaceted process (1998-2001) and

undertaking a hybrid PBL course. In addition, course preference linked with changes in admission practices was investigated by comparing preferences of one group of students with two former groups. Furthermore, relationships between course preference and performance on the multifaceted admission criteria were examined. The relationship of course preference and academic progress and performance will be dealt with in Chapter 5.

Specifically the aim of this aspect of the project was to address *Research Question (RQ) 1* ie, *What factors are related to students choosing to become dentists?* (refer to Chapter 1, section 1.9 Table 1.1). Sub-questions were also devised and related hypotheses (H) were generated from the literature review (section 3.2). The sub-questions and hypotheses are summarised as follows:

RQ 1.1 What factors influence the decision to become a dentist?

It was hypothesised that:

H 1.1 The decision to become a dentist is likely to be influenced by both career and service factors

H 1.2 Male and international students are more likely to be influenced by career factors than females and Australian students

H 1.3 Previous educational experience is not likely to be associated with factors influencing the decision to become a dentist

RQ 1.2 What people influence the decision to study dentistry?

It was hypothesised that:

H 2.1 Parents are likely to influence the decision to become a dentist

H 2.2 School leavers are more likely to be influenced by parents compared with non-school leavers

H 2.3 Gender, permanent place of residence and course preference of students are not likely to be associated with the type of people influencing the decision to become a dentist

RQ 1.3 When do students decide to pursue dentistry as a career?

It was hypothesised that:

H 3.1 Students are likely to decide about a career in dentistry during or after secondary school

H 3.2 Female students and those who choose dentistry as their second preference are more likely to decide on a dental career later in life than males and those who choose dentistry as their first-preference career

H 3.3 Previous educational experience and permanent place of residence are not likely to be associated with the timing of the decision to become a dentist

RQ 1.4 What are students' reasons for choosing to study dentistry at Adelaide?

It was hypothesised that:

H 4.1 Students are likely to study at the Adelaide School of Dentistry because of the perceived 'good' reputation of the school

H 4.2 Gender, previous educational experience, permanent place of residence and course preference are not likely to be associated with reasons for choosing to study at the Adelaide School of Dentistry

RQ 1.5 What are students' previous experiences and exposure in the field of dentistry?

It was hypothesised that:

H 5.1 Most students are likely to have undertaken some work experience in the dental field

H 5.2 Female students are more likely to have previous experience in the dental field than males

H 5.3 Students who choose dentistry as their first-preference course are more likely to have previous experience in the dental field than those who choose dentistry as a lower preference

H 5.4 Previous educational experience and permanent place of residence are not likely to be associated with students' previous experiences and exposure in the dental field

RQ 1.6 What are students' course preferences (on the admission application form)?

It was hypothesised that:

H 6.1 Most students admitted via a multifaceted admission process are likely to indicate dentistry as their first-preference course

RQ 1.7 Are there any differences in student characteristics and course preference?

It was hypothesised that:

H 7.1 Gender, previous educational experience and permanent place of residence are not likely to be associated with course preference

RQ 1.8 Are there any differences in the course preference of students undertaking a conventional or hybrid PBL course?

It was hypothesised that:

H 8.1 Course preference is not likely to be associated with a change in curriculum

RQ 1.9 Are there any differences in the course preferences of students selected via a conventional or a multifaceted admission process?

It was hypothesised that:

H 9.1 Students selected via a multifaceted admission process (1998-2001) are more likely to have indicated dentistry as their first-preference career choice compared with students admitted via a conventional admission process (1993-96 and 1983-86)

RQ 1.10 Are there any differences in performance on the Adelaide School of Dentistry admission process (UMAT, TER and admission interview) between students who choose dentistry as their first-choice career and those who choose dentistry as their second-choice career?

It was hypothesised that:

H 10.1 Course preference is not likely to be associated with performance on the UMAT and the TER

H 10.2 Students who choose dentistry as their first preference are more likely to perform better on the admission interview

3.4 Methods

Three groups made up the sample for this part of the study, Group 1: CACC (1983-86); Group 2: CAHPBL (1993-96) and Group 3: MAHPBL (1998-2001). Details about these groups were provided in Chapter 2, section 2.3. Group 3 was the main focus of this part of the study. Groups 1 and 2 were used as comparison groups for one aspect of this part of the study ie, course preference.

Data regarding course preference were collected for Groups 1, 2 and 3 (as discussed in Chapter 2, section 2.6.1.4). Data regarding factors that related to becoming a dentist (Group 3: Cohorts A to D) were collected retrospectively via a survey (commencement survey). Details about the commencement survey were described in Chapter 2 (section 2.6.3.1). Six questions explored factors that related to becoming a dentist (Appendix 2.3 'Commencement survey' questions 8 to 13). As this aspect of the study was not intended to provide an extensive investigation of Adelaide dental students' career decisions, six themes were chosen for investigation as identified from the dental education literature (refer to sections 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5 and 3.2.6). These themes included: motivational factors that influence career choice; people who may influence the decision; timing of the decision; reasons for choice of dental institution; previous experiences within the field of dentistry; and course preference. The first five themes are potentially useful in informing admission committees. The sixth theme (course preference) has been shown to relate to student academic success (refer to section 3.2.8). A brief description of each theme will follow.

Motivational factors that may influence the decision to become a dentist

- two categories of factors were chosen from the literature, career and service factors. These factors are frequently cited motives. Some additional ones were included that reflected the

local context eg, 'working in a team' (Table 3.3). Students were asked to indicate the extent of influence classified as great, some or none, to each of the statements. There was an opportunity to indicate an 'other' factor that was not included on the list.

Table 3.3 Motivational (career and service) factors influencing dental career choice selected for inclusion in the current study

CAREER FACTORS		
Vocational	Socio-economic	Career opportunities
Opportunity to be self-employed	Status	Varying career paths after graduation
Flexible working hours	Income	
Interesting and challenging work	Job security	
Working in a team		
Pleasant work environment		
The work is important		
SERVICE FACTORS		
	Desire to help people	

People who influenced the decision to study dentistry

- four sub-categories of people were chosen from the literature: self; family/friend; member of dental profession; and career adviser. Students were asked to indicate the extent of influence, classified as great, some or none, to each the statements. There was an opportunity to indicate another person who was not included on the list.

Timing of decision

- five periods of time were chosen from literature and further refined for the current study: during their primary school education; during the early and later part of secondary school education; during or after tertiary education; and after being in the workforce.

Reasons for choosing to study dentistry at the University of Adelaide

- several tangible and intangible factors were chosen from the literature (section 3.2.4) (Table 3.2) and others were included to reflect the local context eg, 'the only dental school in South Australia'. In addition, students were also asked about the people who had influenced their decision to study at the University of Adelaide. Students had to tick 'yes' or 'no' to each statement. There was an opportunity to indicate another reason that was not included on the list.

Previous experiences within the practice of dentistry

- previous employment within the practice of dentistry categories included: none; as a dental auxiliary; dental receptionist; and dental technician. The categories that were selected reflect

possible roles in which dental students could have worked. Students had to tick 'yes' or 'no' to each statement.

- previous experience/exposure to the practice of dentistry, categories included: none; work experience at a dental surgery; as a dental patient; family member is a dentist/dental student; and family member works in a dental surgery. Students had to tick 'yes' or 'no' to each statement.

Course preference

- course preference on admission form: data were collected via Adelaide School of Dentistry admission records.

Descriptive and bivariate statistical methods were used to summarise and analyse the data. Survey results were collated and frequencies of different responses calculated. Students' verbatim responses are included in italics. Chi-square tests or Fisher exact tests (applied if a Chi-square test was significant but there was one expected cell with a frequency less than 5.0) were performed to examine:

- associations between characteristics of survey respondents (gender, previous educational experience, permanent place of residence and course preference) and factors related to becoming a dentist
- associations between course preference and performance on admission criteria (Group 3).

Statistical significance was set at $p<0.05$.

3.5 Results

3.5.1 Commencement survey response rate and characteristics of respondents

The overall response rate was high (95.9%) (Appendix Table 3.1). For details of the response rate within each of the four cohorts refer to Appendix Table 3.2. Most (53%) respondents were female. Two-thirds of respondents were school leavers and 51% were South Australian. The majority (82%) of respondents had indicated dentistry as their first-preference course (on admission application) (Appendix Table 3.1). Chi-square tests indicated that there were no statistically significant associations between patterns of responses between the cohorts. In addition, there were no statistically significant associations between respondents' characteristics and factors related to becoming a dentist between the cohorts. In the following sections, data are presented for all cohorts combined. Sections 3.5.2-3.5.6 will present results on factors related to becoming a dentist from Group 3 (Cohorts A to D). Section 3.5.7 will present results on course preference (on admission application) from Groups 1, 2, and 3.

3.5.2 Factors influencing the decision to become a dentist

The majority of Adelaide dental students (79.9%) reported that the factor that had a 'great' influence on their decision to become a dentist was 'the work would be interesting and challenging'. The 'desire to help people' (66.5%), the opportunity to be self-employed (64.6%) and 'job security' (63.4%) were other factors that had a 'great' influence on students' decisions. Only 26.8% and 22.6% of students reported that 'status' and 'income' had a 'great' influence on the decision, respectively. The three students' responses to the 'other category' were classified into two subgroups: 'hands-on career' (*working with my hands and being artistic* and *work with my hands ie, not your average desk job)* and 'miscellaneous' reasons *(always wanted to do it)* (Table 3.4).

Statistically significant associations were found between various student characteristics and factors that influenced the decision to become a dentist. More students who had indicated dentistry as their first preference (88.5%) were influenced in becoming a dentist because they perceived 'the work is important' compared with students who had indicated dentistry as a lower preference (11.5%) (x^2=4.95; p=0.02) (Appendix Table 3.3). In contrast, more international students were influenced in becoming a dentist by a perception of a good 'income' level (37.9%) than South Australians (35.1%) and non-South Australians (27.0%) (x^2=6.46; p=0.04) (Appendix Table 3.4). In addition, international (34.1%) and non-South Australian students (34.1%) were more likely to be influenced by the perceived 'status' of the profession than students from South Australia (31.8%) (x^2=8.92; p=0.01) (Appendix Table 3.5).

Table 3.4 Motivating factors that influenced the decision to become a dentist

	Extent of influence					
	Great		Some		None	
	n	%	n	%	n	%
Motive						
the work would be interesting and challenging	131	79.9	31	18.9	2	1.2
desire to help people	109	66.5	53	32.3	2	1.2
opportunity to be self employed	106	64.6	44	26.8	14	8.6
job security	104	63.4	48	29.3	12	7.3
the work is important	90	54.9	62	37.8	12	7.3
the varying career paths after graduation	89	54.3	50	30.5	25	15.2
flexible working hours	78	47.5	58	35.4	28	17.1
working in a team	76	46.3	70	42.7	18	11.0
the pleasant work environment	56	34.1	79	48.2	29	17.7
status	44	26.8	87	53.1	33	20.1
income	37	22.6	108	65.8	19	11.6
hands on career#	2	1.2	0	0.0	0	0.0
miscellaneous#	1	0.6	0	0.0	0	0.0

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=164*
*n=164 applies to the total row count except for #
these are open-ended free responses (not all students responded)

3.5.3 People who influenced the decision to study dentistry

The most frequently reported person to have influenced the decision to study dentistry was one's own self ie, 'own interest' (86.6%) and 'belief that they would be suited to a dentist' (72.6%). Only 16% of students' reported that a 'parent' had influenced on their decision. Very few students reported that a 'career counsellor' (1.2%) or 'teacher at school' (0.6%) had an influence on their decision. Students' responses to the 'other category' were related to 'other people' *(supervisor, family doctor)* and other factors eg, vocational (Table 3.5).

More students who had indicated dentistry as their first preference were influenced by the 'belief that they would be suited to be a dentist' (87.9%) than students who had chosen dentistry as lower preference (12.1%) (x^2=9.08; p=0.00) (Appendix Table 3.6). Students who had indicated dentistry as their first preference were more likely to be influenced by a 'dental practitioner' (95.2%) to study dentistry than students who had chosen dentistry a lower preference (4.8%) (x^2=6.95; p=0.01) (Appendix Table 3.7). In addition, more international students (46.1%) and non-school leavers (61.5%) were influenced to by a 'parent' to study dentistry compared with South Australia students (30.8%), non-South Australian students (23.1%) and school leavers (38.5%) respectively (x^2=8.45; p=0.01 and x^2=7.40; p=0.01) (Appendix Tables 3.8 and 3.9).

Table 3.5 People and other factors that influenced the decision to study dentistry

	Extent of influence					
	Great		Some		None	
People (and other factors)	n	%	n	%	n	%
own interest	142	86.6	21	12.8	1	0.6
belief would be suited to be a dentist	119	72.6	39	23.8	6	3.6
dentist	45	27.4	63	38.4	56	34.2
parent	26	15.8	69	42.1	69	42.1
friend	22	13.4	29	17.7	113	68.9
brother/sister **	9	5.5	29	17.8	125	76.7
relative **	7	4.3	29	17.8	127	77.9
another dental employee	5	3.1	21	12.8	138	84.1
career counsellor	2	1.2	21	12.8	141	86.0
other – miscellaneous#	4	2.4	2	1.2	0	0.0
previous dental experience#	3	1.8	0	0.0	0	0.0
vocational# (future of career; desire to work with people)	2	1.2	0	0.0	0	0.0
other people#	2	1.2	0	0.0	0	0.0
teacher at school	1	0.6	17	10.4	146	89.0

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=164*
*n=164 applies to the total row count except for #
**not all students responded
these are open-ended free responses (not all students responded)

3.5.4 Timing of the decision to become a dentist

The majority of Adelaide dental students (43.9%) made the decision to become a dentist during their senior years of secondary school (Table 3.6).

Table 3.6 Timing of decision to become a dentist

Time period	n	%
During senior years of secondary school (years 11 or 12 or 13)	72	43.9
During secondary school before year 11	46	28.0
During or after tertiary education	21	12.8
During primary school	15	9.1
After being in the workforce	9	5.5
Other (both in late secondary school and after being in workforce)	1	0.7

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=164

More male students (91.4%) chose dentistry as career during primary school or the junior years of secondary school compared with female students (8.6%) (x^2=40.11; p=0.00 01) (Appendix Table 3.10). Furthermore, students who had indicated dentistry as their first-course preference (89.8%), chose dentistry as career during primary school or the junior years of secondary school compared with students who did not have dentistry as their first-course preference (10.2) x^2=10.29; p=0.01) respectively (Appendix Table 3.11). More non-school leavers (93.3%) were likely to choose a career in dentistry during or after completing tertiary studies or after being in the workforce than school leavers (6.7%) (x^2=50.19; p=0.00) (Appendix Table 3.12).

3.5.5 Reasons for choosing to study dentistry at the University of Adelaide

The most commonly reported reason for choosing to study dentistry at Adelaide was a students' 'own decision' (87.8%). The 'good reputation of the dental school' was the next most commonly reported reason (62.8%). Students responses to the 'other' category were classified into three subgroups: 'financial reason' (*not financially able to study interstate, too expensive at home* and *financially appropriate*), 'geographic location' (*SA closest to NT* and *close to home)* and 'miscellaneous' (*did not know any other option interstate existed, recognition of degree in home country, only dental course applied for* and *structure of course (PBL) appealed to my own approach to learning*) (Table 3.7).

Table 3.7 Reasons for choosing to study dentistry at the University of Adelaide

	Yes		No	
Reason	n	%	n	%
Own decision	144	87.8	20	12.2
Good reputation of the dental school	103	62.8	61	37.2
The only dental school in SA	67	40.9	97	59.1
Did not gain entry to other dental school	34	20.7	130	79.3
Advice from a dentist	34	20.7	130	79.3
Parent(s) decision	31	18.9	133	81.1
Did not gain entry to other course of choice	13	7.9	151	92.1
Brother/sister already attending	12	7.3	152	92.7
Advice from teacher	9	5.5	155	94.5
Financial reason	3	1.8	161	98.2
Location	3	1.8	161	98.2
Miscellaneous	4	2.4	160	97.6

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=164

More Australian students were unlikely to choose to study dentistry at Adelaide due to the perceived 'good reputation of the Adelaide School of Dentistry' (85.7%) and 'parental decision' (81.2%) than international students (14.3%) and (18.8%) respectively (x^2=5.09; p=0.02 and x^2=9.64; p=0.00) (Appendix Tables 3.13 and 3.14). Also more non-South Australians (58.8%) and non-school leavers (52.9%) chose to study dentistry at Adelaide as a result of 'advice from a dentist' than South Australian students (23.5%), international students (17.7%) and school leavers (47.1%) respectively (x^2=25.37; p=0.00 and x^2=4.18; p=0.04) (Appendix Tables 3.15 and 3.16). Significantly more South Australians (92.5%) and school leavers (80.6%) were likely to choose to study dentistry at Adelaide as a result of it being the 'only dental school in South Australia' than students from other Australian states (6.0%), international students (1.5%) and non-school leavers (19.4%) respectively (x^2=80.07; p=0.00 and x^2=15.02; p=0.00) (Appendix Tables 3.17 and 3.18). In contrast, significantly more students from other Australian states (58.8%) and non-school leavers (55.9%) chose to study dentistry at Adelaide as a result of 'not entering their dental school of choice' than South Australian students (5.9%) and international students (35.3%) and school leavers (44.1%) respectively (x^2=37.82; p=0.00 and x^2=5.96; p=0.00) (Appendix Tables 3.19 and 3.20). Male students (76.9%) were more likely to choose to study dentistry at Adelaide as a result of 'not entering their course of choice' than female students (23.1%) (x^2=5.09; p=0.02) (Appendix Table 3.21). Finally, students who had not indicated dentistry as their first preference (53.8%) were more likely to choose to study dentistry at Adelaide as a result of 'not entering their course of choice' than students who had indicated dentistry as their first preference (46.2%) (Fisher exact test p=0.002) (Appendix Table 3.22).

3.5.6 Previous experiences within the practice of dentistry

3.5.6.1 Previous employment within the practice of dentistry

The majority of Adelaide dental students (90.2%) had not been employed previously within the dental field. Those with prior experience had worked as a dental assistant, receptionist, or dental technician (Table 3.8). There were no statistically significant associations between student characteristics and patterns of previous employment within the practice of dentistry.

Table 3.8 Employment in the field of dentistry prior to commencing dental studies

	Yes		No	
Types of employment*	n	%	n	%
None	148	90.2	16	9.8
Dental assistant	9	5.5	155	94.5
Receptionist in a dental surgery	6	3.7	158	96.3
Dental technician	3	1.8	161	98.2
Dental hygienist	0	0	164	100
Dental therapist	0	0	164	100

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=164
*students could indicate more than one response

3.5.6.2 Previous exposure to the practice of dentistry

Most Adelaide dental students had previous exposure to the practice of dentistry. Often this exposure was in the form of being a dental patient (70.1%) or work experience (43.3%). Some students (11.6%) had no previous exposure to the practice of dentistry prior to commencing their dental studies and 29.9% had no previous experience as a dental patient (Table 3.9). As students were able to indicate if they had more than one type of previous exposure to the practice of dentistry, responses of all types of exposures were collated. The majority of students (n=77; 53.1%) had more than one type of previous exposure to the practice of dentistry (Appendix Table 3.23).

Table 3.9 Students' exposure to the practice of dentistry prior to commencing dental studies

	Yes		No	
Types of exposure*	n	%	n	%
As a dental patient	115	70.1	49	29.9
Work experience at a dental surgery	71	43.3	93	56.7
Family member is a dentist or dental student	49	29.9	115	70.1
Family member works in a dental surgery	24	14.6	140	85.4
None	19	11.6	145	88.4

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=164
*students could indicate more than one response

Australian (79.3%) students were more likely to have had previous exposure to the practice of dentistry compared with international students (20.7%) (Fisher exact test p=0.02) (Appendix Table 3.24). Specifically, significantly more Australian students (85.9%) had previous exposure to the practice of dentistry via work experience than international students (14.1%) (x^2=6.49; p=0.01) (Appendix Table 3.25). In addition, more Australian students (80.9%) were likely to have had previous exposure to dentistry via being a dental patient than international students (19.1%) (x^2=4.59; p=0.03) (Appendix Table 3.26). In contrast, more international students (53.1%) had previous exposure to dentistry through a family member being a dentist or dental student compared with Australian students (46.9%) (x^2=6.92; p=0.01) (Appendix Table 3.27). Finally, significantly more school leavers (71.8%) had previous exposure to the practice of dentistry via work experience than non-school leavers (28.2%) (x^2=4.94; p=0.03) (Appendix Table 3.28).

3.5.7 Course preference

3.5.7.1 Group 1 (CACC)

The majority of students had indicated that dentistry was not their first-course preference (56.9%) (Table 3.10). Twenty-one percent had dentistry as their second preference, 25.6% their third and 9.4% their fourth preference (Cooper and Spencer 1987).

3.5.7.2 Group 2 (CAHPBL)

A slight majority had indicated dentistry as their first-course preference (50.7%) (Table 3.10). No students had indicated dentistry as their third or fourth preference. In addition, students who had indicated dentistry as their second-course preference were more likely to be school leavers (93.8%) than non-school leavers (6.2%) (x^2=26.32; p=0.00) (Appendix Table 3.29).

3.5.7.3 Group 3 (MAHPBL)

Most students had indicated dentistry as their first-preference course (82.7%) (Table 3.10). For details of course preferences within each of the four cohorts refer to Appendix Table 3.30. There were missing data for five students and thus course preference could not be determined. While more females (21.6%) had indicated dentistry as their second preference than males (12.5%), this difference was not statistically significant. In addition, school leavers were more likely to have indicated dentistry as their second preference (86.2%) than non-school leavers (13.8%) (x^2=7.68; p=0.01) (Appendix Table 3.31). All students (n=29) who had indicated dentistry as their second-preference choice had selected medicine as their first-preference choice.

Table 3.10 Course preference of first-year dental students

	Group 1: CACC Cohorts commencing 1983-86		Group 2: CAHPBL Cohorts commencing 1993-96		Group 3: MAHPBL Cohorts commencing 1998-2001	
Course preference	n	%	n	%	n	%
Dentistry first preference	50	43.1	68	50.7	139	82.7
Dentistry other preference	66	56.9	66	49.3	29	17.3
Missing data	1		43		5	

Group 1 (CACC): n=117; Group 2 (CAHPBL): n=177 and Group 3 (MAHPBL): n=173
Group 1 results from Cooper and Spencer (1987)
CACC: Conventional admission, conventional curriculum; CAHPBL: Conventional admission, hybrid PBL curriculum
MAHPBL: Multifaceted admission, hybrid PBL curriculum

3.5.7.4 Comparison between Groups 1, 2, and 3

A comparison of students' course preference was made between the study groups. More students (Group 3) indicated dentistry as their first-preference course (54.1%) than students in Group 1 (19.5%) (x^2=48.42; p=0.00) and in Group 2 (26.4%) (x^2=35.38; p=0.00) (Appendix Tables 3.32 and 3.33).

3.5.8 Course preference and performance on admission criteria (Group 3)

There were differences between course preference and admission interview performance. More students who had indicated dentistry as their first-preference course (95.0%) scored highly (rating 1) on the 'motivation to become a dentist' category than students who indicated dentistry as a lower preference (5.0%) (x^2=8.32; p=0.02) (Appendix Table 3.34). Furthermore, more students who had indicated dentistry as their first-preference course (95.2%) scored highly (rating 1) on the 'perseverance' category than students who indicated dentistry as a lower preference (4.8%) (x^2=7.03; p=0.03) (Appendix Table 3.35). There were no statistically significant differences between course preference and the TER; and the UMAT performance (Appendix Tables 3.36 and 3.37).

3.5.9 Summary of results

For Adelaide dental students admitted via a multifaceted admission process and who undertook a hybrid PBL course:

- The decision to become a dentist was influenced by professional, social and vocational factors and mostly made by the student [RQ1.1 and RQ1.2].
- Most students made the decision to study dentistry in the later stages of their secondary schooling [RQ1.3].

- The decision to study dentistry at Adelaide was made by the student or based on the perceived good reputation of the dental school [RQ1.4].
- Most students had some previous experience of the dental profession, mostly in the form of being a dental patient, with only 43.3% having previous work experience in the dental field [RQ1.5].
- The majority of Adelaide dental students had indicated dentistry as their first-choice career [RQ1.6].

Factors related to becoming a dentist varied between: male and female students; school and non-school leavers; South Australians, other Australians and international students; and those who had chosen dentistry as their first-preference or second-preference course [RQ1.7].

Following implementation of the new PBL style curriculum (1993-96) there was no difference in students' course preferences compared with students who had undertaken the previous conventional curriculum (1993-96) [RQ1.8]. This is in contrast to the increase in the proportion of students indicating dentistry as their first-preference course since the implementation of a multifaceted admission process (1998-2001) compared with those selected via the previous conventional admission process (1983-86 and 1993-96) [RQ1.9].

More students who had chosen dentistry as their first-preference course scored highly (rating 1) on the 'motivation to become a dentist' and 'perseverance' categories in the structured interview compared with those who had chosen dentistry as their second preference [RQ1.10] (Table 3.11).

Table 3.11 Summary of significant factors that influenced the decision to become a dental student

Factor		Student characteristic
Motive influencing decision to become a dentist		
	Income and status	International students
	Status	Other Australian students
	Work is important	First-preference dentistry
People who influenced the decision to study dentistry		
	Advice from dentist	Other Australian students
	Parent	International students; non-school leavers
	Self motivated	First-preference dentistry
	Dentist	First-preference dentistry
Timing of decision		
	Primary school	Male students; first-preference dentistry
	After tertiary studies/entering the workforce	Non-school leavers
Reasons for choosing to study dentistry at the University of Adelaide		
	Good reputation of school	International students
	Advice from dentist	Other Australian students; non-school leavers
	Only dental school in South Australia	South Australian students; school leavers
	Did not get dental school of choice	Other Australian students; non-school leavers
	Parent	International students
	Did not achieve entry to course of choice	Male students; second-preference dentistry
Previous experience/exposure to the practice of dentistry		
	Work experience	Australian students
	Dental patient	Australian students
	Family member is a dentist/sibling dental student	International students
Course preference	Second-course preference	School leavers

Group 3 (MAHPBL) (Cohorts A to D: 1998-2001)
MAHPBL: Multifaceted admission, hybrid PBL curriculum

3.6 Discussion

3.6.1 Motivational factors influencing the decision to become a dentist

Vocational and service factors were perceived to have influenced Adelaide dental students' decisions to become a dentist. In general, socio-economic factors were not major influencing factors.

The current results are in contrast to several other studies (Israel: Zadik et al. 1997; USA: Scarbecz and Ross 2002; UK: Crossley and Mubriak 2002) in which dental students were predominantly motivated by the personal gains of a dental career compared with the benefits to society or vocational features of the profession. However, the current findings are consistent with several studies of Australian dental students. The top three factors given by Queensland dental students were, 'interest in dentistry', the 'desire to be my own boss' and the 'desire to work for and with people' (Kruger 1962). It is surprising that the current study's findings are similar to a previous study conducted over 40 years ago and at a time when dental students were a homogeneous group ie, Australian, male school leavers who often chose dentistry as a second preference to medicine, were admitted based on academic merit and who undertook a four-year conventional dental curriculum. In a more recent study of Australian and New Zealand dental students (first to final year students, which included Adelaide students post 2001), the most commonly reported motivating factors included service ('desire to help') and vocational factors ('desire to work independently' and being 'interested in the work of the profession') (Marino et al. 2006). The hypothesis [1.1] that Adelaide dental students are more likely to be influenced by both career and service factors than other factors can be supported.

There are mixed reports regarding the presence (Bernabè et al. 2006; Marino et al. 2006; Orenuga and da Costa 2006; Gallagher et al. 2007) or absence (Hallisey et al. 2000; Vigild and Schwarz 2001; Crossley and Mubriak 2002; Scarbecz and Ross 2002) of differences between males and females in their motives for choosing dentistry as a career. The current study found no differences between males and females in their motives for choosing a dental career. Thus the hypothesis [1.2] that male Adelaide dental students are more likely to be motivated by career factors than female students cannot be supported. This result, however, contrasts with a recent study of similar size to the present investigation (Gallagher et al. 2007) which reported that UK male dental students were more likely to be motivated by career factors (ie, able to run own business) compared with female students.

The current study indicates differences between Australian and international students in their motives for becoming a dentist. International students were more likely to be influenced by income and status than Australian students. It is possible that local students may be more motivated by other aspects of the dental profession rather than personal gains. The majority of international students studying at Adelaide come from Asian backgrounds and reasons for career choice may be influenced by cultural factors. Consistent with the findings of this study, Marino et al. (2006) reported that Australian dental students of Asian backgrounds were least influenced by 'the desire to work with people' than those of Caucasian background. Hence, the hypothesis [1.2] that international students admitted to the Adelaide dental course are more likely to be influenced by career factors than service factors can be supported.

In addition, there were no differences between previous educational experience and factors influencing the decision to become a dentist, thus the hypothesis [1.3] that no differences are likely to be found can be supported.

Furthermore, the current study found there were differences in the type of motivational factors influencing the decision to become a dentist based on students' course preferences. Adelaide students who had dentistry as their first preference were more likely to be influenced by the importance of their future work compared with those who had indicated dentistry as their second choice. This may indicate that those who are strongly motivated to become dentists place more value on the work of a dentist compared with those who are not as highly motivated.

3.6.2 People who influenced the decision to study dentistry

The majority of Adelaide dental students reported that their decision to study dentistry was self-motivated (their own interest and belief that they would be suited to be a dentist). This is consistent with the findings of James et al. (1999) who reported that intrinsic interest in an area of knowledge and applicants' assessment of their own talents and abilities were two of the most important influences in the choice of field of Australian university students. In addition this result is also consistent with results reported by Kruger (1962) and Marino et al. (2006) of Australian and Australian and New Zealand dental students, respectively. From this, it seems that Australian students are fairly independent in making decisions about their future careers. Hence, the hypothesis [2.1] that parents are more likely to influence students' decision to become a dentist than other people cannot be supported.

Surprisingly, the current study found that more non-school leavers were influenced by their parents than school leavers. It was also found that the decision by non-school leavers to become dentists was more likely to be made after completing tertiary studies or being in the workforce. It is thus possible that the parents of non-school leaver dental students may be motivating their children to persist in accomplishing entry into dentistry. The hypothesis [2.2] that parents are more likely to influence school leavers' decision to become a dentist than non-school leavers cannot be supported.

Australian university applicants (in particular school leavers) were not overly influenced by parents in their career choice (James et al. 1999). This result is mimicked in the current study. In addition, this finding is consistent with other studies of Peruvian (Bernabè et al. 2006), Australian and New Zealand (Marino et al. 2006) and UK (Gallagher et al. 2007) dental students who reported that parents did not greatly influence their career decision. Cultural reasons may partly account for why parents are more influential in career decisions of different groups of dental students. For example, parents, in particular the mother, were more influential among dental students of Asian backgrounds (Marino et al. 2006). A recent comparative study (Karibe et al. 2009) also reported cultural differences in career choice between Japanese and Swedish dental students. Japanese students were more likely to

have chosen dentistry as a career because a relative was a dentist or they had to take over their parents dental practice compared with Swedish dental students. The current study provides further evidence to support the view that cultural factors may influence career decisions. More international students (who were mostly of Asian background, refer to Chapter 4, Appendix Table 4.4) studying at Adelaide indicated that they were greatly influenced by parents in the decision to become dentists than Australian dental students. Thus the hypothesis [2.3] that parents are not likely to influence the decision to become a dentist held true for Australian students studying at Adelaide but not for international students.

Approximately 30% of Adelaide dental students were influenced by a dentist in their career decision. Significantly more Adelaide students who had indicated dentistry as their first-course preference were greatly influenced by a dental practitioner and 'by the belief that they would be suited to the profession'. This may be explained by those who had selected dentistry as their first-career preference having a better understanding of what is involved in working as a dentist. This suggestion is verified by findings in the current study. Students who had selected dentistry as their first-choice course scored better on the category relating to 'motivation to become a dentist' in the admission interview (section 3.5.8). Healthcare practitioners may serve as role models or provide encouragement in pursuing health care careers (Baldwin and Agho 2003). The hypothesis [2.3] that there are unlikely to be differences in the people who influenced the decision to become a dentist between those with dentistry as a first- or second-preference course cannot be supported. Furthermore, the hypothesis [2.3] that there are unlikely to be differences between male and female Adelaide dental students and the type of people who may have influenced the decision to become a dentist can be supported.

It is clear that the role of teacher and career counsellor has limited influence on Adelaide dental students' decisions to study dentistry. This is also consistent with decisions made by other university (James et al. 1999) and dental students (Rice et al. 1999; Marino et al. 2006). In addition, very few allied health students (except for dental hygiene and physical therapists) reported that high school counsellors were a source of initial information about allied health courses (Baldwin and Agho 2003). It is noteworthy that UK dental applicants reported that they frequently contacted a careers teacher or co-ordinator or form teacher, but they perceived these sources as unhelpful (Morris 1992). This may be due to a lack of knowledge by teachers and counsellors about dentistry as a career.

3.6.3 Timing of the decision to become a dentist

As expected, only a few Adelaide dental students aspired to become a dentist from a young age, rather they decided later during senior years of secondary schooling. This result is consistent with Over et al. (1984) who reported that the majority of students in one Australian dental school made their career choice near the end of their secondary schooling. However, this is in contrast to a more recent

Australian and New Zealand study by Marino et al. (2006) who reported that the most common time for choosing dentistry as career was after leaving secondary school, followed by late in secondary school. This difference to the current study may be due to this previous study involving of a mix of entry modes to dental school ie, undergraduate and graduate-entry. The result from the current study is in general agreement with Australian university students. Many applicants to Australian universities do not start making decisions about the field of study until a few years prior to applying to university (James et al. 1999). Thus, the hypothesis [3.1] that Adelaide dental students are more likely to decide on a career in dentistry during or after secondary school is supported.

The current study found that males were more likely to have considered dentistry as a career from an early age compared with females hence hypothesis [3.2] can be supported. This is consistent with Wigfield et al. (2002) who reported that younger girls were more likely to believe that certain careers should only be for males compared with older girls.

In addition, more students who indicated dentistry as their first preference were likely to have considered dentistry as a career from an early age compared with students who had indicated dentistry as their second preference. Presumably some of those who indicated dentistry as their first choice career would have been exposed at an early age either through personal experience at a dentist eg, management of childhood trauma of teeth or orthodontic treatment or through a parent/family member being a dentist. Hence, the hypothesis [3.2] that those who chose dentistry as their first-choice career are more likely to decide early on a career in dentistry is supported.

Furthermore, more non-school leavers chose dentistry as a career during or after completing tertiary studies/or after being in the workforce. These students may have missed out on previous admission to dentistry and were still keen to pursue a career in dentistry. There does not appear to be any published literature about these issues for dental students. In light of these results, the hypothesis [3.3] that there is unlikely to be a difference between school leavers and non-school leavers in relation to the timing of career choice cannot be supported. In addition, the hypothesis [3.3] that there is unlikely to be no difference between local and non-local students in relation to the timing of career choice can be supported.

3.6.4 Reasons for choosing to study dentistry at the University of Adelaide

The two most commonly reported reasons for choosing to study dentistry at Adelaide were self-selection and the perceived good reputation of the school. This finding is partly supported by Whitehead et al. (2002) who also found that the main reason why US dental applicants (1994-95) chose a dental school was based on the perceived reputation of the school which contrasted with applicants during the period 2000-01 who cited the location of the dental school was an important factor in their choice of dental school. Significantly more international students (and non-school leavers) reported that the

perceived reputation of the Adelaide School of Dentistry and also their parents affected their choice of dental school compared with Australian students (and school leavers). As mentioned previously (section 3.6.2), international students were influenced by parents in deciding to study dentistry and thus it would follow that parents would also play an influential role in choice of dental school. Parental influence was one strong factor amongst Australian international students choosing a destination country (ie, Australia) to pursue tertiary studies (Mazzarol and Soutar 2002). Thus, it might follow that parents of international students might also be influential in the selection of an Australian dental school. Gaining an insight into what is perceived to be a 'good' dental school, by potential international students, would be helpful for admission committees. Alumni, word-of-mouth referral (Mazzarol and Soutar 2002) and recommendation from friends or relatives (Michael et al. 2004) have been reported to be important factors. Other factors may include the cost of the course (Michael et al. 2004), the institution's reputation for quality (Mazzarol and Soutar 2002), and the type of curriculum eg, early clinic experience.

Students' permanent home address was associated with the reason for studying dentistry at the University of Adelaide. As expected, South Australian students (and school leavers) were more likely to choose to study dentistry at The University of Adelaide compared with students from interstate, international students and non-school leavers. This result is consistent with the finding that most school leavers were South Australians (Chapter 4, Appendix Table 4.3). Furthermore, there is only one dental school in South Australia and as such only one option for these students. Other Australian (and non-school leavers) were more likely to have reported that the reason for choosing to study dentistry at Adelaide was because they 'did not enter school of choice' than South Australian and international students (and school leavers). These students possibly missed out on entry into dentistry in their home states but had also applied to Adelaide, as they may have had a strong desire to pursue a dental career. Indeed, it has been reported that 55% of Australian university applicants who missed out on entry to their first choice field of study at one university, would consider doing the same course at a different university (James et al. 1999).

Advice from a dentist influenced some students' decisions to study dentistry at Adelaide. In particular, other Australian and non-school leavers were more likely to have chosen the Adelaide School of Dentistry based on advice from a dentist than South Australian and international students, and school leavers. In considering which other dental schools to apply to, students may have sought advice from dentists who were either Adelaide graduates or had employed Adelaide graduates and were informed about the Adelaide dental course.

As expected, students who had indicated dentistry as their second-preference course were more likely to have reported that they chose to study dentistry at Adelaide because they did not gain entry to their course of choice than students who had indicated dentistry as their first-choice course.

Males were also more likely to have reported that they chose to study dentistry at Adelaide because they did not successfully gain entry to their course of choice than females.

In light of findings from the current study, further exploration of what factors influence the perceived reputation of the Adelaide dental course and health profession courses in general may be useful for admission committees. Such factors may include the reputation of a course amongst employers of graduates; employment rates after graduation; perceived course satisfaction of graduates; and approaches to learning and teaching adopted by a course eg, PBL approaches and early clinical experience.

The hypothesis [4.1] that students are more likely to choose to study dentistry at Adelaide because of its perceived good reputation is supported. There were differences between male and female students; school leavers and non-school leavers; South Australians and other Australians and international students; first preference for dentistry and second preference for dentistry; and reasons for choosing to study dentistry at Adelaide, thus the hypotheses [4.2] that there are unlikely to be differences cannot be supported.

3.6.5 Previous experiences within the practice of dentistry

The majority of Adelaide dental students had not been previously employed in the field of dentistry. This is consistent with Rice et al. (1999) who found that only 3% of US dental students were employed in an occupation related to dentistry prior to admission. These results are to be expected since most dental students proceed to dental studies immediately after completing secondary school or tertiary studies (Rice et al. 1999; Marino et al. 2006). However, most Adelaide dental students indicated that they had some previous exposure to the practice of dentistry. Often this exposure took the form of being a dental patient (70.1%) which was similar to a previous report (Morris 1992). Forty-three percent indicated they had undertaken work experience at a dental surgery. This is less than reported in previous studies (50% of dental applicants: Hoad-Reddick and Macfarlane 1999; 63% of dental students; Morris 1992). The benefits of work experience or working in the dental field have been suggested to include gaining accurate perceptions of dentistry as a career and eliminating any uncertainties (Coombs 1978; Mentasti and Thibodeau 2006). The hypothesis [5.1] that most students are likely to have undertaken some work experience in the dental field cannot be supported.

The current study found that significantly more Australian students had some previous exposure to the practice of dentistry than international students. Australian students may be more likely to have visited a dentist due to the relative ease of access to dental services compared with international students who were often from South-East Asian countries where access to dental care may not be so widely available. Previous exposure to the practice of dentistry was in the form of being a dental patient and to a lesser extent, work experience. In addition, it was also found that significantly more school

leavers had undertaken work experience in a dental practice than non-school leavers. These results may be due to the encouragement by secondary school teachers and opportunities available to Australian students in seeking work experience (Fullarton 1999) compared with international students. In contrast, significantly more international students had exposure to the practice of dentistry via a family member who was a dentist or dental student. This result may explain previous findings from the current study. In particular, it may explain the finding in section 3.6.2, that significantly more international students were likely to be influenced by parents to pursue a career in dentistry. It has been suggested that family influence plays a role in health profession students undertaking health profession careers. Students enrolled in health profession courses often have parents who are themselves professionals eg, dentists or medical practitioners (Sivaneswaran and Barnard 1992; Hennequin et al. 2002; Orenuga and da Costa 2006). Furthermore, the current finding may explain why international students studying at Adelaide did not frequently have work experience in the field of dentistry. UK dental students of Asian background were also found to be influenced by siblings or relatives already in dental school (Stewart et al. 2004). The hypothesis [5.2] that females are more likely to have previous experience in the dental field than males cannot be supported. There were no differences between students who had indicated dentistry as their first preference and dentistry as a lower preference in relation to previous experience in the dental field, thus the hypothesis [5.3] that those choosing dentistry as their first-choice course are more likely to have had previous experience in the dental field cannot be supported. In addition, the hypothesis [5.4] that there are unlikely to be differences between Australian and international students; school leavers and non-school leavers in relation to previous experience in the dental field cannot be supported.

Surprisingly, there were some dental students (required to participate in a multifaceted admission process) who had no prior exposure to the practice of dentistry prior to commencing their dental studies, including no experience as a dental patient. This result may be due to international students being less likely to have been exposed to dentistry via being a patient and more likely to be exposed by family members being in the dental profession. This finding is of some concern as students may lack some insight into the profession they have chosen to undertake. Further research is warranted to explore reasons why dental students may have no prior exposure to practice of dentistry and whether this impacts on their academic success. A previous study reported no difference in academic performance of first-year UK dental students and levels (sufficient or insufficient) of previous experience (Hoad-Reddick and Macfarlane 1999). However, this study was completed a decade ago.

3.6.6 Course preference

During 1983-86 and 1993-96 the majority of Adelaide dental students (selected via a conventional admission process) had not chosen dentistry as their first-preference career. A significant

change has occurred subsequently. The majority (82.7%) of Adelaide dental students (selected via a multifaceted admission process: 1998-2001) selected dentistry as their first-preference career. The hypothesis [6.1] that there are likely to be more students who preferred to become dentists being admitted to the Adelaide School of Dentistry via a multifaceted process can be supported. This finding is consistent with a UK study that indicated 89% of students (who are admitted via a multifaceted admission process) had indicated dentistry as their first-choice career (Stewart et al. 2004). This trend is also reflected in a recent study of Australian and New Zealand dental students where the majority of students selected dentistry as their first choice (65.3%) (Marino et al. 2006). There was, however, variation between the dental schools, with the lowest proportion of first-preference dental students in Melbourne (58.1%) and the highest proportion in Adelaide (77.1%: 2002 data) (Marino et al. 2006). Admission into the Melbourne dental school was based on previous academic achievement and the UMAT but not on an admission interview. It may be possible that the use of an admission interview as part of selection accounts for more students admitted to the Adelaide dental course indicating dentistry as their first preference. There was no difference in students' course preference after a new hybrid PBL curriculum was introduced but prior to a new admissions process compared with the previous conventional curriculum, thus hypothesis [8.1] can be supported. The hypothesis [9.1] that there are likely to be more students who preferred to become dentists being admitted to the Adelaide School of Dentistry via a multifaceted process than a conventional admission process can be supported.

There are several possible reasons why there has been an increase in dental students indicating dentistry as their first-preference career choice. The change in the admission process in Adelaide may partially account for the significant increase in number of first-preference dental students. The Adelaide admission interview aims to distinguish between those who have carefully considered a prospective career in dentistry and those who have not. Those who can demonstrate a clear motivation to become dentists should be more likely to be successful in being offered a place. There were indeed significantly more Adelaide students who had indicated dentistry as their first-preference course who scored highly (rating 1) on the 'motivation to become a dentist' category than students who had indicated dentistry as a lower preference. Furthermore, admission into dental school that is based solely on academic achievement may encourage selection based on level of attainment in school or college rather than on genuine career aspirations (Over et al. 1984; Dobson and Skuja 2005). Another reason why there has been an increase in dental students preferring dentistry as their first-choice career may relate to the highly competitive nature of gaining entry to dental courses. Potential dental applicants need to choose carefully as they may not gain entry if they have not chosen dentistry as their first-preference course. In addition, the decision to choose dentistry as a first-choice career may be strategic. Students of Asian background indicated that they chose dentistry because they perceived they had a better chance of entering and completing the degree than other courses (Marino et al. 2006).

Further reasons for an increase in students choosing dentistry as their first-preference course include: greater public awareness of the dental workforce shortage in Australia; high salaries of dentists on graduation (Hannon 1997; Graduate Careers Australia 2006); public awareness of cosmetic dentistry from television programmes; career lifestyle choices eg, dentistry may be more appealing than medicine; and parents advising their children to choose stable careers.

All Adelaide dental students (admitted during 1998-2001) who had indicated dentistry as their second-career choice had indicated that medicine was their first-career choice. Medicine was also often the career of choice for Irish (66%: Hallissey et al. 2000), UK (56%: Stewart et al. 2004) and Nigerian (63.5%: Orenuga and da Costa 2006) dental students who indicated dentistry was not their first preference. Students of Asian background were significantly less likely to have dentistry as their first-preference course and more likely to have indicated medicine as their first-preference course (Marino et al. 2006). However, the current study did not find any differences between males and females or Australian and international students in relation to course preference. Thus the hypotheses [7.1] indicating that there are unlikely to be differences can be supported. School leavers were also more likely to have selected dentistry as their second preference compared with non-school leavers. The hypothesis [7.1] that there are unlikely to be differences between school leavers and non-school leavers in relation to course preference cannot be supported.

3.6.7 Course preference and admission criteria

There were no differences in the performance on two aspects of the multifaceted admission process (ie, the UMAT and the TER) between students who had chosen dentistry as their first- or second-preference career, thus the hypothesis [10.1] can be supported. In contrast, Adelaide dental students who had indicated dentistry as their first-preference course were more likely to have performed better on the categories relating to 'motivation to become a dentist' and 'perseverance' in the admission interview than those students who had indicated dentistry as their second-choice course. Thus the hypothesis [10.2] that students who chose dentistry as a first-choice career are more likely to perform better on the admission interview than those who chose dentistry as their second choice can be supported. One would expect that potential dental students would be highly motivated to pursue a career in dentistry and that this should be borne out in the Adelaide admission interview that aims to assess students' motivation to pursue a career in dentistry.

3.7 Conclusions

The decision by Adelaide dental students to become a dentist was based on personal choice and both vocational and social factors. In addition, the decision to choose to study at The University of Adelaide was often the applicant's personal choice and based on the perceived reputation of the

Adelaide School of Dentistry. Cultural differences were noted in reasons for career choice and decision to study at Adelaide. There were differences betweeen students who had chosen dentistry as their first-preference career and those who chose dentistry as their second-preference career with regards to motives influencing the decision to become a dentist; people who influenced the decision; timing of career choice; and reasons for choosing to study at Adelaide. This information may be used by admission committees to target recruitment strategies at students during the senior years of high school or at universities and in the workplace rather than in the early years of primary or secondary school.

Whilst most Adelaide dental students had experience in the dental field (by being a dental patient) prior to commencing dental studies, some had no prior experience. Australian students were more likely to have had work experience or experienced being a dental patient than international students. International students gained exposure to the practice of dentistry via family members who were in the dental profession. If it is considered to be important that applicants should be well informed about the working life of a dentist and have undertaken work experience, clearer information in admission documents that are disseminated to the public may be warranted.

The majority of students who were admitted into the Adelaide dental course had indicated dentistry as their first-preference career. Students' persistence at university is associated with studying in a field of interest and being admitted into a course of first choice (Krause 2005). Thus, from this result, it may be hypothesised that Adelaide dental students should have a high rate of persistence ie, low drop out rate. This will be explored in Chapter 5.

Introduction of a multifaceted Adelaide dental admission process seems has been associated with an increase in the number of students admitted who have indicated dentistry as their first preference. In addition, students who had chosen dentistry as their first-preference course were rated better on two of six admission interview categories (ie, motivation to become a dentist and perseverance) than those who had chosen dentistry as their second preference. These two findings are consistent with one of the aims of the process ie, admitting highly motivated students (Mullins et al. 2003). Characteristics of Adelaide dental students and performance on admission criteria will be discussed in the next chapter.

4.1 Introduction

There has only been limited research on the characteristics of Australian dental students and their performance on admission criteria. This chapter will present information on the characteristics of Adelaide dental students during 1998-2001 and discuss their association with performance on admission criteria. Specifically, the following characteristics will be discussed: gender; previous educational experience; type of secondary school attended during senior years; and permanent place of residence. Associations between these characteristics and performance on the following admission criteria ie, previous academic achievement (TER score); cognitive admission test performance (UMAT); and admission interview performance, is presented. Chapter 4 also examines changes in student demographics arising after the introduction of a new admission process at the Adelaide School of Dentistry.

4.2 Literature review: characteristics of dental students

The following review discusses characteristics of dental students and performance on admission criteria. The review is restricted predominantly to the international dental literature, with inclusion of some relevant health profession and general education literature.

A wide range of university student characteristics has been researched (both in the health and general education literature) in relation to the validity of admission processes or in search of factors that may be associated with academic success. Such factors include demographic characteristics (age, gender and marital status), socio-demographic factors (ethnicity and languages spoken), socio-economic status (parental highest educational level, parental income, parental occupation, residential address and having a physician or dentist as a family member) and socio-educational status (type of secondary school attended and courses studied prior to entry to tertiary education) (Scheetz 1987; Nowacek and Sachs 1990; Sivaneswaran and Barnard 1992; Gietzelt 1997; Murtaugh et al. 1999; De Clercq et al. 2001; James and Chilvers 2001; McKenzie and Schweitzer 2001; Craig et al. 2004). In general, whilst many of these characteristics are not used in initial screening or final selection of university students due to anti-discrimination laws (Nowacek and Sachs 1990; Tchen et al. 2001), information is usually collected on application data or via surveys and stored in databases for research purposes (Nowacek and Sachs 1990).

Knowledge about student characteristics is important for several reasons. Admission processes may influence the type of students applying for entry into health profession courses, their performance on admission criteria and ultimately their level of success in being made and accepting offers. The profile of health profession students has workforce implications eg, the type of practitioners who will go on to serve the community. Moreover, student characteristics may be one group of factors

that could influence academic success of tertiary and health profession students (this is discussed further in Chapter 5, section 5.2).

As mentioned previously, there is a large range of student characteristics and the types chosen for inclusion in research vary depending on the research questions and aims. The following characteristics were chosen for the present study: gender; previous educational experience; previous secondary school attended; and permanent place of residence (country, state/territory, urban area, rural location). These were chosen on the basis of: previous indications in the literature that these characteristics may influence academic success (discussed further in Chapter 5); their relevance to the Adelaide School of Dentistry admission process (refer to Chapter 1, section 1.3); and the ability to collect data on these variables from existing Adelaide School of Dentistry admission records and purpose-designed surveys. Whilst previous studies have examined student age and its impact on academic success, this characteristic was not examined in the current study. Large-scale Australian studies which have categorised first-year tertiary students according to age ie, under 19 years, 20 to 24 and above 25 years of age (McInnis et al. 1995; 2000a and Krause et al. 2005), were conducted to examine differences in the university experience of school leavers (ie, those who were under 19 years of age) compared with mature-age students (above 25 years of age). Within this context, mature-age students typically would be studying part-time and off-campus. However, the Adelaide dental course is a full-time course and has few mature-age students. Hence, it was decided for this study to examine students' previous educational experience and its influence on academic success rather than age per se.

4.2.1 Gender

Historically, dentistry has been a male dominated profession, with female roles in dentistry confined to the auxiliary fields of dental hygiene and dental assisting (Scarbecz and Ross 2002). During the 1960s, females accounted for only approximately 5% of all Australian dental students (Barnard et al. 1967). In the US during the 1970s, less than 1% of US dental graduates were females (Scarbecz and Ross 2002). Within contemporary society, however, this pattern has changed dramatically worldwide with a substantial increase in the number of females who have taken up careers in dentistry. In 1998, 50% of UK dental students were female (Duguid and Drummond 2000) and by 2002, 38% of US students attending four-year dental colleges were female (Scarbecz and Ross 2002). In one Australian dental school by 1994, females comprised 44% of the student body (Gietzelt 1997).

More broadly, the increasing rise of female dental students is also reflected amongst the general university population. Across Australian universities, the majority of undergraduate students (including international students) who commenced first year studies in 2001 were female (57.3%) (DEST 2002). Due to anti-discrimination laws, there are no quotas for the number of males and females

admitted into dental courses (Duguid and Drummond 2000). Thus trends in differences in sex ratios have been suggested to reflect differences in evolving course preference between males and females (Over et al. 1984). Furthermore, it has been suggested that differences in the types of senior secondary school subjects and secondary school matriculation scores between males and females, may explain differences in the number of females becoming dentists (Over et al. 1984).

4.2.2 Previous educational experience

There are various entry pathways to Australian undergraduate university studies. Students may enter directly after completing secondary (high) school ('school leavers') or after completing or partially completing a tertiary course ('non-school leavers'). Other entry pathways to university include mature-age entry (over 25 year olds admitted via special provisions) or via completion of 'Open Learning' studies or completion of courses conducted through 'Technical and Advanced Further Education' (TAFE) College training (DEST 2002). These are similar pathways to those internationally. Across Australian universities previous educational experiences of students who were admitted into undergraduate degree courses in 2001 included: school leavers (45.4%); previous tertiary experience (23.0%); mature-age entry (7.8%); and other modes of entry (23.8%) (DEST 2002).

The type of previous educational experience of dental students is reflected in the type of dental course in which they have enrolled. Graduate-entry dental courses (the typical mode of entry in Northern America and the Sydney dental school in Australia) invariably have non-school leavers. Conversely, undergraduate entry dental courses eg, in the UK (Hoad-Reddick and Macfarlane 1999; Lynch et al. 2006) and Australia (Over et al. 1984; Sivaneswaran and Barnard 1992; Gietzelt 1997) predominantly have school leavers. Many undergraduate entry dental courses do however admit non-school leavers. This pathway provides applicants who missed out on entry directly from secondary school another chance to undertake a dental career. Types of previous university courses that Adelaide dental students have undertaken prior to dental studies include nursing/allied health profession courses (physiotherapy, pharmacy, and occupational therapy), science courses, health science and engineering courses.

In Australia, each undergraduate dental course may have its own quota for the number of school leavers and non-school leavers. In Adelaide, during 1998-2001 there was no fixed quota for admission of school leavers and non-school leavers. It is postulated that the proportion of school leavers and non-school leavers applying to undergraduate health profession courses may be influenced by the type of admission process and curriculum. Broader admission processes that include assessment of attributes other than academic achievement may be appealing to those who have commenced or completed a previous tertiary course. In addition, PBL dental curricula may encourage

more non-school leavers to apply given that other university courses eg, nursing, veterinary science and architecture also use PBL in their curricula (Biley 1999; Azer 2001).

4.2.3 Previous secondary school attended

Australian school leavers usually attend one of two types of secondary school, government or non-government (independent schools or Catholic schools). In general, the proportion of Australian school leavers attending government secondary schools (compared with those who had attended non-government schools) has decreased over time (Le and Miller 2003), from 74% in the 1980s to 68% in the 1990s (Kelley and Evans 2004). However, students who have originated from rural areas are more likely to attend government secondary schools than non-government schools (Durkin et al. 2003; Krause et al. 2005).

With regards to dentistry, the proportion of Australian dental students who had attended government and non-government schools has varied over time. In 1964 most Australian dental students had attended non-government secondary schools (Barnard et al. 1967). However, in 1981, almost two-thirds of all students at the Melbourne dental school had completed secondary education at a government school (Over et al. 1984). Almost 10 years on, there was evidence that this trend had started to reverse. Sivaneswaran and Barnard (1992) reported that 55% of dental students studying in Sydney had attended government schools and 45% had attended non-government schools, with a slightly higher proportion of female students than male students who had studied in non-government secondary schools. By 1997, the number of first-year dental students studying at Sydney who had attended government secondary schools had decreased to 49.0% (Gietzelt 1997). It has been postulated that the type of university admission process ie, based on school grades, might encourage attendance at non-government secondary schools. Such schools often offer subjects that allow Australian students to gain maximum matriculation scores, hence enabling entry into courses such as medicine that have very high entrance score requirements (Turnbull et al. 2003). Parental socioeconomic status, occupation, education levels, and perceptions that particular type of schooling may facilitate entry to university, are other reasons that might explain the choice of Australian secondary school by parents for their children (Williams and Carpenter 1991; Le and Miller 2003; Kelley and Evans 2004).

4.2.4 Permanent place of residence

Each university course will normally have its own quota for the number of local (domestic) or full fee-paying international students. The number of international fee-paying dental students has traditionally been small (less than 10%) (Barnard et al. 1967; Over et al. 1984; Sivaneswaran and Barnard 1992). Following on from changes in higher education funding and the globalisation of higher

education, universities have increased the number of international fee-paying students over the past two decades eg, in the UK (Cook and Leckey 1999; Yorke 2000) and Australia (Bennell and Pearce 2003; Lukic et al. 2004b; Trewin 2005). In 2001, international students (including New Zealanders) commencing first year (undergraduate and post-graduate courses) in Australian universities, comprised 21.0% of the total first year intake (DEST 2002). Duguid and Drummond (2000) reported a doubling of international fee-paying UK dental students between 1983 and 1998. These students contributed significantly to the finances of UK dental schools. UK schools have a set quota of 10% of the total intake for international fee-paying students by funding authorities but this has often been exceeded due to special arrangements with individual countries (Duguid and Drummond 2000). In Adelaide, during 1998-2001, the quota for Australian local students (Commonwealth Supported Place (CSP)) was 33. In 2001, an additional five fee-paying places for Australian applicants was introduced. The quota for international fee-paying students was 10 (Adelaide University 2000a and b).

Local (domestic) university students may reside in the same state/territory/province (in-state) as the university they attend or they may have moved from another state (out-of-state). In addition, students' permanent home residence (prior to entering university) can be classified as urban or rural. Most Australian dental students are local residents from urban areas (80%: Over et al. 1984; 79%: Sivaneswaran and Barnard 1992). The number of students who had moved to another state to study dentistry was reported to be low (4%) (Sivaneswaran and Barnard 1992). Australian university equity policies encourage enrolment by students who are traditionally less represented in higher education. One such group comprises rural students, as they have been a small fraction of the university population (James et al. 2002). During 1994-2001, rural students comprised 14.8% of the student population in one Australian university (Zeegers and Klinger 2003). The percentage of rural students studying medicine at the University of Adelaide ranged from 4 to 12% during 1991-96 (Turnbull et al. 2003). Rural students made up 9% of the dental student population in one Australian dental school (Over et al. 1984). The Adelaide School of Dentistry has no quota or special entry scheme for students who are permanent residents of rural areas.

4.2.5 Performance on the admission process

Admission into dental schools, world wide, tends to be very competitive due to a large applicant pool and limited places (Adkins et al. 1982; Röding 1997; Drummond and Duguid 1997; De Ball et al. 2002; Mullins et al. 2003). Only a fraction of the total applicant pool is able to gain entry eg, 9% of applicants managed to reach the final stage of accepting an offer to one UK dental school (Newton et al. 2003). Selection of dental students is usually based on previous academic achievement or performance on both previous academic achievement and performance on cognitive admission tests. Increasingly more dental schools have also commenced assessing personal qualities (eg, motivation,

communication skills and team work) via admission interviews (for further details about dental school admission refer to Chapter 1, section 1.3 and Chapter 5, section 5.2.4.3).

Due to the large applicant pool, health profession applicants need to perform very well. In Australia, school leavers need to attain a very high TER score (ie, above the 90th percentile) (Turnbull et al. 2003; Dobson and Skuja 2005) (refer to Chapter 1: Appendix Table 1.1 for entry requirements to Australian dental schools). Applicants who do not perform as well (ie, lower scores) on selection criteria are eliminated early in admission decisions. Thus, dental students who are admitted tend to be fairly homogenous with regards to scores obtained on selection criteria (Ranney et al. 2005).

Dental admission processes have also been required to be non-discriminatory, encourage applications from all parts of society and not favour one type of applicant over another (Sanders 1996). However, research has shown that some demographic groups perform better than others on certain selection criteria. Gender differences in the performance on high stakes examinations eg, dental admission tests, have been demonstrated. American male and female dental applicants have been reported to show differential performance on the various components of the Dental Admission Test (DAT). Males tended to outperform females (Fields et al. 2003; Smithers et al. 2004; Kingsley et al. 2007). There are no readily available published results on gender differences and performance on the UMAT for those students who are successfully admitted to Australian dental schools. UK female dental applicants seem to outperform males during admission processes (Duguid and Drummond 2000; Newton et al. 2003). It has been postulated that females perform better in admission processes because they may project themselves better (be more mature) during interviews and they also may attain higher grades in public secondary school examinations (Duguid and Drummond 2000).

Australian students attending non-government schools, in particular independent (non-Catholic) schools, have been more likely to gain entry to university than those who attended government schools (Williams and Carpenter 1991). This has been attributed to those students attending non-government schools achieving higher TER scores than students attending government schools (Marks et al. 2001). In addition, female school leavers entering Australian tertiary institutions had slightly higher TER scores than males (Marks et al. 2001). There are no published reports on differences between school leavers and non-school leavers, or local and non-local residents in performance on admission processes.

During 1993-96 there were major changes to the Adelaide dental curriculum and admission process, as discussed in Chapter 1, sections 1.6.1, 1.6.2 and 1.3.1, 1.3.2, respectively. There have also been major changes in the Australian higher education sector as discussed in Chapter 1 (section 1.4). At the commencement of this research project in 1999, the most recent international and Australian studies examining dental student characteristics were those by Duguid and Drummond (2000) and Gietzelt (1997), respectively. There has been no comprehensive study of the characteristics

of Adelaide dental students since Cooper and Spencer (1987) nor the impact of these characteristics on the academic success of dental students (refer to Chapter 5, section 5.2.4.1).

4.3 Aims, research questions and hypotheses

The overall aim of this part of the study was to investigate characteristics and performance on admission criteria of Adelaide dental students admitted by a multifaceted process (1998-2001) during the early years of a hybrid PBL course. An additional aim was to determine whether there were any changes in the characteristics of Adelaide dental students associated with changes in admission practices (by comparing characteristics of one group of students with two former groups). Furthermore, the relationships between student characteristics and performance in the admissions process were examined.

Specifically the aim of this aspect of the project was to address *Research Question (RQ) 2* ie, *What are the characteristics of students in this study and how do students perform on admission criteria?* (refer to Chapter 1, section 1.9 Table 1.1). Sub-questions were also devised and related hypotheses (H) were generated from the literature review (section 4.2). The sub-questions and hypotheses are summarised as follows:

RQ 2.1 What are the characteristics of individuals admitted via a conventional admission process to the Adelaide dental course, who undertook a conventional dental course during 1983-86?

RQ 2.2 What are the characteristics of individuals admitted via a conventional admission process to the Adelaide dental course, who undertook a hybrid PBL course during 1993-96?

RQ 2.3 What are the characteristics of individuals admitted via a multifaceted admission process to the Adelaide dental course, who undertook a hybrid PBL course during 1998-2001?

RQ 2.4 What are the changes in the characteristics of Adelaide dental students after the implementation of a hybrid PBL course?

It was hypothesised that:

H 4.1 There would be more females than males undertaking dentistry during the period 1993-2001 than the period 1983-86

RQ 2.5 What are the changes in the characteristics of Adelaide dental students after the implementation of a multifaceted admission process?

It was hypothesised that:

H 5.1 There would be relatively fewer school leavers and relatively more non-school leavers undertaking dentistry during 1998-2001, compared with 1983-86, and 1993-96

RQ 2.6 How do individuals who were admitted via a multifaceted admission process perform in the admission process?

RQ 2.7 Are there any differences in the performance in the admission process between different groups of students (eg, males/females; Australian students attending non-government/government schools)?

It was hypothesised that:

H 7.1 Female students are more likely to perform better than males on the admission interview

H 7.2 Gender is not likely to be associated with performance on the UMAT and the TER

H 7.3 Previous educational experience is not likely to be associated with performance on the UMAT, TER and admission interview

H 7.4 Permanent place of residence is not likely to be associated with performance on the UMAT, TER and admission interview

H 7.5 Australian school leavers who attended non-government secondary schools are more likely to achieve higher TER scores than those who had attended government schools

H 7.6 Type of secondary school is not likely to be associated with performance on the UMAT

H 7.7 Type of secondary school is not likely to be associated with performance on the admission interview

4.4 Methods

Three study groups made up the sample for this part of the study, Group 1: CACC (1983-86); Group 2: CAHPBL (1993-96) and Group 3: MAHPBL (Cohorts A to D: 1998-2001). Background information concerning these study groups was provided in Chapter 2, section 2.3. The type of student characteristics and admission criteria chosen for investigation related to potential factors that may be associated with academic success in the early years of the dental course are discussed in Chapter 4, section 4.2 and Chapter 5, section 5.2. Data were collected on gender, permanent place of residence, previous educational experience and performance on the admission process (TER scores, composite UMAT percentile band and admission interview performance). These data were collected via admission records (refer to Chapter 2, section 2.6.1). There were some differences in the data collected between the three study groups. In addition, Cohort A from Group 3 was excluded from some parts of this study,

in particular for examination of Australian school leavers and their performance on admission criteria (the TER and the UMAT). These differences or exclusions were discussed in Chapter 2, section 2.6.1.3.

Descriptive and bivariate statistical methods were used to summarise and analyse the data. Frequencies of the different categories of student characteristics and of the different levels of performance on admission criteria were calculated. Chi-square tests were performed to:

- compare student characteristics between cohorts in the same year level and between year levels (Group 3 only)
- compare student characteristics between the three study groups
- compare performance on admission criteria between cohorts in the same year level and between year levels (Group 3 only)
- examine associations between characteristics and performance on admission criteria (Group 3).

Statistical significance was set at $p<0.05$.

4.5 Results

4.5.1 Group 1 (CACC)

The characteristics of students who commenced first year from 1983-86 inclusive are summarised in Table 4.1. Most students were male (62.4%). There were some differences between the cohorts within this group. There were significantly more male (76.7%) than female (23.3%) students enrolled in 1984 ($x^2=8.34$; $p=0.04$) (Appendix Table 4.1).

4.5.2 Group 2 (CAHPBL)

The characteristics of students who commenced first year from 1993-96 inclusive are summarised in Table 4.1. The majority were female (53.7%). In addition, there were more female (74.4%) than male (25.6%) international students ($x^2=11.64$; $p=0.00$) (Appendix Table 4.2). Most students were South Australians (59.9%). The majority were school leavers (72.1%) and more school leavers were South Australians (84.5%) compared with other Australians (15.5%) ($x^2=9.69$; $p=0.04$) (Appendix Table 4.3).

Table 4.1 Characteristics of first-year dental students

Characteristic	Group 1: CACC Cohorts commencing 1983-86 n	%	Group 2: CAHPBL Cohorts commencing 1993-96 n	%	Group 3: MAHPBL Cohorts commencing 1998-2001 n	%
Gender						
Male	73	62.4	82	46.3	82	47.4
Female	44	37.6	95	53.7	91	52.6
Previous educational experience						
School leaver	102	87.2	98	72.1	108	62.4
Non-school leaver	15	12.8	38	27.9	65	37.6
Missing data	0		41		0	
Permanent place of residence						
South Australian	-		106	59.9	89	51.4
Other Australian	-		32	18.1	46	26.6
International	-		39	22.0	38	22.0

Group 1 results from Cooper and Spencer (1987)
Group 1 (n=117), Group 2 (n=177) and Group 3 (n=173).

CACC: Conventional admission, conventional curriculum; CAHPBL: Conventional admission, hybrid PBL curriculum
MAHPBL: Multifaceted admission, hybrid PBL curriculum

In the absence of specific information, the ages of students were used to infer their previous educational experience. Students under 20 years of age were categorised as school leavers and those older than 20 years of age were categorised as non-school leavers (Cooper and Spencer 1987).

4.5.3 Group 3 (MAHPBL)

There was a total of 173 first-year students who comprised the main subjects in this study (Group 3: Cohort A n=36; Cohort B n=46; Cohort C n=47; and Cohort D n=44). There were no statistically significant differences in the frequency of the various sub-categories of characteristics between the four cohorts, thus data were pooled. For details of characteristics of students within each of the four cohorts refer to Appendix Table 4.4.

The majority of students within Group 3 were female (n=91: 52.6%). Fifty-one percent were residents of South Australia, 26.6% were residents from other Australian states and territories and 22% were international students (Table 4.1). The majority of students originating from other Australian states were derived from Victoria (23.9%) and New South Wales (21.7%). The majority of Australian students had been original residents from urban areas (87.4%) and there were a total of 17 (12.6%) students (1998-2001) who were original residents of Australian rural areas (Appendix Table 4.5). International students were mostly from Malaysia (23.7%) and India/Other Asia (21.0%) (Appendix Table 4.5).

Approximately 62% (n=108) of students enrolled during 1998-2001 entered dentistry directly

from school (Table 4.1). In addition, school leavers were more often females (60.2%) than males (39.8%) (x^2=6.63; p=0.01) and more likely to be South Australians (63.0%) than other Australians (22.2%) or international students (14.8%) (x^2=6.17; p=0.00) (Appendix Tables 4.6 and 4.7). Of the 17 Australian rural students, nine (52.9%) were non-school leavers and the other eight (47.1%) were school leavers. The majority of Australian school leavers (n=61; 66.3%) had attended a non-government secondary school during their final year of secondary school, whereas 33.7% (n=31) had attended a government secondary school (Appendix Table 4.9). The majority of Australian school leavers who originally resided in urban areas had attended non-government secondary schools (n=57; 67.9%), whereas 27 (32.1%) had attended government secondary schools. In contrast, Australian school leavers who originally resided in rural areas had attended non-government (n=4; 50%) and government (n=4; 50%) secondary schools in equal proportions.

Previous tertiary experiences of non-school leavers included commencing or completion of a wide range of undergraduate courses such as science, health science, pharmacy, physiotherapy, occupational therapy, medicine, medical radiation, nursing and engineering. The most common of these courses was science. A few students had obtained further qualifications, namely honours degrees. Data related to the previous educational experiences and type of secondary schools attended by Australian school leavers in individual cohorts are provided in Appendix Tables 4.8 and 4.9.

4.5.4 Comparison of student characteristics between Groups 1, 2 and 3

There were two noteworthy differences between the characteristics of students who commenced the Adelaide dental course over different periods of time. There were more female students in Group 2 (CAHPBL) (41.3%) and Group 3 (MAHPBL) (39.6%) than in Group 1 (CACC) (19.1%) (x^2=8.51; p=0.01) (Appendix Table 4.10). In addition, there were more non-school leavers in Group 2 (32.2%) and Group 3 (55.1%) than in Group 1 (12.7%) (x^2=21.36; p=0.00) (Appendix Table 4.11).

4.5.5 Performance on admission criteria: Group 3

4.5.5.1 Australian school leavers: previous academic achievement (TER score, UMAT performance and admission interview performance)

The majority of Australian school leavers (63.4%) had a very high TER score (94.99-99.95) (Table 4.2). There were significantly more students in Cohort B (enrolled in 1999) (40.0%) and C (enrolled in 2000) (37.8%) who had a very high TER score compared with students in Cohort D (enrolled in 2001) (22.2%) (x^2=7.51; p=0.02) (Appendix Table 4.12). TER scores did not differ significantly between: males and females; South Australians and non-South Australians; students from

urban areas and rural areas; and students attending non-government and government schools (Appendix Table 4.13).

Most Australian school leavers (45.5%) who were admitted during 1998-2001 scored within the 56-70% composite percentile band on the UMAT (Table 4.2). There was no statistically significant difference in the performance on the UMAT between the four study cohorts. Performance on the UMAT of students in the different cohorts is provided in Appendix Table 4.14. Australian school leavers who had attended a government school (76.5%) were significantly more likely to have performed very well (86-100% composite percentile band) on the UMAT than those who had attended a non-government school (23.5%) (x^2=8.74; p=0.01) (Appendix Table 4.15). There were no statistically significant differences between male and female Australian school leavers or between and South Australians and other Australians school leavers on performance on the UMAT (Appendix Table 4.16).

The majority of Australian school leavers (57.7%) were rated 'good' on the admission interview (Table 4.2). Admission interview scores did not differ between Australian school leavers who attended non-government or government secondary schools. There were no statistically significant differences between male and female Australian school leavers or between South Australian and other Australian school leavers on performance in the admission interview (Appendix Table 4.17).

Table 4.2 Performance of Australian school leavers on the admission process

Admission criterion	n	%
TER score		
95.00-99.99	45	63.4
'very high' academic achievement		
90.00-94.98	26	36.6
'high' academic achievement		
UMAT performance: composite percentile band		
86-100% ('higher' achiever)	17	25.0
71-85% ('higher' achiever)	19	28.0
56-70% ('lower' achiever)	31	45.5
41-55% ('lower' achiever)	1	1.5
Missing	3	
Overall admission interview rating		
Excellent	13	18.3
Good	41	57.7
Adequate	17	24.0

Group 3 (Cohorts B, C and D*) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
* Cohort A not included as TER and UMAT scores for applicants fro 1998 entry could not be pooled with the other cohorts n=71

4.5.5.2 Performance on the admission interview

Performance on the admission interview of Adelaide dental students (Group 3) is summarised in Table 4.3. For details of admission interview performance of students within each of the four cohorts refer to Appendix Table 4.18. There were no statistically significant differences in the interview ratings between the cohorts, thus data were pooled. Using the overall interview rating, the majority of students were deemed to be 'good' candidates (51.5%). Twenty-five percent of students were rated as 'adequate' candidates. Very few students who were admitted were rated as 'barely adequate' (2.3%). For five of the six individual interview categories, the majority of students were rated with a score of '2' which equated to a 'good' rating (Table 4.4). There were significantly fewer students who scored highly (rating 1) for the categories, 'tolerance of ambiguity' (13.0%), 'supportive and encouraging behaviour' (13.0%) and 'communication skills and personal effectiveness' (13.0%) compared with the categories of 'motivation to become a dentist' (21.8%), 'compatibility with the dental course' (16.3%), and 'perseverance' (22.9%) (x^2=61.18; p=0.03) (Appendix Table 4.19).

There were no statistically significant associations between admission performance and student characteristics in the different cohorts so data were combined. There were differences between the performance of males and females on the admission interview. More females (70.3%) scored highly ie, 'excellent' on the overall rating compared with males (29.7%) (x^2=6.98; p=0.03) (Appendix Table 4.20). In addition, more females (69.1%) scored highly (rating 1) for the category relating to 'communication skills and 'personal effectiveness' than males (30.9%) (x^2=10.23; p=0.01) (Appendix Table 4.21). There were also significant differences between students' previous educational experience and admission interview performance. Specifically, more non-school leavers scored lower ratings (rating 3/4/5/6) on the category for 'supportive and encouraging behaviour' (52.1%) than school leavers (47.9%) (x^2=13.31; p=0.00) (Appendix Table 4.22). There were no statistically significant associations between permanent place of residence and admission interview performance.

Table 4.3 Overall rating on admission interview of dental students who gained entry during 1998-2001

Rating	n	%
Excellent	37	21.6
Good	88	51.5
Adequate	42	24.6
Barely adequate	4	2.3
Missing data	2	

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=173

Table 4.4 Performance on individual admission interview categories of dental student who gained entry during 1998-2001

Categories	n	%	Categories	n	%
Motivation to become a dentist			Perseverance		
Rating 1	40	23.7	Rating 1	42	24.7
Rating 2	72	42.6	Rating 2	81	47.7
Rating 3	44	26.0	Rating 3	45	27.6
Rating 4/5/6	13	7.7	Rating 4/5/6	2	1.2
Missing data	4		Missing data	3	
Compatibility with the dental course			Supportiveness and encouraging behaviour		
Rating 1	30	17.7	Rating 1	24	14.2
Rating 2	78	45.9	Rating 2	72	42.6
Rating 3	47	27.6	Rating 3	63	37.3
Rating 4/5/6	15	8.8	Rating 4/5/6	10	5.9
Missing data	3		Missing data	4	
Tolerance of ambiguity			Communication skills and personal effectiveness		
Rating 1	18	10.6	Rating 1	55	32.4
Rating 2	67	39.4	Rating 2	74	43.5
Rating 3	66	38.8	Rating 3	37	21.8
Rating 4/5/6	19	11.2	Rating 4/5/6	4	2.3
Missing data	3		Missing data	3	

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=173
Rating 1 = highest rating for particular attribute

4.5.6 Summary of results

Students admitted to the Adelaide dental course:

- via a conventional admission process and who undertook a conventional curriculum during 1983-86, tended to be male and school leavers [RQ2.1].
- via a conventional admission process and who undertook a hybrid PBL curriculum during 1993-96, tended to be female, school leavers and South Australian [RQ2.2].
- via a multifaceted admission process and who undertook a hybrid PBL curriculum during 1998-2001, tended to be female, school leavers, South Australian, and had attended non-government secondary schools. There were few Australian rural students [RQ2.3].

Changes in the profile of Adelaide dental students over time:

- there was a significant increase in the proportion of female students for the period 1993-96 (CAHPBL) and 1998-2001 (MAHPBL) compared with 1983-86 (CACC) [RQ2.4].
- there was a significant decrease in the proportion of school leavers for the period 1993-96 (CAHPBL) and 1998-2001 (MAHPBL) compared with 1983-86 (CACC) [RQ2.5].

Performance on admission criteria of Adelaide dental students admitted via the multifaceted process (1998-2001) [RQ2.6]:

- previous academic achievement (TER score) of Australian school leavers who had gained entry (1998-2001) to the Adelaide dental course was very high and within a narrow range. Achievement of Australian school leavers on the UMAT test was more variable.
- most students were rated as 'good' applicants on the admission interview. There were some students who received low ratings for individual categories, in particular for tolerance of ambiguity; supportive behaviour; and communication skills and personal effectiveness.
- Australian school leavers admitted in 1998, 1999 and 2000 were more likely to have had very high TER entrance scores than those admitted in 2001.

Associations between characteristics, course preference and performance on admission criteria of Adelaide dental students admitted via the multifaceted process (1998-2001) [RQ2.7]:

- type of secondary school attended was associated with UMAT performance but not associated with matriculation score or admission interview performance. Students who attended government secondary schools performed better on the UMAT than those attending non-government schools.
- gender and permanent place of residence were not associated with previous academic achievement (TER score) or achievement on the cognitive admission test (UMAT).
- more females rated highly (excellent) on the admission interview than males. In addition, females scored highly (rating 1) for the category, communication and personal effectiveness than males. Non-school leavers were more likely to receive lower ratings (3/4/5) for the category related to supportive behaviour compared with school leavers. Permanent place of residence was not associated with admission interview performance.

4.6 Discussion

4.6.1 Characteristics of students

The Adelaide dental student cohorts during the period 1998-2001 were fairly heterogeneous. Most commonly students were female, South Australian, from urban Adelaide, school leavers and had attended non-government secondary schools. International students tended to be non-school leavers and residents from Asian countries. Australian non-school leavers tended to be males and non-South Australians. However, the shifts in characteristics over time may have important implications for dental education and employment.

4.6.1.1 Gender

The current study revealed a significant increase in the number of female dental students at Adelaide from 38% in the mid 1980s to 53% in the late 1990s. This result supports hypothesis [4.1] that there would be relatively more females than males studying dentistry at Adelaide during 1998-2001 compared with 1983-86 and 1993-96. The magnitude of this shift is also exemplified when compared with data from 40 years ago when nearly all (91.7%) Australian dental students were male (Barnard and Siu 1966). Alterations to the Adelaide admission process after 1996, however, do not seem to have impacted on the ratio of males to females, as the proportion of male to female students was similar between 1993-96 and 1998-2001. This pattern is consistent with other Australian dental schools and the single dental school in New Zealand, where females comprised, 56.1% of the dental student population in 2002 (Marino et al. 2006). There were no significant differences between the dental schools in the proportion of male to female students (Marino et al. 2006). The trend for more females to undertake dental studies is also reflected internationally. Fifty to 60% of students in Indian dental schools were female (Parkash et al. 2006) and females constituted the majority of students in four Nigerian dental schools (Orenuga and da Costa 2006). The general finding that there are more females doing dentistry is consistent with increasing female participation in Australian higher education ie, 56.7% in 2002, up from 54.1% in 1992 (James et al. 2002). There has also been an increase in the number of female medical applicants and students at the University of Adelaide, from 44 to 61% during the period 1997-2001 (Turnbull et al. 2003).

Several factors have been described that may account for changes in the number of male and female dental students. The increase in the number of female dental students may be due to breaking down of stereotypes within the dental profession, and more females thus considering dentistry as a viable career path. Indeed, features of the dental profession such as flexible working hours and the ability to balance professional life with family life may be differentially appealing to females (Whittaker 1984; Bedi and Gilthorpe 2000; Orenuga and da Costa 2006). As girls grow older they are less likely to believe that certain careers should be restricted to males (Wigfield et al. 2002). Parental occupation

has been suggested to have a strong influence in motivating daughters to pursue a professional career (Coombs 1976; Sivaneswaran and Barnard 1992). Increases in the number of female dental students may also be due to government strategies in the UK (Bedi and Gilthorpe 2000) and Australia (James et al. 2002) aimed at increasing access of females to university education in general.

The reduction in numbers of Australian male dental students concurrently reflects general trends in higher education. Male participation in Australian higher education has fallen to 43% compared with 49% of males in the general population (James et al. 2002). In addition, changes to health profession admission policies may account for the increase in female students. In conventional medical/dental admission processes, Australian school leavers need a very high TER score to gain entry. Prerequisite subjects, such as physics and mathematics, tended to be favoured by males and contributed to gaining high TER scores (Over et al. 1984). The removal of prerequisite subjects for medical (or dental) courses (Turnbull et al. 2003) and a decreased reliance solely on very high TER scores may have encouraged more females to apply to dental courses. Female applicants may be more successful than male applicants on particular components of admission procedures eg, the admission interview component (Duguid and Drummond 2000). Indeed, the current study found that those females who were successful in gaining entry to dentistry performed better on the interview compared with males. However, further investigation of the performance of all female and male applicants who undertake the admission interview (rather than a subset of those admitted to the course) is required before any definitive conclusion about females outperforming males could be made.

The current study did not find gender differences in motivating factors that influenced the decision to become a dentist (Chapter 3, sections 3.5.2 and 3.5.3). In addition, results suggest that course preference may not necessarily account for why there were more females studying dentistry at Adelaide than males, with an observed trend for more females who were admitted to the Adelaide dental course (1998-2001) to have indicated dentistry as their second-preference course compared with males (Chapter 3, section 3.5.7.3). Preliminary analysis has shown that during 2003-06, the number of female Adelaide dental students appears to have risen slightly ie, 58.8% (n=169) compared with 52.6% (n=91) during 1998-2001. Further research is required to monitor the previously mentioned trend and investigate why there may be fewer males admitted to the Adelaide dental course and dentistry in general.

4.6.1.2 Previous educational experience

The current study revealed that the majority of Adelaide dental students who commenced first year during 1998-2001 were school leavers. However, there was a significant increase in the number of non-school leavers enrolled during 1993-2001 compared with the period 1983-86. There was no significant difference between the proportions of school and non-school leavers during the period before

(1993-96) and after (1998-2001) the inception of the multifaceted Adelaide dental admission process. This result might suggest that the change in the admission process did not result in an increase in non-school leavers as hypothesised [5.1]. But caution is needed when interpreting this result as there were missing data concerning previous educational experience for students enrolled during the period 1993-96.

The majority of school leavers were female and South Australians. This is in contrast to non-school leavers who tended to be males from other Australian states/territories or international students. This result may indicate that males from other Australian states/territories or male international students may have missed out on entry into dentistry in their usual place of residence. It is also feasible that entry to their local dental school was graduate-entry and hence they had undertaken another university course but maintained a strong motivation to pursue a career in dentistry and thus applied to Adelaide. Another possible explanation is that male students whilst failing to gain entry to their first course of choice compared with female students (Chapter 3, section 3.5.5) were comparatively successful in gaining entry to their second-preference course ie, dentistry.

4.6.1.3 Previous secondary school attended

The vast majority of Australian school leavers commencing studies at Adelaide attended a non-government school in their senior year(s) of secondary school. This observation is consistent with the findings that the majority of dental students from two UK schools (Stewart et al. 2004) and Australian schools (Marino et al. 2006) had attended non-government secondary schools. However, the proportion of students who attended non-government secondary schools in the studies by Stewart et al. (2004) (57%) and Marino et al. (2006) (56%) were not as great as reported in the current study (66%). Furthermore, Marino et al. (2006) reported that Australian and New Zealand dental students studying in Adelaide (first through to final year students in 2002) were significantly less likely to attend a government secondary school compared with those studying in the other four Australian dental schools. Also most school leavers in the Adelaide medical course (during 1997-99) were educated in non-government secondary schools (Turnbull et al. 2003). Thus it seems that the educational backgrounds (in terms of type of secondary school attended) of school leavers studying dentistry at Adelaide are no different from other UK or Australian dental/medical students.

Rural origin tertiary students have been found to be more likely to have attended government secondary schools while urban origin tertiary students are more likely to have attended non-government (Krause et al. 2005). This finding was not supported in the current study. There was no difference in the type of secondary school attended by rural and urban Australian school leavers.

It is not clear from this current research why there may be a greater proportion of students who had attended non-government schools. Students (1998-2001) who had attended a government school

were found to have higher UMAT scores compared with those who had attended non-government schools, but there was no difference in TER scores or admission interview performance between those who had attended non-government or government secondary schools. Further analysis of the entire applicant pool is required to evaluate if any admission criteria favour students from one type of secondary school over another and hence account for why there are more students who are admitted to the Adelaide dental course who have previously attended non-government schools. The higher socio-economic status (Le and Miller 2003) and education and occupational levels of parents of students (Kelley and Evans 2004) may explain why there has been an increase in Australian secondary school students and thus dental students attending non-government secondary schools. Studies have also shown that dental students are often from more privileged backgrounds (Gietzelt 1997; Vigild and Schwarz 2001; Hennequin et al. 2002; Marino et al. 2006).

4.6.1.4 Permanent place of residence

Whilst there was a majority of South Australian students enrolled during 1983-86 (CACC) and 1993-96 (CAHPBL), there has been an increase in students from other states/territories in Australia with a concomitant decrease in students from South Australia since the late 1990s. There is not a study tradition of Australian students moving interstate for their university education. In a large national study, McInnis cited that only 5% of first-year students had relocated to another state as compared with a national average of 10% (McInnis et al. 1995). This is in contrast to the current study which revealed a high proportion of non-South Australian students studying dentistry at Adelaide. Furthermore, the proportion of non-local dental students is substantially higher than the proportion of non-local students studying in all other courses at the University of Adelaide (The University of Adelaide 2004b). Australian Government statistics in the higher education sector may shed some light on why more students from interstate may be studying dentistry in Adelaide. Whilst the data from 2001 are not specific to dentistry, they revealed that very few South Australian residents study in universities in New South Wales or Victoria (0.8% and 1.0% respectively). This is in contrast to 1.4% of Victorians and 1.9% residents of New South Wales studying in South Australian universities (DEST 2002). A recent report has shown that the Adelaide and Sydney dental schools have considerably higher numbers of students undertaking dental studies who are from another state, whereas most students studying at the dental schools in Melbourne, Perth and Brisbane are residents of the same state (Marino et al. 2006). Set quotas on the number of students entering from the different Australian states/territories are not permitted. Thus the ratio of South Australian and other Australian students may reflect: students' career choice; the admission process in Adelaide and the other Australian dental schools; the type of dental course (ie, undergraduate versus graduate-entry); the location of the dental school; the perceived reputation of the school; and the type of curriculum (eg, early clinical exposure, PBL).

An additional possibility is that there are not enough South Australians considering a career in dentistry. Most students studying dentistry at Adelaide who are from other Australian states are predominantly from the eastern Australian states of Victoria and New South Wales. The populations of these states are much larger than in South Australia and it would be highly competitive to gain entry to Melbourne and Sydney dental schools given that the number of places for first year is similar to that in Adelaide. Results from this current study provide evidence that students from other parts of Australia are more likely to choose to study dentistry interstate eg, Adelaide, because they have missed out on entry to a local dental school than South Australians moving interstate to study dentistry (Chapter 3, section 3.5.5). Furthermore, entry to the Sydney dental school is via graduate-entry, thus school leavers who want to enter a dental course immediately after finishing school may opt to apply to a dental school that offers undergraduate entry eg, Adelaide. In addition, another possible reason why there may be more students from these two Australian states studying in Adelaide is the close geographic proximity of Adelaide to Melbourne and Sydney. Residents of Queensland may prefer to apply to the dental schools in Sydney, or more recently Griffith, which are geographically closer than Adelaide. Thus the number of applicants for the Adelaide dental course from Melbourne and Sydney may be proportionately high, increasing the competition for South Australian applicants.

During 1998-2001, international students comprised 22% of Adelaide dental student body. The number of international students admitted to Adelaide is influenced by a quota system. Hence, as expected, there was no difference in the numbers of international students prior to and after the introduction of the multifaceted admission process. Since 2003 there have been changes to the overall number of students admitted to the Adelaide dental course with increased places for Australian and international students. Preliminary analysis indicates that during 2003-06, international students at the Adelaide School of Dentistry comprised 30% (n=87) of the total (n=289) student population. This increase is similar to trends across the Australian higher education sector. International students (including New Zealanders) commencing first year (undergraduate and post-graduate courses) in Australian universities in 2006 comprised 29.2% (DEEWR 2007) of the total first year intake. This is a 9% increase from 2001 (DEST 2002). Furthermore, preliminary analysis also indicates that during 2003-06, non-South Australian students at the Adelaide School of Dentistry comprised 48% (n=138) of the total (n=289) student population.

Approximately 13% of Australian students commencing the Adelaide dental course during 1998-2001 were originally from rural areas of Australia. This is fairly similar to the numbers of rural dental students studying in Queensland (14.5%) and New Zealand (10.8%) and higher than those reported in Sydney (2.9%), Melbourne (7.8%) and Western Australia (4.9%) (Marino et al. 2006). It is interesting to note that the numbers of rural students studying at Adelaide in all year levels during 2002 was only 3.7% (Marino et al. 2006). This is considerably lower than the findings in the current study

despite an analogous method of assigning rurality, via use of Australian post codes (Marino et al 2006). The disparity however may be accounted for by data collection methods, with the current study reporting data on all students admitted to the Adelaide dental course using admission records, whereas data for the study of Marino et al. (2006) were collected via surveys. Nonetheless, the proportion of Australian rural students undertaking the Adelaide dental course is low. The proportion of Australian rural medical students during 1997-2000 was substantially higher (20 to 22%) (Turnbull et al. 2003) than the reported proportion of Australian rural dental students during a similar period. This is a curious difference given that both the Adelaide medical and dental admission processes were changed to the same multifaceted admission process at the same time and that there were no quotas or special strategies to recruit rural students to medicine (Turnbull et al. 2003). It has been suggested that the removal of prerequisite subjects, the change to a multifaceted admission process, and increased public information sessions, are possible reasons for the increase in numbers of rural medical students (Laurence et al. 2002; Turnbull et al. 2003). Specific reasons why there may be few rural dental students may relate to limited role models available within the dental profession in rural locations. There have also been suggestions that potential rural dental students may be disadvantaged in being able to access or afford 'coaching' sessions for the UMAT test compared with metropolitan counterparts (Hutton 2006). Further research as to why there are relatively high numbers of non-South Australians and relatively few rural students being admitted to the Adelaide School of Dentistry is warranted.

4.6.2 Performance on admission criteria

As expected, Adelaide dental students who were admitted via a multifaceted process (1998-2001) performed very well on the admission criteria. There was a narrow spread of admission scores in particular for the TER score and the admission interview. The spread of UMAT scores was broader. This is most likely due to the size of the applicant pool within a given year. Only those students with highest attainment on dental admission criteria would be eligible to gain entry. To qualify for an admission interview, Adelaide dental students must rank within the top performers in the UMAT. The range of scores in the UMAT varies depending on the size of the applicant pool within a given year. Subsequently potential Adelaide dental students must receive a minimum of 90.00 TER score and be rated at least 'adequate' on the admission interview to be eligible for an offer. It is therefore, not unexpected that there is a narrowly restricted range of dental admission scores for those admitted to exist, as compared with the total applicant pool (Ranney et al. 2005).

Whilst the current study did not examine the performance on the admission interview of all applicants who applied during 1998-2001, it did find that of those students who accepted offers into the Adelaide dental course, females were more likely to have performed better on the admission interview than males. A gender difference in the admission process, in favour of females, has also been noted

amongst UK dental applicants. Female applicants were more likely than males to be successful in gaining a position (Newton et al. 2003). These authors however did not collect data on whether the applicants had undertaken an interview or whether there were differential outcomes of an interview between male and female applicants. In the current study involving a multifaceted process that also assesses applicants' personal qualities, it is suggested that females may project themselves better (be more mature) during an interview process (Duguid and Drummond 2000). The current study also found that females were more likely to perform better on the communication attribute of the admission interview than males. Hence it could be further suggested that female applicants were more articulate and personally effective than males. There was no gender difference amongst those students who were admitted to the Adelaide dental course during 1998-2001 on TER achievement or UMAT performance. This is in contrast to others who have reported that, on average, Australian female university had slightly higher TER scores than males (Marks et al. 2001). Hence, the hypotheses [7.1 and 7.2] that female dental students are more likely to perform preferentially better than males on some admission criteria can be supported. The hypotheses [7.3 and 7.4] that there are unlikely to be differences in achievement on admission criteria (TER, UMAT and admission interview) between school leavers/non-school leavers; and South Australians/other Australians/international students can also be supported.

The current study found there was no difference in TER scores between those Australian school leavers who had attended non-government and government secondary schools. This is in contrast to Marks et al. (2001). The hypothesis [7.5] that Australian school leavers (commencing dental studies at Adelaide during 1998-2001) who studied at non-government secondary schools are more likely to perform preferentially better on admission criteria (TER score) than those who attended government schools cannot be supported. Those who studied in government schools however, performed better on the UMAT than non-government schools. Hence, the hypothesis [7.6] that there is unlikely to be a difference between the type of secondary school, Australian school leavers attended and performance on the UMAT cannot be supported. There was no difference in the performance on the admission interview between Australian school leavers who attended non-government or government schools, hence the hypothesis [7.7] can be supported. However, caution is needed in interpreting this finding given that performance on admission criteria of the total applicant pool was not gained in the current study. Research using future cohorts of Adelaide dental students and the total applicant pool would be useful.

4.7 Conclusions

There was a significant increase in the proportion of female students and a decrease in the proportion of school leavers in the Adelaide dental course during 1993-2001 (excluding 1998) compared with 1983-86. Career preference and broadening of access to higher education may account for these

changes rather than changes to the admission process. This may pose an equity issue in terms of admission to dentistry of male students. However, further research is needed using data from the total applicant pool is needed before any definitive conclusions can be drawn. The feminisation of the Adelaide dental course, if repeated in other dental schools may have future workforce implications.

The majority of Australian school leavers (1998-2001) had attended non-government secondary schools. This may pose an equity issue in terms of admission to dentistry of students from lower socioeconomic backgrounds. Many Adelaide dental students (1998-2001) were non-South Australians and there were also few students (1998-2001) from Australian rural backgrounds. These observations may have implications in terms of transition of students to a new environment and academic success. In addition, these results, if similar in other dental schools may have future Australian dental workforce planning implications.

Previous academic achievement (TER score) of Australian school leavers who had gained entry (during 1998-2001) to the Adelaide dental course was very high and within a narrow range. Achievement of Australian school leavers on the UMAT was broader. Most Adelaide dental students admitted via the multifaceted process (1998-2001) were rated as 'good' applicants on the admission interview. Hence, those admitted to the Adelaide dental course during 1998-2001 have the potential to be successful academically during the first three years of the course. Academic success and factors that may be associated with/or predictive of academic success of Adelaide dental students during the early years of the course will be discussed in the next chapter.

5.1 Introduction

Chapter 5 will discuss the academic success and difficulties encountered by Adelaide dental students during the early years of their course and factors which influenced their academic progression. Specifically, quantitative measures of students' academic success (progress and performance) will be evaluated, together with three groups of 'pre-admission' factors (student characteristics, cognitive ability and personal characteristics) and one 'post-admission' factor (academic achievement in first year). Other post-admission factors that influence academic success include non-academic experiences, such as paid work, participation in extracurricular activities and living arrangements; and students' perceptions of factors that relate to success and difficulties. These factors will be discussed in Chapters 6 and 7 respectively. In addition, changing levels of success of Adelaide dental students linked with changes in the admission process and learning and teaching practices will be examined in this chapter.

A main aim of admission processes in health profession courses is to select, from a large applicant pool, students most likely to succeed in their course and, hopefully, in their chosen profession. Historically admission to medicine/ dentistry has been highly competitive due to a greater number of applicants compared with positions available (Adkins et al. 1982; Powis 1994; Röding 1997; Drummond and Duguid 1997; De Ball et al. 2002; Mullins et al. 2003; Turnbull et al. 2003). Such admission processes are often complex and resource intensive. Moreover, despite previous high achievements, not all students admitted into medical (Powis et al. 1988; Collins and White 1993; Simpson and Budd 1996; James and Chilvers 2001; Iputo and Kwizera 2005) and dental courses (Barnard et al. 1967; Cooper and Spencer 1987; Jacobsen 1987; Susarla et al. 2003; Heintze et al. 2004) will be successful academically. Poor academic progress or performance has negative consequences for the student, the institution and the community.

During the 1990s several changes occurred in the Adelaide School of Dentistry. In 1993, its dental curriculum was changed from conventional to hybrid PBL and a new admission process was implemented in 1997 (Mullins et al. 2003). The previous Adelaide admission process had only assessed applicants on their previous academic achievement. Given competition for admission was fierce, only those candidates with very high matriculation scores were eligible for selection. As such, potentially good students were missing out on gaining entry to the course. In addition, it was perceived that admission based on academic achievement did not assess other attributes considered to be important for dental practice and thrive in a PBL environment (Mullins et al. 2003). The revamped admission process consisted of a multifaceted 3-step process which included a cognitive (aptitude) test and assessment of personal characteristics via a structured admission interview. There has been limited systematic or longitudinal research exploring factors affecting the academic success of dental students in Australia. Preliminary evaluation of the first intake of students admitted under the revised admission process showed that students performed at least as well in examinations and tests and there was no

change in failure rates of first-year students compared with those admitted on academic grounds alone (Mullins et al. 2003). This chapter will take that evaluation further.

5.2 Literature review: academic success and difficulties

As the focus of the current study was on quantitative measures of academic success or difficulties (progress and performance), the following literature review will discuss these measures for university students, the impact of poor academic progress or performance, and factors (pre-admission and one post-admission factor) that influence academic success. The discussion will be restricted to findings from the dental and medical education literature with some reference to the allied health and higher education literature. In addition, the discussion will be restricted to measures of success used during courses within tertiary institutions. Success on licensing examinations will not be discussed.

A variety of terms has been used to describe academic success and difficulties and a variety of measures have been used to describe them. Based on a review of the literature, there are, two broad categories of terms related to academic success: academic progress and academic performance (Figure 5.1). Most student difficulties are notionally encountered in the early years, with the frequency of both medical (Powis et al. 1992; De Clercq et al. 2001) and dental (Jacobsen 1987; Scheetz 1987) students experiencing difficulties diminishing as they progress through their respective courses.

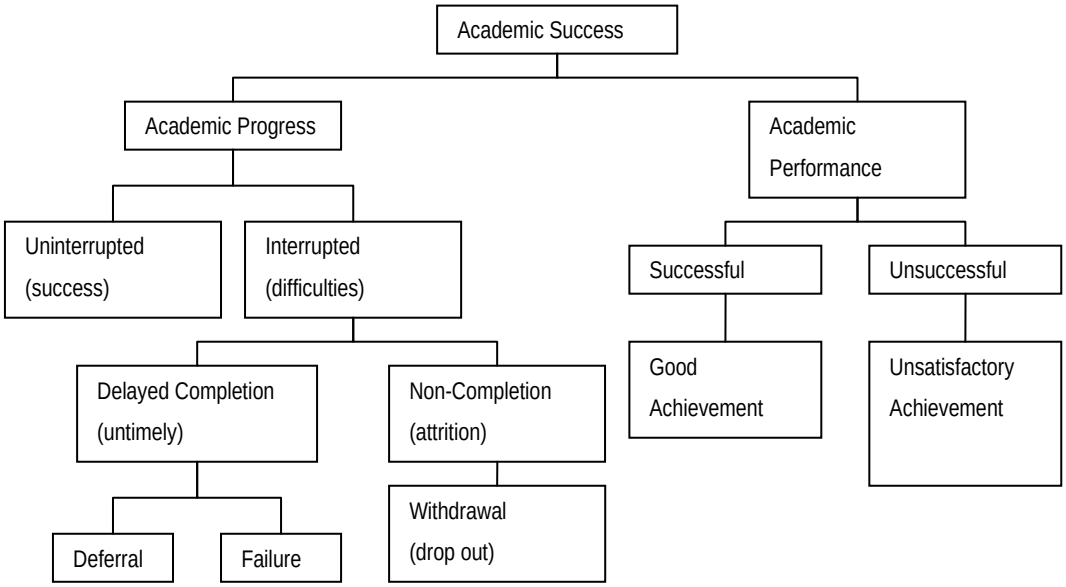

Figure 5.1 Summary of terminology used in the literature to describe quantitative measures of academic success and difficulties

5.2.1 Academic progress

University students' progress through a course may be categorised as uninterrupted or interrupted. Successful completion of each academic year results in uninterrupted progress (timely

completion) (Figure 5.1). In contrast, interrupted progress results in prolonged or delayed completion, or non-completion. A range of measures has been used to quantify academic progress for research purposes eg, pass versus fail; completion rates; time to complete; drop out rates; and attrition rates (Appendix Table 5.1).

5.2.1.1 Interrupted progress: academic failure (delayed completion)

Academic failure is usually described as the unsatisfactory completion of course requirements within a given academic year. Tertiary students who have failed an academic year for the first time are usually permitted to return the following year and repeat coursework. Students who have failed more than once during a course, or failed the same academic year twice, are variously dealt with depending on the assessment policy of the institution.

Many students have been admitted into conventional medical (Powis et al. 1988; Turnbull et al. 2003) and dental (Barnard et al. 1967; Jacobsen 1987; Lynch et al. 2006) courses solely on the basis of past secondary school academic performance. Those who have been admitted under these circumstances have attained high academic standards, and were perceived to be prime candidates to succeed. But some failed to achieve course requirements (Powis et al. 1988; Simpson and Budd 1996). Indeed in the past (1960s, 70s and 80s) failure rates amongst dental students were very high eg, 50% of Australian dental students in the 1960s failed at least one year during their conventional course (Barnard et al. 1967). In Adelaide, 40% of students enrolled in a conventional course during 1983 to 1986, failed first year (Cooper and Spencer 1987). The high failure rates of dental students who had undertaken conventional curricula may be due to particular features of these curricula eg, discipline based organisation of the curriculum, high formal contact hours, large course workload, little exposure to clinical work in the early years and delivery, and assessment of course material that promotes narrow, minimalist approaches to studying (Smales 1977; Ramsden 1992; Townsend and Burgess 1993; Kember 2000). In contrast, recent research has revealed that implementation of a PBL dental course was associated with higher graduation rates and lower attrition rates (Susarla et al. 2003).

5.2.1.2 Interrupted progress: deferral (delayed completion)

Deferral is a term used to denote situations when students take a transient break from study. Reasons for deferral may include non-academic (personal, health, family and financial problems) and academic factors (failing to complete course requirements and taking a year off before returning and passing a year but finding it academically demanding and deciding to take a year off). In contrast with available data on withdrawal rates (refer to next section) there are limited data on the frequency of deferrals by university students. The deferral (temporary interruption) rate amongst Swedish dental

students was reported to be 23% (Heintze et al. 2004). There has been no previous published information on deferral rates of Australian, and in particular Adelaide dental students.

5.2.1.3 Interrupted progress: withdrawal (non-completion)

Non-completion of a tertiary course can be described as occurring when students commence studies and then, at some point during the course, withdraw (drop out) or do not complete course requirements and thus do not obtain a qualification. Discontinuation of university studies may be voluntary or involuntary (ie, due to failure or exclusion as per assessment policies) (Johnes 1990; Simpson and Budd 1996; Blunden 2002). Attrition tends to be particularly problematic for first-year university students. In Australia, withdrawal rates amongst first-year students were over 20% (for all years 1994-2002) compared with 10 to 11% withdrawal rates amongst second-year students (Lukic et al. 2004a). Among health profession courses, however, withdrawal rates may not be as high (Shah and Burke 1999), particularly for more recent cohorts. For example, among medical students in the UK, US and Australia, withdrawal rates were respectively 14% (Simpson and Budd 1996), 7.2% (James and Chilvers 2001) and 1 to 2% (Durkin et al. 2003). Similarly, for dental students, Scheetz (1987) reported only a 10% attrition rate in each class over the four years of the course. More recently, a US review report revealed that withdrawal rate amongst dental students was 1.3% (Ranney et al. 2005). And in the UK, between 8.4 to 16.8% (72 to 142 non-completing students during 1984-1990) of dental students were reported to have dropped out (Drummond and Duguid 1997). While the overall academic success of Adelaide dental students has been reported, no information concerning withdrawal rates has been published (Cooper and Spencer 1987).

Academic and non-academic reasons have been cited to explain non-completion of tertiary studies (Table 5.1). Other more general reasons for non-completion of dental studies have included: being dismissed for disciplinary reasons; unwillingness to endure the tension of a dental curriculum; lack of interest; transferring to another dental school; decreased career opportunities (DeMarais 1977; Heintze et al. 2004); and low intellectual stimulation or inferior educational aspects of a conventional dental curriculum (Jacobsen 1994). Non-academic reasons have tended to be more influential in the decision of tertiary students to withdraw from university (Aldridge and Rowley 2001) whereas medical students have cited both academic and non-academic reasons equally as frequently for non-completion (Collins and White 1993; James and Chilvers 2001).

Table 5.1 Reasons for withdrawal (drop out) from university, medical and dental courses

Factors	
Academic	Increased scientific content in dental courses [4,6]
	Problems in non-clinical/academic subjects or practical/technique subjects [1]
	Academic failure/ dismissed due to poor academic performance [2,3,5,7,9,10,12]
	Discontinuing after being asked to repeat a year [12]
	Course too difficult/less academically able [2,5,7]
	Poor study habits/ lack of personal maturity or skills for university studies [4,5]
	Poor quality university experience; unhappiness with the environment at university [1,2,3,4,5,8,9,11]
Non-academic	Financial problems eg, inability to pay tuition fees [2,6,7,8,10,12]
	Loss of career motivation or change of career objective/transferring to another course/pursuing another career [1,2,3,4,5,6,7,8,9,11]
	Personal problems eg, poor health, family problems, social problems, maternity, travelling difficulties, accommodation issues [1,2,3,4,5,8,9,11]

DeMarais (1977)[1D]; Johnes (1990)[2HE]; Collins and White (1993)[3M]; Jacobsen (1994)[4D]; Simpson and Budd (1996)[5M]; Drummond and Duguid (1997)[6D] ; Yorke (2000)[7HE]; Aldridge and Rowley (2001)[8HE]; James and Chilvers (2001)[9M]; Bennett (2003)[10HE]; Heintze et al. (2004)[11D]; Iputo and Kwizera (2005)[12M]

HE: higher education; M: medical education; D: dental education

5.2.1.4 Frequency of completion and non-completion (attrition)

Timely or delayed completion and non-completion are usually measured as the percentage of students who fail to complete within the allocated time or do not complete their course. Within the literature, there are marked variations in the frequencies of university students who have successfully completed their course on time, had delayed completion or did not complete their course. These variations include differences between cohorts for the same year level in the same course, between the same courses offered at different institutions, and between courses. As different outcome measures for completion or non-completion have been used, direct comparisons between studies are difficult (Table 5.2).

Table 5.2 Completion/non-completion rates of students in medical and dental courses (from selected studies)

Academic Progress	Cohort; University; Type of admission and curriculum	Reference
58.1% completed first-year at the first attempt 28.6% completed on time	- 1983-86 - School of Dentistry, University of Adelaide; Australia - Conventional admission - Conventional curriculum	Cooper and Spencer (1987)[D]
22.9% did not pass course 16.1% prolonged time to complete course 16.8% dropped out of course	- 1982-86 - Oslo Dental Faculty; Norway - Conventional admission - Conventional curriculum ?	Jacobsen (1987)[D]
74.5% graduated on time 19.8% average attrition	- 1980-2002 - Harvard; USA - Multifaceted admission - Hybrid PBL curriculum	Susarla et al. (2003)[D]
46% completed on time 31% dropped out 23% temporarily interrupted then returned 12% failed and had to repeat	- 1996-97 - University of Malmo; Sweden - Conventional admission - PBL curriculum	Heintze et al. (2004)[D]
9.5% did not complete the course (36.6% withdrew in Yr 1)	- 1968-93 - University of Auckland, New Zealand - Multifaceted admission - Conventional curriculum	Collins and White (1993)[M]
7.2% withdrew (3.6% did not complete Yrs 1,2,3) (3.6% did not complete Yrs 4, 5)	- 1986-90 - UK - Conventional admission - Conventional curriculum ?	James and Chilvers (2001)[M]
67% graduated on time 10.3% dropped out	- 1989-2002 - University of Transkei, South Africa, Faculty of Medicine - Conventional admission - PBL/community based curriculum	Iputo and Kwizera (2005)[M]

M: medical education; D: dental education
? = not clear if conventional or student-centred curriculum, most likely conventional

5.2.2 Academic performance

There is no single universal measure which has been utilised to quantify academic performance. Each institution has its own assessment policy that determines the type and form of formative and summative assessment used during the course and the method of final summative assessment that is used for university administrative purposes. This has impacted on the types of outcome measures used for research, a summary of which is given in Table 5.3.

Table 5.3 Quantitative measures of academic performance used in education research

Measures of academic performance
Individual subject performance [1,5,21] (Grade Point Average; grade/score/mark; examination performance)
End-of-semester performance [18,25] (Grade Point Average; grade/score; examination performance)
End-of-year performance [1,2,3,5,7,8,9,10,11,12,15,16,17,20,19,21,24] (Grade Point Average; grade/score/mark; examination performance)
Categorisation of progress or performance [7, 12, 23, 26] (higher versus poorer performers; graduate with/or without difficulty versus being dismissed versus withdrawing; underachiever versus normally tracked; being on probation versus dismissal versus repeating due to poor performance versus graduating on time versus non-academic delay or withdrawal)
Preclinical performance (early years) [4,6,7,13,14]
Clinical performance (senior years) [4,6,7,22] (Clinical Grade Point Average; performance in clinical procedures or treatments; clinic productivity; staff ratings; self-ratings; peer ratings)
Objective structured clinical examination performance [18]
Clinical reasoning performance [23]

Barnard and Siu (1966)[1D]; Kress and Dogon (1981)[2D]; Staat and Yancey (1982)[3D]; Walker et al. (1985)[4D]; Kramer and DeMarais (1986)[5D]; Potter (1986)[6D]; Jacobsen (1987)[7D]; McManus et al. (1996)[8M]; Al-Nasir et al. (2001)[9M]; McKenzie and Schweitzer (2001)[10HE]; Boyle et al. (2002)[11HE]; Sandow et al. (2002)[12D]; Coy et al. (2003)[13D]; Oudshoorn (2003)[14D]; Craig et al. (2004)[15M]; Zeegers (2004)[16HE]; McKenzie et al. (2004)[17HE]; Haq et al. (2005)[18M]; Julian (2005)[19M]; Tickell and Smyrnios (2005)[20HE]; Lynch et al. (2006)[21D]; Park et al. (2006)[22D]; Curtis et al. (2007) [23D]; Groves et al. (2007)[24M]; Kim and Lee (2007)[25D]; Utzman et al. (2007)[26HE]

HE: higher education; M: medical education; D: dental education

5.2.3 Impact of unsuccessful academic progress and performance

Non-completion of a university course has negative consequences for the student, the institution and the community. From the student's perspective, negative outcomes of non-completion

can include financial costs ie, personal expenses of the student and/or their families (eg, loan repayments) and money invested for which there was no return or reward for the student (Scheetz 1987; Drummond and Duguid 1997; Reberger 2005). Other negative outcomes may include psychological problems such as feelings of shattered aspirations and wasted education (Smith 1976; Scheetz 1987; Drummond and Duguid 1997), lower self-esteem and lower self-confidence (McInnis et al. 2000b), feelings of guilt and shame (Johnes 1990), emotional trauma and feelings of uncertainty (Simpson and Budd 1996). However, for some students non-completion may come as a relief because of their initial poor choice (Johnes 1990; Drummond and Duguid 1997). Students who have failed may need to spend further time undertaking supplementary examinations, remedial courses and counselling. Furthermore, student learning may be compromised. For example, group work may suffer or become disrupted if a member of a group is having academic difficulties or drops out (Bennett 2003).

From an institutional perspective, the provision of tertiary education is expensive (Smith 1976; Spratley 1990; 1992; Johnes 1990), particularly dental education. Students who drop out can create financial difficulties for the university through loss of fee income (McInnis et al. 2000b; Bennett 2003; Reberger 2005). Furthermore, funding of universities is often based on the number of enrolled students (Drummond and Duguid 1997). Hence, funds may not be made available for students who do not complete their tertiary course or who have vacated places (Simpson and Budd 1996; Röding 1997; Yorke 2000). There are also indirect financial costs to the institution such as 'up-front' administration costs associated with enrolling extra students to offset 'wastage' (Bennett 2003). There may be lost resources and time invested in the initial training of students who subsequently withdraw from a course (Simpson and Budd 1996; Bennett 2003). Morale of staff and remaining students may also be adversely affected (Simpson and Budd 1996). Additionally, the reputation of the dental school and/or the university (McInnis et al. 2000b) may suffer if non-completion rates are high and publicly known. This may subsequently translate to a low number of students applying to a particular dental school (Smith 1976; Drummond and Duguid 1997). Resources (financial, personnel and time expended on admission processes) may also be 'wasted' when students do not complete the course. In addition, further staffing and financial resources need to be allocated to those whose academic performance is interrupted by repeating or defering studies eg, providing remedial classes, supplementary examinations and counselling (Massler and Evans 1977; Sandow et al. 2002; Utzman et al. 2007).

From a community perspective, workforce issues may arise with decreased progression rates. Loss of students may represent a loss of future members of the workforce (Peat et al. 2001) leading to reduced numbers of dentists available to serve the needs of the community (Ross 1962; Smith 1976; Drummond and Duguid 1997). In addition, there is a cost to the community (ie, tax-payers) through government funding for places that are lost when students withdraw (Collins and White 1993).

5.2.4 Factors (independent variables) influencing academic success

In order to maximise academic success and minimise difficulties it is important to understand what factors may drive these outcomes. In health education research, examination of factors that may influence academic success has previously been completed as part of validating admission processes, with three types of factors commonly researched: student characteristics; cognitive ability; and personal characteristics. These factors may be considered as 'pre-admission' factors as these characteristics and abilities are what students 'bring with them' prior to commencing dental studies. Another factor used as a surrogate measure of cognitive ability has been academic achievement in first year of university studies. This factor can be described as a 'post-admission' factor.

A large range of pre-admission factors that may influence academic success in dentistry have been investigated (Appendix Table 5.2). The following conceptual model summarises a selection of these factors in terms of independent and outcome variables (Figure 5.2).

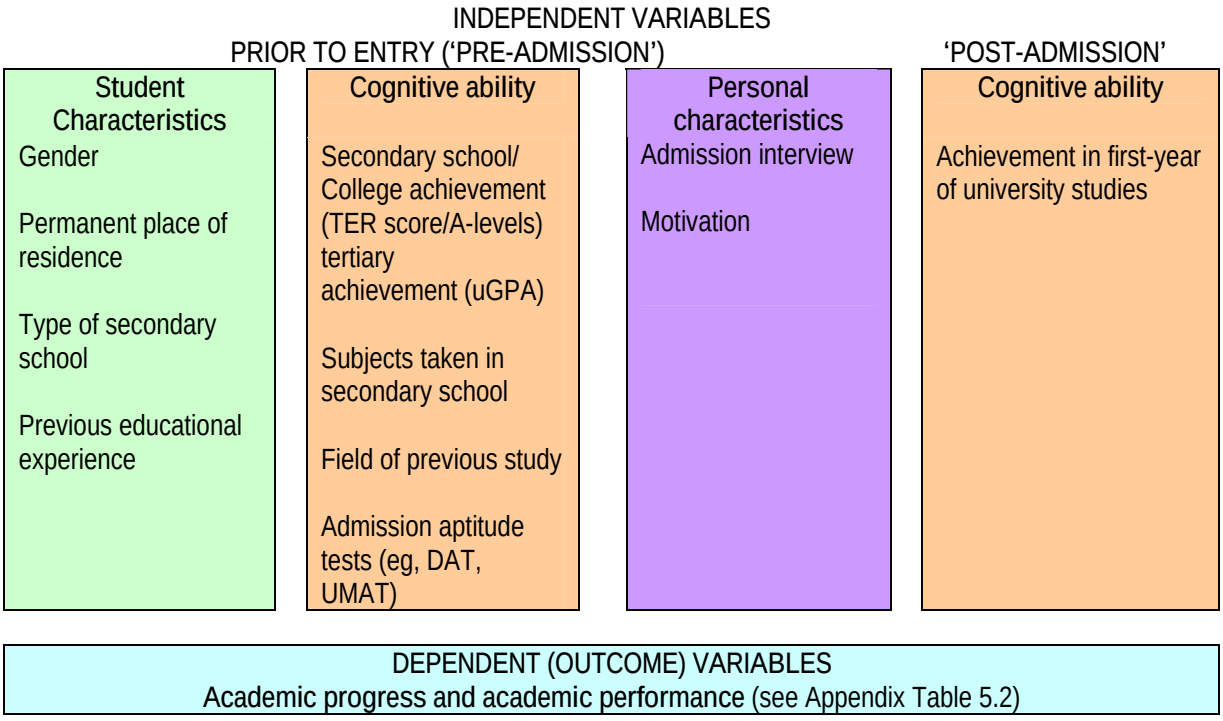

Figure 5.2 Factors that have been investigated when evaluating tertiary students' academic success

TER: Tertiary Entrance Rank; uGPA: undergraduate Grade Point Average; DAT: Dental Admission Test
UMAT: Undergraduate Medicine and Health Sciences Admission test; A-levels: Advanced Level General Certificate of Education

The following discussion will be restricted to factors derived from the literature as influencing academic success which are considered to be relevant to the Adelaide School of Dentistry admission process and also accessible via local admission records (as discussed in Chapter 1, section 1.7.1 and Chapter 2). As discussed in Chapter 1 these will include the 'pre-admission' factors of student

characteristics (gender, type of secondary school, previous educational experience and permanent place of residence); cognitive ability (previous secondary school or tertiary academic achievement, previous subjects studied in the final year of secondary school and performance on admission aptitude tests); personal characteristics (admission interview and course preference); and the 'post-admission' (cognitive ability) factor of performance in first-year dental studies. Socio-demographic characteristics such as: age; ethnicity; deferred entry; field of previous study; and personality tests will not be discussed. Post-admission factors such as participation in paid work, extracurricular activities and type of living arrangements may also influence tertiary students' academic success. These factors will be discussed in Chapter 6, section 6.2. In addition, other student and course factors which can impact on tertiary academic success will be discussed in Chapter 7, section 7.2.

5.2.4.1 Student characteristics

The following student characteristics are discussed in this literature review: gender; type of secondary school attended; previous educational experience; and permanent place of residence, as these are relevant to the Adelaide School of Dentistry admission process. An overview of these particular student characteristics was provided in Chapters 2 (section 2.6.1.2) and 4 (sections 4.2.1-4.2.4). The subsequent literature review will focus on a discussion of their potential role in explaining academic success of tertiary students. Studies reviewed were confined predominantly to the medical and dental education literature with reference, where relevant, to the general higher education literature.

Differences have been reported in academic progress or performance between male and female tertiary students. Several studies have reported that females tend to be more successful academically than males. In terms of academic progress, males at university (Johnes and McNabb 2004) and male medical students (Arulampalam et al. 2004) were more likely to drop out during first year than female students. Female students were also more likely to complete their Australian university course than male students (Shah and Burke 1996; Urban et al. 1999; Marks 2007) and to take less time to do so than male students (Shah and Burke 1996). In terms of academic performance, females have been reported to perform better in university examinations (Hoskins and Newstead 1997; Pargetter et al. 1998; Van den Berg and Hoffman 2005; Win and Miller 2005) and attain honours at the end of medical training (James and Chilvers 2001). In addition, male university students were more likely to fail (Johnes and McNabb 2004) and male medical students were found to have had poorer academic performance (McManus et al. 1996; Wyller and Wyller 2002) than female students. Female UK dental students were less likely to fail than male students (Hoad-Reddick et al. 1999) and male Adelaide dental students have been reported to be more likely to fail during first and second year than female students (Cooper and Spencer 1987). It is unclear if there are any differences in academic success between the sexes for contemporary Australian dental students.

In contrast, to the relevant research above, De Clercq et al. (2001) reported that female medical students did not perform as well as males during first year, and DeMarais (1977) reported more female students dropped out of dental school than males. Furthermore, other studies have found no differences in academic progress (during the preclinical years) between the sexes in a conventional medical (Green et al. 1993b) and dental (Smith et al. 1989) course. There was also no difference in drop out rates between male and female medical (Collins and White 1993) and dental (Jacobsen 1987; Drummond and Duguid 1997) students. In addition, no differences were reported in the academic performance of male and female students in first year (McKenzie and Schweitzer 2001), across an entire university course (Ticknell and Smyrnios 2005), in a graduate medical PBL course (Neame et al. 1992), in an undergraduate PBL medical course (Kay-Lambkin et al. 2002) and in conventional dental courses (Smith et al. 1989; Lynch et al. 2006). From the studies reviewed there is evidence both for and against differences in academic success between the sexes. Female and male students may be equally successful.

Reported differences in academic success between the sexes may relate to differences in learning approaches, the learning environment, and different educational contexts (Wyller and Wyller 2002). Female tertiary students have been reported to have stronger academic orientation and application towards their studies, a stronger sense of purpose, and to be more likely to be satisfied with their university courses compared with male students (McInnis et al. 1995).

There have been differences reported in academic progress and performance between students who have entered university directly from secondary school (school leavers) and those who have had previous tertiary educational experience (non-school leavers). Students with a previous university qualification outperformed those who did not have a tertiary qualification (Dickson et al. 2000; Tchen et al. 2001). Mature-age undergraduate medical students with a prior graduate degree have been also reported to perform better than those without a tertiary qualification, particularly, in the first two years (Montague and Odds 1990) and were less likely to have academic problems (Green et al. 1991). These results contradict the results of Power et al. (1987) who reported school leavers were more successful than those with full or partial previous tertiary qualifications. Supporting this later finding, younger medical students performed better than those who had delayed entry (Parker 1993). Interestingly, James and Chilvers (2001) reported that older, mature or graduate entrants were more successful in obtaining a first-class award but being older, mature or a graduate entrant was also negatively correlated with passing medicine. And yet other researchers have reported no difference in academic progress during a medical course (Neame et al. 1992; Iputo and Kwizera 2005) or in first-year medical school performance (Kay-Lambkin et al. 2002) between school leavers and non-school leavers. On balance, from the studies reviewed there is lack of consensus on differences in academic success between school leavers and non-school leavers.

Differences in academic success at university between school leavers and non-school leavers may relate to adapting to the role of being a tertiary student and the demands of university studies. School leavers are often taught in a programmed way with tests and assignments being set at frequent intervals. This contrasts with the contemporary teaching methods used in higher education in which students are given more independence and personal responsibility for organising their own studies (Yorke 2000). First-year school leavers were reported to have found adjusting to a new environment and being a university student more difficult than mature students with previous university experience (McInnis et al. 1995; Yorke 2000). In addition, they were less diligent in their study habits and less academically orientated (McInnis et al. 1995). It has also been proposed that students who have previously undertaken higher degree studies would be able to adapt more quickly to the university environment and academic demands (Tchen et al. 2001). There have been no recent Australian studies that have examined the relationship between previous educational experience and subsequent dental school performance.

Differences in academic performance and progress have been reported between students who attended government and non-government secondary schools. UK tertiary students who had attended non-government schools had a lower level of academic performance (Smith and Naylor 2001) and were more likely to fail (Johnes and McNabb 2004) than those attending comprehensive (government) schools. Other studies have not found such differences amongst UK medical students (Arulampalam et al. 2004). Within Australia, students who had attended government schools during their final year of secondary school were more likely to have better university academic performance than those who attended non-government schools (Evans and Farley 1998; Pargetter et al. 1998). A previous study of Adelaide dental students reported no association between first-year academic performance and the type of secondary school attended prior to dental studies (Cooper and Spencer 1987). There have been no recent Australian studies that have examined the relationship between type of secondary school attended and subsequent dental school performance. From the studies reviewed there was more evidence that those who had attended government schools tended to be more successful at university than those who attended non-government secondary schools. It is postulated that the school environment and teaching methods of non-government schools are relatively successful in producing good secondary school academic achievement (eg, A-levels, TER scores), which may lead to successful entry to university (Marks et al. 2001). However, these factors may be less successful in preparing students for independent study at university (Smith and Naylor 2001).

Differences in academic success between local/domestic/home and non-local/non-resident (eg, international) students have been reported. Attrition rates were lower for local US first-year university students than non-residents (Murtaugh et al.1999). In addition, international students studying in a UK university were more likely to drop out or fail (Johnes and McNabb 2004) and were also reported to

have not performed as well as local students (ie, more likely to have not received a good degree classification (Smith and Naylor 2001). A similar trend has been reported for an Australian medical course where international first-year students were more likely to have performed 'non-satisfactorily' than Australian students (Kay-Lambkin et al. 2002). There have been limited studies on similarities or differences in academic success of local and non-local dental students. It seems that local students tend to be more successful and international students may encounter academic difficulties. Adjusting to a new country, language and academic system are some of the reasons why international tertiary students may not be as successful academically as local students (Kay-Lambkin et al. 2002).

5.2.4.2 Cognitive ability

Cognition is a general term to describe all the processes involved in knowing/acquiring knowledge (Corsini 1994). Cognitive ability refers to any human characteristic or trait that enables a person to do things with their mind. Thus, intelligence may be composed of a number of interrelated but distinct abilities, all of which involve cognitive processes (Corsini 1994). Within health education literature the terms 'cognitive' or 'academic ability' are often used interchangeably. Measures of cognitive ability have been studied for use as predictor variables of academic success of university students. Such measures have included prior academic achievement, such as final year secondary school examination achievement (A-levels/TER score), subjects taken in the final year of secondary school, academic achievement (uGPA) in college or tertiary studies (other than dental studies), and performance on admission aptitude tests. University admission processes use such scores to select the most suitable applicants for entry to university courses. Conventional admission processes in medicine and dentistry have tended to use a single measure of cognitive ability ie, academic achievement in secondary school or college. Over time, though, it has been difficult distinguishing between the growing numbers of applicants receiving very high A-level scores (McManus et al. 2005) or TER scores (Powis et al. 1988; Mullins et al. 2003; Turnbull et al. 2003) thus making selection of potentially good doctors/dentists difficult. Hence many medical and dental admission processes have incorporated more than one measure of cognitive ability eg, achievement on cognitive admission tests (eg, MCAT, DAT and UMAT).

It is presumed that the quality of students' experiences at university will be influenced by how well they are prepared academically, as reflected by previous educational experience (Murtaugh et al. 1999). Measures of previous academic achievement eg, A-levels, TER scores and uGPA scores, all reflect students' intellectual capacity and accumulated knowledge. It is then assumed that those students with high scores of previous measures of academic/intellectual ability should perform well academically in dental (health profession) courses (Mace and Tira 1999).

For the purpose of this review, A-levels or TER scores will be used to describe achievement at secondary school. Undergraduate Grade Point Average (uGPA) will be used to describe performance for partial or full completion of US college or UK/Australian tertiary studies. Examinations in the final year of secondary school measure achievement or attainment, and assess accumulated knowledge of content in various academic subjects such as chemistry, physics and mathematics (McManus et al. 2003; 2005). This contrasts with aptitude or ability tests which assess cognitive ability independent of content and educational experience (McManus et al. 2003).

In general, research has shown that students who have gained high achievement scores ie, high A-level grades, TER scores or uGPA scores, tend to be more academically successful at university, including medical and dental school, than those with lower achievement scores. A UK study demonstrated a positive association between good A-level performance and degree performance (Smith and Naylor 2001). Voluntary and involuntary non-completion was negatively related to A-level performance (Johnes and McNabb 2004). Several Australian studies have demonstrated clearly that previous academic achievement (TER score) predicts first-year university performance (Evans and Farley 1998; Pargetter et al. 1998; McKenzie and Schweitzer 2001; Tchen et al. 2001). In addition, it was reported that secondary school performance (TER score) also predicted performance beyond first year (predicted completion of bachelor degree) (Urban et al. 1999). Likewise, Australian medical students (all tertiary entrants) who had 'lower' uGPA (less than distinction level) did not perform as well in first year as those with a 'higher' uGPA (De Clercq et al. 2001).

Similar trends have been noted for dental students. US college GPA scores predicted dental school performance especially in basic science subjects (Kress and Dogon 1981). In recent US studies, level of achievement on undergraduate GPA were more consistent predictors of overall dental school achievement (Holmes et al. 2008) or dental school progress and performance in the early and later years (Sandow et al. 2002) compared with an admission cognitive test (DAT). A positive albeit weak relationship (r=0.22) was found between performance of Irish dental students in A-levels and performance in the first dental examination (Lynch et al. 2006). In addition, this study also revealed that A-levels correlated with academic performance in seven of 55 individual dental subjects. These seven subjects were science-based (eg, biochemistry, anatomy) or preclinical subjects. For Australian dental students, a higher level of secondary school achievement was related to better performance in examinations during the course and a lower chance of failing (Barnard and Siu 1966). In a previous study involving Adelaide dental students, whilst it was reported that those students with high matriculation scores performed better in first year, there was no association between matriculation scores and academic performance in the remainder of the course (Cooper and Spencer 1987).

Lack of associations between previous academic achievement and success at university has also been reported. For example, Boyle et al. (2002) found no association between previous school

achievement and final-year university academic performance. In addition, previous school achievement was found to only predict inconsistently (James and Chilvers 2001) or was not associated significantly with medical school performance (Green et al. 1991; Parker 1993) or academic progress in medical school (Powis et al. 1988; Neame et al. 1992). Furthermore, previous academic achievement has been found to display weak or no associations with clinical or final year or practical performance in medical school (McGaghie 1990a and b), other health profession courses (Salvatori 2001) and in dental school (Ross 1962; Lynch et al. 2006). One reason why there may be an absence of correlation between previous secondary school academic achievement and success at university may relate to the lack of similarity between subjects taught at secondary school and university. This premise is supported by research observing positive correlations between TER scores and discipline areas which were similar to subjects taught at secondary school eg, science, but weak or no correlations between TER scores and discipline areas which were dissimilar to subjects taught at secondary school eg, health (Dobson and Skuja 2005). In response to these contrasting findings several review papers have concluded that while prior academic achievement may be the 'best' single predictor of academic performance of health profession students, it does not account for much of the variance in academic performance (Mitchell 1990; Salvatori 2001; Ferguson et al. 2002; Ranney et al. 2005).

Three reasons have been postulated as to why prior academic achievement in secondary school or college may influence academic success in health profession courses. These include student achievement, ability and motivation (McManus et al. 2003). Successful academic achievement in secondary school or college may provide a good background in subjects such as, chemistry, which are relevant to health profession courses like medicine/dentistry. Attaining a high level of achievement in the final year of secondary school (eg, examinations and coursework) may reflect the underlying level of a students' intelligence and thus reflect capacity to do well in university (inclusive of their motivation to continue to succeed at university (McManus et al. 2003). Furthermore, as the style of assessments and examinations used in conventional health profession curricula are often similar to secondary school assessments and examinations (Weiss et al. 1988), students may be adequately prepared.

Differences in academic success of university students have also been attributed to the type of subjects studied in the final year of secondary school and/or the level of achievement in these subjects. The type of subject studied may provide background knowledge for further studies in similar topics at university. In particular, for health profession courses such as medicine and dentistry, the early years (especially ones with a conventional curriculum design) are often dominated by subjects that require students to have a basic understanding of chemistry, physics and biology (Montague and Odds 1990; Gaengler et al. 2002). Consistent with this, science-based subjects have tended to predict preclinical success of medical students (Gough and Hall 1975; Herman and Veloski 1981), in particular biology. Montague and Odds (1990) showed a correlation between performance in medical school and A-level

chemistry and biology but not mathematics, physics or general studies. In addition, first-year medical students who did not have A-level biology or equivalent performed at a significantly lower level than students who had a background in biology. Others have found that those medical students who had received a low score in school biology had difficulties (academic failure) in preclinical examinations in the early years and those who had difficulties continued to do so in later years (Green et al. 1993a). UK dental students who had studied A-level biology were less likely to fail first year (Hoad-Reddick et al. 1999). More recent studies are consistent with the earlier findings, namely, high grades in chemistry and biology predicted success of medical students (James and Chilvers 2001) and medical students who scored well in biology, chemistry or physics during the final year of secondary school had a 10% less chance of dropping out (Arulampalam et al. 2004). Thus the student who is not exposed to biology at secondary school may have difficulty in understanding the concepts of the biological sciences in their medical (Montague and Odds 1990) and dental (Gaengler et al. 2002) course.

Other studies, however, have contradicted the above findings. For example, no relationship was identified between types of subjects studied in the final year of secondary school and the level of performance in these subjects at university (Smith 1998; Boyle et al. 2002). Similarily, medical students without a previous science background performed just as well as those with a science background (Yens and Stimmel 1982). In addition, the previous study of chemistry, physics or biology was also not associated with academic performance of a cohort of Adelaide dental students (Cooper and Spencer 1987). Hence there is inconclusive evidence that the type of secondary school subject is predictive of university academic success. Those who have/have not studied biology, chemistry or physics may be equally successful. This lack of association may reflect differences in curriculum design and context, assessment processes and student/staff expectations between secondary and tertiary studies.

Admission aptitude tests are designed to measure intellectual capabilities of thinking and reasoning, particularly logical and analytical reasoning ability (McManus et al. 2005). Intellectual aptitude tests may assess both “fluid intelligence (logic, critical reasoning or intelligence as a process) and crystallised intelligence (intelligence as knowledge consisting of general culturally acquired knowledge)” (McManus et al. 2005 pp556-557). Aptitude may also refer to non-cognitive abilities such as personality (McManus et al. 2005). The Adelaide dental admission process does not include an assessment of applicants’ personalities via the use of purposefully designed standardised personality tests. Thus the following literature review will focus on admission aptitude (cognitive) tests. Standardised personality tests will not be discussed.

Admission aptitude tests are standardised tests and a variety of these tests have been used in admission of students to health profession courses (Appendix Table 5.3). In Australia the UMAT test is used for entry to various undergraduate dental courses (a detailed discussion of the UMAT was presented in Chapter 1, section 1.3.2.1).

There has been mixed evidence on the predictive validity of admission aptitude tests and performance in medical or dental school. Several studies have found positive associations between the Medical College Admission Test (MCAT) and medical school performance (Cariaga-Lo et al. 1997; Koenig et al. 1998). Dental studies have also reported positive associations between achievement on the Dental Admission Test (DAT), in particular the Academic Average (AA) component score and dental school performance, including basic science subjects (Kramer 1999) or in the early years (Smithers et al. 2004). In addition, DAT has been shown to predict academic progress through dental school eg, the DAT (AA) was the only predictor variable that distinguished between graduation and non-graduation through a US dental course (Scheetz 1987). Students with lower DAT scores were also more likely to have difficulties with academic progress ie, dismissal, repeating and remediation than those with higher DAT scores (Sandow et al. 2002). There is limited published research on the UMAT and subsequent performance of students in Australian dental schools.

Whilst there is some evidence that admission aptitude tests predict medical/dental school performance in the early years, the ability of these tests to predict clinical performance (often in the later years) has been questioned. No association was found between the MCAT and clinical performance (Murden et al. 1978). Similarly, the DAT has been reported to be a less reliable indicator of dental student performance in the clinical years compared with performance in the early years/preclinical years (Sandow et al. 2002; Smithers et al. 2004).

In medical and dental schools with conventional curricula, the first few years tend to be heavily weighted towards basic science ('academic') subjects. Thus the results described above seem to imply that MCAT and DAT(AA) measure aptitude (eg, knowledge and problem-solving) for mastering the academic portion of medical or dental curricula (Scheetz 1987) compared with measuring clinical skills and clinical knowledge (eg, interpersonal skills, fitness for patient management) (Sandow et al. 2002). In addition, the combination of two measures of cognitive ability ie, previous academic achievement (eg, uGPA) and admission aptitude tests: MCAT (Julian 2005) and DAT (DAT-AA or other DAT subscores) (Dworkin 1970; Staat and Yancey 1982; Kramer 1986; Bennett and Boyd 1990) have been found to provide better prediction of medical and dental academic performance.

Early academic achievement (eg, in first year) within a tertiary educational course has been shown to be predictive of subsequent academic progress (eg, non-completion: Johnes 1990; and retention: Murtaugh et al. 1999) and academic performance (university students: Zeegers 2004; Tickell and Smyrnios 2005; dental students: Curtis et al. 2007). In addition, the anecdotal views of academic staff indicate that Adelaide dental students who have academic difficulties in first year are more likely to have difficulties later in the course. Indeed, academic achievement in first year may be a better predictor than previous secondary school achievement (eg, A-levels) (Johnes 1990) or previous US college experience (eg, uGPA) (Curtis et al. 2007). One explanation of why this might be the case is

that the environment of assessment and learning outcome measures is likely to be more similar between first and later years at university compared with that between previous secondary school and university (Curtis et al. 2007).

5.2.4.3 Personal characteristics

Success in medical (health profession) courses requires not only cognitive ability but a variety of personal characteristics (Powis 1994). Personal characteristics are often referred to in the literature as non-cognitive, non-academic, qualititative, psychosocial or humanistic characteristics or variables. These characteristics have been defined as "features of an individual's character, personality, personal or social history that contribute to success of medical students and physicians" (McGaghie 1990b p145). Over 80 personal characteristics have been cited in the literature (Albanese et al. 2003). Students' personal characteristics are thought to relate to dental school success in both conventional curricula (Walker et al. 1985) and student-centred learning curricula (eg, PBL) (Pereira 1998) as well as clinical environments (Röding 1997; Pereira 1998).

Common personal characteristics that have been assessed in health profession admission interviews include interpersonal skills and communication, professionalism, motivation, decision making, teamwork and capacity for independent learning (Table 5.4). The multifaceted Adelaide admission process utilises an admission interview to assess personal characteristics of potential applicants (for details refer to Chapter 1, section 1.3.2.2). The use of an admission interview to assess personal characteristics is discussed further in the next section. Studies that have used admission interviews as part of simulated admissions tests, as opposed to use of an admission interview as part of the actual admission process, will not be included in this discussion (eg, Gafni et al. 2003; Heintze et al. 2004; Smithers et al. 2004; Eva et al. 2004).

An admission interview is often used as the main method for assessing personal characteristics and admission committees often place emphasis on the information gained from interviews in admission decisions (Albanese et al. 2003). Admission interviews used by health profession admission committees vary widely in their composition (structured, semi-structured or unstructured), format (one-on-one, panel of assessors or multiple-mini interview), the amount of time spent training assessors, and the personal characteristics being assessed (Salvatori 2001). The Adelaide School of Dentistry admission interview (at the time of the current study) was a structured 45 minute interview with 15 minutes allocated to scoring. Two trained interviewers assessed six personal characteristics (for further details refer to Chapter 1, section 1.3.2.2).

Table 5.4 Personal characteristics assessed in dental and medical admission interviews (from selected studies)

Personal characteristics
Endurance, tenacity, emotional stability, integrity, personal motivation[2]
Professional attitude, communication skills, team and leadership experience, non-academic interests, evidence of manual dexterity (attitude compared with ability), awareness for need of Hepatitis B immunisation[3]
Professional manner, maturity, motivation and clarity of expression, dental related experience[4]
Sense of vocation, motivation and commitment within the context of dentistry; good communication skills a sense of caring, empathy and sensitivity, decision making, teamwork, appreciation of role of research in dentistry[6]
Compatibility with the course, motivation to become a doctor, tolerance of ambiguity, supportive and encouraging behaviour, communication and personal effectiveness[1]
Communication skills, cognitive style, decision-making ability, cooperativeness and participation, motivation, personal attributes (empathy and self-awareness) [5]

Powis et al. (1988)[1M]; Röding (1997)[2D]; Hoad-Reddick and Macfarlane (1999)[3D]; Sandow et al. (2002)[4D]; Groves et al. (2007)[5M]; University of Sydney (2008)[6D]
M: medical admission; D: dental admission

Various personal characteristics assessed in admission interviews have been reported to be linked to academic success. Maturity, non-academic achievement, motivation for medicine and rapport were correlated with internship rating (Murden et al. 1978). Low scores on a range of personal attributes namely: compatibility with the medical course; supportive behaviour; motivation; and self-confidence were associated with failure to complete a medical degree, whereas high scores on perseverance and self-confidence attributes were associated with graduating with honours (Powis et al. 1988). Students whose motivation to study medicine was predominantly influenced by family members rather than personal choice (as described via informational statements from an admission process) were reported to be less likely to perform well in second and third year (Elam et al. 1997). Dental students with high leadership scores were less likely to fail examinations in first year (Hoad-Reddick and Macfarlane 1999). Those judged as quiet or shy in interpersonal behaviour and manner had poorer performance in third year (Elam et al. 1997). Overall, several of these studies (Murden et al. 1978; Powis et al. 1988 and Elam et al. 1997) revealed that being motivated to become a health practitioner seems to be a personal characteristic that is consistently associated with academic success.

Admission interviews aim to assess personal qualities that are associated with being a good dentist or doctor and do not measure academic ability. Thus those who have performed well on an admission interview may be more successful in the early years and in clinical subjects and there is

unlikely to be associations between admission interview performance and science-based/preclinical subjects in the early years of medical/dental courses.

Within the literature there is some evidence that performance on an admission interview can predict subsequent medical/dental school success. Medical students who performed well in an admission interview were more likely to graduate with honours (Powis et al. 1988) while those who performed poorly on an admission interview were more likely to fail (Powis et al. 1988). In addition, medical students who received negative assessor comments were more likely to withdraw (Powis et al. 1992). Likewise, dental students who performed well in an admission interview were: less likely to drop out (Röding 1997); less likely to fail examinations in a first year PBL curriculum (Hoad-Reddick and Macfarlane 1999); and performed better in integrated examinations in first and second year and traditional examinations in first year (Röding 1997). In contrast, Groves et al. (2007) found no association between performance on an admission interview and second-year medical exam performance. Furthermore, one group of researchers found mixed results. Sandow et al. (2002) reported that admission interview scores were the most consistent determinant of dental school academic performance (ie, yearly and final GPA) but they did not find a relationship between admission interview performance and academic progress (ie, those more likely to repeat, remediate or be dismissed).

Given that admission interviews are, in part, intended to assess personal characteristics required to succeed as a clinician, it is presumed that there would be associations between admission interview performance and clinical outcome measures. Several studies confirm this proposition with one study showing no correlation (Basco et al. 2000). A global admission interview rating was associated with medical clinical science grades but not with basic science grades and medical clerkship ratings (Weiss et al. 1988). A positive trend was found between admission interview ratings and clinical as well as academic medical performance (Hobfoll and Benor 1981). Furthermore, a positive correlation was reported between clinical reasoning skills scores (in each year level of a graduate medical course) and admission interview performance (Groves et al. 2003). Admission interview performance has also been reported to be positively correlated with dental clinical performance (during the later years of the course) but not correlated with 'preclinical' (academic) performance, in a conventional dental course (Walker et al. 1985).

In medical/dental schools that have used multifaceted admission processes (eg, assessment of cognitive ability and personal characteristics via an admission interview), performance on the admission interview was found to be a better predictor of academic success than cognitive ability measures (matriculation scores or aptitude tests) (Murden et al. 1978; Powis et al. 1988; Röding 1997). However, others have not confirmed this relationship and have found cognitive ability measures were better

predictors of subsequent medical (Weiss et al. 1988; Al-Nasir et al. 2001) or dental school (Sandow et al. 2002) performance than admission interviews.

As discussed in the previous section, motivation to pursue a career in a health profession may contribute to academic success. Tertiary (McInnis et al. 2000a; Christie et al. 2004) and dental (Coombs 1978) students who are not strongly motivated are less likely to succeed. Course preference, as indicated on students' application forms to dental school may be considered a proxy measure for motivation. If a student is granted entry into a course that is not their first choice, it is plausible that interest in that course may not be as high as someone who has chosen that course as their first choice. There have been no recent studies which have examined the relationship between course preference and academic success of dental students. A previous study of Adelaide dental students found no association between first-year academic performance and course preference (Cooper and Spencer 1987).

5.2.4.4 Academic success in conventional and student-centred dental/medical curricula

Conventional dental curricula, such as the Adelaide dental course prior to 1993, were typically organised into preclinical and clinical years. During the preclinical years students studied the basic and applied dental sciences. During the later years, they were introduced to the clinical disciplines and patient care. There was limited integration between theoretical and clinical aspects of the course. Curriculum design, delivery mode and assessment tended to promote rote learning. Conventional courses also tended to be dominated by high formal contact hours and large course workload (Smales 1977; Townsend and Burgess 1993). Rates of student success were often reported to be low. Failure rates were high and students had to repeat, thus taking longer to complete the course or not completing at all (Barnard et al. 1967; Jacobsen 1987).

Several studies have shown that academic success of students undertaking a student centred-course eg, one with a PBL philosophy, is improved compared with those in conventional courses. Implementation of a hybrid PBL dental curriculum has been reported to be associated with higher graduation rates and lower attrition rates than conventional curriculum (Susarla et al. 2003). Improvements in drop out rates and the number of medical students completing on time have also been reported in a medical PBL/community based curriculum, compared with those in the previous conventional curriculum (Iputo and Kwizera 2005). Furthermore, Casey et al. (2005) reported improved examination performance in a PBL preclinical obstetrics and gynaecology curriculum compared with the previous didactic curriculum.

Features of PBL curricula associated with academic success have included an emphasis on the process of learning and not just the content (Iputo and Kwizera 2005). The close interaction between students and staff, including monitoring of learning processes, giving quicker feedback to students and

facilitating academic development of students (Iputo and Kwizera 2005) may be conducive to success. Furthermore, the co-operative learning in tutorial groups (Iputo and Kwizera 2005), including placing academically weaker students with stronger ones (Iputo and Kwizera 2005), can also foster success.

5.2.4.5 Academic success and dental admission processes

Rates of withdrawal may vary depending on the type of university admission process. Dental students admitted via an 'individualised' admission system that included an admission interview and previous academic achievement were found to withdraw less often (3.3%) during the early years of the course compared with those admitted via a conventional process (ie, based on previous academic achievement) (22.2%) (Röding 1997).

A review of the literature (particularly medical/dental empirical and review studies) has demonstrated variability in the association between pre-admission and post-admission factors and their respective relationships with academic success and difficulties.

Factors for which consistent evidence of association has been demonstrated include: place of permanent residence; type of secondary school attended in senior year(s); prior academic achievement in secondary school (predictive of first year academic success and in science-based/preclinical university subjects); type of secondary school subject (biology); admission aptitude test performance (predictive of first year academic success); admission interview performance (predictive of academic success during the early years and in clinical subjects); and performance in first-year university studies.

Conversely, equivocal evidence exists for: gender; previous educational experience; prior academic achievement in secondary school (not predictive of academic success beyond first year and in clinical subjects); type of secondary school subjects (chemistry, physics); admission aptitude test performance (not predictive of academic success beyond first year and not predictive of clinical subjects); admission interview performance (not predictive of science-based/preclinical subjects); and course preference.

Currently there is limited research on changes in levels of success of students linked with changes in admission processes and learning and teaching practices. Rates of progress of Adelaide dental students who undertook the conventional admission process and curriculum were reported to be poor (Cannon and Makinson 1983; Cooper and Spencer 1987). Initial evaluation of the first intake of students admitted via a multifaceted admission process showed that they performed at least as well or better compared with students admitted on academic merit (Mullins et al. 2003). However, there has been limited systematic or longitudinal research specifically on the factors affecting academic success of dental students in Australia. In addition due to contrasting findings, continued research is required to add to the body of existing evidence on the predictive ability of admission criteria and subsequent university performance. Research into academic success and difficulties experienced and the potential

factors that may influence university achievement, is important from an individual, institutional and community perspective. Understanding what factors influence academic success can be helpful in providing all students with a fair chance of success and improving the targeting of interventions and support services (McKenzie and Schweitzer 2001). Admission processes need to be understood by those involved. They should be evaluated and evidence-based so that informed decisions can be made and to ensure that they are legally defensible (Röding 1997; McManus et al. 2003; Hoad-Reddick and Macfarlane 1999; Lynch et al. 2006). In addition, dental schools invest substantial resources (personnel, time and financial) into the admission process, thus the process needs to be examined in terms of its effectiveness (Gaengler et al. 2002; Stacey and Whittaker 2005).

5.3 Aims, research questions and hypotheses

The overall aim of this part of the study was to investigate academic progress and academic performance of Adelaide dental students (1998-2001) during the early years of a hybrid PBL course. In addition, levels of success of Adelaide dental students linked with changes in learning and teaching practices and admission practices were investigated (by comparing academic progress of these students with two former groups of Adelaide dental students). Moreover, factors that may be associated or predictive of academic progress and performance were explored for students who were admitted during 1993-96 and 1998-2001.

Specifically the aims of this aspect of the research project were to address *Research Question (RQ) 3* ie, *What is the academic success of students in the early years?* and *Research Question 4 (RQ) ie, What factors are associated with/or predict academic success in the early years?*. Sub-questions were also devised and related hypotheses (H) were generated from the literature review (section 5.2). The sub-questions and hypotheses are summarised as follows:

RQ 3.1 How successful academically are dental students selected via a conventional admission process, and undertaking a conventional (1983-86) or hybrid PBL course (1993-96) during the early years?

RQ 3.2 How successful academically are dental students selected via a multifaceted admission process, and undertaking a hybrid PBL course (1998-2001) during the early years?

RQ 3.3 Are there any changes in the level of academic success after the implementation of a hybrid PBL curriculum?

It was hypothesised that:

H 3.1 Progress of students undertaking a hybrid PBL curriculum (1993-96 and 1998-2001) will

improve and there will be a reduction in failure and withdrawal rates compared with a conventional curriculum (1983-86)

RQ 3.4 Are there any changes in the level of academic success after the implementation of a multifaceted admission process?

It was hypothesised that:

H 4.1 Progress of students selected via a multifaceted admission process and undertaking a hybrid PBL curriculum (1998-2001) will improve and there will be a reduction in failure and withdrawal rates compared with students admitted via a conventional admission process (1993-96)

RQ 3.5 What factors are associated with and predict academic progress and performance of students during the early years?

It was hypothesised that:

H 5.1 Gender is not likely to be associated with/or predictive of academic success

H 5.2 Previous educational experience is not likely to be associated with/or predictive of academic success

H 5.3 Students with academic difficulties in first year are more likely to experience academic difficulties in subsequent years

H 5.4 Students with high-ranking performance in the structured admission interview are more likely to be successful in first year and during the early years than those with low rankings

H 5.5 Students with high-ranking performance in the structured admission interview are more likely to be successful in clinical subjects than those with low rankings

H 5.6 Performance in the admission interview performance is not likely to be associated with/or predictive of academic success in science-based dental subjects in the early years

H 5.7 Students who indicate dentistry as their first-preference course are more likely to be successful than those who had chosen dentistry as a lower preference

RQ 3.6 What factors are associated with and predict academic progress and performance of Australian school leavers during the early years?

It was hypothesised that:

H 6.1 Students from government secondary schools are more likely to be successful than those from non-government secondary schools

H 6.2 South Australian students are more likely to be successful than students from other Australian states or overseas

H 6.3 Australian school leavers with high-ranking pre-admission scores (UMAT and TER

scores) are more likely to be successful in first year than those with low ranking scores

H 6.4 UMAT performance is not likely to be predictive of academic performance in second and third year

H 6.5 Students with higher TER scores are more likely to perform better in science-based subjects in the early years compared with those with lower TER scores

H 6.6 TER performance is not likely to be predictive of academic performance in second and third year

H 6.7 Students who have studied biology in secondary school are more likely to be successful in science-based subjects in the dental course than those who have not studied biology

H 6.8 The previous study of chemistry or physics at secondary school is not likely to be predictive of performance in science-based subjects or clinically-orientated subjects in the dental course

5.4 Methods

5.4.1 Study sample

Three study groups made up the sample for this part of the study: Group 1 (CACC); Group 2 (CAHPBL) and Group 3 (MAHPBL). Group 1 formed the smallest part of this the study with data derived from reported findings by Cooper and Spencer (1987). Data concerned with academic progress of students comprising Group 2 as well as factors potentially associated with academic progress were obtained from a retrospective review of available records. Group 3 formed the major part of this study. Academic progress and performance of students comprising Group 3, and factors potentially associated with/or predictive of academic progress and performance, were prospectively examined. Further details of each of the groups are available in Chapter 2, section 2.3.

5.4.2 Independent variables potentially associated with/or predictive of academic success and difficulties

Three groups of variables were examined: student characteristics (gender, previous educational experience, type of secondary school attended in final year and place of permanent residence); cognitive ability (secondary school performance, secondary school subjects, performance in admission aptitude test: the UMAT, and academic achievement in first-year dental studies); and personal characteristics (structured admission interview global rating and performance on six individual categories and course preference). Variables selected were restricted by the nature of the Adelaide admission process and based on several factors reported in the literature. Some of these independent variables were not common to all students within and between Groups 2 and 3 due to modifications to the Adelaide admission process over time. For example, students in Group 2 did not undertake the

UMAT test or the structured admission interview; international students in Group 3 did not have to undertake the UMAT test as part of the admission process. The scores used to determine prior academic performance thresholds also varied for prospective Adelaide dental students. For example, Australian school leavers were selected on their performance in the final year of secondary school (TER score) whereas international school leavers had a different rating which was not convertible to a TER score. In addition, non-school leavers were selected on a score determined by their prior performance at university. Australian students commencing the dental course in 1998 did not have a comparable composite UMAT percentile band or TER score to students who commenced the dental course in 1999, 2000 and 2001 and thus were excluded from analysis of cognitive ability and academic success. Further descriptions of the variables used in this study are available in Chapter 2, section 2.6.1. Year-of-entry into the Adelaide dental course (by students in Group 3) was also used as an independent variable initially, in multivariate analyses (ie, model 2). Year-of-entry was not a predictive factor of academic performance and hence was not used as an independent factor in subsequent multivariate analyses ie, Models 1, 3 and 4 (Refer to sections 5.4.5.3.1, 5.4.5.3.2, 5.4.5.3.3 and 5.4.5.3.4).

5.4.3 Measures of academic success and difficulties (dependent variables: outcomes)

Refer to Chapter 2, section 2.7 for details and rationale of the two general outcome measures used in this part of the study. In summary, academic progress of students was categorised as a binary outcome ie, 'uninterupted' or 'interrupted' progress, during the early years. Academic performance of students was also categorised as a binary outcome ie, 'higher' and 'lower' academic achievers for each academic year and each subject.

5.4.3.1 Academic progress through the early years

End-of-year academic results were analysed and students' academic progress categorised (Group 2: CAHPBL and Group 3: MAHPBL). For descriptive and bivariate statistical analyses, outcome measures were: uninterrupted progress; interrupted progress; withdrawal; deferral; and academic failure. For multivariate analyses (Group 3: MAHPBL) the primary outcome measure was academic difficulty ie, academic failure during the early years of the course.

5.4.3.2 Academic performance in the early years

Students' academic performance (Group 3: MAHPBL) was categorised as a binary outcome: either 'higher' or 'lower' academic achievers. Academic performance was examined at various levels: overall academic achievement at the end of the year; achievement in individual subjects within each year level; and achievement in the clinical component of Dental Clinical Practice (DCP) subjects.

For descriptive and bivariate statistical analyses outcome measures were academic success ie, 'higher' or 'lower' academic achievers. For multivariate analyses (Group 3: MAHPBL), the two outcome measures were academic progress: ie, what factors predicted academic failure during the early years of the course?; and academic performance ie, what factors predicted a 'higher' level of performance in first, second and third year and the different subjects in each year level?.

5.4.4 Conceptual model

The conceptual model (Figures 5.3 and 5.4) used in this part of the study includes factors potentially associated with/or predictive of academic success in Adelaide dental students who had undertaken a conventional or multifaceted admission process and a hybrid PBL curriculum. It was anticipated that the outcome variables would be influenced by some of the independent variables as stated in the hypotheses (refer section 5.3).

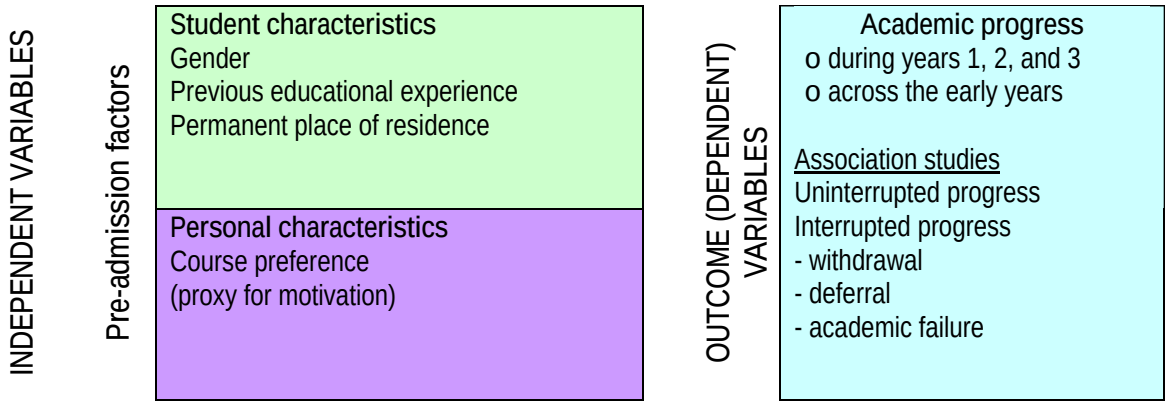

Figure 5.3 Factors potentially associated with academic success in Adelaide dental students Group 2: 1993-96) who had undertaken a conventional admission process and a hybrid PBL curriculum

No arrows have been included in this figure to demonstrate that at this stage it is unknown whether independent variables predict outcome measures

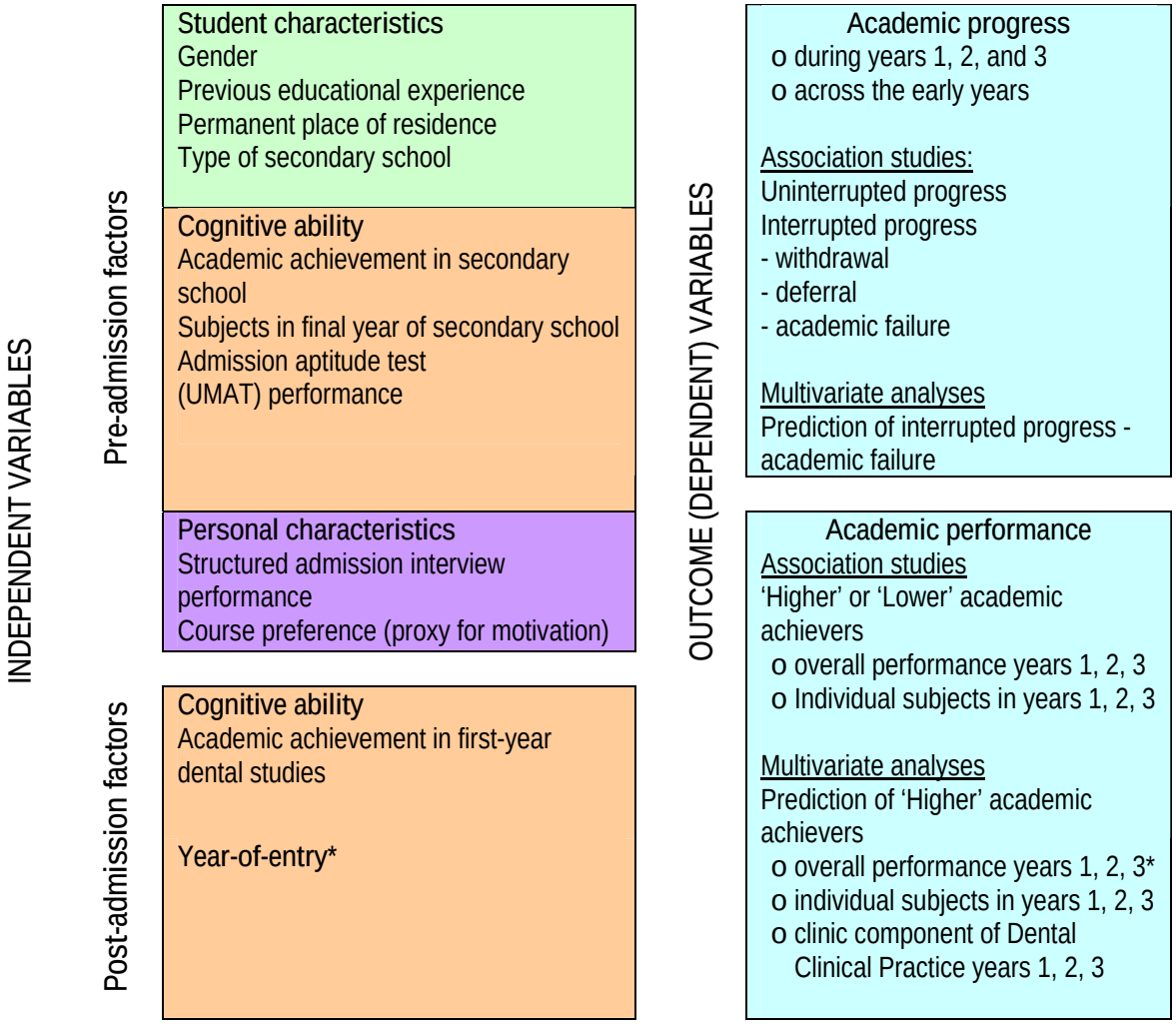

Figure 5.4 Factors potentially associated with/or predictive of academic success in Adelaide dental students (Group 3: 1998-2001) who had undertaken a multifaceted admission process and a hybrid PBL curriculum

No arrows have been included in this figure to demonstrate that prior to analysis it was not known which independent variables would be associated with/or predictive of outcome measures

* Year-of-entry (eg, 1998, 1999, 2000, 2001) was an independent variable in multivariate analyses (overall performance years 1, 2 and 3)

5.4.5 Statistical analyses

5.4.5.1 Descriptive analyses

Data sets were checked for any data that may have been incorrectly entered or coded. Data from students who had not consented or did not fulfil inclusion criteria (as discussed in Chapter 2, section 2.3.3) were removed. Data sets from all cohorts within the respective groups were combined and then further cross-checking was performed. Less than 1% of the data had minor errors which were corrected prior to statistical analyses. Patterns of academic progress and performance were explored. Frequencies of uninterrupted and interrupted progress (including withdrawal; deferral and academic failure rates) within each year and across the three year levels were calculated. In addition, frequencies of the different levels of performance ('higher' vs 'lower') were calculated for each year level.

Prior to multivariate analyses being carried out, for a subset of independent variables, some categories were collapsed to overcome having categories with a very small number of counts. For example, for performance on the admission interview, individual categories scored as 5 or 6 were collapsed into one category (score of 4). In addition, for data sets used for the 19 multivariate analyses, some students had to be excluded from analyses thus reducing the sample size due to: missing data for one or more predictor variable(s); exemption given from studying Human Biology in first year; and no available outcome data (student deferred or withdrew during the year). Excluding some students from data analysis, is often a limitation encountered by others undertaking similar research eg, Zeegers (2004) and Poole et al. (2007). The number of students excluded varied from 2 (5.5%) to 22 (14.0%). This was consistent with another comparable study that examined factors related to dental student academic success (Park et al. 2006).

5.4.5.2 Association studies

5.4.5.2.1 Academic progress

Pearson chi-square tests were undertaken to compare student characteristics, course preference (Groups 2 and 3) and performance on the structured admission interview (Group 3 only) and those with interrupted progress and those with uninterrupted progress. In addition, Pearson chi-square tests were also undertaken to compare student characteristics, course preference (Groups 2 and 3) and performance on the structured admission interview (Group 3 only) and those who failed and those whose progress was uninterrupted. Statistical significance was set at $p<0.05$.

5.4.5.2.2 Academic performance

Pearson chi-square tests or Fisher exact tests (applied if Pearson chi-square test was significant but one or more cells had an expected value less than 5.0) were used to compare the

student characteristics and performance on the structured admission interview for those classified as 'higher' and 'lower' academic achievers in first, second and third year (Group 3 only).

5.4.5.3 Multivariate analyses

The data from Group 3 (MAHPBL) were subjected to logistic regression analysis. Logistic regression analysis is a statistical procedure by which prediction of the dependent (outcome/criterion) variable is sought through the inclusion of several predictor variables in a regression equation (Norman and Streiner 2000). Logistic regression was used in this study because the dependent variable (uninterrupted/academic failure or 'higher'/'lower' academic achievement) was defined as a dichotomous variable (Norman and Streiner 2000). A forward stepwise logistic regression analysis was conducted. Initially univariate logistic regression analysis was performed on each of the potential predictors. All variables with a p-value of less than 0.2 in the univariate analyses were put into a model and the variable with the largest p-value was removed. The likelihood ratio test was then used to determine if the removed variable improved the fit of the model and therefore should remain in the model. The process of removing a variable and conducting a likelihood ratio test was repeated until a final model was obtained.

Logistic regression does not assume linearity of relationship between independent variables and the dependent variable and does not required normally distributed variables (Garson 2006). It does require observations to be independent from each other (Garson 2006). This was taken into account when statistical analysis was undertaken as there were several independent variables used in the current study that were interrelated eg, the overall interview rating and the individual interview ratings; and TER score and attendance to a non-government secondary school. During the modelling process only one of any interrelated variables was added to the model at a time.

In terms of adequate sample size and the minimum observation-to-predictor ratio for logistic regression, there are no specific rules but it has been suggested that there should be a minimum sample size of between 50 to 100 and an observation-to-predictor ratio of 10:1 (Peng et al. 2002). This study fulfilled the requirement for a minimum sample size for all models. However, the observation-to-predictor ratio for two models fell below the recommended ratio of 10:1. Small sample sizes and large number of predictors may result in wide confidence intervals around the estimated odds ratio (Pallant 2005). A very wide confidence interval may indicate that more data should be collected before making a definitive statement about the independent variable (Easton and McColl 1997). Significance for the final model was assessed at the 5% level. The results were reported as odds ratios and 95% confidence intervals. All analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC, USA).

Different models were created as there is no consensus from the literature as to which factors consistently predict university or dental student success and the type of outcome measures of success

that may be used in predictive models. A variety of outcome measures (ie, overall year level performance, individual subject level performance, as well as academic progress) were chosen to allow for a thorough analysis of factors that may predict academic success and difficulties. In addition, different models were created because different sub-sets of independent variables were applicable to some students and not others, and due to the different outcome measures being defined. Thus whilst some potentially important variables were not available for all students, constructing different models based on the available variables enabled prediction of academic progress and academic performance for a larger sample of students. A total of four models were created to determine which factors predicted academic success for students in Group 3 (MAHPBL). The categorisations of the independent and dependent variables used in the four logistic regression models are presented in Appendix Tables 5.4 to 5.7. Overall a total of 19 logistic regression analyses were run. The subsequent two sections describe these models in further detail.

5.4.5.3.1 Model 1: all students - academic progress

This model contained data for the students in all four cohorts. Three groups of independent variables were included: student characteristics; cognitive ability (achievement in first year dental studies); and personal characteristics. The dependent (outcome) measure was academic progress over the early years of the course: uninterrupted progress versus academic failure.

5.4.5.3.2 Model 2: all students - academic performance overall year performance

This model also contained data for the students in all four cohorts. Three groups of independent variables were included: student characteristics; personal characteristics; and year-of-entry. The dependent (outcome) measures were: overall academic performance ('higher' and 'lower' achievers) in first; second; and third year. Three separate analyses were run, one for each dependent measure.

5.4.5.3.3 Model 3: Australian school leavers - academic performance overall year performance

This model contained data for Australian school leavers in three of the four cohorts (Cohort B, C and D). Three groups of independent variables were included: student characteristics; cognitive ability (TER score and UMAT performance); and personal characteristics. The dependent (outcome) measures were: overall academic performance ('higher' and 'lower' achievers) in first; second; and third year. Three separate analyses were run, one for each dependent measure.

5.4.5.3.4 Model 4: Australian school leavers - academic performance individual subjects and components of subjects

This model contained data for Australian school leavers in three of the four cohorts (Cohort B, C

and D) of Group 3. Three groups of independent variables were included: student characteristics; cognitive ability (TER score and UMAT performance); and personal characteristics. The dependent (outcome) measures were academic performance ('higher' and 'lower' achievers): in each of the first-year subjects (Human Biology, Dental and Health Science, Dental Clinical Practice); in each of the second-year subjects (Structure and Function of the Body, Dental and Health Science, Dental Clinical Practice); in each of the third-year subjects (Diseases and Disorders of the Body, Dental and Health Science, Dental Clinical Practice); the clinic component of Dental Clinical Practice in first-, second- and third year. Twelve separate analyses were run, one for each dependent measure.

5.5 Results

5.5.1 Academic progress of Group 1 (CACC)

The rate of interrupted progress (academic failure and students who withdrew) was high, with only 58.1% of students successfully completing first year at their first attempt (Cooper and Spencer 1987). Fourteen percent of students did not continue with their dental studies after first year. The failure rate in second year (19.1%) improved compared with first year. Only 29% of students had uninterrupted progress from the first to final year.

5.5.2 Academic progress of Group 2 (CAHPBL)

Most students progressed through the early years uninterrupted (92-97%) (Table 5.5). Academic failure, withdrawal and deferral were causes of interrupted progress during the early years of the course. Academic failure was the most common cause of interrupted progress. Six (3.4%) students withdrew during first year and a further three students withdrew in or during second or third year, and often transferred to another dental or University course. For those who deferred, this mostly occurred in first year. Reasons for deferral were either personal or academic issues (poor performance). Four of the five deferrers returned to continue their studies. Of the 13 students who failed academically, two subsequently failed and were required to withdraw due to poor academic progress and one student withdrew during third year for personal reasons. The remaining 10 students completed their course (Table 5.5). There were no significant differences in the proportion of students whose progress was uninterrupted and those whose progress was interrupted.

Table 5.5 Patterns of progress of dental students during the early years

	Year levels							
	First year 1993-96		Second year 1994-97		Third year 1995-98		Progress from first to third year	
Pattern of progress	n	%	n	%	n	%		
Uninterrupted - proceeded to next year level (year 1 to 2; year 2 to 3)	163	92.1	154	94.5	150	97.4	150	84.8
Interrupted progress	14	7.9	9	5.5	4	2.6	27	15.2
Academic fail - to repeat academic year	4	2.3	6	3.7	3	1.9	13	7.3
Deferred-passed and deferred entry to year 2 or 3	1	0.6	0	0.0	0	0.0	1	0.6
Deferred - without completion of year	3	1.7	1	0.62	0	0.0	4	2.3
Withdrew - passed and withdrew from course	3	1.7	1	0.62	0	0.0	4	2.3
Withdrew - without completion of year	3	1.7	1	0.62	1	0.7	5	2.8
Total	177	100	163	100	154	100	177	100

Group 2: CAHPBL
CAHPBL: Conventional admission, hybrid PBL curriculum

In examining progress over the entire five years, a further six students deferred their commencement of fourth or fifth year for personal reasons or to undertake an honours program in dental science. Four students failed fourth year. No student failed final year. Overall, 140 (79.1%) students who commenced dental studies during 1993-96 had uninterrupted progress and completed the five year course on time. Twenty-four (15.8%) students completed the course in more than five years. Overall the rate of attrition ie, students who did not complete the Adelaide dental course, was low (n=13; 7.3%).

A total of 18 students failed one or more subjects in first, second and third year. Four first-year students failed Human Biology and one student failed Dental and Health Science. Five second-year students failed Structure and Function of the Body, two students failed Dental and Health Science and one student failed Dental Clinical Practice. Three third-year students failed Dental Clinical Practice and two students failed Diseases and Disorders of the Body (Appendix Table 5.8).

5.5.3 Academic progress of Group 3 (MAHPBL)

There were no statistically significant differences in student characteristics, course preference, structured admission interview performance or patterns of progress between the cohorts within first, second or third year or between the year levels. Thus data were pooled.

Most Adelaide dental students (87% to 96%) had uninterrupted progress through the early years of the course (Table 5.6). Academic failure, withdrawal and deferral were causes of interrupted

progress during the early years of the course. Academic failure was the most common cause of interrupted progress and the frequency of academic failure ranged from 2.9% to 9.6% during the early years. Of the 26 students who failed academically, 10 (38.5%) failed subsequently and were required to formally withdraw from the course due to poor academic progress (the remaining 16 students completed the course). Five students deferred during or at the end of first year and six students deferred during or at the end of second and third year. Reasons for deferral included personal or academic (poor academic performance) issues and all students who deferred returned to continue their studies. All five (2.9%) students who withdrew did so during first year and often transferred to another dental or university course.

Within Group 3, there were significantly more students in Cohort C who had interrupted progress during the early years (47.6%) than in the other three cohorts (x^2=12.50; p=0.01) (Appendix Table 5.9). There were no statistically significant differences in the proportion of students with uninterrupted and interrupted progress, between the three year levels. There were more students in Cohorts A, B and D (77.9%) with uninterrupted progress during their second-year than Cohort C (22.1%) (x^2=7.14; p=0.01) (Appendix Table 5.10).

Table 5.6 Patterns of progress of dental students during the early years

	Year levels							
	First year 1998-2001		Second year 1999-2002		Third year 2000-03		Progress from first to third year	
Patterns of progress	n	%	n	%	n	%	n	%
Uninterrupted: proceeded to next year level (year 1 to 2; year 2 to 3)	156	90.2	136	87.2	132	96.4	131	75.7
Interrupted progress	17	9.8	20	12.8	5	3.6	42	24.3
Academic fail - to repeat academic year	7	4.1	15	9.6	4	2.9	26	15.0
Deferred - passed and deferred entry to year 2 or 3	3	1.7	4	2.6	0	0.0	7	4.1
Deferred - without completion of year	2	1.2	1	1.0	1	1.0	4	2.3
Withdrew - passed and withdrew from course	5	2.8	0	0.0	0	0.0	5	2.9
Total	173	100	156	100	137	100	173	100

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

In examining progress over the entire five years, an additional six students deferred commencing fourth or fifth year for personal reasons. No student failed final year. Overall, 125 students

(72.3%) who commenced dental studies during 1998 to 2001 had uninterrupted progress and completed the five year course on time. Thirty three (19.0%) students completed the course in more than five years. Thus, the overall rate of attrition was low (n=15; 8.7%).

A total of 50 students failed one or more subjects in first, second and third year. Five first-year students failed Human Biology, five students failed Dental and Health Science and four students failed Dental Clinical Practice. Fifteen second-year students failed Structure and Function of the Body, nine students failed Dental Clinical Practice and eight students failed Dental and Health Science. Three third-year students failed Diseases and Disorders of the Body and one student failed Dental Clinical Practice (Appendix Table 5.11).

5.5.4 Academic performance of Group 3

5.5.4.1 Overall academic performance

Academic performance of students in first, second, and third year was classified into two groups: 'higher' and 'lower' academic achievers. Approximately 60% of students were classified as 'higher' academic achievers in first, second, and third year (Table 5.7). There were no statistically significant associations between the proportions of 'higher' and 'lower' academic achievers between all year levels and all cohorts. Frequencies of 'higher' and 'lower' academic achievers of all cohorts within each year level are presented in Appendix Tables 5.12, 5.13 and 5.14.

Table 5.7 Proportion of dental students who were categorised as 'higher' and 'lower' achievers between the year levels

	First-year students 1998-2001		Second-year students 1999-2002		Third-year students 2000-03	
Level of performance	n	%	n	%	n	%
Higher achievers	101	60.1	90	58.1	81	59.6
Lower achievers	67	39.9	65	41.9	55	40.4
Total	168	100	155	100	136	100

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
First-year students n=168*; Second-year students n=155*; Third-year students n=136*
* excludes students who withdrew or deferred part way through the academic year.

5.5.4.2 Performance in the individual subjects between the cohorts

There were significantly more students whose overall first-year performance was classified as 'higher' in Dental Clinical Practice in Cohorts B (30.6%), C (26.4%), and D (22.2%) compared with those in Cohort A (20.8%) (x^2=10.02; p=0.02). In addition, there were significantly more students whose overall second-year performance was classified as 'higher' in Dental and Health Science in Cohorts A (21.0%), B (28.6%), and D (31.1%), compared with those in Cohort C (19.3%) (x^2=15.64; p=0.01).

There were no statistically significant differences between the cohorts in the proportion of students whose performance in third-year subjects was classified as either 'higher' or 'lower' achievement.

In first year, there were more 'higher' academic achievers in the Dental Clinical Practice (41.5%) subject than in Human Biology (28.8%) and Dental and Health Science (29.7%) (x^2=20.66; df=2; p=0.00). In second year, there were significantly more 'higher' academic achievers in Dental and Health Science (34.9%) and Dental Clinical Practice (37.5%) than in SF (27.6%) (x^2=19.69; df=2; p=0.00). Finally, in third year, there were significantly more 'higher' achievers in Dental and Health Science (38.1%) and Dental Clinical Practice (36.4%) than Diseases and Disorders of the Body (25.5%) (x^2=50.58; df=2; p=0.00).

5.5.5 Factors associated with academic progress - Group 2: association studies

There was a statistically significant difference in the permanent place of residence between those students who had uninterrupted and interrupted progress. More students from South Australia (64.6%) had interrupted progress than students from other Australian states (16.3%) and international students (19.8%) (x^2=6.43; p=0.04) (Appendix Table 5.15). More specifically, there were significantly more international students who failed (61.5%) than Australian students (38.5%) (Fisher exact test p=0.002) (Appendix Table 5.16). No other independent variables were found to be significantly associated with academic progress of Adelaide dental students in Group 2 (CAHPBL). The characteristics and course preference of students with uninterrupted and interrupted progress (including academic failure) are outlined in Appendix Table 5.17.

5.5.6 Factors associated with academic progress - Group 3: association studies

The characteristics and course preference of students and structured admission interview performance of students with uninterrupted and interrupted progress (including academic failure) are outlined in Appendix Table 5.18.

There were several statistically significant differences in the performance on the structured admission interview of students who had uninterrupted progress and those who had failed. A greater proportion of students who had uninterrupted progress had the highest rating '1' (61.2%) on the 'communication and personal effectiveness' category compared with those students who had failed (38.8%) (x^2=6.38; p=0.04). Also, students who had uninterrupted progress scored the highest rating 'excellent' more often (93.5%) than those students who failed (6.5%) (x^2=6.41; p=0.04) (Appendix Table 5.19).

5.5.7 Factors associated with academic performance - Group 3

5.5.7.1 Association studies

There were no significant associations between student characteristics or interview performance of students classified as 'higher' and 'lower' academic achievers, between the cohorts within first, second and third year, thus data were combined. Previous educational experience, course preference, and one structured admission interview category were significantly associated with academic performance in first and third year. More third-year students who were classified as 'lower' academic achievers were school leavers (72.7%) compared with non-school leavers (27.3%) (x^2=5.31; p=0.02) (Appendix Table 5.20). More first-and third-year students who were classified as 'higher' academic achievers had indicated dentistry as their first-preference course (88.0% and 89.9% respectively) compared with those who indicated dentistry as their other-preference course (12.0% and 10.1% respectively) (x^2=4.88;p=0.03 and x^2=6.06; p=0.01) (Appendix Tables 5.21 and 5.22). In addition, more first-year students who were classified as 'higher' academic achievers had a rating of (2) on 'perseverance' category of the structured admission interview (42.0%) than those who had a rating of (1) (30.0%) and a rating of (3) (28.0%) (x^2=7.12; p=0.03) (Appendix Table 5.23).

In summary, after bivariate analyses were conducted, the following independent variables were found to be significantly associated with academic progress or academic performance of Adelaide dental students (Group 3: MAHPBL) during the early years of the course: previous educational experience; course preference; and performance in structured admission interview (Table 5.8).

Table 5.8 Factors associated with academic success of dental students after bivariate analyses

	Progress	Performance
Student characteristics		
Gender	NS	NS
Previous educational experience	NS	More 3rd year students who were classified as 'lower' academic achievers were school leavers compared with non-school leavers
Permanent place of residence	NS	NS
Course preference (proxy for motivation)		
	NS	More 1st and 3rd year students who were classified as 'higher' academic achievers had indicated dentistry as their first-preference course compared with those with a lower preference.
Structured admission interview performance		
Overall rating	More students who had uninterrupted progress had the highest rating 'excellent' compared with those who failed.	NS
Motivation to become a dentist	NS	NS
Compatibility with the course	NS	NS
Tolerance of ambiguity	NS	NS
Perseverance	NS	More 1st year students who were classified as 'higher' academic achievers had a rating of (2) compared with a higher rating of (1) and a lower rating (3).
Supportiveness and encouraging behaviour	NS	NS
Communication and personal effectiveness	More students who had uninterrupted progress had the highest rating (1) compared with those who failed.	NS

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
NS: not significant

5.5.7.2 Multivariate analyses

5.5.7.2.1 Models 1 and 2: all students

Three independent variables were predictive of academic failure during the early years of the dental course: 'lower' academic achievement in Human Biology compared with 'higher' academic achievement; 'lower' academic achievement in Dental Clinical Practice compared with 'higher' academic achievement; and a low rating (3) on the structured admission interview category 'supportiveness and encouraging behaviour' compared with high ratings (Table 5.9).

Three independent variables were predictive of being a 'higher' academic achiever in first year: being a South Australian student compared with an international student; being a non-school leaver compared with a school-leaver; and having the highest rating (1) on the structured admission interview category 'supportiveness and encouraging behaviour' compared with good (2) or a low rating (4). There were no significant predictors of being a 'higher' academic achiever in second year. One independent variable was predictive of being a 'higher' academic achiever in third year: having high ratings (1 and 2) on the structured admission interview category 'motivation to become a dentist' compared with an average rating (3) (Table 5.9). Year-of-entry did not predict being a 'higher' academic achiever in first, second and third year.

5.5.7.2.2 Models 3 and 4: Australian school leavers

Some independent variables were predictive of some outcome measures for Australian school leavers. Type of secondary school ie, attending a non-government school was predictive of being a 'higher' academic achiever in: first year; in the following first year subjects (Human Biology, Dental and Health Science); in one second year subject (Dental Clinical Practice); and the clinical component of Dental Clinical Practice during third year (Table 5.10). Previous secondary school performance ie, a very high TER score was predictive of being a 'higher' academic achiever in: first year; and Human Biology 1 (Table 5.10). Previous secondary school subject ie, having studied biology was predictive of being a 'higher' academic achiever in the clinical component of Dental Clinical Practice 1 (Table 5.10). Performances on several of the admission interview categories were predictive of some outcome measures. High ratings (1 and 2) on the category 'compatibility with the Adelaide dental course' were predictive of being a 'higher' academic achiever in Dental and Health Science 2 compared with low ratings (4 and 5) (Table 5.10). The highest rating (1) on the category 'supportiveness and encouraging behaviour' was predictive of being a 'higher' academic achiever in the clinical component of Dental Clinical Practice 1, 2 and 3 compared with a good rating (2) (Table 5.11). Gender, permanent place of residence, course preference and performance in the UMAT were not predictors of being a 'higher' academic achiever (for Australian school leavers).

Table 5.9 Statistically significant independent variables from logistic regression analyses (Models 1 and 2: all students)

Dependent (outcome) measure	Predictor(s)	Odds ratio	95% Confidence Interval		p-value
			lower	upper	
Academic failure during the early years	Lower academic achievement Human Biology compared with good achievement	37.14	6.44	214.10#	<0.0001
	Lower academic achievement Dental Clinical Practice 1 compared with good achievement	10.39	2.10	51.37#	0.004
	Average rating (3) supportive behaviour compared with rating (1) and (2)	14.69	2.82	76.52#	0.001
'Higher' achiever in first year	South Australian compared with international student	3.25	1.28	8.25	0.01
	Non-school leaver compared with school leaver	2.54	1.18	5.47	0.02
	Highest rating (1) 'supportiveness and encouraging behaviour' compared with rating (4)	7.33	1.32	40.78#	0.02
	Highest rating (1) 'supportiveness and encouraging behaviour' compared with rating (2)	4.29	1.36	13.56#	0.01
'Higher' achiever in second year	NS				
'Higher' achiever in third year	Highest rating (1) 'motivation to become a dentist' compared with rating of (3)	5.63	1.34	23.77#	0.02
	High rating (2) 'motivation to become a dentist' compared with rating of (3)	5.44	1.55	19.08#	0.01
	*Adequate rating (3) 'communication and personal effectiveness' compared with rating (1)	10.36	2.02	53.27#	0.005
	*Adequate rating (3) 'communication and personal effectiveness' compared with rating (2)	10.88	2.49	47.60#	0.001

Group 3 (Cohorts A to D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
confidence intervals for majority of significant factors are wide (see Discussion section)
NS: No significant predictors
* this result is likely to a spurious event

Table 5.10 Statistically significant independent variables (Models 3 and 4: Australian school leavers)

Dependent (outcome) measure 'Higher' achiever	Predictor(s)	Odds ratio	95% Confidence Interval		p-value
			lower	upper	
First year	Very high TER compared with good TER	8.80	2.16	35.92#	0.002
	Non-government school compared with government school	12.47	3.02	51.49#	0.001
Second year	NS				
Third year	NS				
HB 1	Very high TER compared with good TER	5.41	1.52	19.25#	0.01
	Non-government school compared with government school	7.56	2.12	26.96#	0.002
DHS 1	Non-government school compared with government school	9.99	2.35	42.51#	0.001
	*Average rating (3) 'motivation to become a dentist' compared with rating (2)	8.42	1.48	47.99#	0.02
DCP 1	NS				
SF2	NS				
DHS 2	Highest ratings (1) and (2): 'compatibility with the dental course' compared with low ratings (4) and (5)	18.00	2.11	153.3#	0.001
DCP 2	Non-government school compared with government school	7.44	1.90	29.16#	0.004
DD3	NS				
DHS 3	NS				
DCP 3	NS				

Group 3 (Cohorts B, C and D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
: confidence intervals for majority of significant factors are wide (see Discussion section)
NS: No significant predictors
* this result is likely to a spurious event
DCP: Dental Clinical Practice; DHS: Dental and Health Science; HB: Human Biology; SF: Structure and Function of the Body; DD: Diseases and Disorders of the Body

Table 5.11 Statistically significant independent variables (Models 3 and 4: Australian school leavers)

Dependent (outcome) measure 'Higher' achiever	Predictor(s)	Odds ratio	95% Confidence Interval		p-value
			lower	upper	
Clinic component DCP 1	Biology studies in final year of secondary school compared with biology not studied in the final year of secondary school	3.37	1.16	9.82	0.03
	Highest rating (1) supportiveness and encouraging behaviour compared with rating '2'	5.08	1.06	24.33#	0.04
Clinic component DCP 2	Highest rating (1) 'supportiveness & encouraging behaviour' compared with good rating (2)	6.60	1.25	34.95#	0.03
Clinic component DCP 3	Non-government school compared with government school	14.66	1.46	147.1#	0.02
	Highest rating (1) 'supportiveness & encouraging behaviour' than rating (2)	22.35	2.26	220.7#	0.01
	Highest rating (1) 'supportiveness & encouraging behaviour' compared with lower ratings (3) and (4)	13.70	1.20	156.7#	0.04

Group 3 (Cohorts B, C and D) MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
confidence intervals for majority of significant factors are wide (see Discussion Section)
DCP: Dental Clinical Practice

5.5.8 Comparison of academic progress between Groups 1 (CACC); Group 2 (CAHPBL) and Group 3 (MAHPBL)

Academic progress of students appeared to improve between Groups 1 and 2 and Groups 1 and 3. The failure rate of first-year students in Group 1 was high 40% (Cooper and Spencer 1987) compared with a low failure rate of first-year students in Group 2 (2.3%) and Group 3 (4.1%). Withdrawal rates amongst first-year students were substantially reduced in Group 2 (3.4%) and Group 3 (2.9%) compared with Group 1 (14%) (Cooper and Spencer 1987). More students in Group 2 (79.1%) and Group 3 (72.3%) had timely completion of the Adelaide dental course compared with those in Group 1 (28.6%).

There was a significant difference in the academic progress between students in Group 2 and 3. There were significantly more students in Group 3 who failed (66.7%) compared with those in Group

2 (33.3%) (x^2=5.64; p=0.02) (Appendix Table 5.24). Specifically, there were significantly more second-year students in Group 3 who experienced interrupted progress (69.0%) compared with Group 2 (31.0%) (x^2=5.14; p=0.02) (Appendix Table 5.25). This was due to significantly more second-year students failing to proceed in the 2000 cohort than the 1998, 1999 and 2001 cohorts (section 5.5.3).

Several other trends were noted. The most common cause of interrupted progress was academic failure in both Groups 2 (7.3%) and 3 (15.0%). Rates of deferral were similar between Group 2 (2.8%) and Group 3 (2.9%) and withdrawal rates were also similar between Group 2 (5.1%) and Group 3 (6.4%). Students in third year (Group 2: 2.6%; Group 3: 3.6%) experienced less interrupted progress than students in first year (Group 2: 7.9%; Group 3: 9.8%) (Tables 5.5 and 5.6). Students who had failed academically in Groups 2 and 3 had difficulty successfully completing the following subjects: Human Biology in first year; Structure and Function of the Body in second year; and Diseases and Disorders of the Body in third year (Appendix Table 5.26).

5.5.8.1 Comparison of factors associated with academic progress between Groups 2 and 3

There were no significant differences in student characteristics or course preference of those whose progress was interrupted (during first, second or third year) between Groups 2 and 3. There were more students whose progress was interrupted during the early years of the course who had dentistry as their first preference in Group 3 (80.0%) compared with those in Group 2 (20.0%) (x^2=6.82; p=0.01) (Appendix Table 5.27).

5.5.9 Summary of results

Academic progress:

- the majority of students who were admitted to the Adelaide dental course (1993-96) via a conventional admission process and undertook a hybrid PBL curriculum (Group 2) were successful during the early years. Academic failure was the most common cause of interrupted progress and this tended to occur in first year [RQ3.1].
- the majority of students who were admitted to the Adelaide dental course (1998-2001) via a multifaceted admission process and undertook a hybrid PBL curriculum (Group 3) were successful during the early years. Withdrawal and deferral rates were very low. Academic failure was the most common cause of interrupted progress and this tended to occur in second year. Second-year students in Cohort C (commenced in 2000) were more likely to have experienced academic difficulties compared with the other cohorts. Students in third year experienced less interrupted progress than students in first year (Group 2 and Group 3). There were differences noted in the level of performance in individual subjects, between the cohorts, and within year levels. Students who had failed in Groups 2 and 3 had difficulty successfully

completing the following science-based subjects in first, second and third year: Human Biology, Structure and Function of the Body and Diseases and Disorders of the Body respectively [RQ 3.2].

Changes in the level of academic success after implementation of a hybrid PBL curriculum:

- academic progress appeared to improve, with withdrawal rates reduced amongst dental students who had undertaken a hybrid PBL curriculum in comparison to those who had undertaken a conventional curriculum [RQ3.3].

Changes in the level of academic success after the implementation of a multifaceted admission process:

- academic progress of international students who were admitted via a multifaceted admission process appeared to improve in comparison to those who had been admitted via the previous conventional admission process [RQ3.4].

Factors affecting academic success - association studies:

- only one independent variable was found to be significantly associated with academic progress of Adelaide dental students (Group 2: CAHPBL) during the early years of the course: place of residence ie, there were significantly more international students who failed than Australian students [RQ3.5].
- the following independent variables were found to be associated with academic progress or academic performance of Adelaide dental students (Group 3: MAHPBL) during the early years of the course: previous educational experience, course preference and structured admission interview performance. Specific details with regards to the relationship of the independent variables that were associated with outcome measures are provided in Table 5.8 [RQ3.5].

Factors affecting academic success - multivariate studies:

- various independent variables were found to be predictive of academic progress and academic performance of Adelaide dental students (Group 3: MAHPBL) during the early years of the course. However, there was no single consistent predictor variable. Specific details with regards to the relationship of the independent variables that were predictive outcome measures are provided in Tables 5.9, 5.10 and 5.11 [RQs 3.5 and 3.6].

5.6 Discussion

5.6.1 Student success

5.6.1.1 Academic progress

The majority of Adelaide dental students progressed through the early years uninterrupted. The outcomes were similar to success rates reported for other dental students in a recent study (Sandow et al. 2002). Academic failure was the most common cause of interrupted progress. There were some students who failed more than once and were subsequently precluded from the course. However, most who failed repeated successfully and then progressed to complete the entire course. Rates of deferral were low and most students returned to complete their studies. Frequency of withdrawal was also low and those who withdrew often did so during or at the end of first year (3% for Groups 2 and 3), either transferring to another dental course, changing career paths or withdrawing due to academic difficulties. Indeed, withdrawal rates in an Australian sample of first-year students were double (6%) (Hillman 2005) those reported for Adelaide dental students. Overall, most students commencing the Adelaide dental course completed on time and with a low overall attrition rate (7 to 9% Group 2 and 3 respectively). It is not unusual for completion rates to be high amongst students studying prestige courses such as medicine, dentistry and law (97%) compared with other courses such as, information technology (70%) (Marks 2007). In a recent review paper, Ranney et al. (2005) reported a total attrition rate of 1.3% for US dental students (during 2002-03), a lower rate than reported in the current study. The types of four year graduate-entry US dental courses (eg, conventional or PBL based) students had undertaken were not made clear by Ranney et al. (2005). Differences in the entry mode and type of dental courses may account for the lower rate of attrition reported by Ranney et al. (2005) compared with the current study.

Rates of interrupted progress reduced from first to third year in Group 2 (conventional admission, hybrid PBL curriculum). This is consistent with studies that have reported that students in first year encounter more difficulties than in subsequent year levels (Scheetz 1987; Powis et al. 1992; Jacobsen 1994; De Clercq et al. 2001). Contrastingly, however, Adelaide dental students in Group 3 (multifaceted admission: hybrid PBL curriculum) seemed to experience difficulties in second year, specifically Cohort C (commenced in 2001) with more second-year students from this cohort experiencing interrupted progress (academic failure). There is no clear indication from available data as to why this cohort was more unsuccessful. There were no differences in student characteristics, course preference or admission interview performance compared with other cohorts. This cohort also did not perceive more factors related to difficulties compared with the other three cohorts. Furthermore, they reported fewer factors related to difficulties in third year compared with the other cohorts (refer to Chapter 7, section 7.5.5). There were also no major changes in the second-year curriculum during the period of this study. Nonetheless, compared with first and third year, failure in second year was high.

The second year of the Adelaide dental course is characterised by increased complexity of course material and staff expectations. Students' perceptions of factors that contributed to difficulties in the Adelaide dental course provide evidence that students found second year more demanding (in particular the workload) than first or third year (Chapter 7, Table 7.12 and section 7.5.5.2).

5.6.1.2 Progress and performance in individual subjects

Those Adelaide dental students (Group 2 and 3) who failed encountered most difficulties in completing the applied science subjects in first (Human Biology), second (Structure and Function of the Body) and third (Diseases and Disorders of the Body) year respectively. There were also significant differences in the proportion of students (in Group 3) categorised as 'higher' academic achievers between the subjects within the year levels. In first year there were more 'higher' academic achievers in Dental Clinical Practice than Human Biology and Dental and Health Science. In second and third year, there were more 'higher' academic achievers in Dental and Health Science and Dental Clinical Practice, than the applied science subjects (Structure and Function of the Body) in second and (Diseases and Disorders of the Body) in third year. These results are not entirely unexpected, given the demanding workload associated with the applied science subjects during the early years of the Adelaide dental course eg, attendance and participation in weekly class meetings, tutorials, learning laboratories; completing individual and group assignments, tests of understanding and end-of-semester examinations; and understanding complex biological concepts (Gaengler et al. 2002) and applying them to clinical scenarios in written examinations. The Dental and Health Science subject in first year presents a different learning experience for Adelaide dental students. It is within this subject that students are required to undertake group work and independent learning whilst working through PBL sessions. The examination format is also a new experience. It is scenario based format where students are required to apply knowledge and assessment involves criterion-based marking.

5.6.1.3 Change in curriculum

Contrasting patterns of academic progress of Adelaide dental students who were admitted via a conventional admission process but undertook two different curricula were revealed. The rate of progress of those enrolled in a hybrid PBL course (Group 2 and 3) improved substantially compared with those enrolled in the conventional course (Group 1), as there was a marked reduction in failure rates and an increased rate of timely completion of the course. It may be inferred that this improvement was partly due to the introduction of hybrid PBL curriculum, after 1993. Lower attrition rates for US dental students undertaking a hybrid PBL course compared with those studying in a conventional course have also been reported (Susarla et al. 2003). Features of PBL courses that may promote better academic outcomes include: an enjoyable and stimulating environment; promotion of independent

learning; motivating students to learn; and enabling students to integrate and apply basic science concepts in the context of a patient scenario (Norman and Schmidt 2000; Bernstein et al. 1995; Hughes et al. 1997). Thus, the hypothesis [3.1] that the introduction of a hybrid PBL curriculum will be associated with better academic success rates of Adelaide dental students compared with the previous conventional curriculum is supported by the results of the current study. However, this result should be interpreted with caution as the current study was not able to examine data on progress of Adelaide dental students enrolled from 1987-1992 (conventional curriculum) and hence progress rates may have been better than those who were examined in this research ie, had enrolled during 1983-86 (conventional curriculum). In addition, results are based on bivariate analyses and other factors which may explain improved progress rates, such as reduced contact hours and content and enthusiastic academic staff, were not taken into account.

5.6.1.4 Change in admission process

Using a global measure of academic progress, there was no improvement in overall progress rates during the early years of the Adelaide dental course between students admitted solely on academic merit (Group 2:1993-96) and those admitted using a multifaceted process (Group 3:1998-2001). This result is in contrast to Röding (1997) who reported that fewer Swedish dental students admitted via a multifaceted process dropped out compared with those that were admitted based on previous academic achievement. However, in Röding's (1997) study, this difference was not statistically significant, the outcome measure of progress was not identical, and the multifaceted admission process was not identical to the Adelaide process.

There were significantly more students with interrupted progress in Group 3 but this seems to be related to a cohort effect ie, the 2000 cohort performed poorly during their second year. However, improved academic progress of international students was noted for students in Group 3 in comparison to those in Group 2. This may be linked to the introduction of the new multifaceted admission process. During 1993-96, international students were selected on academic merit alone. Modification of the admission process included a requirement for international students to also undertake a structured admission interview (but the UMAT). This may have resulted in the admission of international students with different skills and attributes needed for success.

Moreover, there were significantly more students with interrupted progress (during the early years) who had chosen dentistry as a lower-course preference in Group 2 than in Group 3. In addition, significantly more students in Group 2 had indicated dentistry as their second-preference career compared with those in Group 3. Some caution needs to be exercised when interpreting this result as there were some missing data on course preference for students in Group 2. In addition, results are based on bivariate analyses and factors not related to the admission process which may explain

improved progress rates such as student and course factors were not taken into account. Nonetheless, these results suggest that the multifaceted admission process leads to the selection of students who are motivated to do dentistry compared with another career and thus more likely to progress satisfactorily through the early years. In addition, Röding and Nordenram (2005) suggested that dental students admitted via a holistic process may regard themselves as 'specially chosen' and more highly motivated and thus want to show this to staff, by doing well in their studies. Furthermore, these results lend some support to the implementation of a multifaceted admission process for Adelaide dental students. The hypothesis [4.1] that the introduction of a multifaceted admission process will be associated with better academic success rates of international Adelaide dental students than the previous conventional admission process can be supported.

5.6.2 Factors associated with academic progress and performance

5.6.2.1 Student characteristics

Gender was not associated with academic failure or good academic performance during the early years in the bivariate analyses and was not predictive of good academic performance during the early years in the multivariate analyses. This result is in agreement with various researchers who have found no difference in performance between male and female students in a conventional dental course (Lynch et al. 2006) and in PBL medical courses (Kay-Lambkin et al. 2002; Groves et al. 2007). Hence, the hypothesis [5.1] that there is unlikely to be a difference in academic success during the early years of the course, between female and male students can be supported.

Previous educational experience was not predictive of academic progress. However, previous educational experience was predictive of being a 'higher' academic achiever in first year. Non-school leavers (Group 3) were 2.54 times (CI:1.18-5.47) more likely to be 'higher' academic achievers in first year than school leavers. This result is in agreement with Tchen et al. (2001) who reported Australian university students who had previously undertaken higher degree studies performed better than school leavers. Success of non-school leaver students may be due their previous experiences at university. For example, familiarity with the university environment, policies, teaching styles and styles of examination. Non-school leavers studying in the Adelaide dental course usually received exemptions from the Human Biology subject in first year and thus had a lighter academic workload and fewer contact hours than school leavers, enabling them to spend more time to study on the other two subjects.

Success of those students with previous tertiary education may also relate to their wider array of life experiences, being more motivated and better equipped to deal with the transitional stresses of university life (Geffen 1991), having a better understanding of staff expectations (Dickson et al. 2000) and better able to cope with the demands of autonomous, student-centred approaches to learning

(Sadler-Smith 1996) compared with younger students. School leavers have also been reported to have different attitudes compared with mature-aged students (older than 25 years of age) (Krause et al. 2005) which may also account for differences in academic success. School leavers were more likely to find it difficult to become motivated to study, to want to change courses and to miss classes, whereas mature-aged students were more likely to seek assistance from staff and be strategic about managing their workload (ie, limit involvement in extracurricular activities) (Krause et al. 2005).

Previous educational experience, however, did not predict second- and third-year performance. This may be because, after adjusting to a new learning environment in first year, school leavers perform just as well as non-school leavers. One might anticipate dental students with previous university experience might be more successful, at least in first year compared with school leavers, but they still may encounter same difficulties as school leavers, if they have not been exposed to PBL style curricula and/or learning in clinic settings. Thus the hypothesis [5.2] that there is unlikely to be a difference in academic success between school leavers and non-school leavers cannot be supported.

Type of secondary school attended ie, non-government as opposed to government, was predictive of being a 'higher' academic achiever for Australian school leavers (Group 3) in first year and in two individual subjects (DHSc 1 and DCP 2). This result is in contrast to several Australian studies (McInnis et al. 1995; Dobson and Skuja 2005; Tickell and Smyrnios 2005) and a UK study (Smith and Naylor 2001) in which it was found that attending a government school was associated with good tertiary academic performance. These differences may relate to the educational context of students involved in different studies. For example, in the Adelaide dental course, students are in relatively small classes with regular contact with staff and thus a similar environment to independent secondary schools. In addition, it has been reported that students from independent private schools were less likely to say that they had difficulties adjusting to the style of teaching at university compared with those students who had attended Catholic schools and government schools (McInnis et al. 1995). The current study revealed attendance at a non-government secondary school predicted dental student success (on several outcome measures). This observation however needs to be explored further with future cohorts of students due to large confidence intervals (eg, Year 1 good academic achievement CI: 3.02-51.49; good academic achievement in Human Biology during first year CI: 2.12-26.96). The hypothesis [6.1] that students who had attended government secondary school are more likely to be more successful in dental school cannot be supported.

Permanent place of residence was not predictive of academic progress. However, permanent place of residence was predictive of being a 'higher' academic achiever in first year. South Australian students were 3.25 times (CI: 1.28-8.25) more likely to be 'higher' academic achievers in first year compared with international students (Group 3). This result is consistent with Zeegers (2004) who reported that international students did not perform as well in the first year of an Australia science

degree and Kay-Lambkin et al. (2002) who found that first-year international medical students were more likely to be classified as 'non satisfactory' than other students. In contrast to non-local and international students, success of South Australian students may relate to these students facing fewer social difficulties, such as living away from home, adapting to a new environment, culture or language. It has been suggested that international medical students studying in Australia have additional problems to Australian medical students such as isolation from family, financial consequences of repeating a year and adjusting to a different academic system of learning and assessment compared with their native country (Kay-Lambkin et al. 2002). Furthermore, first-year international students were reported to have had academic difficulties such as difficulty comprehending course material, feeling uncomfortable participating in class discussions and perceiving their workload was heavy compared with local students (Krause et al. 2005). Permanent place of residence did not predict second- and third-year performance. This may be because after coping with initial homesickness, adapting to new living, social and learning environments, non-local dental students perform just as well as South Australian students. Whilst the current study revealed that permanent place of residence did not consistently predict academic success, the hypothesis [6.2] that South Australians are more likely to perform better than non-locals can be supported for overall first-year performance.

5.6.2.2 Cognitive ability

Prior secondary school academic achievement (TER score) was predictive of academic performance of Australian school leavers (Group 3). A very high TER score was predictive of being a 'higher' academic achiever in first year and in Human Biology (first-year subject). This result is in general agreement with others (McKenzie et al. 2004; Zeegers 2004; Win and Miller 2005) who reported that prior academic performance (TER score) predicted first-year academic performance in Australian university students. These results are also consistent with those of Lynch et al. (2006) who reported a weak positive correlation between previous academic performance (Irish leaving certificate exam) and first-year dental examination performance and performance in preclinical science-based modules. In several recent review papers, Salvatori (2001) and Ranney et al. (2005) stated that previous academic performance (ie, college uGPA) is the best predictor of academic performance in health science courses and dental school. The TER score is a measure of general academic ability based on the final year of secondary school (Evans and Farley 1998). A high TER score may reflect effective study skills, motivation to study and to willingness to succeed (Weiss et al. 1988), all important attributes needed to succeed in a demanding dental course. Human Biology is a demanding subject and not too dissimilar to some final year secondary school subjects in terms of content and complexity of concepts (McManus et al. 2003; 2005). Thus, those performing very well in secondary school should have the necessary academic background to perform well in Human Biology in the Adelaide dental course. The hypotheses

[6.3 and 6.5] that those Australian school leavers with very high matriculation scores are more likely to perform better compared with those with good scores can be supported for overall first-year performance and for one science-based first-year subject ie, Human Biology. However, further research is warranted to confirm this finding with additional future cohorts due to wide confidence intervals (eg, Year 1 good academic achievement CI: 2.16-35.92 and good academic achievement in Human Biology during first year CI: 1.52-19.25).

As expected, the current study showed that the TER score is not predictive of performance beyond first year or in the clinic component of clinical subjects. Hence hypothesis [6.6] can be supported. This is consistent with research that has shown that final secondary school achievement correlates with performance in first year of university but does not correlate well with performance in other subsequent year levels (Zeegers 2004). It has also been reported that prior secondary school achievement was not associated with final-year dental examination performance or results in clinical skills subjects (Lynch et al. 2006). Interestingly, a recent Australian study found that the TER did predict good university academic performance in second and third year, in several courses (Applegate and Daly 2006). Several researchers postulate that previous secondary school achievement has a restricted ability in predicting performance in university. Upon embarking on tertiary studies, other factors such as maturity of students, motivation, interest and study factors may account for variation in student success (Parker 1993). In addition, the methods of teaching, learning experiences and methods of examinations between secondary school and university are different (especially in the later years of a course/clinical subjects). Hence previous secondary school achievement and tertiary achievement are not equivalent measures (Dickson et al. 2000). Furthermore, as students admitted into dental (or medical) courses have very high TER scores, with all occupying a narrow academic range, this reduces the capacity of TER scores to predict university performance (Parker 1993).

Contrary to expectations, the current study found that having studied biology previously during secondary school was predictive of being a 'higher' academic achiever (Australian school leavers: Group 3) in the clinical component of Dental Clinical Practice during first year. This result is in contrast to previous findings of Adelaide dental students for whom undertaking secondary school biology was not associated with academic performance during the early years (Cooper and Spencer 1986). However, in this latter study, the conventional curriculum (1983-86) did not have a clinic subject in first year. This current finding is in general agreement with Hobfoll and Benor (1981) who found that those medical students with prior good performance in biology in secondary school received higher clinical rating scores from their supervisors. Unexpectedly, having previously studied secondary school biology was not predictive of any other outcome measures used in the current study, in particular performance in the science-based subjects. The current study found that the previous study of biology did not predict

good academic performance in science-based dental subjects, hence the hypothesis [6.7] cannot be supported.

As expected, having previously studied chemistry or physics during the final year of secondary school was not predictive of dental academic performance. These results are in contrast to El Mouzan (1992) who reported that secondary school biology and mathematics best predicted first-year school medical performance and secondary school biology and chemistry predicted second-year medical school performance. This difference in findings may be explained by curriculum differences in terms of first year subjects, however, details of the curriculum were not provided by El Mouzan (1992). Prior study of chemistry or physics in the final year of secondary school did not predict dental student academic success, hence the hypothesis [6.8] can be supported.

Overall achievement on the UMAT was not predictive of the academic performance of Australian school leavers (Group 3) during first year. Hence, the hypothesis [6.3] that those with high scores on the UMAT are more likely perform better in first year compared with those with lower ratings cannot be supported from the results of the current study. However, as expected, the hypothesis [6.4] that there is unlikely to be a difference in performance in second and third year; and in the clinic components of Dental Clinical Practice between those with high and lower scores on the UMAT can be supported.

There is limited published research on the predictive ability of the UMAT on performance of Australian health profession students. The current finding is however consistent with various studies of other aptitude tests used for the admission of dental students in Northern America (DAT) (Gray and Deem 2002) and graduate medical students in Australia and New Zealand (GAMSAT) (Groves et al. 2007). Research has also shown that admission aptitude tests have limited ability to predict performance beyond first year (Potter et al. 1982) or clinical performance (Murden et al. 1978; Potter et al. 1982; Sandow et al. 2002; Smithers et al. 2004) of dental/medical courses. Thus, results from the current study provide further evidence to support these findings.

Numerous reasons may explain why performance on admission aptitude tests may not be predictive of dental school academic success. Aptitude tests such as DAT are often broad based objective national tests. DAT performance may constitute a unitary measure of achievement and scholastic aptitude whereas dental school grades reflect both cognitive abilities and personal characteristics (Boyd et al. 1980; Sandow et al. 2002). For example, cognitive tests such as DAT do not assess variables that are related to patient care such as interpersonal or organisational skills, hence it is reasonable to expect DAT will not predict performance in dental clinical subjects (Sandow et al. 2002). In addition, aptitude tests are not able to measure all the factors related to personality, adjustment and emotional stability of potential dental students. These factors may influence academic performance especially under stressful conditions such as studying dentistry (Ross 1962). Furthermore, as a student

progresses through a course there are likely to be fewer direct connections between achievement on an admission test (done prior to entry) with dental school academic achievement several years later (Kramer 1999).

From a practical perspective caution needs to be exercised in interpretation of results related to the UMAT from the current study. Statistical analyses (models 3 and 4 that examined the UMAT as a predictive variable) were performed on a sub-sample of the students in this study because international students who gained entry to the Adelaide dental course were not required to sit the UMAT test. The ability of the UMAT test scores to predict subsequent dental school performance requires further monitoring with a larger sample of students and in light of recent modifications to the UMAT test after this current study was undertaken.

Low achievement in two first-year dental subjects (Human Biology OR 37.14; CI 6.44-214.10 and Dental Clinical Practice OR 10.39; CI 2.10-51.37) was predictive of subsequent academic failure in second and third year (Group 3). This result is in general agreement with that of Zeegers (2004) who reported that previous performance (GPA) in first-year science studies predicted performance in third (final) year. Tickell and Smyrnios (2005) also reported that the best predictor of academic performance of Australian university accounting students in any one year was performance in the previous year. More recently, a study reported that first-year dental students GPA was strongly associated with their GPA in final year ie, 'high'/'low' achievers in first year remained 'high'/'low' achievers at the end of the course (Curtis et al. 2007). The finding from the current study also confers support to the anecdotal evidence from staff that students who had difficulties in first year go on to have academic difficulties in second and third year. Hence, it seems performance in first year is critical for later success. Further research is needed to examine if such a trend continues in the final (senior) years in the Adelaide dental course.

Human Biology may be an academically challenging subject for Adelaide students due to its content and assessment. From the current study it seems that Australian school leavers with very high TER scores performed better in Human Biology, whereas, a background in biology in secondary school was not necessarily required for success in Human Biology. This may suggest that approaches or other factors related to content are important in preparing well in Human Biology eg, organisation and academic support.

Dental Clinical Practice is also a challenging subject for first-year students as it involves working in a clinic environment, which is a new learning experience compared with students' previous school/tertiary experiences. Not only do students need to acquire knowledge but they also need to demonstrate the application of the knowledge learnt in the clinic situation. Assessment in this subject involves self- and tutor assessment of clinical performance and application of theory in station-based examinations. Both of these modes of assessment would be new to most first-year dental students.

The current study found that academic achievement in first-year dental studies predicted dental student academic success in later years. The hypothesis [5.3] that those students who have academic difficulties in first year are more likely to have difficulties subsequently is supported. However, this relationship needs to be confirmed in more cohorts of subjects due to wide confidence intervals (small sample size).

5.6.2.3 Personal characteristics

Using bivariate analyses, the global rating in the structured admission interview was found to be associated with academic progress during the early years. In particular, students who had uninterrupted progress between first and third year, had the highest global rating (ie, deemed to be 'excellent' candidates) compared with those who failed during first, second or third year. This observation is consistent with research on first-year UK dental students who performed well on an admission interview (Hoad-Reddick and Macfarlane 1999). Conversely, using multivariate analyses the global rating on the structured admission interview was not predictive of academic progress or good performance in first, second or third year. Sandow et al. (2002) also found that performance in an admission interview did not predict dental student progress but did predict good performance in first and second year. Differences in the admission interview process implemented in the study by Sandow et al. (2002) and the current study may account for the difference in the results between studies. In the study by Sandow et al. (2002), interviewers were not 'blind' to candidate information prior to the interview. It is not entirely unexpected that the current study did not find that the global rating predicted academic success. As students advanced further along the course (ie, to second and third year) other factors may have contributed to academic success (refer to Chapter 7, section 7.2). Also the global rating on the structured admission interview is a composite of individual categories.

From multivariate analyses, four of the six individual admission interview categories: 'motivation to become a dentist', 'compatibility with the dental course', 'communication and personal effectiveness' and 'supportiveness and encouraging behaviour' were predictive of academic success of Adelaide dental students. 'Tolerance of ambiguity' and 'perseverance' categories were not predictive of academic success. These two categories have now been removed from the Adelaide dental admission interview. The Adelaide admission interview was modified in 2006 for various reasons. The length of the interview was shortened from 45 to 20 minutes and several categories were removed. On the basis of feedback from oral assessors that there were some difficulties assessing, 'tolerance of ambiguity' and 'perseverance', these categories were removed. Results from this study add further support for this decision. 'Supportiveness and encouraging behaviour' predicted a variety of outcome measures: academic failure during the early years; good overall first-year performance; and good performance in the clinic components of Dental Clinical Practice in first, second and third year, whereas the other two

categories predicted one outcome measure. Students who were rated highly on 'supportiveness and encouraging behaviour' performed better than those who were rated well or poorly. In contrast, low ratings on this category predicted academic failure. This admission interview category seeks to evaluate student's perceived level of empathy, supportiveness, listening skills and ability to seek advice from others. It can be suggested that Adelaide dental students who were supportive of others or sought support if difficulties arose in first year or in the clinic component of Dental Clinical Practice during the early years, succeeded, whereas those who did not seek assistance if difficulties arose may have had academic difficulties. Interestingly, Powis et al. (1992) found that negative written comments by interviewers on 'supportive and encouraging behaviour' was the only significant predictor of later withdrawal from a medical course. Another modification to the Adelaide admission interview in 2006, involved the category 'supportive and encouraging behaviour'. This category was incorporated as a component of an existing category 'compatibility with the Adelaide dental course'. Hence, the current finding supports retaining this personal characteristic as a criterion in structured admission interviews for dental students.

Students who were rated highly on the category 'motivation to become a dentist' performed better in third year compared with those who were rated as 'average' in this category. This may be explained by students spending more time in the clinic and providing dental treatment for patients in third year compared with first year. Students who were highly motivated to pursue a career in dentistry may be feeling more enthusiastic (as a result of spending more time in the clinic) and motivated to succeed. Australian school leavers who had high ratings on the 'compatibility with the dental course' category performed better in Dental Health Science 2 compared with those who had low ratings in this category.

There were some inconsistencies in the ability of the individual admission interview categories to predict academic success. For example, students who were rated 'average' on the 'communication and personal effectiveness' category actually performed better in third year compared with those who had higher ratings in this category. Also some categories predicted performance in some year levels and subjects and not others. For example, no category predicted overall second-year performance or performance in Human Biology 1, Structure and Function of the Body 2 or Diseases and Disorders of the Body 3.

Given that the admission interview does not assess academic aptitude (knowledge base), it is not unexpected that the admission interview did not predict higher academic achievement in science-based subjects in the early years, hence hypothesis [5.6] can be supported. Numerous reasons have been cited in the literature to explain why performance in an admission interview may inconsistently predict or is unable to predict academic success in university. Outcome measures (ie, examination grades) used in dental/medical school are often indirect measures of personal characteristics, which

may be measured in an admission interview (Basco et al. 2008). Furthermore, the global rating on an admission interview is often a composite of multiple ratings of various personal characteristics. If a global interview rating is used versus an outcome measure of one particular personal characteristic it is not unexpected to find a lack of statistically significant associations between the two (Basco et al. 2008). Context specificity is another reason that may explain why admission interview performance may not predict university performance. Academic performance is less determined by trait (stable characteristics of the individual) and more determined by the state (context within which the performance was elicited), thus a single interview may not produce an accurate indication of applicant's abilities even if structured and trained assessors are used together with multiple topics (Eva et al. 2004). Finally, skills demonstrated in an admission interview when an applicant is on their 'best' behaviour may not be reliable measures of how well that student may perform subsequently in the course (Adkins et al. 1982; Basco et al. 2008).

There was evidence that a global admission interview rating was associated with academic progress during the early years of the course. In addition, several admission interview categories ie, 'supportiveness and encouraging behaviour', 'motivation to become a dentist' and 'compatibility with the dental course' were predictive of academic failure; and of being a 'higher' academic achiever (ie, overall first- and third-year performance; Dental and Health Science in first and second year; and the clinic component of clinical subjects during the first three years). Hence, hypothesis [5.4] can be supported. To validate these observations however, these trends need to be monitored with larger samples of students due to wide confidence intervals (refer to Tables 5.9 and 5.10) and in light of modifications to the admission interview at Adelaide. Performance on the admission interview did predict good academic achievement in clinical subjects, hence hypothesis [5.5] can be supported.

Bivariate analyses revealed that having chosen dentistry as a first-preference career was associated with being a 'higher' academic achiever in first and third year. However, course preference was found not to be predictive of being a 'higher' academic achiever in any of the outcome measures used in multivariate analyses. This is similar to Mills et al. (2009) who reported that there was no association between career preference and academic progress or performance of health science students. This current study provides some evidence that there was a difference in academic success between students who had indicated dentistry as their first-preference career or who had indicated dentistry as another preference, thus the hypothesis [5.7] that there would be a difference can be supported.

5.6.3 Limitations

There are several limitations related to the methods used in this part of the current study which are common to other studies that examine pre-admission factors and their predictive ability of

subsequent university performance. Students admitted to a dental (health profession) course tend to have a narrow range of scores on admission cognitive tests, previous academic achievement (TER/uGPA) scores, and admission interview scores (Dickson et al. 2000; Smith and Naylor 2001; Salvatori 2001; De Ball et al. 2002; Oudshoorn 2003; Ranney et al. 2005). Due to this small range of variability in admission scores, it is often difficult to display significant associations between admission scores and subsequent academic performance. Academic performance measures used in each subject comprised a variety of assessment methods aggregated into an overall score. Scores from different subjects were combined. This may have an effect of masking individual differences. There is also an inherent assumption that the curriculum (ie, content and assessment practices) did not change substantially from year to year. Whilst there were no major curriculum changes in the Adelaide School of Dentistry between 1998 and 2001, changes to the format and content of end-of-year examinations, different part-time clinic tutors students, and changes to subject co-ordinators could all potentially have influenced the performance of students. Given the number of statistical analyses run in this study, it is likely that some spurious findings resulted (Elam et al. 1997). In addition, chi-square tests and logistic regression analyses used in the project do not give information on causation. These statistical tests simply indicate significant factors which appear to bear some relationship to the outcomes. Moreover, use of logistic regression analysis, with a binary outcome measure, is inherently a less powerful statistical procedure than use of multiple regression analyses with continuous outcome measures (McManus et al. 1996).

5.7 Conclusions

Most Adelaide dental students who were admitted via a multifaceted admission and undertook a hybrid PBL curriculum (1998-2001) were successful academically during the early years of the dental course. Withdrawal and deferral rates were very low and most students progressed satisfactorily during the early years of the course and graduated on time. The frequency of interrupted progress was greater in first year than in third year. Academic failure was the greatest source of interrupted progress. Those who had failed academically had difficulty completing science-based subjects.

Implementation of a hybrid PBL curriculum in the Adelaide School of Dentistry was associated with improved student academic progress compared with that in the previous conventional curriculum. Moreover, implementation of a multifaceted admission process was associated with improved academic progress of international students compared with those admitted via the previous conventional admission process.

The factors that were predictive of academic progress and performance of Adelaide dental students who were admitted via a multifaceted process and undertook a hybrid PBL course are illustrated in Figures 5.5 and 5.6. The current study found several factors were predictive of academic

progress and performance of Adelaide dental students or a subset of these students (Australian school leavers). However, some outcomes (eg, being a 'higher' academic achiever in second year) were not predicted by any of the independent variables selected in the current study. There was no single best predictor or set of consistent predictors. This is consistent with findings in the literature that pre-admission factors account for some but not all of the variance in dental school performance and this reduces in significance as students progress to their later years (Potter et al. 1982; Ranney et al. 2005). In addition, it has been suggested that the requisite abilities required for success in a dental course can be learned (Ranney et al. 2005). As expected, performance the UMAT, was not predictive of being a 'higher academic' achiever in the early years of the course. Further research in other dental faculties and health professions who utilise the UMAT is required. Moreover, in light of modifications to the UMAT (test sections 2 and 3) during 2003-04 and modifications to the Adelaide structured oral admission interview in 2006 (shortened and number of categories reduced), ongoing research is required to continue to examine any relationships between the modified UMAT and admission interview, and dental school performance. In addition, these changes to the UMAT and admission interview have implications in any future research as data from previous cohorts will not be able to be pooled. Retaining a structured admission interview as part of admission process is advocated in light of evidence provided by the current study that good performance in the interview was related to academic success in the early years of the course. Several groups of first-year students have been identified who could benefit from early intervention strategies to maximise their success ie, students who may be having academic difficulties with Human Biology and Dental Clinical Practice in first year; school leavers and non-local students. Non-academic activities (ie, paid work, extracurricular activities) and living arrangements of Adelaide dental students during the early years of the course, as well as the impact of these activities and living arrangements on academic success, will be discussed in the next chapter.

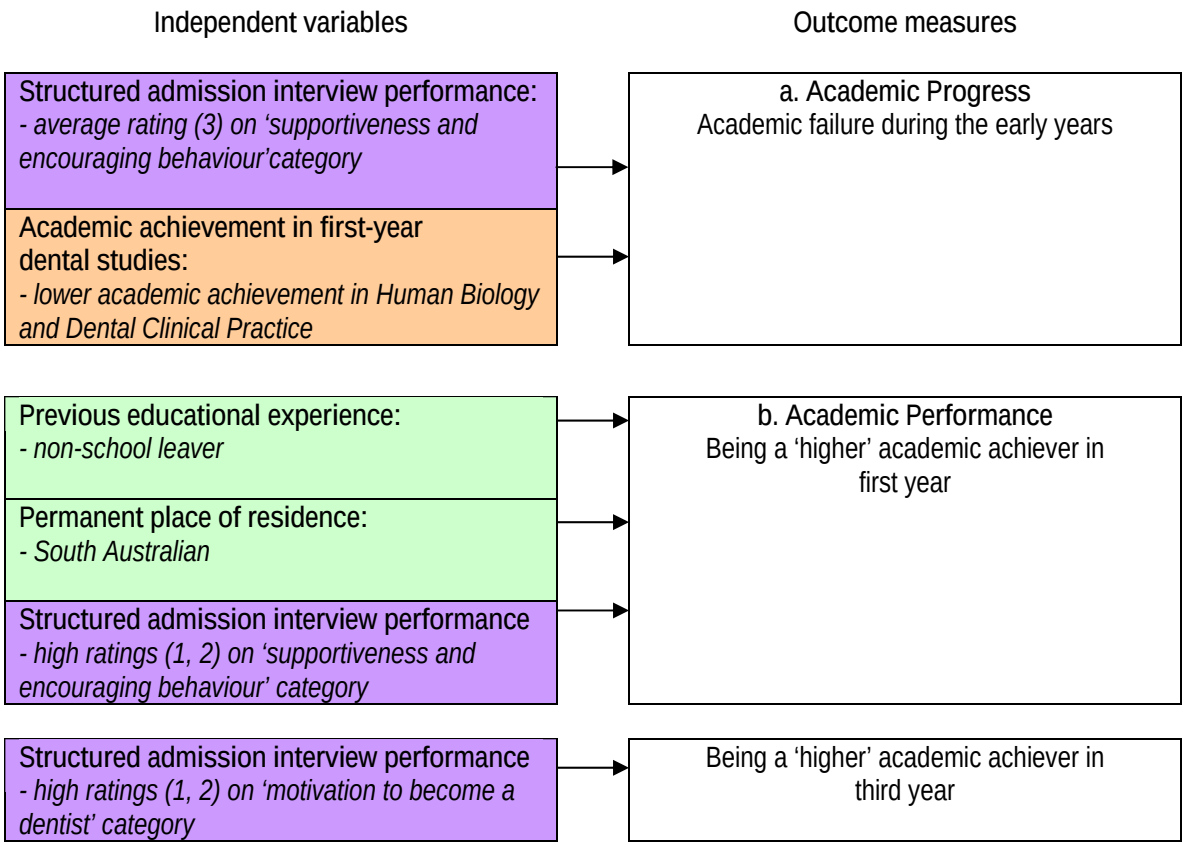

Figure 5.5 Revised model of pre- and post-admission factors that were predictive of academic success during the early years of the Adelaide dental course

Group 3 (Cohorts A to D) MAHPBL: Multifaceted admission, hybrid curriculum

Only statistically significant independent variables shown (based on multivariate analyses)

Arrow: indicates independent variable was a predictor of the outcome variable

Colour coding = type of independent variable:
Green = Student characteristic (pre-admission factor)
Orange = Cognitive ability (post-admission factor)
Purple = Personal characteristic (pre-admission factor)

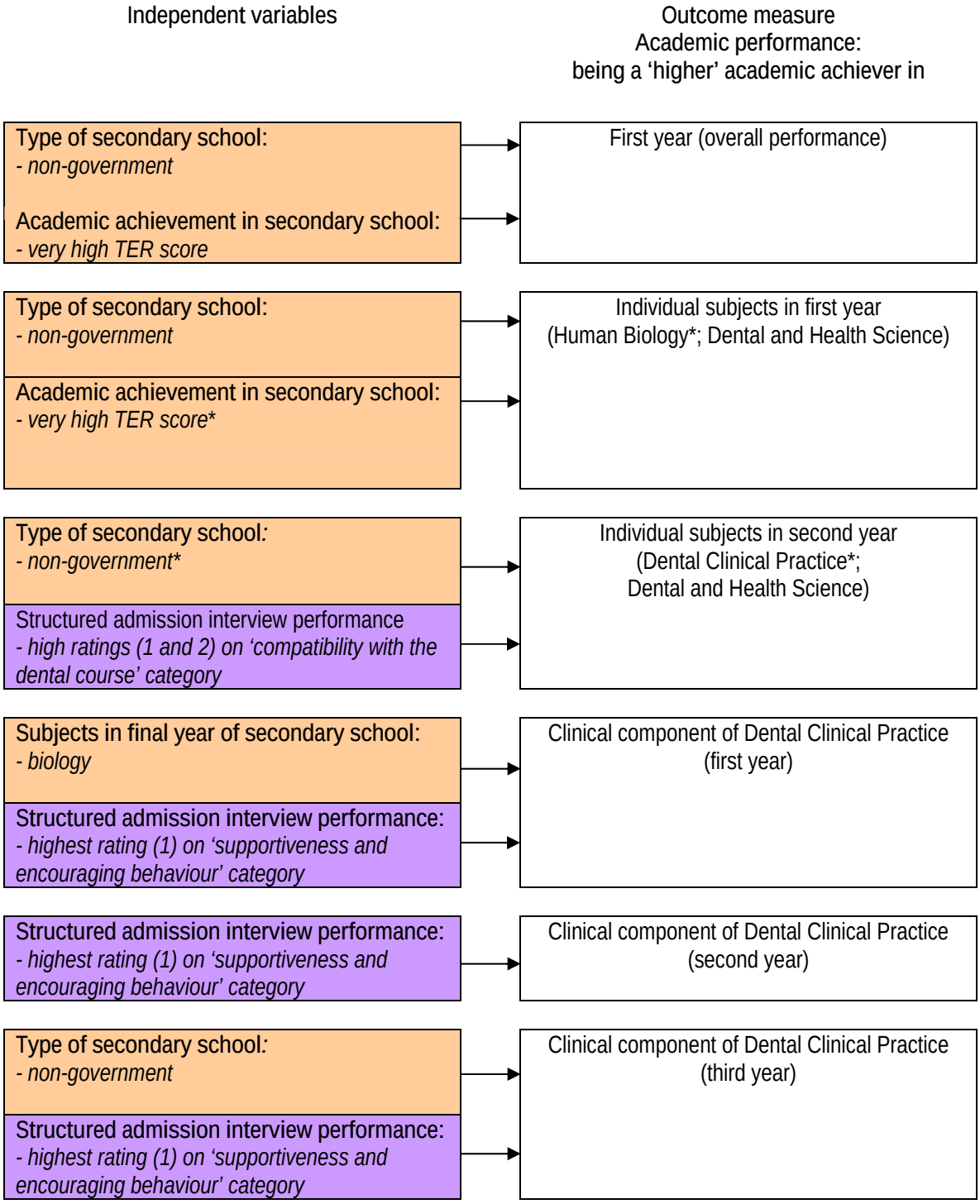

Figure 5.6 Revised model of pre- and post-admission factors that were predictive of academic success of Australian school leavers during the early years of the Adelaide dental course

Group 3 (Cohorts B, C and D) MAHPBL: Multifaceted admission, hybrid curriculum

Only statistically significant independent variables shown (based on multivariate analyses)

Arrow: indicates independent variable was a predictor of the outcome variable

Colour coding = type of independent variable:
Orange = Cognitive ability (pre-admission factor)
Purple = Personal characteristic (pre-admission factor)

6.1 Introduction

As discussed in the literature review in Chapter 1, section 1.7.1, several categories of factors ie, pre-admission and post-admission factors, may influence academic success of university students. Pre-admission factors were discussed in Chapter 5 (section 5.2.4). However, pre-admission factors do not take into account the environment that undergraduate students experience once admitted to the course. Post-admission factors related to individual student experiences (social or contextual factors) such as, participation in paid employment, participation in extracurricular activities (ECAs) and accommodation arrangements whilst studying, may impact on success.

There has been limited research concerning the non-academic experiences of Australian dental students and their potential impact on academic success. This chapter will present information on the non-academic experiences during the early years of the course for, Adelaide dental students (who were admitted via a multifaceted admission process and undertook a hybrid PBL curriculum course during 1998-01). Specifically, participation in paid part-time (PT) employment, ECAs and patterns of living arrangements, will be examined.

6.2 Literature review: non-academic experiences of university students

This review discusses non-academic experiences of full-time university students. Non-academic experiences or commitments may include participation in paid work, ECAs and living arrangements, family support, family responsibilities and interactions with peers on campus (McInnis et al. 1995; Svanum and Bigatti 2006). The review focuses particularly on paid PT employment, ECA experiences and living arrangements for some groups of higher education students.

6.2.1 Paid part-time employment

Traditionally, full-time university students spent most of their time studying and little time engaged in paid PT employment during term-time. Over the past decade there has been a substantial reversal of this trend, both at an international and national level. Many full-time undergraduate students are routinely combining study with term-time paid PT employment. The growing international body of literature has provided descriptive analyses of experiences of paid PT employment by full-time tertiary students in the following domains: patterns of employment; frequency; time spent working; type of paid PT work; type of student undertaking paid PT work; the reasons for working; and the impact of working. A discussion of each of these follows.

6.2.1.1 Patterns of paid part-time employment

Three commonly described patterns of paid PT employment in which full-time university students may be involved are: working only during vacation or holiday breaks; working during term-time;

and working both during vacation breaks and term-time (Ford et al. 1995; Curtis and Shani 2002; McInnis and Hartley 2002). It has been reported that many full-time university students in the UK (Curtis and Shani 2002) and Australia (McInnis and Hartley 2002) may be working during vacation breaks and in term-time. The issue of students working during term-time seems of most interest. Time spent working during term-time might consume time that could be spent doing academic tasks, such as studying or group work.

6.2.1.2 Frequency of participation in paid part-time employment

Rates of employment of students can vary across different universities within a single country, across countries or across fields of study. These differences are often related to: the socio-economic status of students; funding/scholarships available for students; opportunities to find part-time work especially for those students studying in universities not located in a major city; and course factors such as curriculum structure, contact hours and assessment requirements (Little 2002; McInnis and Hartley 2002). The proportion of full-time university students involved in term-time paid PT employment has increased substantially over the last decade from between 30 to 50% of students (43% USA: Stern and Nakata 1991; 30% UK: Ford et al. 1995) to between 50 to 80% (more than 50% USA: Hammer et al. 1998; 48% France, 77% Netherlands: Eurostudent 2005; 50% UK: Little 2002; 72.5% Australia: Long and Hayden 2001).

Students enrolled in health profession degrees, such a medicine and dentistry, which have very high contact hours and compulsory subjects, may however, not display such high rates of term-time paid PT work. For example, whilst a substantial number (66%) of French dental students (Hennequin et al. 2002) were reported to have undertaken PT or casual work, only a small proportion of Swedish (27%) (Widstrom et al. 1990) and Australian (20.4%) (Gietzelt 1997) dental students were involved in paid PT work during the 1990s. More recent data are not available for dental students nationally and locally. However, a recent study of Adelaide medical students reported that 36% of students across all year levels were involved in term-time paid PT work (Duggan and Keefe 2007).

The majority of studies on this topic are cross-sectional and only report frequency of work across year levels or within a given year level. It is not clear whether involvement in paid PT work changes over the duration of a student's stay at university, although notionally it would be expected that work practices may change over time (Ford et al. 1995).

6.2.1.3 Time spent working

Not only has the proportion of full-time tertiary students engaged in term-time paid PT work increased in recent times, so too has the amount of time spent in this work. On average, it is reported that full-time university students spend 14 to 15 hours per week working (Long and Hayden 2001; Curtis

and Shani 2002; Curtis and Williams 2002; McInnis and Hartley 2002; Taylor 2006). This is equivalent to working more than three hours per night each weekday or a full day on both Saturday and Sunday (Ford et al. 1995).

The field of university study was seen to influence the number of hours worked. Those who had fewer contact hours tended to work more. For example, students studying commerce and business studies had fewer contact hours and worked more than students in health and engineering courses (McInnis and Hartley 2002). On average, first-year Adelaide medical students worked 9.8 hours per week (Duggan and Keefe 2007). No study has examined time spent working by dental students in paid PT employment.

Different types of students have displayed different patterns of work hours. For example, school leavers were found to work longer hours compared with mature-aged students (de la Harpe et al. 1997). However, in a later Australian study, school leavers worked fewer hours than mature-aged students and non-school leavers (McInnis and Hartley 2002). International students may only be permitted to work a specific number of hours (eg, maximum of 20) due to government regulations (eg, Australian government) (McInnis and Hartley 2002). Furthermore, male and female tertiary students may have different working hours. Australian male tertiary students have been reported to work longer hours than females (Vickers et al. 2003), however a more recent Australian study found female tertiary students worked more hours than males (Krause et al. 2005). Time spent working can be problematic if work is spread over several days of the week or requests for overtime are made, and problems can be exacerbated if the student is undertaking a course with high contact hours (Ford et al. 1995).

6.2.1.4 Field of employment

The type of paid employment undertaken by university students may increase employment prospects after graduation (refer section 6.2.1.6) and provide increased opportunities for clinical experience in the 'real world' for health profession students eg, nursing (Salamonson and Andrew 2006). The type of paid employment in which most full-time university students are involved, however, may be unrelated to the field of study undertaken.

Contact hours at university may restrict the time of day when students are available to work and thus the type of work that is undertaken eg, 9am-5pm contact hours would favour hospitality work which tends to be after 5pm. Younger students have been found to be more commonly involved in unskilled work (Ford et al. 1995; Watts and Pickering 2000; Curtis and Shani 2002; McInnis and Hartley 2002; Hunt et al. 2004), whereas students who were in the workforce prior to commencing university, or had completed a previous course, were often involved in skilled type work eg, clerical work, reception work, sales, management, technical work and professional work (nursing, other health professions, information technology or public relations) (McInnis and Hartley 2002).

Working in a field unrelated to the course of study may reflect constraints on certain students eg, dental students who are restricted from practising dentistry outside a teaching institution or unable to work as a dental assistants during term-time because of high contact hours. Although it has been postulated that paid work may have a positive effect on academic performance especially when work is related to the degree being undertaken or perceived by students to be relevant to their studies (Winn and Stevenson 1997), this may not always be the case. Nursing students who had nursing-related employment (and worked more than 16 hours per week) did not perform as well (in nursing/non-nursing based subjects) as those who were not involved in term-time paid PT work.

6.2.1.5 Type of student engaged in paid part-time employment

Gender, ethnicity and previous educational experience have been reported to have influenced participation in paid work by full-time tertiary students. Several studies have reported that females are more likely to work than males (US: Stern and Nakata 1991; Australian: Long and Hayden 2001; McInnis et al. 2000a; Vickers et al. 2003; Krause et al. 2005). In addition, students born in Australia and who spoke English at home were also found to be more likely to be working while studying. In contrast, students born overseas or who lived in a home where a language other than English was spoken were more likely to not work while studying (McInnis et al. 2000a; Vickers et al. 2003). School- and non-school leavers were also found to be engaged in term-time paid PT work (de la Harpe et al. 1997; McInnis and Hartley 2002).

6.2.1.6 Motivating factors for participating in paid part-time employment

Various factors have been reported to explain the phenomenon of an increasing number of full-time university students being involved in term-time paid PT employment. These factors have included: financial ('essential') reasons; to provide money for discretionary extras; to gain independence; to continue work habits adopted in secondary school; and to gain work-experience in preparation for life after graduation. The most common of these has been reported to be financial necessity (Ford et al. 1995; Watts 2002; McInnis and Hartley 2002; Moreau and Leathwood 2006; Bradley 2006). Specifically, students have claimed to need money in order to meet costs of essential needs such as food, rent, accommodation and transport (car, petrol or public transport). Included in this category is working to enable: the payment of current or future loans or tuition fees; as an alternative to taking out a loan; to boost income levels; and to meet costs of course requirements (eg, books, course materials, photocopying, printing, other university costs) (McInnis and Hartley 2002; Watts 2002; Hunt et al. 2004).

The need to work to pay for these costs has arisen from changes in government funding for higher education eg, in UK (Ford et al. 1995; Curtis and Shani 2002; Little 2002; Watts 2002; Taylor 2006). In Australia, approximately 39% of university students receive some form of government income

support with the remainder receiving no government support mainly due to their ineligibility (Long and Hayden 2001). Working PT is proposed to provide students with an avenue to supplement other income they may receive eg, government allowances (McInnis and Hartley 2002). Financial reasons are also cited as the major reason why Adelaide medical students became involved in paid PT employment (Duggan and Keefe 2007).

For other students, working PT provides them with money for discretionary extras. These include: buying clothes, gifts, mobile phones, cigarettes, books, to support hobbies, for entertainment purposes, to go on holidays, and maintaining or enhancing a social life (Ford et al. 1995; McInnis and Hartley 2002; Watts 2002; Moreau and Leathwood 2006). Working PT also enabled students to gain financial independence from family members (Krause et al. 2005). Females and school leavers often reported that they worked PT in order to be more financially independent (McInnis and Hartley 2002).

Continuing work habits adopted in secondary school may also be a reason why full-time tertiary students engage in PT employment (Ford et al. 1995; McInnis et al. 2000a; Long and Hayden 2001). It has been quite common for North American (68%) (Lillydahl 1990) and UK (70-80%) (Hodgson and Spours 2001) senior secondary school students to be studying full-time whilst working PT. Participation in paid work whilst at secondary school was found to be widespread amongst boys and girls, across many different ethnic groups and all strata of society (Lillydahl 1990; Singh 1998). Time spent working varied between studies. US senior high school students often spent a substantial amount of time engaged in paid work eg, average of 20 hours per week (Lillydahl 1990) whereas most UK senior secondary school students spent between six to 15 hours per week (Hodgson and Spours 2001). In 1992, one-third of Australian 17 year olds worked PT, and spent on average nine hours per week during the school year (Robinson 1996). Part-time jobs taken up by secondary school students were most often 'white collar' jobs in the retail field (Robinson 1996; 1999; Hodgson and Spours 2001). Others worked in the hospitality and entertainment industries or had 'blue collar' jobs ie, labourers (kitchen hands, shelf stackers in supermarkets) (Robinson 1996; 1999). Australian dental students were not usually engaged in paid employment prior to dental studies. Only 20% of Sydney dental students had some previous employment, mostly vacation jobs, on a casual or PT basis. A small number were employed in skilled positions such as teachers, technicians, child-care workers and research scientists (Gietzelt 1997). There have not been any recent studies of Australian dental students' involvement in paid employment prior to commencing their dental studies, thus it is not known whether the frequency of involvement in paid employment prior to dental studies has changed since 1997.

Working to gain experience for employment after graduation was another motivating factor for engaging in PT employment whilst studying. In the UK, it has been suggested that undergraduates work part-time to foster linkages with potential employers and improve their future professional employment

prospects (Little 2002). One-third of Australian students reported that they worked PT to improve their chances of getting a job after graduation (McInnis and Hartley 2002).

Additional reasons cited for working have included development of skills, social interaction, enjoyment and to relieve boredom (Broadbridge and Swanson 2006; Bradley 2006). No study has examined the motivating factors of dental students who have worked PT during their course.

6.2.1.7 Consequences of paid part-time employment

The literature has demonstrated that working PT whilst undertaking full-time tertiary studies can have both positive and negative outcomes on a number of levels. Positive outcomes included gaining a valuable form of general workplace experience, learning new skills or enhancing existing skills. Other benefits included improved study habits and psychological benefits such as opportunities for social contacts, fewer financial worries and better living conditions (Table 6.1).

Conversely, for some students term-time paid PT work reduced the time spent on campus engaged in learning activities and affected the quality of academic studies (McInnis and Hartley 2002). In addition, a range of studies (Table 6.2) have shown full-time students working PT perceived that university and academic staff did not recognise or support them in combining study and work. Furthermore, working students reported increased stress levels, health concerns and anxiety. Moreover, they were often noted to cut down on social activities and have less personal time for relaxation, possibly as a means to balance the demands of studies and paid work (Table 6.2).

Table 6.1 Positive outcomes of paid part-time work on full-time tertiary students

Dimension	Positive outcomes
INDIVIDUAL LEVEL	
Acquisition of skills (job specific and generic)	Improved organisational and time management skills [1,2,3,4,5,6,7,8,9]; improved communication; negotiation skills; improved interpersonal skills; team work skills [1,2,3,4,5,6,7,8,9]; enhanced employability; build CV [3]
Workplace experience	Better understanding of workforce; meet people outside of university; establish professional contacts [1,6]
Study habits	More organised [6]; some jobs which have slow times eg, car-parking attendant, may have positive effects on studying, by allowing students to study [6]
Psychosocial well-being	
General well-being	Increased confidence; self-respect; enhanced independence [6,7,9]
Health	Stress relief [6]
Social contacts	Meeting new people [2,3,5,6]; expanded social network and outlet [2,6]
Financial	Fewer financial worries[1]
Living arrangements	Improved living conditions[1]
Balance	Life away from university[3]

de la Harpe et al. (1997)[1]; Lucas and Lamont (1998)[2]; Watts and Pickering (2000)[3]; Curtis and Shani (2002)[4]; Little (2002)[5]; McInnis and Hartley (2002)[6]; Broadbridge and Swanson (2006)[7]; Moreau and Leathwood (2006)[8]; Curtis (2007)[9]

Table 6.2 Negative outcomes of paid part-time work on full-time tertiary students

Dimension	Negative outcomes
INDIVIDUAL LEVEL	
Academic studies	Difficulty managing workload [4, 11, 13]
Study Habits	Insufficient time to study including insufficient time to read course-related material or additional reading or reading beyond essential texts/references; not completing course requirements (eg, handing in assignments late or not handing in assignments); seeking extensions; missing classes prior to an assignment being due in order complete work; not having time to go to library to do study or research; rushing tutorial preparation; rushing assignments [1,3,5,6,7,9,10,13,14,15]; doing the bare minimum required as opposed to doing the best possible (that is, 'surface learning' rather than 'deep learning')[9]
Time on campus	Tiredness from work, especially working late at night, has contributed to students missing or running late for lectures or being less able to concentrate during classes or tutorials; missing tutorials [1, 6,7,9,10,13,15]
Group work	Negative impact on group work; limited time available to students to participate in group work outside of class time and to discuss university work with other students [7,8,9]
Access to resources	Reduced access to library; reduced access to academic staff [12]
Psychosocial well-being	
Health	Increased stress, anxiety, emotional and health concerns, guilt, mood swings [1,7,8,9,13,14]; fatigue; tiredness [3,7,13]; lack of sleep [5]; missing meals; getting sick [13]
Social contacts	Reduced time for social and leisure activities [1, 5, 7, 8, 9, 10, 14]; reduced time with family and friends[1,2,7,8,9,14]; difficulties in establishing friendships with classmates and peers[2, 14]; loneliness due to reducing social activities [5]
INSTITUTIONAL LEVEL	
Educational experience	
Satisfaction with university life	Not satisfied; not being able to participate in university activities; social isolation; working may also take students away from their peers resulting in difficulties in establishing friendships and thus limiting integration into the university community; reduced students' commitment to their course of study and thus their persistence at university because they are exposed to other life choices and opportunities [2,9]
Integration into university life	
Retention and persistence	Changing from full-time to part-time study mode; withdrawal/dropping out from university studies [9]
Organisation of courses	Timetabling inflexible; too much emphasis on compulsory attendance [6]
Attitudes of academic staff	Some working students perceived that staff were not sympathetic [6,10]; some academics perceived that full-time students who worked PT were involved in an unnecessary diversion and that term-time work was an extracurricular activity that was not relevant to university study [7]

Ford et al. (1995)[1]; de la Harpe et al. (1997)[2]; Winn and Stevenson (1997)[3]; Lucas and Lamont (1998)[4]; Watts and Pickering (2000)[5]; Long and Hayden (2001)[6]; Curtis and Shani (2002)[7];Little (2002)[8]; McInnis and Hartley (2002)[9]; Watts (2002)[10]; Hillman (2005)[11]; Applegate and Daly (2006)[12]; Broadbridge and Swanson (2006)[13]; Moreau and Leathwood (2006)[14]; Curtis (2007)[15]

Given that time spent working may limit time that spent studying, it is not unexpected that paid employment adversely influences academic success (Appendix 6.1). Of note the influence of time spent in paid PT work on academic success may be time-dependent. For example, spending modest amounts of time eg, 8 to 12 hours working has been reported to have minimal to no impact on academic success (Van den Berg and Hoffman 2005) and may even result in improved academic performance (Applegate and Daly 2006) (Appendix 6.1). In contrast, working a substantial number of hours eg, more than 12 hours (Van den Berg and Hoffman 2005) to 16 hours (Salamonson and Andrew 2006) or more than 20 hours per week (Applegate and Daly 2006) resulted in compromised academic performance. Furthermore, the number of paid PT sessions per week and the number of academic contact hours may additionally influence the extent of this impact (Ford et al. 1995).

Students who work PT whilst studying full-time at university do not necessarily feel the same about the impact of paid work (Appendix 6.1). Two recent UK studies revealed contrasting student perceptions about the impact of paid work. Moreau and Leathwood (2006) reported that students tended to highlight the difficulties of managing paid work and studies rather than the benefits, whereas Curtis (2007) reported that students perceived more advantages of being involved in paid work than disadvantages. No study, to the author's knowledge, has examined the impact of paid work on academic success of dental students or their perceptions of the impact of paid work.

6.2.2 Extracurricular activities

As well as paid PT work, university students may be involved in other ECAs whilst studying, such as participation in sports, non-sporting clubs and associations, volunteer work and other leisure activities. The following section discusses full-time university students' involvement in ECAs.

American undergraduate students have typically participated in ECAs such as leadership activities, academic activities outside of class with peers and travel (Kuh 1995). Improved learning and personal development, (eg, interpersonal competence, practical competence, cognitive complexity, knowledge and academic skills and humanitiarism) were some of the reported benefits gained through participation in ECAs (Kuh 1995). Nigerian dental students have been reported to participate in sports, music/entertainment, reading/writing, home economics, social work and campus politics (Orenuga and da Costa 2006). Prior to the study by Orenuga and da Costa (2006), there was limited information on dental students' involvement in ECAs during their studies and there have been no studies of the potential impact on their academic success.

Participation in ECAs during university studies may be because students are continuing habits adopted in secondary school. Secondary school students have been reported to be involved in activities such as clubs and associations, band, sports, school council, scouting, political campaigning, volunteer or service work, leisure activities and hobbies (Holland and Andre 1987; Chambers and Schreiber 2004;

Fredricks and Eccles 2006). Often secondary school students have participated in several ECAs per week, with the type and number of activities varying depending on the secondary school year level (Fredricks and Eccles 2006). There are no published reports in Australia on the frequency of dental students' involvement in ECAs prior to commencing dental studies. There is also limited information about whether patterns of involvement in ECAs during secondary education are continued into tertiary studies.

While the impact of paid PT work on academic success of tertiary students has been documented, there have been limited studies on the impact of ECAs on academic success. Participation in ECAs whilst undertaking secondary school studies has been found to positively impact on academic performance (Marsh 1992; Cooper et al. 1999; Chambers and Schreiber 2004). A similar effect might be postulated for tertiary students who undertake ECAs. However, no associations were found between ECAs and either US college students' course grades (Svanum and Bigatti 2006) and Australian medical students' academic success (Parker 1993).

6.2.3 Living arrangements

The first year experience at university for many students includes a transition to a new living situation. With regards to the living situation of university students, research has examined the type of living arrangements and the impact of living arrangements on students themselves and their studies.

6.2.3.1 Type of living situation

Living arrangements might vary due to: differences in location of the university; size of the university town; university catchment area; situation of the local private housing market; range of available places at halls of residence; policies for recruitment of international students; course undertaken (some academic courses have a high intake of international students); curriculum structure (may include a placement component where students are expected to live away from campus); national and cultural issues; economic independence of students; age; and gender (Eurostudent 2005). In the USA (Pike 2002) and UK (Johnes and McNabb 2004) it has been traditional for students to leave home and go to college or university where they live on-campus. In contrast, Australian (McInnis et al. 1995) tertiary students tend to live off-campus, either continuing to live within the family home, or moving out and living independently. In one Australian study, more first-year school leavers (under the age of 19 years) lived at home than non-school leavers (McInnis et al. 1995). These authors reported that approximately 64% of school leavers lived with family, 39% had moved out of the family home and 15% lived in residential college. It was suggested that school leavers tended to live at home as they may not be ready to move out of home and away from family support.

Studies in the dental literature have highlighted the variation in proportion of dental students who live away from home or live at home in different regions of the world. For example, most Sydney (70.0%) (Gietzelt 1997) and Tokyo (54.4%) (Sugiura et al. 2005) dental students lived at home. This is in contrast to the very few Nordic (10%) (Widstrom et al. 1990), Nigerian (5%) (Sofola and Jeboda 2006) and English (10%) (Heath et al. 1999) dental students who lived at home.

For students who live away from home, there are several accommodation options. One option is private rental arrangements, such as hostels, units, flats, apartments or houses. Students may choose to live on their own or in shared accommodation with other friends, siblings, relatives or university peers. Another option is to become a resident of a university or affiliated residential college or university hall or units (Widstom et al. 1990; McInnis et al. 1995; Chalmers and Volet 1997; Johnes and McNabb 2004). Most Australian universities are affiliated with residential colleges, halls of residence or units that are usually located within or close to the university campus, providing an easy walking distance or minimal transportation costs (McInnis et al. 1995; The University of Adelaide 2004a; Flinders University 2006). In these colleges, students live in furnished single rooms and meals are provided, often at set times. Thus, students spend less time on domestic chores, shopping for meals and cooking. Residential colleges also provide a range of social activities (eg, common room with various entertainment facilities, sporting facilities), academic activities (eg, computer and library facilities and tutorial/academic support) as well as pastoral care and personal support by college staff (The University of Adelaide 2004a; Flinders University 2006). The proportion of students living in private accommodation versus residential college may vary depending on the local context. In Australia, the proportion of students living in residential colleges also depends on the availability of places (McInnis et al. 1995).

6.2.3.2 Consequences of living situation

The living arrangement of tertiary students may contribute positively or negatively to their adjustment to university, academic success and psychosocial well-being. Living in residential college was found to have contributed to better integration and adjustment to university life compared with living at home (McInnis et al. 1995). In addition, it provided opportunities to meet and socialise with peers within the same course or year level as well as other university students from the wider university community (McInnis et al. 1995). Stability of college life was also found to be a source of comfort for the students' family (Duggan and Keefe 2007). In addition, living in a residential college helped university students adjust emotionally and socially to first year (McInnis et al. 1995; Stevens and Walker 1996; Wilcox et al. 2005).

However, living away from home has also been found to have contributed to difficulties for students. A Dutch study reported that first-year university students who lived independently experienced

more problems than students who stayed at home. Specifically, these students spent fewer hours on their studies, which in turn was found to negatively affect study progress (Beekhoven et al. 2004). It was hypothesised that living independently was a potential problem as it placed an additional burden on time management and discipline of students (Beekhoven et al. 2004). Rates of involuntary drop out of first-year Canadian university students were also reported to be higher amongst students who lived away from home (Grayson 1998). International students living away from home have been noted to have difficulties adjusting to university life and making friends with local students due to their constrained living arrangements that have restricted contact with local students (Chalmers and Volet 1997).

Living at home has also been reported to have both positive and negative outcomes. Whilst living with family has been shown to provide is ready access to a support network (Grayson 2003) researchers have concurrently observed that living at home may not necessarily be conducive to success. Recent UK studies have found that students who live at home are more likely to drop out of university than those who live in halls of residence (Christie et al. 2004; Johnes and McNabb 2004). They suggested living at home may make it difficult for first-year university students to develop new social networks and gain independence. In Australia, younger university students who lived at home and were not involved in paid PT work were reported to be more dependent, less orientated to demands of independent study, and less at ease with expectations placed on them by academic staff (McInnis et al. 1995).

6.2.3.3 Living arrangements and paid work

The literature has also established associations between living arrangements of full-time tertiary students and participation in paid PT work. Australian tertiary students who lived with family were more likely to have been working PT compared with students who had other living arrangements (McInnis et al. 2000a; Hayden and Long 2003). However, those living at home and working tended to work fewer hours compared with those who lived away from the family home (McInnis et al. 2000a). In addition, full-time students who lived in residential college or lived at home with family were only half as likely as full-time students living alone or with children to experience an adverse impact of employment on academic studies (Hayden and Long 2003).

In summary, it seems to be the 'norm' for full-time university students to be involved in some form of paid PT work whilst studying. Those who work may spend on average 15 hours per week working in areas unrelated to their field of study. Financial reasons seem to be the main motivators for these students working. Whilst many reported they could manage university and work commitments successfully, for others balancing competing demands was difficult, creating academic and personal issues. Full-time university students have also participated historically in other ECAs (apart from paid work) however, participation in these activities has not necessarily impact negatively on academic

success. There is a lack of consensus on whether living at home or away from home has influenced academic success.

There has been no comprehensive study of non-academic experiences (paid PT work, ECAs, living arrangements) of dental students and tracking these experiences longitudinally. As research of other higher education student groups has identified both positive and negative effects on academic success, exploration of these issues in dental students is needed. Further empirical work could help students make informed decisions about involvement in non-academic activities and the type of living arrangements during their studies that may enhance success.

6.3 Aims, research questions and hypotheses

The overall aim of this part of the project was to investigate experiences of paid employment, ECAs and living arrangements among first-, second- and third-year Adelaide dental students (1998-2001) admitted via a multifaceted admission process and who undertook a hybrid PBL course. In addition, the study sought to describe how these experiences evolved over the in the first three years of the Adelaide dental course.

A comparison between paid employment and ECAs during the early years of the course with those experienced prior to commencing the Adelaide dental course was also undertaken. In addition, the potential impacts of paid employment, ECAs and living arrangements were examined.

Specifically the aim of this aspect of the project was to address *Research Question (RQ) 5* ie, *What are the non-academic experiences of students prior to, and during, the early years and do these experiences influence academic success?* (refer to Chapter 1, section 1.9 Table 1.1). Sub-questions were also devised and related hypotheses (H) were generated from the literature review (section 6.2). The sub-questions and hypotheses are summarised as follows:

RQ 5.1 What are the patterns of involvement in paid employment and ECAs prior to enrolling in the dental course?

RQ 5.2 What are the patterns of involvement and reasons for participating, in paid employment and ECAs during the early years of the course?

It was hypothesised that:

H 2.1 Given the demands of the Adelaide dental course only some students are likely to participate in modest levels of paid PT work during term-time spending less than 15 hours working per week

H 2.2 The level of participation in paid PT work is likely to decrease in second and third year

H 2.3 Students who participate in paid PT work are likely to have non-dentally related jobs

H 2.4 Students who participate in paid PT work are likely to work for financial reasons

H 2.5 Many students are likely to participate in modest levels of ECAs

H 2.6 The level of participation in ECAs is likely to decrease in second and third year

RQ 5.3 Are there any differences in patterns of participation in non-academic experiences (paid work and ECAs) between different groups of students (eg, males/females; school leavers/non-school leavers; Australian/international students)?

It was hypothesised that:

H 3.1 Females are more likely to participate in paid PT work than males

H 3.2 School leavers are more likely to participate in paid PT work than non-school leavers

H 3.3 Australian students are more likely to participate in paid PT work than international students

H 3.4 Gender, previous educational experience and permanent place of residence are not likely to be associated with participation in ECAs

RQ 5.4 What are the similarities or differences in participation in paid employment and ECAs of students before commencing and during the early years of the course?

It was hypothesised that:

H 4.1 Some students who participate in paid PT work prior to the dental course are likely to continue this activity during the course

H 4.2 Most students who participate in ECAs prior to the dental course are likely to continue this activity during the course

RQ 5.5 What were the living arrangements of Adelaide dental students during the early years of the course?

RQ 5.6 *Are there any differences in types of living arrangements between different groups of students (eg, males/females; school leavers/non-school leavers; Australian/international students)?*

It was hypothesised that:

H 6.1 Gender is not likely to be associated with types of living arrangements

H 6.2 School leavers are more likely to live with family in the family home than non-school leavers

H 6.3 South Australians are more likely to live with family in the family home than non-South Australians and international students

RQ 5.7 What are the living arrangements of Adelaide dental students who work PT during the early years of the course?

It was hypothesised that:

H 7.1 Students who participate in paid PT work are more likely to live with family in the family home than away from home

RQ 5.8 What were the positive and negative outcomes of participating in paid employment and ECAs during the early years of the course?

RQ 5.9 To what extent does participation in paid PT work and ECAs and the type of living arrangement impact on academic success during the early years of the course?

It was hypothesised that:

H 9.1 Students who participate in term-time paid PT work are not likely not to perform as well (ie, lower achievers) those who do not participate

H 9.2 Students who participate in more than 10 hours per week of term-time paid PT work are not likely to perform as well (ie, lower achievers) as those who work less than 10 hours per week

H 9.3 Participation in ECAs is not likely to be associated with academic success

H 9.4 The type of living arrangement whilst at university is not likely to be associated with academic success

6.4 Methods

6.4.1 Study sample

One study group made up the sample for this part of the study, Group 3: MAHPBL (1998-2001). Details about this study group were discussed in Chapter 2. Data related to living arrangements were not collected from Cohort A. In addition, non-academic experiences prior to commencing dental studies were also not collected from this cohort (as discussed in Chapter 2, section 2.6.2.2).

6.4.2 Data collection and analysis

This aspect of the study investigated non-academic experiences prior to, and during the early years of the course. The types of experiences selected were based on factors identified from the literature that have been reported to influence academic success in the early years of higher education (sections 6.2.1, 6.2.2 and 6.2.3).

Data about non-academic experiences prior to commencing dental studies were collected retrospectively via a survey (commencement survey). Details about the commencement survey were described in Chapter 2, section 2.6.3.1. This part of the survey consisted of two closed questions (Appendix 2.3 Commencement survey Questions 6 and 7). The first question collected data on the type of ECAs in which Australian students might have been involved, in the year prior to dental studies. Six

types of activities were included with provision for students to indicate if they were involved in any other type of activity not listed. ECAs such as leisure activities, television viewing time and time with friends were not investigated. The types of ECAs selected also reflected activities relevant to the local context (Table 6.3). Data on the average hours per week students spent on ECAs were also collected. The second set of questions collected data on paid employment experience in the year prior to dental studies. Students were asked to indicate whether they worked, when they worked, the type of work and average hours they had spent working. Cohort A was excluded from this part of the study as these students had already completed first year at the commencement of this current study (refer to Chapter 2, section 2.6.2.2).

Table 6.3 Types of extracurricular activities students may have participated in prior to commencing dental studies

Secondary school/out-of secondary school setting	Organised/unorganised Academic/non-academic	Activities explored in the current study
School	Organised academic	• Membership of club(s) or organisation(s) • Prefectship or School Representative Council • Debating team • Playing a musical instrument
	Organised non-academic	• Playing sport
Out-of-school	Organised non-academic	• Voluntary community service • Playing sport • Participating in clubs

Data about non-academic experiences during the early years of the course were collected retrospectively via a survey (post-admission survey) specifically designed for this study. Details of the post-admission survey were described in Chapter 2 (section 2.6.3.2). This part of the survey consisted of questions related to paid PT work, ECAs and living arrangements (Appendix 2.4 Post-admission survey Questions 3, 4, 5 and 6). The response categories were selected based on findings from the literature and linked to aims of this study. In terms of paid work, students were asked to indicate whether they worked PT, when they worked, the type of work they did and the average hours they worked. The second question collected data on the type of ECAs pursued. Students were asked to indicate if they participated in any of six types of activities thought to encompass the range of ECAs in which Australian university students may be involved. There was also provision for students to indicate if they were involved in any other type of activity not listed. Data on the average hours per week they spent on ECAs were also collected. In terms of living arrangements, students were asked to indicate the type of

accommodation and the people with whom they lived, from a list of options of the most common types of accommodation. An administrative oversight was made during data collection for students in Cohort A, B, and C during their third year with the survey questions on time spent on paid PT work and field of employment not included.

The relationship between hours involved in paid work and academic performance was examined. It was decided to dichotomise time spent working into two groups: working less or more than 10 hours per week. Other researchers have used different thresholds eg, greater or less than 14 hours (Hunt et. al. 2004); 16 hours (Salamonson and Andrew 2006); and 22 hours (Applegate and Daly 2006) but students in these studies were mostly undertaking courses with fewer contact hours than dentistry. After initial data analysis, it was found that most Adelaide dental students worked on average 9 to 10 hours. This further justified the initial threshold that was chosen for this study. As discussed in Chapter 2 (section 2.7) students' academic performance was categorised into two groups, 'higher' and lower' academic achievers.

Data were collated for each student about their non-academic experiences during each of the first three year levels of the course. Data included in this part of the analysis required that students had responded to all three (first, second and third year) post-admission surveys. Students who had only completed one or two surveys had their data removed from this part of the analysis. Reasons students did not complete all three surveys included withdrawal from the course or that the student did not complete the survey at the time of its administration. Students who failed and repeated a year were also excluded from this part of the analysis. Furthermore, data were collated for students about their experiences in paid employment and ECAs, prior to, and during, each of the first three year levels of the course. Data included in this part of the analysis required that students had completed all four surveys (one commencement survey and three post-admission surveys).

Descriptive and bivariate statistical methods were used to summarise and analyse the data. Frequencies of different responses (paid work, ECAs and living arrangements) were calculated for experiences prior to and during each year level. Chi-square tests were performed to

- compare patterns of non-academic experiences (paid work, ECAs, living arrangements) between cohorts in the same year level and between year levels
- examine associations between characteristics of survey respondents and non-academic experiences during first-, second- and third-year
- examine any differences in non-academic experiences across the early years of the course between cohorts
- examine any differences in non-academic experiences prior to and during the early years of the course and

- examine associations between first-, second- and third-year academic performance (lower versus higher achievers) and non-academic experiences (paid work, time spent in paid work, ECAs and living arrangements).

Statistical significance was set at $p<0.05$. Other data (open-ended survey questions) from the post-admission survey were analysed qualitatively using content analysis with frequencies subsequently calculated.

A follow-up survey was also used to collect additional data about non-academic experiences during the early years of the course. The follow-up survey was conducted in response to initial data analysis of the post-admission survey eg, many dental students were identified to have spent a substantial amount of time in non-academic activities and a significant number of students had moved out of residential college. In addition, there was a considerable increase in studies that were examining participation in paid PT work of full-time tertiary students, and in particular were examining students' reasons for working and the impacts of paid PT work but not specifically for dental students. Data for this aspect of the study were from students in fourth (Cohort D) and fifth (Cohort C) year in 2004. Students from earlier cohorts (A and B) had mostly graduated. Data were collected retrospectively via a survey (follow-up post-admission survey) (Appendix 6.2). There were three parts to the survey with a total of 14 open-ended questions. Prompts were used to help students focus their answers. Questions were directed to students who were involved in either paid PT employment during the academic semester, ECAs, or lived in residential college during the first three years of the dental course. Students were asked to provide the main reasons for working part-time and for being involved in ECAs, and to nominate the most important reason why they worked or were involved in ECAs. They were also asked to comment on the positive and negative influences on their dental studies of working part-time or being involved in ECAs. A final set of questions was directed to students who lived in residential college during the early years. They were asked to comment on both the positive and negative influences on their dental studies of residing in residential college. If they had moved out of residential college during the early years, they were asked to comment on the reasons for moving out, the most important reason for moving out, and to describe the positive and negative influences this move had on their dental studies. Further details on the follow-up post admission survey are provided in Chapter 2, section 2.6.3.3.

After coding the follow-up post admission surveys, data were analysed using a content analysis approach (as discussed in Chapter 2, section 2.8.1). Quantitative analysis was then conducted ie, responses were pooled and frequencies of responses calculated. Examples of verbatim student responses are indicated in italics. Responses chosen for inclusion were deemed to best illustrate the categories formulated from the data and represent the majority view. Table 6.4 summarises the data

collection points for Group 3, Cohorts A to D and Cohorts B, C and D with regards to non-academic experiences.

Table 6.4 Data collection points with regards to non-academic experiences of dental students prior to and during the early years

	Non-academic experiences		
	Paid work	ECAs	Living arrangements
Non-academic experiences prior to the dental course Commencement survey	Cohorts B,C&D (1999-2001)	Cohorts B,C&D (1999-2001)	Not applicable
Non-academic experiences during first, second and third year			
Post-admission survey	Cohorts A to D (1998-2004)	Cohorts A to D (1998-2004)	Cohorts B,C&D (1999-2004)
Follow-up post-admission survey	Cohorts C and D (2004)	Cohorts C and D (2004)	Not applicable

Group 3: MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

6.5 Results

6.5.1 Survey response rates and characteristics of respondents

6.5.1.1 Commencement survey

The overall response rate was high (97.1%) (Appendix Table 6.1). For details of the response rate within each of the cohorts refer to Appendix Table 6.1. Most respondents (54%) were female. Approximately two-thirds of respondents were school leavers and 49% were South Australian. The majority (82%) of respondents had indicated dentistry as their first-preference course (on admission application) (Appendix Table 6.1). Chi-square tests indicated that there were no statistically significant associations between patterns of participation in paid work or ECAs and non-academic experiences prior to commencing dental studies. In addition there were no statistically significant associations between respondents' characteristics and non-academic experiences prior to commencing dental studies between the cohorts. Thus data for all cohorts were combined.

6.5.1.2 Post-admission survey

The response rates to the post-admission survey were high for first- (96.2%) and second- (94.9%) year students, but were lower for third-year students (82.2%) (Appendix Table 6.2). This was

due to low numbers of third-year students being present during survey administration in Cohorts A (51.9% return rate) and C (76.9% return rate) (Appendix Table 6.6). Most respondents were South Australian, female, school leavers and had chosen dentistry as their first preference course (Appendix Tables 6.2 and 6.3). Chi-square tests indicated that there were no statistically significant associations between respondents' characteristics and non-academic experiences between cohorts. For details of response rates within each of the cohorts and within each of the year levels, refer to Appendix Tables 6.4, 6.5 and 6.6. In the following sections, data are presented for all first-, second- and third-year cohorts combined.

A total of 88 students (Cohorts B, C and D) completed the commencement survey and all three post-admission surveys. Appendix Table 6.7 summarises the characteristics of the sample of students included in this part of the analysis.

A total of 101 students (Cohorts A to D) completed all three post-admission surveys (first, second and third year). Appendix Tables 6.8 and 6.9 summarise the characteristics of the sample of students included in this part of the analysis.

6.5.1.3 Follow-up post-admission survey

There were several fourth-year students who did not provide their student identification number on the cover page of the survey and thus their data could not be coded. The total survey response return rate was satisfactory at 73.3%. Similar numbers of students in the fourth-year and fifth-year classes of 2004 responded to the survey. There were no statistically significant differences in respondents' characteristics and non-academic experiences between the two classes (Appendix Table 6.10). In the subsequent sections, data are presented for both classes combined.

6.5.2 Paid part-time employment

The following sections will discuss patterns of paid PT employment, type of work performed, time spent working, type of dental student who engaged in paid PT employment, reasons for participating in paid PT employment, and the consequences of paid PT employment on Adelaide dental students (Group 3: MAHPBL) during first, second and third year.

6.5.2.1 Participation in paid part-time employment prior to commencing the dental course

Two-thirds (n=89) of students were involved in some type of paid employment prior to commencing dental studies, whereas 45 students reported they were not involved in any form of paid employment. Twenty-five percent (n=33) of those who worked were involved in paid PT employment on a regular basis (regularly during weekend, Thursday or Friday nights, or regularly during the week), 23.9% (n=32) worked only during the holidays/semester breaks, and 11.9% (n=16) worked

full-time (greater than 30 hours per week). Some (n=8) students had 'other' irregular employment arrangements eg, worked for one hour
for two months, occasional work, worked sparsely during the week, part-time casual, or had two different jobs, one in the holidays and the other during the semester or vice versa (Appendix Table 6.11). For those students who worked on a regular basis (n=33), most were employed in the retail field (54.5%), often working as sales assistants in a retail outlet. Others worked in the hospitality field or had a wide range of 'other' jobs. In addition, most students who worked on a regular basis spent more than five hours per week (Appendix Table 6.12). The maximum times spent in paid employment on a regular basis were 20, 25 and 20 hours per week, in Cohorts B, C and D respectively. Sixteen students worked full-time prior to commencing dental studies. The characteristics of students who worked full-time prior to the Adelaide dental course are outlined in Appendix Table 6.13. Furthermore, all school leavers who worked full-time prior to entry to first-year dentistry, had taken a 'gap' year (ie, deferred their place in the Adelaide dental course) before commencing dental studies. The majority of students who reported to be employed full-time, worked more than 30 hours per week and in a diverse range of fields eg, professional (health professions), para-professional (teacher aid, administration work), research (laboratory or research assistant), manual labour and miscellaneous (army service, tutor) (Appendix Table 6.13).

6.5.2.2 Participation in paid part-time employment during the early years

One-third of first-year (n=50), second-year (n=45) and third-year (n=38) students were involved in paid PT work on a regular basis (regularly during weekends, Thursday or Friday nights only, or regularly during the week) during the academic semester (Table 6.5). Approximately, one-third did not engage in paid work during the early years and between 26 to 30% of students only worked during holiday periods or semester breaks (Table 6.5). For those who worked on a regular basis during term-time, the fields of employment included hospitality and retail. First- and second-year students commonly worked in the hospitality field (Table 6.6). Work in the hospitality field commonly involved bar work, waitering or working in a food outlet. Work in the retail field often involved being a sales assistant. Other types of jobs are outlined in Table 6.6.

Most first-year students (77.6%) who worked during term-time spent more than five hours working, with most spending between six to 10 hours per week (40.8%) (Table 6.6). The average time spent by those first-year students who worked PT during term-time was 10.4 hours. In addition, maximum times involved in regular paid PT employment were 16, 15, 20 and 25 hours per week in Cohorts A, B, C and D respectively. Only 22% (n=10) of second-year students spent less than five hours per week, whereas the majority (46.7%) spent between six to 10 hours per week (Table 6.6). The average time spent by those second-year students who worked PT during term-time was 9.0 hours. In

addition, maximum times spent were 20, 15, 25 and 20 hours per week, in Cohorts A to D respectively. Most third-year students (54.5%) spent between six to 10 hours, at work per week (Table 6.6). The average time spent by third-year students who worked PT during term-time was not calculated due to insufficient data (as explained previously). In addition, maximum time involved was 12 hours per week for one student in Cohort D

More first-year South Australian students (70.0%) were involved in regular term-time paid PT employment compared with non-South Australians (18.0%) and international students (10.0%) (x^2=14.00; p=0.00) (Appendix Table 6.14). In addition, more second-year South Australians (73.3%) were involved in regular term-time paid PT employment compared with non-South Australians (22.2%) and international students (4.5%) (x^2 =18.20; p=0.00) (Appendix Table 6.15). Consistent with first- and second-year experiences, third-year South Australians (78.9%) were involved in regular term-time paid PT employment compared with non-South Australians (15.8%) and international students (5.3%) (x^2=15.58; p=0.00) (Appendix Table 6.16).

Table 6.5 Participation in paid part-time employment during the early years

	First year (1998-2001)		Second year (1999-2002)		Third year (2000-2003)	
Patterns of participation	n	%	n	%	n	%
None	49	32.5	43	32.8	37	34.6
During the holidays or semester breaks	44	29.1	39	29.8	28	26.2
During the academic semester: regularly during the weekends or Thursday nights or Friday nights	28	18.6	35	26.7	27	25.2
During the academic semester: regularly during the week	22	14.6	10	7.6	11	10.3
Other	8	5.2	4	3.1	4	3.7
Yr 1: *irregular during the week and 40 hours in the holidays, coached in hockey season, and tutored only a few weeks per year*						
Yr 2: *casual work; tutoring every fortnight*						
Yr 3: *once every few weeks; defence force*						
Total	151	100	131	100	107	100

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
PT: part-time

Table 6.6 Field of employment and time spent per week by students involved in regular term-time paid part-time employment during the early years

	First year (1998-2001)		Second year (1999-2002)		Third year* (2000-2003)	
	n	%	n	%	n	%
Field of employment						
Hospitality	23	46.0	21	46.7	0	0.0
Retail	13	26.0	13	28.9	6	54.5
Other	14	28.0	10	22.2	5	45.5
Yr 1: Para-professional (dental assisting, personal carer), tutoring/coaching, domestic work, miscellaneous (paper delivery)						
Yr 2: Para-professional (dental assisting, personal carer, reception duties), tutoring/coaching, domestic work (cleaning)						
Yr 3: Para-professional (dental assisting, reception duties), tutoring/coaching, hospitality						
Total	50	100	45	100	11	100
Time spent						
1-5 hours	11	22.4	10	22.2	4	36.4
6-10 hours	20	40.8	21	46.7	6	54.5
More than 10 hours	18	36.7	14	31.1	1	9.1
Missing data (not all students responded)	1					
Total	50	100	45	100	11	100

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
* Cohort D only due to administrative oversight ; PT: part-time

6.5.2.3 Participation in paid part-time employment across the early years

Fifty-three (52.5%) of a total of 101 students participated in regular paid PT employment during the academic semester in at least one of the first three years of the dental course. Approximately half of these (n=25: 47.2%) were engaged in regular paid PT employment in all three year levels (Appendix Table 6.17). There was no statistically significant association in the patterns of participation in regular term-time paid PT work between the cohorts.

6.5.2.4 Participation in paid part-time employment prior to, and during, the early years

There were various patterns of involvement in paid PT work prior to, and during, the first three years. Twenty nine (40.3%) students did not work prior to, or during, the first three years, whereas 19 (26.4%) students who did not work prior to subsequently took up paid PT work during the early years. Seventeen students (23.6%) worked prior to, and during, the first three years, whilst seven (9.7%) worked prior to dental studies but then ceased involvement in paid PT work during the first three years. Ten students were engaged in full-time paid employment prior to commencing the dental course and of

these, seven (70.0%), continued to work on a part-time basis during first to third year. The remaining three students did not engage in any paid PT work, during the first three years. There were no significant associations in patterns of participation in employment between the cohorts.

6.5.2.5 Reasons for, and perceived consequences of undertaking paid part-time employment

Students identified four reasons for engaging in paid PT work: discretionary extras; essentials; social aspects; and other. Most reported that they were engaged in paid PT work to afford discretionary extras (49.2%) eg, paying for holidays, social expenses (drinks, takeaway food), entertainment and clothes. The next most common reason for working was to be able to afford essentials, including university expenses (Table 6.7). Of all these, the most important reason for working PT, as nominated by students was to afford discretionary extras (n=17: 56.7%; Appendix Table 6.18).

Table 6.7 Reasons for engaging in regular term-time paid part-time employment during the early years

Reasons	n	%
Discretionary extras *extras eg, clothes, entertainment; paying for holidays; social expenses ie, drinks, takeaway food; I did not need to work to support myself but chose to for extras eg, entertainment, clothes; to be more financially independent*	32	49.2
Essentials (including university expenses) *to meet basic needs eg,, food, transport; assist with household finances; to sustain my daily expenses eg, rent, transport, food; to help mum in general (sole parent family); paying off HECS; uni fees; to afford textbooks; travel home*	25	38.5
Social interaction *social aspect of working; to be more socialising in terms of meeting people*	2	3.1
Other reasons *personal interest; working in family business; pleasant working environment; debt of gratitude to employers – trained me from scratch and I was keen to make their investment worthwhile*	6	9.2
Total number of responses	65	100

Group 3 (Cohorts C and D: 2004): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=30
NB: "travel home" was classified as a basic necessity
HECS: Higher Education Contribution Scheme (Australian Government university student fee scheme)
PT: part-time

Adelaide dental students perceived numerous positive and negative outcomes from engaging in regular term-time paid PT employment during the early years of the course (Tables 6.8 and 6.9). They provided a total of 120 comments, with 55% of comments related to positive outcomes and 45% to

negative outcomes. The predominant positive outcome was the acquisition or enhancement of skills (68.2%), whereas the predominant negative outcomes were psychosocial impacts such as impaired physical health, stress and compromised personal time (57.4%). In addition, 26% (n=14) of students reported a negative outcome on their dental studies eg, compromised study habits and missing classes.

Table 6.8 Perceived positive outcomes of being engaging in regular term-time paid part-time employment during the early years

Perceived positive outcomes	n	%
OUTCOMES AT THE INDIVIDUAL LEVEL		
Acquisition or enhancement of skills	45	68.2
a. communication and interpersonal skills	28	42.4
had to deal with many different customers and their problems; improved communication skills; learnt to work with co-workers even if didn't like or respect them; improved ability to work with people, particularly those with special needs; helped with patients		
b. organisational and time management skills	13	19.7
forced to have good time management skills and organise my work ahead of due dates; organisation skills were also transferable to dental setting; efficiency at getting jobs done; worked at fast pace under pressure; discipline		
c. other skills	4	6.1
sales technique; increased responsibility; responsibility for self		
Psychosocial well-being	15	22.7
a. Stress relief	5	7.6
enabling me to tune out from uni life; gave me an outlet away from dentistry		
b. Financial benefits	3	4.5
made meeting uni expenses easier; being rewarded financially for working.		
c. Social interaction	4	6.1
good friendships; met lots of people; meeting members of the dental profession		
d. Motivation	3	4.5
allowed me to appreciate how I will be paid well as a dentist; personally enriching and provides me with another notch in my belt; motivation to not end up working at a supermarket		
Other positive outcomes	4	6.1
help from colleagues with homework; greater diversity; to do preparation for work; worked in med field so increased my understanding and information		
No positive outcomes	2	3.0
otherwise little help with dental studies; working on weekends and holidays gave me limited time to do studies		
Total number of responses	66	100

Group 3 (Cohorts C and D: 2004): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum; n=30; PT: part-time

Table 6.9 Perceived negative outcomes in engaging in regular term-time paid part-time employment during the early years

Perceived negative outcomes	n	%
OUTCOMES AT THE INDIVIDUAL LEVEL		
Psychosocial impact	32	59.3
a. Impaired physical health		
injured my back; increased tiredness; definitely exhaustion; fatigue as I was working nights during the week	15	27.7
b. Stress/mood	10	18.5
increase stress; met mean people at work, influences mood; at times work load and study load overwhelming; high stress levels; financial stress		
c. Impaired personal time	7	12.9
less social time; less free time; less time to relax, go out etc; decreased time		
Negative impact on dental studies (academic work)	14	25.9
a. Compromised study habits	12	22.2
decrease time to study; didn't always have enough time for homework; less time to prepare for assignments, DLPs etc; definitely insufficient time to study		
b. Missing classes	2	3.7
missed morning lectures.		
Balancing paid work and study	2	3.7
very tricky to find hours to work ie, have to work on weekends only since we finish (at clinic) so late; had to prioritise importance of work that is, study for exams in swot vac during semester and study for next day		
Other negative outcomes	1	1.9
boring job		
No negative outcomes	5	9.3
nil; none; had to be very organised; minimal – 3rd yr (sem 1) was unusually stressful in part due to work		
Total number of responses	54	100

Group 3 (Cohorts B, C and D: 2004): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=30
PT: part-time

6.5.3 Extracurricular activities

The following section discusses patterns of involvement in ECAs, type of activities undertaken, time spent, types of students who undertook ECAs, reasons for participating in ECAs and consequences of such activities on Adelaide dental students (Group 3: MAHPBL) during first, second and third year.

6.5.3.1 Participation in extracurricular activities prior to commencing dental studies

Most students (n=120: 89.6%) were involved in a range of ECAs prior to commencing dental studies (Appendix Table 6.19). Eighty-one per cent (n=97) of students were often involved in more than one ECA. On examining how much time (hours per week) was spent by students involved in ECAs, the majority (74.8%) spent more than five hours per week (Appendix Table 6.20). The maximum times spent were 37, 36 and 32 hours per week for students in Cohorts B, C and D respectively, with minimum times spent being 1, 1 and 2 hours per week for Cohorts B, C and D respectively. A total of 102 students played sport, varying from team sports such as football, netball, basketball, cricket, soccer, rugby, hockey, volley ball, golf, to individual pursuits such as gym work, swimming, jogging, tennis, badminton, squash, martial arts, athletics, surfing, horse riding and cycling. Most students (60.8%) played more than one sport (Appendix Table 6.21). The maximum time spent playing sport was 30 hours per week by one student in Cohort C.

Sixty-three students were involved in a broad range of clubs or organisations including, non-sporting clubs, church groups, international organisations (eg, Amnesty International), orchestras and choirs. The maximum times spent were 28, 8 and 15 hours per week, by students in Cohorts B, C and D respectively. For the 58 students involved in musical pursuits, the maximum time spent was 25 hours per week by a student in Cohort B.

Finally, 38 students participated in volunteer community service work eg, working in a hospital, kindergarten, soup kitchen (refer to Glossary of Terms), nursing home or aged care, being a lifeguard and involvement in St Johns Ambulance and charitable organisations such as the Red Cross, Salvation Army, Legacy, St Vincent de Paul and Meals on Wheels.

6.5.3.2 Participation in extracurricular activities during the early years

Most first-year (80.1%), second-year (80.2%) and third-year (84.1%) students were involved in a range of ECAs. The most common of these was sport (Table 6.10). Most students during the early years were involved in more than one ECA (Table 6.11). Sporting activities, included team sports (football, netball, basketball, cricket, soccer, rugby, hockey, volley ball, golf) or individual sports (gym work, swimming, jogging, tennis, badminton, squash, martial arts, athletics, surfing, horse riding and cycling). Those students who played sports, commonly played more than one sport (Appendix Tables 6.22 and 6.23). The types of clubs or organisations students were involved in included, student associations or committees, sporting clubs, church groups, ethnic and international organisations (Table 6.10). A few students were involved with volunteer community service work during the early years such as, involvement in charitable organisations (eg, World Vision, Amnesty International), donating blood, helping out with a soup kitchen (refer to Glossary of Terms), delivering newsletters, being involved in a theatre company and being a peer adviser (Table 6.10).

Table 6.10 Participation in extracurricular activities during during the early years

	First year*		Second year**		Third year***	
	Yes		Yes		Yes	
Type of ECA	n	%	n	%	n	%
Sport	102	67.5	85	64.9	74	69.2
Club or organisation	56	37.1	54	41.2	52	48.6
Year 2: student associations/committees (eg, Dental Students Association), sporting clubs, church groups, ethnic clubs (eg, German, Irish Clubs) and international organisations (eg, Greenpeace), choir and youth clubs Year 3: sporting clubs, student associations/committees (eg, Dental Students Association) and other clubs or associations (eg, choir, church, scout club, Youth Breast cancer association, Earth Sanctuary)						
Music	38	25.2	34	26.0	23	21.5
Voluntary community service	10	6.6	6	4.6	9	8.4
Year 2: scout leader, a hike organiser, organising events, being involved in English conversation activities with international students, Red Cross Year 3: blood donor, community work, scout leader, church work, working for St Johns, Juvenile Diabetes Association, Youth Breast Cancer Association and university o'week activities						
Other:	14	9.3	17	13.0	23	21.5
Year 1: recreational activities, paid work, teaching/coaching, domestic duties, self-education, religious organisation, studying, miscellaneous Year 2: recreational activities, paid work, religious organisation, self-education, domestic duties Year 3: recreational activities, paid work, teaching/coaching, domestic duties, self-education, religious organisation, research studies, miscellaneous						
Any of the above	121	80.1	105	80.2	90	84.1

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
*n=151 first-year students; applies to the total row count
**n=131 second-year students; applies to the total row count
***n=107 third-year students; applies to the total row count
ECAs: extracurricular activities

Table 6.11 Number of extracurricular activities and time spent per week during the early years

	First year (1998-2001)		Second year (1999-2002)		Third year (2000-2003)	
	n	%	n	%	n	%
Number of activities						
1 type	60	49.6	35	33.3	30	33.3
2 types	35	28.9	49	46.7	36	40.0
3 types	25	20.7	20	19.0	18	20.0
4 types	1	0.8	1	1.0	6	6.7
Total	121	100	105	100	90	100
Time spent						
0.25-5 hours	51	44.7	35	35.7	31	35.2
6-10 hours	34	29.8	39	39.8	31	35.2
11-15 hours	19	16.7	15	15.3	18	20.5
16-20hrs	6	5.3	5	5.1	5	5.7
More than 20 hours	4	3.5	4	4.1	3	3.4
Missing data (not all students responded)	7		7		2	
Total	121	100	105	100	90	100

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
ECAs: extracurricular activities

On examining how much time first-year students spent involved in ECAs, most students spent less than five hours per week (44.7%) whereas 29.8% of students spent between six to 10 hours per week (Table 6.11). The maximum times spent by first-year students were 27, 20, 24 and 17.5 hours per week for Cohorts A, B, C and D respectively, with the minimum time spent being 30 minutes per week in Cohorts A and D and one hour per week in Cohorts B and C. Most second-year students (39.8%) spent six to 10 hours per week on ECAs (Table 6.11). The maximum times spent in ECAs were 20, 15, 25 and 20 hours per week in Cohorts A to D respectively, with the minimum times spent being 5, 2, 4, 4 hours per week for Cohorts A to D respectively. Third-year students were evenly divided in the amount of time spent on ECAs. Thirty-five percent spent less than five hours per week and 35% spent between six to 10 hours per week (Table 6.11). The maximum times spent were 14, 15, 22 and 24 hours per week for Cohorts A to D respectively, whereas the minimum times spent were 2 hours, 15 minutes, 3 hours and 1 hour per week for Cohorts A to D respectively.

First-year female students (76.7%) were more likely to not participate in any ECAs compared with males (23.3%) (x^2=7.98; p=0.02) (Appendix Table 6.24). In addition, there were more third-year female students (82.4%) who did not participate in ECAs compared with males (17.6%) (x^2 =6.87; p=0.01) (Appendix Table 6.25). Furthermore, more first-year school leavers (61.2%) participated in ECAs compared with non-school leavers (38.8%) (x^2 =5.24; p=0.02) (Appendix Table 6.26). There were

no statistically significant associations between student characteristics and participation of second-year students in ECAs.

6.5.3.3 Participation in extracurricular activities across the early years

Ninety-five (94.1%) of a total of 101 students participated in ECAs in at least one of the first three years. Seventy-three percent participated in ECAs in each of the first three year levels (Appendix Table 6.27). There was no statistically significant association in the patterns of participation in ECAs between the cohorts.

6.5.3.4 Participation in extracurricular activities prior to, and during, the early years

There were various patterns of involvement in ECAs prior to, and during, the first three years. The majority of students (n=79; 89.8%) participated in ECAs prior to, and during, the early years of the course. Only four students (4.5%) did not participate in ECAs prior to, and during, the early years of the course. One student (1.1%) participated in ECAs prior to, the course but not during. Furthermore, four students (4.5%) did not participate prior to the course but took up ECAs during the course. There were no significant associations in patterns of participation in ECAs prior to, and during, the first three years of the dental course between the cohorts.

6.5.3.5 Students' reasons for and perceived consequences of participation in extracurricular activities

Students identified eight reasons for participating in ECAs ie, health benefits; stress relief; social interaction; leisure; personal improvement; making a contribution to the community; a break from dental studies; and other. Health benefits (35.5%), included *keeping fit* and *trying to maintain physical fitness* (Table 6.12). Health benefits were nominated as the most important reason (51.2%) for being involved in ECAs (Appendix Table 6.28).

Table 6.12 Reasons for participating in extracurricular activities during the early years

Reasons	n	%
Health benefits *fitness; maintain physical fitness; keeping fit; health; to get outside for fresh air*	43	35.5
Stress relief *stress relief; stress relief from uni work; clear my head*	22	18.2
Social interaction *social pass time – spending time with friends; social connections*	22	18.2
Leisure *leisure; fun; leisure/fun; enjoyment*	11	9.1
Break from dental studies *break from study; break from uni; distraction from studies; take mind off uni*	8	6.6
Personal improvement *enriching; develop as a person; self-improvement; maintain a certain skill level*	4	3.3
Make a contribution to the community *organisations – wanted to serve in church; for volunteer work; community of contribution;*	3	2.5
Other reasons *wanted to serve in church; for volunteer work; break from college life; like keeping busy (not being lazy); interest in arts; will be re-enlisted into army after course*	8	6.6
Total number of responses	121	100

Group 3 (Cohorts C and D: 2004): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=42
ECAs: extracurricular activities

Students perceived there were positive and negative outcomes in participating in ECAs. They provided a total of 123 comments regarding these outcomes with 61% of the comments related to positive outcomes and 39% of comments related to negative outcomes. Most positive outcomes related to psychosocial well-being such as stress relief, health benefits, social interaction, balanced lifestyle and break from dental studies. Some students perceived that participation in ECAs helped improve their academic skills (Table 6.13). However, many students (64.6%) also reported psychosocial costs (lack of time, impairment of physical health and stress) and compromised study habits (Table 6.14).

Table 6.13 Perceived positive outcomes in participating in extracurricular activities during the early years

Positive outcomes	n	%
Psychosocial benefits	55	73.3
a. Stress Relief *stress relief; mentally fit; decrease stress; reduced stress/clearer mind*	24	32.0
b. Health benefits *to be physically fit; boost energy and health; improved capacity to cope with physical cost of dental work (eg, back tension); improved energy levels; enjoy burning off energy after a hard day*	19	25.3
c. Social interaction *socialising – important for well-being and variety – being happier; making friends; support network*	7	9.3
d. Balanced lifestyle *gave me good balance in life so I didn't burn out with uni work; ability to put dental studies in perspective as one component of my life*	4	5.3
e. Break from dental studies	1	1.3
Improvement in skills *better time management; helps to keep myself organised; I found that I use my time more efficiently, effectively when I incorporate exercise in my day; better coping strategies*	12	16.0
Focus and structure *goal for the week; structure in life; keeps me on the move (I cant stand being lazy)*	4	5.3
Other positive outcomes *reflection on studies; paid for photocopying and textbooks*	2	2.7
No positive outcomes	2	2.7
Total number of responses	75	100

Group 3 (Cohorts C and D: 2004): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=42
ECAs: extracurricular activities

Table 6.14 Perceived negative outcomes of being involved in extracurricular activities during the early years

Negative outcomes	n	%
Psychosocial impact	15	31.3
a. Reduced time *sometimes did not get to do it due to uni work; leaves no time for relaxation; reduced time to socialise; time consuming but benefits outweigh; around exam time find I don't have time to do it; sports takes up entire Saturday*	10	20.8
b. Physical health effects *get tired afterwards; tiredness*	4	8.3
c. Stress *stress from insufficient study*	1	2.1
Compromised study habits *insufficient time to study; too tired to study; detracting from time able to spend on uni work; increase temptation to socialise after activities rather than study; increase temptation to socialise after activities rather than study*	12	25.0
Other negative outcomes *cost*	4	8.3
No negative outcomes *none; sometimes things get a bit rushed especially when things are due but I organise things fairly well so there is no impact between uni and fun*	17	35.4
Missing data	2	
Total number of responses (excludes missing data)	48	100

Group 3 (Cohorts C and D: 2004): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
n=42
ECAs: extracurricular activities

6.5.4 Participation in paid part-time employment and extracurricular activities

Patterns of participation in both paid PT employment and ECAs during the early years of the course were examined. The majority of first-, second- and third-year students (around 60%) were involved in regular term-time paid PT employment or ECAs (but not both), whilst, approximately 30% were involved in both activities (Table 6.15). Some students had spent a substantial amount of time participating in both paid PT work and ECA eg, Yr 1: 28 to 41 hours; Yr 2: 19 to 39 hours. Some non-school leavers in first-year were exempt from some subjects in first or second year and this may account for why some students may have reported spending substantial amounts of times involved in paid work and ECAs. The maximum times involved in either or both paid PT work and ECA are detailed in Appendix Table 6.29.

More first- and second-year female students (Yr 1: n=17; 77.3% and Yr 2: n=17; 89.5%) were

not engaged in both activities compared with male students (Yr 1: n=5; 22.7 % and Yr 2: n=2; 10.5%) (x^2=7.26; p=0.03 and x^2=10.76; p=0.00) (Appendix Tables 6.30 and 6.31). More time per week was spent by first- and second-year students involved in both activities (Yr 1: n=34; 66.7% and Yr 2: n=30; 65.2%) compared with those involved in either activity (Yr 1: n=17; 33.3% and Yr 2: n=16; 34.8%) (x^2 =40.98; p=0.00 and x^2=31.09; p=0.00) (Appendix Tables 6.32 and 6.33).

Table 6.15 Patterns of participation in paid part-time employment and extracurricular activities during the early years

	First year (1998-2000)		Second year (1999-2001)		Third year (2000-2003)	
Patterns of participation	n	%	n	%	n	%
No paid PT work/No ECAs Did not participate in either regular paid PT employment or ECAs during the academic semester (may have participated in paid work during holidays or semester break only)	22	14.6	19	14.5	9	8.4
Either Participated in either regular paid PT employment or ECAs during the academic semester but not both	87	57.6	74	56.5	68	63.6
Both Participated in both regular paid PT employment and ECAs during the academic semester	42	27.8	38	29.0	30	28.0
Total	151	100	131	100	107	100

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum
PT: part-time
ECAs: extracurricular activities

6.5.4.1 Participation in both paid part-time employment and extracurricular activities across the early years

Forty-five (44.6%) of a total of 101 students, participated in both regular term-time paid PT employment and ECAs in at least one of the first three years. Of the 45 students involved in both these activities, 20.0% participated in each of the three year levels (Appendix Table 6.34). There were no significant associations in the patterns of participation in paid PT employment and ECAs between the cohorts.

6.5.5 Living arrangements

The following section discusses students' living arrangements and the impact of living in residential college during the early years of the course. In addition, the relationships between living arrangements and participation in paid employment are also presented.

6.5.5.1 People students lived with during the early years

Adelaide dental students lived with a variety of different people. Many lived with family members (Yr 1: 46.2%; Yr 2: 52.4%; Yr 3: 51.1%), whilst others lived independently, on their own or with others, including friends, classmates, other university students, friends of family members, college residents or with a partner or child (Table 6.16).

Table 6.16 People students lived with during the early years

	First year (1998-2000)		Second year (1999-2001)		Third year (2000-2003)	
Type of person	n	%	n	%	n	%
Family (parent/sibling)	55	46.2	54	52.4	46	51.1
On own	37	31.1	25	24.3	24	26.7
Others	24	20.2	23	22.3	18	20.0
Partner or child	3	2.5	1	1.0	2	2.2
Missing data (not all students responded)	2		2		3	
Total	121	100	105	100	93	100

Group 3 (Cohorts B, C and D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

More first-year non-South Australian and international students lived on their own (97.3%) or with others (91.7%) compared with South Australians who lived on their own (2.7%) or with others (8.3%) (x^2=100.84; p=0.00) (Appendix Table 6.35). In addition, more second-year non-South Australian and international students lived on their own (91.3%) or with others (100%) compared with South Australians who lived on their own (8.7%) or with others (0.0%) (x^2=79.87; p=0.00) (Appendix Table 6.36). Furthermore, more third-year non-South Australian and international students lived on their own (88.9%) or with others (91.6%) compared with South Australians who lived on their own (11.1%) or with others (8.4%) (x^2=58.89; p=0.00) (Appendix Table 6.37).

More first-year school leavers (81.8%) lived with family members compared with non-school leavers (18.2%) (x^2=11.95; p=0.00) (Appendix Table 6.38). Similarily, more second-year school leavers (77.8%) lived with family members compared with non-school leavers (22.2%) (x^2=10.87; p=0.00) (Appendix Table 6.39). Furthermore, more third-year school leavers (80.4%) lived with family members compared with non-school leavers (19.6%) (x^2=10.50; p=0.01) (Appendix Table 6.40). More second- and third-year male students lived on their own (Yr 2: 69.6%;Yr 3: 72.2%) compared with females (Yr 2: 30.4%; Yr 3: 27.8%) (Yr 2: x^2=8.63; p=0.01; Yr 3: x^2=8.42; p=0.01) (Appendix Tables 6.41 and 6.42).

6.5.5.2 Style of accommodation during the early years

Adelaide dental students lived in a range of different styles of residential accommodation. Many

lived in the family home (Yr 1: 48.7%; Yr 2: 51.9%; Yr 3: 51.1%), whilst others lived in private accommodation, including their own apartment or flat, granny flat, accommodation in the residential wing of a major hospital, hostel or boarding house or in residential college (Table 6.17).

Table 6.17 Style of accommodation during the early years

	First year (1998-2000)		Second year (1999-2001)		Third year (2000-2003)	
Style of accommodation	n	%	n	%	n	%
Family home	58	48.7	54	51.9	46	51.1
Private accommodation	35	29.4	25	24.0	38	42.2
Residential college	26	21.9	23	22.1	6	6.7
Missing data (not all students responded)	2		1		3	
Total	121	100	105	100	93	100

Group 3 (Cohorts B, C and D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

For first and second year, more non-South Australian and international students lived in residential college accommodation (Yr 1: 100%; Yr 2: 100%) compared with South Australians (Yr 1: 0.0%; Yr 2: 0.0%). Furthermore, more non-South Australian and international students lived in private accommodation (Yr 1: 91.2%; Yr 2: 94.2%) compared with South Australians (Yr 1: 8.8%; Yr 2: 5.8%) (Yr 1: x^2=104.10; p=0.00; Yr 2: x^2=91.54; p=0.00) (Appendix Tables 6.43 and 6.44). For first and second year, more school leavers (Yr 1: 79.3%; Yr 2: 80.3%) lived in family accommodation than non-school leaver students (Yr 1: 20.7%; Yr 2: 19.7%) (Yr 1: x^2=11.15; p=0.00; Yr 2: x^2=12.35; p=0.00) (Appendix Tables 6.45 and 6.46). There was a statistically significant decrease in the number of students living in residential college from first year (n=26; 52.0%) to third year (n=6; 12.0%) (refer to section 6.5.6 and Appendix Table 6.57).

6.5.5.3 Living arrangements during the early years

For fifty-nine students (67.0%) there was no change in the people they lived with, while for 71 students (80.7%) there was no change in the style of their accommodation during the early years of the course. Twenty-nine students did however report a change in the person they lived with, with the majority of these (n=27: 93.1%) doing so once. In addition, 17 students changed the style of their accommodation, with the majority of those (n=15: 88.2%) doing so once during the early years of the course. This was typified by 73.3% (n=11) changing from college to private accommodation at the end of first or second year (Appendix Table 6.47). There were no significant associations between the living arrangements of students and the different cohorts.

6.5.5.4 Living in residential college

Eleven students (20.0%) who had completed the follow-up post-admission survey indicated they had lived in residential college during years 1 to 3. Students perceived both positive and negative outcomes in living in residential college. The major perceived positive outcome was access to resources (peers, tutors and physical resources) (66.7%) (Appendix Table 6.48). The most common negative outcome was the college environment (ie, distractions, physical environment and college activities) (95.7%) (Appendix Table 6.49). Nine (81.8%) of the 11 survey respondents moved out of college during these years. The most common reason for moving out was the college environment (69.6%) with many comments including *too many distractions, not wishing to share a bathroom, flexibility of meal times* and *too many characters and rules* (Appendix Table 6.50). Factors relating to the 'college environment' were also nominated as the most important reasons for moving out of residential college (75.0%) (Appendix Table 6.51). The most common perceived positive outcome of moving out of residential college was minimisation of distractions or disruptions (61.5%) (Appendix Table 6.52). However, there were some perceived negative outcomes in moving out of residential college, such as loss of access to college resources (43.8%) and increased personal responsibilities (31.2%) (Appendix Table 6.53).

6.5.5.5 Living arrangements and participation in paid part-time work

More first-year students who participated in regular term-time paid PT employment lived with family (71.1%) rather than on their own (18.4%) or with others (10.5%) (x^2=11.21; p=0.00) (Appendix Table 6.54). A similar association was found for second- (Yr 2: family 78.1%; on own 9.4%; others 12.5%) and third-year students (Yr 3: family 80.7%; on own 12.9%; others 6.4%) (Yr 2: x^2=12.03; p=0.00; Yr 3: x^2 =16.58; p=0.00) (Appendix Tables 6.55 and 6.56).

6.5.6 Comparison of non-academic experiences between the three year levels

Students' non-academic experiences in each of the three year levels were compared. There was a significant association between the patterns of accommodation and year level. There was a significant decrease in the number of students residing in residential college across first, second and third year ie, significantly fewer third-year students lived in residential college (12.0%) compared with first- (52.0%) and second-year (36.0%) students (x^2 =10.28; p=0.04) (Appendix Table 6.57). There were no statistically significant associations in the patterns of paid employment, participation in ECAs, and people with whom students lived, between the three year levels.

6.5.7 Impact of non-academic experiences on academic performance

Academic performance ('higher' versus 'lower' achievers) in first, second and third year of students who participated or did not participate in paid PT work and ECAs was examined. In addition, academic performance of those who worked less than or more than 10 hours per week was compared. Furthermore, academic performance of students who lived at home or independently was also examined.

There were no statistically significant associations between involvement in term-time paid PT employment, or time spent involved in paid work and academic performance during the early years of the course. Furthermore, there were no significant associations between involvement in ECAs and academic performance during the early years of the course. In addition, there were no statistically significant associations between living arrangements and academic performance during the early years of the course.

6.5.8 Summary of results

Despite undertaking a course like dentistry, participating in other activities outside of university contact hours and spending considerable amounts of time on such activities, did not negatively impact on students' academic performance [RQ5.9]. However, some students perceived that involvement in paid PT work or ECAs negatively impacted on their study habits eg, less time to study [RQ5.8]. The type of living arrangement also did not impact on academic performance [RQ5.9]. A profile of the characteristics of Adelaide dental students' living arrangements and characteristics of those students involved in term-time paid PT work and ECAs is presented in Table 6.18.

Table 6.18 Profile of dental students' non-academic experiences during the early years

Paid part-time (PT) employment	Extracurricular activities (ECAs)	Living arrangements
Those students who were involved in term-time paid PT employment were found to have:	Those students who were involved in ECA were found to have:	o most students had stable living arrangements during the early years of the dental course [RQ5.5]
o worked during first, second and third year [RQ5.2]	o participated in ECAs during first, second and third year [RQ5.2]	o advantages of living in residential college included access to resources, peers, tutors, library [RQ5.5]
o worked in non-dental fields (hospitality and retail) [RQ5.2]	o participated in more than one ECA per week, which included sporting activities; however not many were involved in volunteer/community work [RQ5.2]	o those residing in residential college in first year were more likely to have moved out by third year [RQ5.5]
o worked six to 10 hrs per week during first, second and third year; rates of participation were not reduced as students progressed through the course [RQ5.2]	o spent more than 5 hours per week during first, second and third year; rates of participation were not reduced as students progressed through the course [RQ5.2]	o distractions, college activities and the physical environment were reasons for moving out of college [RQ5.5]
o been residents of South Australia and lived in the family home with parent(s) [RQ5.3 and 5.7]	o been male rather than female [RQ5.3]	o those who lived with family and in family home were more likely to be South Australians; school leavers [RQ5.6]
o not necessarily been working prior to commencing the dental course [RQ5.4]	o have participated in ECAs prior to commencing the dental course [RQ5.4]	o those who lived away from home (independently) were more likely to be other Australians and international students [RQ5.6]
o worked for discretionary extras rather than financial necessity [RQ5.2]	o been involved for health benefits [RQ5.8]	o students who participated in term-time paid PT work were more likely to live with family than on their own or with others [RQ5.7]
o benefited by acquiring and enhancing communication, interpersonal and time management skills [RQ5.8]	o benefited by reducing stress levels and keeping fit and healthy [RQ5.8]	o types of living arrangements were not associated with academic success [RQ5.9]
o suffered impaired physical health, stress and compromised study habits [RQ5.8]	o suffered lack of time for study and other activities [RQ5.8]	
o did not perform worse academically than those who did not work PT during term-time [RQ5.9]	o did not perform worse academically than those who did not participate in ECAs during term-time [RQ5.9]	

RQ: Research Question (as per section 6.3)
Group 3 (Multifaceted admission, hybrid PBL curriculum)

6.6 Discussion

6.6.1 Paid part-time employment

6.6.1.1 Frequency of participation

The percentage of dental students who had participated in paid employment prior to commencing the Adelaide dental course was greater than the last published Australian report by Geitzelt (1997). This latter study reported that 20% of Sydney first-year dental students had some previous employment on a casual or part-time basis. Approximately one-third of Adelaide dental students were not involved in paid work during term-time or during holiday periods. This is consistent with that reported for US college students (Nonis and Hudson 2006).

Despite undertaking a full-time university course, one-third of Adelaide dental students were consistently involved in regular term-time paid PT work during first to third year. Whilst this rate is not as high as that reported for other full-time Australian (72.5%: Long and Hayden 2001 and 86%: Bradley 2006) and UK (59% Curtis 2007) university students, it is relatively high when one considers that Adelaide dental students have 24 to 30 formal contact hours per week and are expected to study outside of class time. Despite the increasing demands of the Adelaide dental curriculum from first to third year, the rate of participation across these years remained stable at around 30%. The frequency reported in this study is consistent with that reported for Adelaide medical students (36%) who also undertake a demanding educational course (Duggan and Keefe 2007). For medical students, the proportion engaged in paid term-time work increased in later years (Years 4 to 6). It is not known if the rate of participation amongst fourth or fifth year dental students increases, decreases or remains stable in the face of an increase in contact hours. A follow-up study would be useful. Tracking how involvement in non-academic activities changes over the course of a student's time at university is relevant to assist in making recommendations regarding the optimal combination of academic and non-academic activities to students, according to their course and stage of study (Broadbridge and Swanson 2005). The hypothesis [2.1] that students are likely to participate in modest levels of paid PT work during term-time can be supported. However, given that rates of participation did not decrease across the year levels, the hypothesis [2.2] that participation rates are likely to decrease from first to third year cannot be supported.

6.6.1.2 Time spent working

The majority of Adelaide dental students who were involved in term-time paid PT work spent between six to 10 hours per week in this activity. This pattern was consistent across the three year levels. On average, first-year Adelaide dental students worked 10.4 hours and second-year students

worked 9.0 hours. This is less time, on average, than: full-time first-year Australian university students (averaged 14 to 15 hours per week) (Krause et al. 2005; Bradley 2006); second- and third-year Australian university students (averaged 20.7 hours per week) (Applegate and Daly 2006); students in courses with more than 21 contact hours eg, Health/Engineering (averaged 13.2 hours) (McInnis and Hartley 2002); and physiotherapy students (averaged 12.7 hours) (Tucker et al. 2006). Like Adelaide dental students, Adelaide medical students averaged 9.8 to 10.8 hours per week, with 27% working more than 16 hours per week (Duggan and Keefe 2007). Whilst most Adelaide dental students in this study worked less than 15 hours, there were some first- and second-year students who worked more than 10 hours per week. In addition, the amount of time spent in paid PT work was similar to the time students had spent prior to commencing dental studies. This may indicate that spending some time in paid work was a routine part of their lives. It is likely that the high contact hours of the Adelaide dental course constrains the amount of time students spend working, in particular during weekdays. It is not unexpected that dental students spent less than the average university student (ie, less than 15 hours), hence the hypothesis [2.1] can be supported.

For those first-year students who worked on a regular basis during term-time, similar proportions worked during weekdays, weekends or weeknights. In contrast, those involved in paid PT work during second and third year often worked during the weekends or weeknights. This is not unexpected given that weekly contact hours increase in the second and third years of the Adelaide dental course, making it difficult for students to work during the week in later years compared with first year. Adelaide medical students also reported being employed mostly after 5pm on weekdays or weekends (Duggan and Keefe 2007).

6.6.1.3 Field of employment

As hypothesised [2.3] Adelaide dental students had jobs that were unrelated to the field of dentistry, mostly in the hospitality industry. This finding is consistent with findings that full-time university students tend to work in fields unrelated to the course of study being undertaken (UK: Broadbridge and Swanson 2006; Curtis 2007; Australia: McInnis and Hartley 2002). In contrast to Adelaide dental students, several large scale studies have shown that equal proportions of students worked in retail and hospitality industries (Curtis and Shani 2002; Bradley 2006). Interestingly, those Adelaide students who worked regularly during term-time prior to commencing dental studies continued to work predominantly in the retail field, whereas those who commenced work after enrolling in dentistry tended to work in the hospitality industry. This might indicate that some students continue in the same retail job during secondary and tertiary studies. Jobs in the hospitality industry, such as bar work and waitering, tend to be available after 5pm on most weekdays and weekends. The curriculum structure is such that Adelaide students are expected to be on-campus from 8am to 5pm most week days, especially in second and

third year. Hence, students taking up PT work during the dental course might find it easier to work in the hospitality industry, rather than have jobs directly related to dentistry.

6.6.1.4 Type of student engaged in paid part-time employment

No difference was found in participation in term-time paid PT work between male and female Adelaide dental students. This is consistent with the findings of Bradley (2006). However, the current findings are in contrast to the findings of previous Australian (Long and Hayden 2001; Vickers et al. 2003; Krause et al. 2005) and UK (Curtis 2007) studies which reported females to be more likely involved in term-time paid PT work than males. In addition, the current study found no difference in participation in term-time paid PT work between school leavers and non-school leavers. This latter result contrasts with the finding of McInnis and Hartley (2002) who reported that Australian university students, under the age of 19 years (most likely to be school leavers) and between the ages of 20 to 24 years, worked for a source of income and that mature aged students (older than 25 years) relied on government allowances as a source of income rather than paid work. The current study, however, did not categorise students according to age, and so this may explain this difference. The hypothesis [3.1] that female students are more likely to participate in paid PT work than male students cannot be supported. In addition, there was no difference in the rate of participation of paid work between school leavers and non-school leavers hence, the hypothesis [3.2] that there are likely to be differences cannot be supported.

More South Australian students participated in paid PT employment during term-time in first, second and third year compared with non-South Australians or international students. This is consistent with another study that compared local students' participation rates with non-local students (Carney et al. 2005). In addition, consistent with the findings of McInnis et al. (2000) and Hayden and Long (2003), more Adelaide dental students who participated in paid PT employment lived with family rather than on their own or with others. Several reasons may explain why local students who lived at home participated in paid work such as: local students found it easier to access employment (Carney et al. 2005); they may have been familiar with how to seek casual work; they were maintaining patterns of employment that arose from their time in secondary school; or they were working to meet discretionary extras.

International students may not have sought paid employment due to visa restrictions or socio-economic and cultural reasons eg, family placing priority on successful academic progress or family being able to fund economic needs (Sugiura et al. 2005). In addition, an Australian study found that mature age international students were involved less often in paid work due to their relatively secure financial status and/or being supported by family or partners (Leder and Forgasz 2004). Furthermore, Krause et al. (2005) reported that international students studying in Australian universities were less likely to be engaged in paid work than local students and, those who did work, worked for non-financial

reasons.

Non-South Australian dental students were less involved in paid work. Given these students lived away from home and may have needed to work for expenses, several reasons might exist to explain why they worked less. Non-locals may struggle to find and maintain a job during term-time (Carney et al. 2005). It is possible these students may have been supported by parents or had reserves of funds available. For those of non-English speaking backgrounds there may be cultural differences eg, parents making financial sacrifices for their child to attain a higher degree (McInnis and Hartley 2002; Vickers et al. 2003). The hypothesis [3.3] that Australian students are more likely to participate in paid PT work than international students can be supported. In addition, the hypothesis [7.1] that students who participated in paid PT work are more likely to live with family in the family home than independently can also be supported.

6.6.1.5 Motivating factors for participating in paid part-time employment

Personal choice rather than necessity was the predominant reason given by Adelaide dental students for being involved in paid PT work. This finding is in agreement with Hunt et al. (2004) and Krause et al. (2005) who found that the main reason tertiary students in the UK and Australia worked was a desire to achieve a certain standard of living. This result is in contrast to findings that many UK (Moreau and Leathwood 2006; Applegate and Daly 2006) and Australian (Bradley 2006) full-time university students work for financial needs. It also contrasts with findings for Adelaide medical students who reported working because they felt they had less family support and higher expenses. However, some medical students did report working due to lifestyle preferences (Duggan and Keefe 2007). One reason why so many Adelaide dental students worked for discretionary extras might relate to their living arrangements and age. The current study found that significantly more students who were engaged in paid PT employment during first, second or third year, lived with their families. It is not uncommon for full-time university students who work PT to be more likely to live at home than away from home (McInnis et al. 2000a; Hunt et al. 2004). In addition, those living at home in the current study were also more likely to be South Australian school leavers (eg, usually less than 20 years of age). Hence, it may be postulated that South Australian dental students who lived at home were supported by parents (Hunt et al. 2004) for their essential financial needs (eg, paying university fees) (Long and Hayden 2001) and worked for their own personal needs or to be financially independent (Krause et al. 2005). Nonetheless, approximately 40% of Adelaide dental students worked for essentials needs as well as to meet university costs. Hence, some Adelaide students were no different from other university students who tended to work for basic needs. However, the hypothesis [2.4] that most students who participated in paid PT work do so for financial reasons cannot be supported.

Continuing habits commenced during secondary school studies also seems to be a reason why tertiary students work during their studies. Twenty-four per cent of Adelaide dental students were found to have worked prior to and also during the course. This rate is less than that reported by UK tertiary students (56%) (Curtis 2007). Thus the hypothesis [4.1] that some students who are involved in paid PT work prior to commencing their studies are likely to continue these activities during the dental course can be supported. Working to gain experience that might be valuable after graduation, or so that students can be more employable upon graduation, or to improve their chances of getting a job after graduation have been cited in the literature (section 6.2.1.6). However, Adelaide dental students did not cite these reasons. This is not unexpected given that dental assisting is the only job in the dentally related field that dental students could alternately do. However, these jobs are mostly restricted to similar time requirements as their course commitments.

6.6.2 Extracurricular activities

6.6.2.1 Frequency of participation and time spent

Adelaide dental students were involved consistently in ECAs during the early years of the course. Only 20% reported that they were not involved in any ECA. Despite increased contact hours and workload demands associated with the second and third year of the course, the frequency of participation in ECAs remained high as students progressed from first through to third year. During first year, many Adelaide dental students (46%) spent between six to 15 hours per week engaging in more than one ECA, with the most time spent in sporting activities. This rate of participation appears higher than for other first year Australian university students (Krause et al. 2005). An aggregate of all the time spent in these activities was not given by Krause and colleagues so a direct comparison is difficult. Participation in sporting activities by UK tertiary students decreased from first to third year, possibly due to increasing course demands (Humphrey et al. 1998). This trend would also have been expected of Adelaide dental students. However, time dedicated to ECAs did not decrease between first to third year, with more than half the students spending six to 15 hours per week involved in ECAs during second and third year. Thus the hypotheses [2.5 and 2.6] that students are likely to participate in modest levels of ECAs and that the level of participation will decrease across the year levels, cannot be supported.

6.6.2.2 Type of extracurricular activities

Most Adelaide dental students participated in sporting activities. Many French (Hennequin et al. 2002) and Nigerian dental students (Orenuga and da Costa 2006) were also reported to have participated in sporting activities. Other extracurricular pursuits included involvement in non-sporting clubs or associations and music pursuits. Very few Adelaide dental students (less than 10%), were involved in volunteer or charity work during the early years of the dental course. This contrasts with the

finding that many of them were involved in this type of ECA prior to commencing their dental studies. Other researchers have also found that very few full-time university students are involved in volunteer work, and the rate of participation in this type of ECA decreases over time eg, 23% in 1994; 10% in 2004 (Krause et al. 2005). Reasons for participating in each type of ECA were not investigated in the current study. Several reasons are proposed as to why tertiary/dental students might not be involved in volunteer or charity work. Many university students are undertaking paid work, which leaves less time for previous traditional pursuits such as charity work and volunteer work (Little 2002). Furthermore, within the Australian higher education landscape there is a stronger vocational focus compared with the US. There is minimal emphasis placed on the civic or spiritual growth of Australian university students, except for those in some of the university residential colleges (McInnis and Hartley 2004). In addition, Adelaide dental students may have been required to participate in volunteer or charity work as part of secondary school studies but there are no compulsory requirements to do so as part of the undergraduate dental curriculum.

6.6.2.3 Type of student participating in extracurricular activities and motivating factors for participating in extracurricular activities

Fewer females participated in ECAs compared with males in first and third year. Male French dental students were also more likely to have played sport than female students (Hennequin et al. 2002). More male Adelaide dental students also participated in ECAs prior to commencing dental studies. Thus male students might have continued to pursue previous activities. Significantly more school leavers participated in ECAs compared with tertiary transfer students in first year. This result might also be due to school leavers continuing with activities that were supported previously during secondary school studies. The hypothesis [3.4] that participation in ECAs is not likely to differ: between male and female students; and between school-leavers and non-school leavers, cannot be supported. In addition, the current study found no difference in participation in ECAs between South Australians and non-South Australians.

The main reason reported by Adelaide dental students for being involved in ECAs was to maintain physical fitness. It was also revealed that Adelaide dental students continued activities they began prior to commencing their studies. As hypothesised [4.2] many students who are involved in ECAs prior to commencing their studies continue these activities during at least one of the first three year levels of the dental course. There were some similarities in patterns of involvement in ECAs prior to, and during, the Adelaide dental course. The majority of students, both prior to, and during, the early years, spent between six to 15 hours per week involved in more than one activity, with the most common activity being sport. Interestingly, 25% of students reported spending more than 20 hours per week on ECAs prior to commencing their studies, whereas less than five per cent of students reported

spending this amount of time once in the course. It is likely that those students who reported spending large amounts of time on ECAs prior to commencing dental studies had more time available or fewer study commitments (eg, had taken a 'gap' year or enrolled in a tertiary course with fewer contact hours than a dental course).

6.6.3 Living arrangements

An equal proportion of Adelaide dental students lived at home and away from home during the early years of the course. This finding is similar to an Australian study that found 54% of first-year students lived at home (McInnis et al. 1995), but contrasts with several studies that have found that the majority (62% to 95%) of dental students in the UK, Europe and Nigeria live away from home (Heath et al. 1999; Humphris et al. 2002; Sofola and Jeboda 2006). Interestingly, the current result is similar to a Japanese study that reported 54.4% of Japanese dental students lived at home (Sugiura et al. 2005). The finding in the current study most likely reflects the characteristics of the student body, with half the students being residents of South Australia and the other half non-residents (Chapter 4 Table 4.1). The majority of Adelaide dental students, who lived away from home, lived on their own. There were differences in living arrangements according to students' gender, usual place of residence, and previous educational experience.

Male Adelaide dental students (in second and third year) were more likely to live away from home than females. This may be due to males wanting to be more independent (Schliebs 2008), but there could be a number of alternate reasons. Thus the hypothesis [6.1] that there is likely to be no difference in living arrangements between male and female students cannot be supported.

As expected, non-South Australians, international students and non-school leavers were more likely to live away from home. Those who lived with family and in the family home during the early years of the dental course were more likely to be South Australians and school leavers. This result is expected as two-thirds of South Australians live in Adelaide. In addition, given they are also school leavers ie, under 19 years of age, one would expect them to still be living at home. First-year Australian university students who were under the age of 19 years have been shown to be more likely to live at home (McInnis et al. 1995). It has been suggested that these students are more dependent and might not be ready to move out of home and away from family support (McInnis et al. 1995). In addition, those who lived away from home often lived in private accommodation or in residential colleges. The proportion who resided in these two types of accommodation was similar in first and second year. Furthermore, as expected, significantly more non-South Australians and international students lived in private accommodation or residential college than South Australians. Thus the hypotheses [6.2 and 6.3] that South Australian school leavers will live with their families, in the family home, can be supported.

For those students who resided in residential college, the commonly reported positive outcome was access to 'resources', such as peers, tutors, a library and past exam papers. Thus, living in college was supportive of students' study pursuits. For residential college students, college is an integral part of their learning environment eg, access to college tutors and peers, and opportunities for formal and informal group work outside of class time (McInnis et al. 1995). However, the college environment was reported to be the main negative impact of living in college. These problems are not uncommon, with noise in the halls of such residences was cited as a barrier to study by 30% of UK medical students (Whittle and Murdoch-Eaton 2004).

Most Adelaide dental students had fairly stable living arrangements, but some did experience changes in the people with whom they resided or their style of accommodation. There was, indeed, a significant decrease in students residing in residential college over the three years. The most common reason for leaving residential college was the college environment (eg, distractions, noise, physical conditions, and college regimentation). Other Australian tertiary students who lived in residential colleges also reported concerns with lack of privacy and difficulty in finding time for themselves (McInnis et al. 1995). Thus, it was not surprising that the most common positive outcome of moving out of college was the minimisation of distractions or disruptions. However, a cost of moving out of college was loss of access to college resources. It seems that students were prepared to forgo the benefits gained from availability of college resources for an improved living environment which may have contributed to overall academic success. European dental students have been reported to change accommodation during their studies; in particular, they tend to move out of the family home and out of residential college and move into their own accommodation (Gorter et al. 2008). Whilst the current study did not examine why Adelaide dental students who lived at home might have moved out, it has been suggested that young adults may move out of the family home to become more independent (Schliebs 2008). Caution must be exercised when interpreting the findings related to reasons for moving and the positive and negative outcomes of moving out of college due to the small sample of students surveyed in this aspect of the current study.

6.6.4 Consequences of participation in paid part-time employment and extracurricular activities

Positive and negative consequences in engaging in term-time paid PT work were identified by Adelaide dental students. Their comments were consistent with those of full-time UK (de la Harpe et al. 1997; Lucas and Lamont 1998; Curtis and Lucas 2001; Little 2002; Moreau and Leathwood 2006) and Australian (McInnis and Hartley 2002) tertiary students who worked PT. Moreover, the wide range of positive and negative outcomes identified by Adelaide dental students highlight the heterogeneity of the sample and the likely complexity of the impact of term-time paid PT work. Two main groups of perceived benefits were acquisition or enhancement of skills (communication, interpersonal, organisational and

time management) and psychosocial well-being (stress relief, financial benefits and social interaction). Skills perceived to have been gained in the workforce such as, communication and interpersonal skills are relevant to the practice of dentistry. Many of these skills can also be learnt within the classroom setting. Dental academics may consider designing learning activities that emphasise acquistion of skills gained in the workforce or provide opportunities for students to apply skills learnt in the workforce into the classroom. Students did not acknowledge other positive outcomes cited in the literature, such as work experience. This is not surprising given that Adelaide dental students predominantly worked in non-dental fields. Negative outcomes were experienced at the individual level ie, psychosocial issues (stress, tiredness and less time) and compromised academic work (insufficient time to study or to prepare for assignments). Others have found that being involved in paid work whilst studying full-time can contribute to increased stress and negative health effects (McInnis and Hartley 2002; Carney et al. 2005; Broadbridge and Swanson 2006; Moreau and Leathwood 2006). Adelaide students however, did not mention other negative outcomes cited in the literature, such as dissatisfaction with and lack of integration into university life or negative staff perceptions. Thus, it seems that these perceived effects of working (for some dental students) included both positive and negative health effects.

The major positive outcome gained in participating in ECAs was stress relief. It is well established in the dental literature that students find dental studies stressful (Al-Omari 2005; Sugiura et al. 2005; Gorter et al. 2008). A positive association between involvement in regular physical activity or leisure activities and decreased stress or anxiety levels, and general well-being, has been reported (Rubenstein et al. 1989; Sugiura et al. 2005; Pöhlmann et al. 2005). Thus, despite undertaking a strenuous study program, Adelaide dental students may have placed a priority on ensuring they spent time on ECAs in order to self manage their stress levels and maintain a balanced lifestyle. This, in turn, may have had positive effects on their academic progress. However, some students reported that participating in ECAs impacted negatively on them (eg, reduced time, tiredness and stress) or negatively affected their dental studies (eg, insufficient time to study).

6.6.5 Participation in non-academic activities, living arrangements, and academic success

As expected [hypothesis 9.3], no difference was found in the level of academic performance between students who participated in ECAs and those who did not. This is consistent with the findings of Svanum and Bigatti (2006). Positive benefits experienced from participating in ECAs may assist in coping with a demanding course like dentistry.

Despite one-third of Adelaide dental students being involved in term-time paid PT work, there was no statistically significant impact on academic performance in first, second or third year. This is consistent with the findings of Parker (1993) and Watts (2002) but contrasts with the findings of Svanum and Bigatti (2006). Time spent (greater or less than 10 hours per week) in paid PT work was also found

not to have a statistically significant negative impact on academic performance in the early years of the course. This is in agreement with the findings of McInnis and Hartley (2002) and Nonis and Hudson (2006) but in contrast to de la Harpe et al. (1997). Overall, it appears that being involved in paid work had no detrimental effect on academic performance.

There are numerous reasons that might explain why working PT (or time spent working) did not have a negative effect on academic performance. The amount of time spent working by Adelaide dental students might not have been 'high' enough to impact negatively on success compared with other full-time university students who spend more time involved in paid work (Applegate and Daly 2006). The binary classification of Adelaide dental students' academic performance ('higher' versus 'lower' achievers) may have masked differences. Other factors that influence the relationship between non-academic activities and academic performance were not explored given that only bivariate analyses were used in this study to examine the relationship between non-academic activities and academic performance.

Moreover, recent literature has identified that a complex relationship is likely to exist between involvement in non-academic activities and academic performance. The direct relationship between time spent working and academic performance might be moderated by personal (ability, motivation and study habits) and situational (level of stress, courseload) variables, thus the impact may be different under different circumstances (Broadbridge and Swanson 2005; Nonis and Hudson 2006). McInnis and Hartley (2002) reported that high contact hours combined with substantial work and study conflict rather than the actual numbers of hours spent in paid work is more likely to cause academic problems. Study-work conflict was not investigated in the current study. Motivating factors for working and living arrangements of those working can influence the impact on academic performance. University students who were financially self-reliant and those who lived alone have reported experiencing adverse effects of employment on their academic performance (Hayden and Long 2003). In contrast, in the current study, most of those who worked did so for discretionary extras and lived at home.

Furthermore, positive effects of being involved in paid work may mitigate negative effects on academic performance. Psychosocial well-being, decreased financial pressure and social support are positive consequences of involvement in paid work and may enhance a positive attitude towards study and thus academic performance (Broadbridge and Swanson 2005; Bradley 2006). Adelaide dental students who worked did perceive such positive benefits of working.

In addition, experiences already established prior to gaining entry to dentistry ie, 'routinisation' of successfully juggling paid work and or a busy life outside of school, added with the positive benefits of working or participation in ECAs, may mean that students are accustomed to carrying out multiple roles. It has been proposed that university students continually evaluate the costs and benefits

associated with each of their life roles and invest in those roles that are relatively rewarding and disinvest in those that are relatively costly (Horsmantshoff and Zimitat 2003).

Several strategies might have been used by those who worked PT and managed to succeed. These may have included: curtailing social activities (McInnis and Hartley 2002; Svanum and Bigatti 2006); improving time management and organisational skills (McInnis and Hartley 2002); seeking help and borrowing notes from peers (Krause et al. 2002); and juggling and adjusting the numbers of hours of paid work (eg, around exam time or when coursework is due) (McInnis and Hartley 2002). In addition, academically stronger students may be better at balancing academic work and therefore reducing the negative effects that time spent working may potentially have on academic performance (Nonis and Hudson 2006). Conversely, others may be more strategic in their approach to juggling work and study (eg, skip classes, spend less time at university) and do the bare minimum rather than trying their best (McInnis and Hartley 2002; Bradley 2006).

Despite the current study revealing no negative impact on academic performance for those who worked, the students themselves perceived some negative effects on their studies (refer to previous section 6.6.4). Hence, involvement in paid work does to some extent negatively affect academic work even if not seen as a difference in the level of academic achievement. Dental students are often required to provide direct patient care in a clinic setting. Being tired, stressed and not spending enough time studying may indirectly influence the level of patient care and have negative outcomes for the patient, student and supervisor. Further investigation of this assumption is warranted. The hypotheses [9.1 and 9.2] that students who participate in term-time paid PT work or who work more than 10 hours per week, are unlikely to perform as well as those who did not participate in paid work or worked less than 10 hours per week, cannot be supported.

There was no significant impact on academic performance in first, second and third year related to different living arrangements. This is in contrast to the findings of Beekhoven et al. (2004). This difference may be due to cultural and curriculum differences between the studies. The hypothesis [9.4] that there is unlikely to be a difference between living arrangements and academic success can be supported.

6.6.6 Limitations

Caution is needed in interpreting results related to paid employment given that only bivariate analyses were performed. Other factors that may influence academic success, such as time spent studying, course effort (eg, class attendance) student characteristics and previous academic performance, were not examined simultaneously (Applegate and Daly 2006; Svanum and Bigatti 2006). The response rate to the post-admission survey of third-year students was lower than first- and second-year students, particularly among Cohort A, and thus their results may not be representative of all third-

year students. In addition, some data on term-time paid employment were not collected from all third-year students. Consideration also needs to be given to the accuracy of the estimated hours students spent in non-academic activities, given that the data were collected retrospectively. Furthermore, only a proportion of the total sample was followed-up and thus responses to the follow-up survey may not be representative of all students who participated in the current study. However the findings gained from the sub-sample provide an insight into the experiences of dental students regarding living arrangements and reasons for, and outcomes of, participating in paid work and ECAs, which is lacking in studies that focus on experiences of other university students.

6.7 Conclusion

Adelaide dental students were observed to lead very busy lives in the year prior to commencing dental studies. Furthermore, despite being enrolled in a full-time professional university course, a considerable number of Adelaide dental students continued with, or took-up, non-academic activities such as paid PT work and ECAs. Again pursuit of these activities was not observed to impact negatively on academic performance during the early years. The current generation of dental students may value the importance of living a balanced life and appear to be relatively successful in juggling the various aspects of their lives. Factors that Adelaide dental students perceived contributed to their success and difficulties during the early years of the course will be discussed in the next chapter.

Chapter 7. Students' perceptions of the factors related to their success and difficulties during the early years

7.1 Introduction

Pre-admission factors such as student characteristics, prior academic achievement, performance on admission cognitive tests and admission interviews have been cited as explaining differing levels of academic success of tertiary students (Chapter 5, section 5.2). However, such pre-admission factors do not take into account the environment undergraduate students experience once admitted to the course. Post-admission factors related to the learning-teaching context (eg, course design, teaching methods, learning activities, assessment) and individual student experiences (eg, employment, accommodation arrangements whilst studying, transition to a new environment and learning situation) have been reported to be associated with academic success of tertiary students.

There have not been any published reports on the factors Australian dental students perceive might relate to their successes or difficulties during their course. It was anticipated that results from this study would inform future research into post-admission factors specifically relevant to dental students in conjunction with relevant conceptual or theoretical frameworks from the general education literature. As noted previously (Chapter 5, section 5.2), research into types of post-admission factors that may influence academic success is important from an individual, an institutional and community perspective. Hence, this part of the study aims to explore 'post-admission' factors that, from the students' perspective, contributed to success and difficulties during the early years of the Adelaide dental course. Gaining an understanding from the student perspective about factors they perceive have influenced success or contributed to difficulties may help in improving students' quality of life, well-being (reducing stress) and enhance their total educational experience.

7.2 Literature review: post-admission factors and success of tertiary students

This review will discuss post-admission factors and success of tertiary students. Firstly, the scene will be set with a discussion of challenges faced by tertiary students and specifically the experiences of dental students. This will be followed by a brief discussion of the tertiary 'student transition and retention' literature and the tertiary 'student experience' literature. Post-admission factors influencing Australian university student success that have been identified in several large national studies will be subsequently reviewed. An overview of student (social) factors will follow. This will lead on to a discussion of students' perceptions of factors that contribute to academic success.

For the purposes of the current project, the review will be limited mainly to a selection of studies within the general education field as there are limited analyses of this issue in the dental/health professions literature. The studies reviewed focus on tertiary students' perceptions of factors related to their success or difficulties; post-admission factors associated with tertiary student academic success ie, attrition (withdrawal) and academic performance and; selected studies from the student transition and

retention literature and student experience literature. In addition, a selection of studies on dental student experiences will be reviewed.

7.2.1 Challenges for students at university

From the general higher education literature, it is clear that students face many challenges at university, including those related to themselves ie, personal, emotional and commitment issues and also those related to the academic environment (Table 7.1). Such challenges may contribute to a poor transition to university and poor academic success (refer to section 7.2.3).

Table 7.1 Challenges faced by university students

Category		Challenge
STUDENT RELATED	Personal	Leaving parental home[6,7]; leaving former classmates, teachers and meeting new friends, housemates, class mates and staff[7]; balancing study and social activities/family life[2,3,4,5]; balancing study and paid work[2,3,4,5]; financial difficulties[1,2,3,4,5]; accommodation[1]; parental pressure[2]; mixing with local students[1]
	Emotional	Loneliness[2]; homesickness[1]
	Commitment/ Motivation	Decreased motivation[2,3,4,5]
COURSE RELATED	Academic	Concerns about academic progress/performance[1]; coping with time pressures[7]; concerns about lack of knowledge and skills[2]; concerns about language competence[1,2] Adjusting to new academic environment specifically: course organisation, structure, content; learning and teaching methods; teachers' motivations, commitment, academic knowledge[1,2,3,4,5]

Li and Kaye (1998)[1] UK international tertiary students; Leder and Forgasz (2004)[2] first-year international mature age undergraduate students studying at an Australian university; McInnis et al. (1995, 2000a)[3, 4] and Krause et al. (2005)[5]: Australian first-year undergraduate students; Wilcox et al. (2005)[6] :UK first-year tertiary students; Eggens et al. (2008)[7] :Dutch university students

In addition to the challenges of being at university, dental students face additional demands and pressures. Dental students are often overwhelmed by the demands of the dental curriculum because it differs from previous schooling experience, both in time requirements (six to eight hours per day, five days per week with an occasional free period for study) and in the number of subjects (Canfield et al. 1976; Tedesco 1995; Plasschaert et al. 2007). New students often have little knowledge about dental school, the practice of dentistry and the need to adjust to personal demands of a professional conduct code (Canfield et al. 1976; Tedesco 1995). Dental students need to master a large amount of biomedical science information to provide the foundation for patient care (Canfield et al. 1976; Tedesco 1995). They also spend considerable time in the clinic managing and treating patients and performing

irreversible procedures in a confined space. Features of the dental clinic learning environment which differ from class-based learning activities include: patient interactions (expectations, beliefs, anxious or fearful patients); taking responsibility for decision making; timing and scheduling demands; working with peers and other members of the dental team; and interacting with and being assessed by clinic supervisors (Heath et al. 1999; Fugill 2005; Henzi et al. 2006). Hence, it is not surprising that despite differences between dental schools world-wide (eg, in admission criteria, curriculum design, institutional characteristics, social and cultural characteristics), the experience of stress by dental students is ubiquitous (Australia: Sanders and Lushington 1999; North America: Muirhead and Locker 2007; UK: Heath et al. 1999; Europe: Pöhlmann et al. 2005; Polychronopoulou and Divaris 2005; Gorter et al. 2008; Asia-Pacific: Sugiura et al. 2005; Morse and Dravo 2007). Perceived stress levels have been reported to be higher among dental students than in the general population (Pau and Croucher 2003).

Sources of perceived stress can be broadly summarised as student, study and course factors (Gorter et al. 2008). Primary sources of stress vary between studies, but course factors tend to dominate (Polychronopoulou and Divaris 2005; Morse and Dravo 2007; Muirhead and Locker 2007). The literature on dental student stress has also identified student related sources of stress or difficulties, such as financial, living and relationship problems (Table 7.2). In a study of Adelaide dental students, the single most stress-inducing concern was examinations and grades, and the main source of stress was related to negative self-efficacy beliefs (eg, lack of confidence to be a successful student or dentist; fear of being unable to catch up if behind) (Sanders and Lushington 1999). These researchers also found that stress levels escalated after second year, with the greatest stress arising from students' uncertainty of their capabilities to succeed. Table 7.2 summarises the wide range of stress-provoking factors experienced by dental students.

Stress experienced by dental students may pose problems for their well-being (psychological health). For example, emotional and psychological distress (Humphris et al. 2002), depressed mood, (Sugiura et al. 2005), anxiety (Sugiura et al. 2005), burn out or emotional exhaustion (Humphris et al. 2002; Pöhlmann et al. 2005; Gorter et al. 2008), depersonalisation (Pöhlmann et al. 2005) and feelings of lack of accomplishment (Pöhlmann et al. 2005). High stress levels experienced by dental students have been reported to also be associated with poor academic performance (Westerman et al. 1986). This is in contrast to the findings of Sanders and Lushington (2002) who reported that chronic stress did not predict academic performance of Adelaide dental students. However, these researchers reported that students who had higher levels of stress related to a 'faculty and administration factor' (eg, atmosphere created by clinic staff, receiving criticism about work, inconsistent feedback on work between different instructors) tended to show lower clinical grades in clinic competency and contextual understanding compared with students with lower levels of stress related to this factor. Thus, the dental

learning environment may contribute to difficulties experienced by students and these may impact negatively on students' well-being and academic performance.

Table 7.2 Summary of the sources of stress experienced by dental students

Category	Source of stress
STUDENT FACTORS	
Social factors	
Financial	Financial problems[5, 6]
Accommodation	Accommodation (moving away from home, accommodation problems, environment to study)[1]
Relationships	Making friends[1]; relationships (family)[6]; relationships (partner)[1]
Health issues	Physical health[1]
Psychological/emotional factors	Negative self-efficacy beliefs[2,4;] lack of self confidence[3;] fear of failure[1,5;] fear of facing parents after failure[5]
Leisure time	Lack of leisure time[1,3,6]
Study factors	Exam anxiety or phobia[1,2,3;] performance: grades[2]; performance pressure[1,4]; competition for grades[1,4]; study obligations[7]; concerns about manual dexterity[1]
COURSE FACTORS	
Curriculum design	Introduction of new curriculum design eg, PBL[1]
Workload	Amount of assigned work[4,5]; full loaded day[5];study pressure[7]
Assessment	Inconsistent feedback from clinic tutors[2,6]; critical feedback in front of patient[5]; receiving criticism about work – academic or clinical[1,2]
Clinic training	Adapting to clinical phase[1,3]; patient-related issues eg, patient late[2,7]; Inadequate treatment time[1,3]; responsibilities for comprehensive patient care[1,2]; confidence in own clinical decision making[1]; completing clinic requirements[1]
Staff relationships	Approachability of staff[1]
Others	Rules and regulations[1]

Heath et al. (1999)*[1]; Sanders and Lushington (1999)*[2]; Pöhlmann et al. (2005)* & **[3]; Polychronopoulou and Divaris (2005)**[4]; Morse and Dravo (2007)**[5]; Muirhead and Locker (2007)***[6]; Gorter et al. (2008)****[7]

NB: * PBL curriculum; ** conventional curriculum; ***type of curriculum not indicated

7.2.2 Dental student experiences

As discussed in Chapter 5 (section 5.2), most research conducted by dental educationalists regarding factors that may be associated with academic success and difficulties have examined pre-admission factors. There is limited published research with regard to post-admission/non-academic factors and students perceptions of how such factors may influence dental student success (Widstrom et al. 1990). More recently there have been an increase in publications that have examined North American/European dental students' perceptions of their learning environment (Burk and Bender 2005; Henzi et al. 2006; Stewart et al. 2006; Divaris et al. 2008). These publications have identified difficulties, rather than factors relating to success, faced by dental students. Difficulties identified included student and course related problems (Table 7.3). Many of the difficulties experienced by dental students are similar to those encountered by university students in other disciplines (refer to section 7.2.6 Table 7.7). However, there are some specific issues for dental students related to hands-on practical and clinic work on patients (Table 7.3).

Table 7.3 Summary of the difficulties or problems faced by dental students internationally

Category	Problem
Student factors	
Adjustment to dental school	Difficulty with transition to dental school[2]
Social	Financial problems[2,4]; living arrangements/accommodation[2]; physical well-being[2]; separation issues[2]; lack of leisure time[4]
Emotional	Emotional well-being, relationship issues, self-doubt[2]; personal disappointment with performance[2]; fear of treating live patient[2]
Commitment/motivation	Questioning commitment to and interest in dentistry[2]; questioning commitment to complete 4-6 year degree[2]
Performance	Study skills, time management[2]; not enough time to read[1]; substandard didactic performance[2]; substandard technique performance[2]; examination and grades[4]
Course factors	
Curriculum	Meeting graduation requirements[4]; long contact hours[4]; demanding workload/academic overload[4]; frequent examinations[1]
Assessment	Inconsistent feedback from clinic tutors[3]
Staff-student relationships	Staff-student relationships[4]; clinic tutor-student relationships[4]
Clinic work	Long hours spent working in clinic[1]; responsibility for patients[1]

Widstrom et al. (1990)[1]; Burk and Bender (2005)[2]; Henzi et al. (2006)[3]; Divaris et al. (2008)[4]

7.2.3 'Student transition and retention' literature and 'Student experience' literature as related to academic success or difficulties

All students new to university face a period of transition, irrespective of their prior backgrounds. This involves varying degrees of adjustment to the university culture in general and to the conventions and expectations of students' individual disciplines. In addition, first-year students experience many social and personal changes (McInnis et al. 1995; Beasley and Pearson 1999). All first-year students are therefore considered to be 'transitional' students. The degree and length of transition experienced is influenced by the students' personal and social background and individual characteristics, and mediated by the organisational culture of the university (McInnis et al. 1995; Beasley and Pearson 1999). For a considerable number of tertiary students, the first-year experience is not a successful transition and some decide to leave. The attrition rate (voluntary drop out) amongst first-year Australian university students has been reported to be double (20%) that for second year (10 to 11%) (Lukic et al. 2004a). This is also an international phenomenon (DesJardins et al. 2002; Yorke and Longden 2004). Consequently, substantial theoretical and empirical research has focused on understanding why first-year tertiary students may leave their studies. This has included examining factors, particularly institutional and student factors that may influence students' decisions to leave or stay at university.

The Australian higher education context is quite different from the US college context where a considerable amount of the research on the student experience/student retention has been conducted (eg,Tinto 1986; Pascarella and Terenzini 1998; Tinto 1998). US colleges focus on broad development of undergraduates while Australian universities focus more directly on vocational and academic education (McInnis 2001). Therefore research findings from Australian studies are likely to be more applicable to discussions of Adelaide dental students. Thus, for the purpose of the current study, this next part of the literature review will be restricted to a discussion of factors that have been identified from Australian research.

Attrition rates in professional courses such as dentistry tend not to be as high as those for other university courses. For example, withdrawal rates were low (3%) in prestigious courses such as medicine and law compared with information technology courses (30%) (Marks 2007). Thus, given that the focus of the current study was to examine factors (pre- and post-admission) that may be associated with dental student academic progress and performance, this literature review will not extensively cover studies on university student attrition. Furthermore, as the current study did not focus on dental students' transition to university and experience of university this will only be discussed briefly.

Within the Australian context, three national surveys (McInnis et al. 1995; 2000a; Krause et al. 2005) have examined the first-year university student experience. Three broad categories of factors were identified to characterise the first-year experience. These were student background characteristics and experiences, contextual factors and institutional factors (Table 7.4) (McInnis et al. 1995; 2000a;

Krause et al. 2005). Many Australian first-year students found the transition to university a challenge. For example, less than half the students perceived that the teaching staff were good at explaining things and approximately 30% felt like deferring during the first term of first year (McInnis et al. 1995). Several student background characteristics were found to influence students' attitudes. Females tended to have a stronger sense of purpose and be more likely to be satisfied with their courses compared with males. Furthermore, school leavers had more difficulties with the transition to university. They were less certain about their roles, less diligent in their study habits, and less academically orientated compared with older students. Many felt that university was more demanding than secondary school and the standard at university was higher than they expected (McInnis et al. 1995).

Table 7.4 Factors that may influence the first-year experience at university, based on three national Australian studies: McInnis et al. (1995); McInnis et al. (2000a); Krause et al. (2005)

Factor	Description	
Student background characteristics (influence behaviour, outlook and expectations of the course and the university students' have chosen)	Goals and commitment Age Parental education School attended Ethnicity	Goals and commitment; course selection; sense of purpose; previous study**; course preference**; deferring first enrolment**; other current enrolments**; academic adjustment; approaches to study; obstacles to effective study; change and uncertainty**
Student contextual factors (can impact on study habits)	Social and economic context (daily life*/managing commitments**)	Residential arrangements (type of accommodation and life in residential colleges); financial arrangements (sources of income, paid work, family support)
Course/institutional factors (can influence students' learning experiences and level of satisfaction)	Universityexperience: academic integration & involvement	Sense of identity as a university student; student expectations**
	Adjustment**	Adjustment to assessment and standards**; adjustment from school to university**; academic orientation; academic application
	Engagement**	Engagement patterns** (time spent on campus, course contact hours, time on private study, engaging at the institution level, engaging with academic staff, engaging in the learning environment, engaging with peers, engaging through online technologies); patterns of social interaction and the learning process; study habits and time commitments; factors undermining commitment (support services for personal affiliation, survival and maintenance; relationship to staff
	Teaching and courses	Goals and standards clear; workload; assessment (feedback); satisfaction with quality of teaching

*McInnis et al. (2000a) additional questions related to this factor that were not asked in 1995 study
**Krause et al. (2005) additional questions related to this factor that were not asked in 1995 and 2000 study

7.2.4 Post-admission factors that may influence academic success: progress and performance

An extensive review of Australian studies (Pargetter et al. 1998) examined: factors influencing attrition (ie, voluntary withdrawal rather than academic failure or exclusion); factors that might predict academic performance; and factors related to transition from secondary to tertiary education. Three groups of 'post-admission' factors were identified: student psychological characteristics; social factors; and institutional factors (Table 7.5). Analysis of factors predictive of first-year student performance indicated that students who were more academically successful displayed the following attributes: they knew what occupation they wanted; they were motivated to study; they studied more than the minimum requirement; they considered good grades important; they comprehended the required reading material; they felt comfortable participating in group discussions; and they mixed with students of various backgrounds.

Table 7.5 'Post-admission' factors that may influence Australian tertiary student persistence/attrition and academic performance as summarised by Pargetter et al. (1998)

Factor	Description	Alternative labelling of categories
Student Psychological characteristics	Academic preparedness (study skills, prerequisite knowledge); learning strategies (studying and learning approaches); locus of control; students' own goals/goal commitment; academic motivation	"Post-admission: student related"
Student Social factors	Family and peer support; study mode (full-time/part-time); financial issues	"Post-admission: student related"
Course/Institutional factors	Institutional commitment; academic integration (out of class contact with faculty staff related to academic activities); social integration (staff providing for personal and social needs of student); course expectation/characteristics; nature of the course; teaching paedagogy (learning and teaching activities)	"Post-admission: institutional related"

Several smaller empirical studies based on inventories and quantitative statistical methods have also analysed 'post-admission' factors that may influence or predict Australian tertiary student academic performance in particular. Post-admission factors evaluated broadly related to the individual student or the educational institution. No two studies examined the same set of post-admission factors, however, the common outcome measure was academic achievement (GPA) (Appendix Table 7.1). These studies concluded that various post-admission factors were significantly associated with academic performance. For example, student factors related to: integration into university; self-efficacy; and employment

responsibilities were found to be predictive of academic performance whilst self-reported study skills; depression; anxiety; and stress were not significant predictors of academic performance (McKenzie and Schweitzer 2001). Tchen et al. (2001) reported that stress, personality measures and social support (post-admission factors) were predictive of academic performance. Approaches to learning and English language skills were factors that Zeegers (2004) reported a direct effect on academic performance. Furthermore, McKenzie et al. (2004) revealed that use of self-regulatory learning strategies and personality traits (being introverted and agreeable) were indicators of academic success.

7.2.5 Post-admission factors: social/student related factors

As noted previously (Chapter 6, section 6.2), social/contextual/student related factors such as involvement in paid work, residential arrangements, other daily or life commitments and family/peer support, have been identified as impacting on tertiary students' experience (Tables 7.3 and 7.4). For a review of the literature of the following post-admission factors: paid work; extracurricular activities; and living arrangements and their potential influence on tertiary student academic success, refer to Chapter 6, section 6.2. The following discussion will focus on social support and impact on tertiary student success.

Seeking social support is considered a fundamental approach to coping (Forshaw 2002). It is considered in the field of psychology as support (perceived, available or actual) given through friendships and family, significant others and professionals (Forshaw 2002). Support can come in the form of informal sources eg, peers, friends and family, or formal sources eg, academic staff, tutors, administrative, service staff, professionals and peer tutors (Burk and Bender 2005). Several forms of social support have been described (Table 7.6). The type of support available to a person depends upon the social network of the person, their gender and culture (Forshaw 2002). Australian first-year university students identified their partner, family, friends and staff as sources of social support (Ramsay et al. 2007).

When students move from school to university, existing supportive relationships change or disappear and new ones are formed (Eggens et al. 2008). Peers can provide reassurance, a familiar face in a new environment and, therefore, help students to settle in (Lowe and Cook 2003). Tertiary students have been reported to have received practical types of support from friends and family rather than from academic staff (Ramsay et al. 2007). Academic staff can help with the transition of first-year students to university by understanding the anxieties, fears and issues that students bring with them. Staff play a role in providing support for students often by the way they appraise performance and provide information (Wilcox et al. 2005). Positive academic staff and student relationships are important to foster supportive relationships between the two. This can be achieved by meeting and being introduced to staff and having approachable staff and tutors (Wilcox et al. 2005).

Both integration into the new environment at university and the amount of social support received from peers play a role in academic persistence (Gloria and Ho 2003) and academic success or failure (Eggens et al. 2008). Educational support from academic staff and peers, and emotional and financial support from partners, were found to be associated with high academic performance (Tchen et al. 2001).

There are variations in patterns of seeking support or sources of support between: male and female university students (Halamandaris and Power 1999; Burk and Bender 2005); local and non-local university students (Ramsay et al. 2007); university students classified as 'high' and 'low' achievers (Burk and Bender 2005; and first-, second- and third-year university students (Krause et al. 2002). Prior to the study by Burk and Bender (2005) there had been little examination of patterns of seeking support or sources of support amongst dental students and whether patterns of seeking support vary between different types of dental students.

Table 7.6 Types of social support and their descriptions

Type of support	Description
Appraisal	Where person is enabled or encouraged to evaluate their own state of health or personal state. Provision of information or empowerment. Can help to places stressors in context (Stroebe and Stroebe 1995; Forshaw 2002)
Emotional	Provision of empathy, care, love and trust (Stroebe and Stroebe 1995). Communication to others that they are valued (Cohen and Wills 1985). For university students often received from friends, partners and least received from professors (Ramsay et al. 2007)
Informational	Involves providing people with information which they can use in coping with their problems (Stroebe and Stroebe 1995). Cognitive guidance and advice (Cohen and Wills 1985). For university students often received from professors and friends and least received from family (Ramsay et al. 2007)
Practical (instrumental)	Consists of behaviours that directly help the person in need eg, taking care of children (Stroebe and Stroebe 1995). Material assistance (Cohen and Wills 1985). University students often received from friends, family and least received from academic staff (Ramsay et al. 2007)
Social companionship	Spending time with others in leisure activities (Cohen and Wills 1985)

7.2.6 Student perceptions of factors that contribute to academic success or difficulties

Several Australasian studies (Killen 1994; Ditcher and Tetley 1999; Hunter 2001) have attempted to examine factors that students perceive to be related to their academic success or difficulties. Two of these studies (Killen 1994 and Ditcher and Tetley 1999) also examined the staff

perspective, but this was not the focus of this current project. Australian university students were asked to list five factors that they perceived had contributed to success at university and five factors that had contributed to failure (Killen 1994; Ditcher and Tetley 1999). Another study investigated first-year engineering student perceptions of what helped or hindered their learning (NZ: Hunter 2001). Key categories identified were student and course factors (Table 7.7). There was variation in the categorisation of the factors identified between studies. This was probably related to the different student samples and different survey questions used.

Table 7.7 Factors that tertiary students perceived related to their success and failure: Killen (1994), Ditcher and Tetley (1999) and what helped/hindered learning (Hunter 2001)

Academic success/failure	Factor	Description
Success (helped learning)	Student (related to self)	Self-motivation[1, 2]; effective study technique[1]; personal study strategies[3]; academic ability[2]; time management and organisational skills[2]; effort[2];discussion with other students[3]
	(other)	Family support[1]
	Course	Enthusiastic lecturers[1]; feedback and assessment[2]; resources[2]; support courses[2]; tutorials[3]; good lecturers[3]; well structured presentations by lecturers[2]; taking the same paper[3]
Failure (hindered learning)	Student	Poor literacy skills[1;] insufficient effort[1]; lack of self-motivation[2]; poor time management/organisational skills[2]
	Course	Boring presentations[1]; poorly structured presentations by lecturers[2]; heavy course workload[1,2]; feedback and assessment[2]; availability of resources[2]; poor teaching[3]; class-related problems[3]

Killen (1994)[1] Australian second-year education students in one university
Ditcher and Tetley (1999)[2] Australian university students in different levels in different courses in one university
Hunter (2001)[3] New Zealand first-year engineering students living in residential hall in one university

7.2.7 Post-admission factors: differences between different types of tertiary students

Post-admission factors that contribute to success or difficulties may be perceived differently by different types of students. Gender differences were reported in perceived difficulties linked to emotional well being and stress (Burk and Bender 2005), as well as study skills and course difficulties (Yorke 2000). School leavers were more likely to find it difficult getting motivated to study compared with older students (Krause et al. 2005). International university students have been reported to experience more

difficulties with academic work, homesickness and support needs compared with local students (Mullins et al. 1995; Treolar et al. 2000; Krause et al. 2005).

7.2.8 Post-admission factors: successful versus unsuccessful students

Factors that may contribute to success or difficulties during university studies may differ between those students who progress satisfactorily and those who withdraw or fail, and also between those who are classified as 'higher' achievers and 'lower' achievers. Tertiary students who were classified as being at medium or high risk of leaving university cited more difficulties with their course of study and living away from home compared with those classified as being of low risk of withdrawing (Rickson and Rutherford 1995). There were differences in reported self-regulatory behaviours, perceptions of teaching and ability to manage commitments between those students who were more likely to drop out of university compared with those who were more likely to persist (Krause et al. 2005). Those dental students whose academic achievement was ranked as 'low', perceived the transition to dental school to be more difficult compared with those whose academic achievement was ranked as 'high' (Burk and Bender 2005) and they were more likely to report problems in performance, emotional and adjustment categories.

Many post-admission factors have been identified that may explain tertiary students' academic success. Despite the extent of research in this area, to date no single post-admission factor, or set of factors or universal theoretical framework, that can explain tertiary student success whether it is measured quantitatively as academic progress (withdrawal or persistence) or qualitatively as successful experience has been identified. This large body of research in the general higher education field has investigated post-admission factors that may influence academic success of university students, however, dental students' experiences are somewhat different to most other university students eg, provision of direct patient care.

There have been no published reports on factors that Australian dental students perceive to relate to their success and difficulties, not just in first year, but over several years of education. In this study it was decided to use open survey questionnaires to collect data from the student perspective, similar to the method used by Killen (1994), Ditcher and Tetley (1999) and Hunter (2001). It was anticipated that results from this study would inform future research concerning further exploration of post-admission factors specifically relevant to dental students in conjunction with relevant theoretical frameworks from the general education literature.

The importance of research into pre-admission factors was discussed in Chapter 5, section 5.2. Research into post-admission factors has supplementary importance from a student, an institutional and a community perspective. It is important because there has been an increase in the diversity of the university student population. Students represent different social and cultural backgrounds and have

different experiences. Identification of factors that students perceive influence academic success is important to give all students an equal chance of success (McKenzie and Schweitzer 2001). In an era of quality auditing, one key performance indicator at an institution level is student progress (attrition rates) (Yorke 2000; McInnis 2001). Universities face pressure to ensure a positive student experience. It is essential for academic staff to reflect upon and review the curriculum in light of student achievement. Success seems straightforward for some students and problematic for others (Dickson et al. 2000). Furthermore, knowledge about which factors students identify as influencing academic success can be used by academic staff to enhance the learning environment, identify students 'at risk' and to maximise student success (Killen 1994; Divaris et al. 2008). Knowledge about which factors may be associated with academic success could be used to identify effective ways of supporting students (Killen 1994; Tchen et al. 2001). Moreoever, knowledge about which factors may benefit or impede academic success could be used by students themselves to help them approach their university studies in a way that will maximise their chances of success (Killen 1994). Finally, there is also increasing interest from parents, as stakeholders, in their children's higher education (McInnis 2001).

7.3 Aims, research questions and hypotheses

The overall aim of this part of the study was to investigate Adelaide dental students' (1998-2001), perceptions of factors that may have contributed to their success or difficulties during the early years of a hybrid PBL course. Specifically the aims of this aspect of the research project were to address *Research Question (RQ) 6* ie, *What factors do students perceive to contribute to success and difficulties during their early years?* (refer to Chapter 1, section 1.9 Table 1.1). Sub-questions were also devised and related hypotheses (H) were generated from the literature review (section 7.2). The sub-questions and hypotheses are summarised as follows:

RQ 6.1 What post-admission factors do students perceive are related to their academic success and difficulties during the early years?

RQ 6.2 Are factors identified by Adelaide dental students different to those identified by other university students?

It was hypothesised that:

H 2.1 Dental students are likely attribute their success and difficulties to similar factors to those identified by other university students

RQ 6.3 Do the factors identified change positively or negatively as students progress through the course?

It was hypothesised that:

H 3.1 Students are more likely to report difficulties in third year compared with first year due to increasing course demands and working in a clinic setting

RQ 6.4 Do students experience more difficulties related to the learning environment (eg, patient care) than other sources of difficulties (personal and academic issues)?

It was hypothesised that:

H 4.1 Students are more likely to experience difficulties related to the learning environment more often (eg, patient care) than other sources of difficulties (personal and academic issues)?

RQ 6.5 Are there any differences in the frequency of factors identified by those classified as 'higher' or 'lower' academic achievers?

It was hypothesised that:

H 5.1 Students classified as 'higher' academic achievers are less likely to report difficulties compared with those classified as 'lower' academic achievers

RQ 6.6 Are there any differences in the frequency of factors identified by those who fail and those who do not fail?

It was hypothesised that:

H 6.1 Students who fail are more likely to report greater difficulties (personal and course factors) compared with those who do not fail

RQ 6.7 Are there any differences in the frequency of factors identified between various groups of students eg, males/females; school leavers/non-school leavers; locals/non-locals; and those who choose dentistry as first preference/second preference?

It was hypothesised that:

H 7.1 The frequency of factors identified to contribute to success or difficulties are unlikely to be associated with gender, previous educational experience, permanent place of residence and course preference

RQ 6.8 What sources of support are sought when difficulties arise?

It was hypothesised that:

H 8.1 Students are more likely to seek support from peers and family than from academic staff

RQ 6.9 Are there any differences in the patterns of seeking support identified between the different year levels?

It was hypothesised that:

H 9.1 Patterns of seeking support are not likely to differ between students in different year levels

RQ 6.10 Are there any differences in the patterns of seeking support identified between various types of students eg, males/females; school leavers/non-school leavers; and locals/non-locals?

It was hypothesised that:

H10.1 Gender, previous educational experience, permanent place of residence and course preference are not likely to be associated with patterns of seeking support

RQ 6.11 Are there any differences in the patterns of seeking support identified by those classified as 'higher' or 'lower' academic achievers ?

It was hypothesised that:

H 11.1 Patterns of seeking support are not likely to be associated with academic success

7.4 Methods

7.4.1 Study sample and methods

One study group made up the sample for this part of the study, Group 3: MAHPBL (1998-2001). Details about this study group are discussed in Chapter 2, section 2.3.3. Data were collected about factors perceived to have contributed to success and difficulties during first, second and third year of the Adelaide dental course. These data were collected retrospectively via:

- a post-admission survey, after completion of the previous academic year, from Cohorts A to D: 1999-2004 and from
- focus group studies in 2004.

7.4.2 Student perceptions of factors related to success and difficulties

7.4.2.1 Post-admission survey data collection

The method used in this aspect of the project drew partially on the methods used in a number of Australasian studies (Killen 1994; Ditcher and Tetley 1999; Hunter 2001) that examined factors students perceived to be related to their academic success or difficulties. For the current study, two open-ended questions were used to collect data on Adelaide dental students' perceptions. The two questions were: "What factors do you think contributed to your success in the dental course last year?" and "What difficulties did you face which influenced your success in the dental course last year?" It was decided not to restrict students' conceptions of success or difficulty and thereby potentially restrict their identification of factors perceived to have influenced their progress. Therefore no specific definition of academic success or difficulty was provided.

Students were asked to reflect on factors perceived to have influenced success and difficulties after completing an entire year of study (February to December). Therefore, at the commencement of their second year of dental studies, students reflected on their first-year experiences. Logistically the survey could not be administered at the end of the year after examination results were finalised and students were informed of results, given that students were on vacation break. Thus, the survey was administered in the next year ie, as soon as possible after the students had returned from vacation, to minimise the influence of other course-related experiences once they had started the 'new' academic year.

7.4.2.2 Data analysis of post-admission surveys

A content analysis method was used to analyse the open-ended responses related to students' perceptions of factors related to success and difficulties. This method is discussed in detail in Chapter 2, sections 2.8.1 and 2.8.1.1. In the Results section (7.5) of this chapter and Appendix 7 (Tables 7.18 to 7.28 and 7.36 to 7.44), direct written student responses have been included. Verbatim responses are in italics and year level is indicated as follows: Yr 1 = first-year; Yr 2 = second-year; and Yr 3 = third-year student. Responses chosen for inclusion were deemed to best illustrate the sub-category and also represent the majority view. Quantitative statistical analyses (descriptive and bivariate) were then conducted. Frequencies of responses were calculated and comparisons made between and within the cohorts. Association studies were undertaken. Chi-square tests were performed to:

- compare the distribution of survey responses between cohorts and year levels
- examine associations between student characteristics (gender, permanent place of residence, previous educational experience and course preference) and factors perceived to influence success and difficulties
- examine associations between 'higher' and 'lower' academic achievers and factors perceived to influence success and difficulties
- examine associations between year level; student characteristics (gender, permanent place of residence, and previous educational experience); seeking support; and sources of support and
- examine associations between 'higher' and 'lower' academic achievers and seeking support; and sources of support

The classification of 'higher' and 'lower' achievers is discussed in Chapter 2, section 2.7.1. Statistical significance was set at $p<0.05$.

7.4.2.3 Focus group studies (data collection and analysis)

Three structured focus group discussions were conducted, with six to seven randomly selected students from Cohorts B, C and D. An invitation, information sheet and consent form were distributed to invitees (Appendix 7.1) The purpose of the focus groups was to seek further clarification and elaboration

about some of the major issues identified from post-admission survey responses to students' perceptions of success and difficulties (after an initial analysis of the data during 2001). The focus group discussions addressed the following topics: seeking support; study habits; social factors; and course-related factors. A series of guiding questions was devised from the survey analysis (Appendix 7.2).

A content analysis method was used to analyse the focus group data. This method was discussed in detail in Chapter 2, sections 2.8.1 and 2.8.1.2. Students' verbal responses are included in the Results (section 7.5) in italics. Responses chosen for inclusion were judged to best illustrate the identified theme and to provide insights into typical ways in which participants responded (Krueger 1998). Students' responses were reported verbatim, with attribution of main quotes to the participants' group (ie, F1, F2 or F3 for students who had completed first-, second- and third-year focus group studies, respectively).

7.5 Results

7.5.1 Post-admission survey response rates and characteristics of respondents

Responses by students who had successfully completed first, second and third year are discussed in this section. Responses by students who had interrupted progress (academic failure) are reported in section 7.5.8. Students who withdrew from the Adelaide dental course were not surveyed. For details on the response rates and respondent characteristics for each cohort within each year level see Chapter 6, section 6.5.1.2 and Appendix Tables 6.2 to 6.6.

7.5.2 Focus group discussions

One of the three focus group discussions (third-year students) did not run as smoothly as the other two. There were a few students who tended to dominate discussions and a fire-alarm was activated in the building hence the duration of this focus group was approximately 20 minutes less. However, the interviewer was able to cover most of the scheduled topics for discussions and enough data were generated for analytical purposes.

7.5.3 General pattern of responses

The form of responses given by students reflecting on first, second and third year (within and between cohorts) were similar. Responses varied between single words, short sentences or longer (descriptive) sentences (Appendix Table 7.2) and various combinations were used. On average, students gave between two or three distinct responses for factors that contributed to their success and difficulties (Appendix Table 7.3). There was some variation between the numbers of responses between the cohorts within the year levels. Third-year students in Cohort A gave on average four responses to

the question about factors that had contributed to success (Appendix Tables 7.4, 7.5 and 7.6). There was also a decrease in the total number of responses between the year levels. Most responses collected were students reflecting on their first year experience (39.9%) compared with students reflecting on their third year experience (25.6%) (Appendix Table 7.7). There were no statistically significant differences between the total number of responses between the cohorts within same year level or between the year levels. Data were thus pooled. Overall there were more responses to the question about what factors contributed to success (Yr 1: 57.1% ; Yr 2: 58.7%; Yr 3: 55.9%) compared with responses to the question about what factors contributed to difficulties experienced (Appendix Table 7.7). This trend was noted across each year level and for each cohort within a given year level except for students reflecting on their third year experience in Cohort C (Appendix Tables 7.8, 7.9 and 7.10).

7.5.4 Factors that contributed to success and difficulties during the early years: themes and pattern of responses

Within and between year levels and between the cohorts there were consistent themes. Post-admission factors identified were broadly classified into two major categories. Adelaide dental students perceived 'student' and 'course' factors had contributed to their success and difficulties during the early years of the course. Examination of patterns of responses for factors that had contributed to success revealed that the majority of students' responses were sub-categorised as 'student' factors. When patterns of responses for factors that had contributed to difficulties were examined, there was still a majority of student factors but there was an increase in the proportion of students who listed 'course' factors (Table 7.8).

Table 7.8 Patterns of responses to factors that contributed to success and difficulties during the early years

	First-year students (1998-2001)		Second-year students (1999-2002)		Third-year students (2000-03)	
Pattern of responses	n	%	n	%	n	%
Factors that contributed to success						
Student-only factors	89	58.9	84	64.1	68	64.2
Both course- and student factors	54	35.8	42	32.1	35	33.0
Course-only factors	8	5.2	5	3.8	3	2.8
Factors that contributed to difficulties						
Student-only factors	103	68.2	71	54.2	52	49.1
Both course- and student factors	32	21.2	36	27.5	26	24.5
Course-only factors	16	10.1	24	18.3	28	26.4
Total number of post-admission surveys	151		131		106	

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

7.5.5 Factors that contributed to success during the early years

There was consistency in the classification of the data between the year levels, with the data fitting the same framework for each year level (Table 7.9). Student factors were sub-categorised into six groups: study factors; skills; psychological factors; social factors; previous experiences; and knowledge. Course factors were sub-categorised into three groups: Adelaide dental course; student-staff interactions; and resources. A total of 10 students responded that they were 'not successful' and provided no further comments. Only one first-year, one second-year and one third-year student did not respond to the question about their success. This was categorised as 'no comment'. Hence, the overwhelming majority of students responded to the question about factors perceived to have contributed to their success (Table 7.10).

Overall, 'student' factors were consistently the most frequently reported group of factors perceived to have contributed to student success in first year (79.5%), second year (81.6%) and in third year (80.8%) (Appendix Table 7.11). There were no statistically significant differences between the number of student and course factors reported by students, within and between year levels. Details of the distribution of responses categorised as student and course factors for each cohort within each year level are provided in Appendix Tables 7.12, 7.13 and 7.14. Three sub-categories of factors were most frequently and consistently perceived to have contributed to success. These were study factors (Yr 1: 30.9%; Yr 2: 36.9%; Yr 3: 36.6%); psychological factors (Yr 1: 22.5%; Yr 2: 21.0%; Yr 3: 13.4%); and

social factors (Yr 1: 15.9%; Yr 2: 18.9%; Yr 3: 27.9%) (Table 7.10). Thus ‘success’ was predominantly attributed to ‘student’ factors. For details on the frequency of factors reported for success for each cohort within each year level refer to Appendix Tables 7.15, 7.16 and 7.17.

Table 7.9 Post-admission factors that were perceived to have contributed to student success during the early years

Theme	Success								
Major category	Student factors						Course factors		
Subcategory	Study factors	Psychological factors	Social factors	Skills	Previous experiences	Knowledge	Adelaide dental course	Student-staff interactions	Resources
Sub-units	Study patterns Time management	Motivation Attitudes & beliefs Behaviours	Support Lifestyle Accommodation Finances	Communication Group work Manual dexterity Stress management			Curriculum content, structure and process Contact hours/timetabling Workload Assessment Course objectives Task difficulty Environment		

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

Table 7.10 Frequency of the factors perceived to have contributed to success during the early years

SUCCESS FACTORS	First-year students (1998-2001) n	%	Second-year students (1999-2002) n	%	Third-year students (2000-03) n	%
STUDENT						
1. Study factors	136	30.9	144	36.9	101	36.6
a. Study patterns	83	18.9	80	20.5	42	15.2
b. Time management and organisation	53	12.0	64	16.4	59	21.4
2. Psychological factors	99	22.5	82	21.0	37	13.4
a. Motivation	69	15.7	50	12.8	19	6.8
b. Attitudes	21	4.8	16	4.1	9	3.3
c. Behaviours	9	2.0	16	4.1	9	3.3
3. Social factors	70	15.9	74	18.9	77	27.9
a. Support	43	9.8	45	11.5	43	15.6
b. Lifestyle	21	4.8	21	5.4	30	10.8
c. Accommodation	6	1.3	6	1.5	2	0.7
d. Finances	0	0.0	2	0.5	2	0.7
4. Previous experiences/academic preparedness	24	5.5	12	3.1	2	0.7
5. Knowledge	8	1.8	3	0.8	0	0.0
6. Skills	5	1.1	2	0.5	3	1.1
a. Communication	0	0.0	1	0.25	0	0.0
b. Group work	2	0.45	0	0.0	2	0.7
c. Clinic/practical/manual dexterity	2	0.45	0	0.0	1	0.4
d. Stress management	1	0.2	1	0.25	0	0.0
COURSE						
1. Positive student-staff interactions	40	9.1	28	7.1	26	9.4
2. Adelaide dental course	39	8.9	29	7.4	18	6.5
a. Curriculum content, structure and process	16	3.7	24	6.1	12	4.3
b. Contact hours/timetabling	7	1.6	1	0.25	4	1.4
c. Workload	2	0.45	0	0.0	1	0.4
d. Assessment	5	1.1	3	0.8	0	0.0
e. Course objectives	0	0.0	1	0.25	1	0.4
f. Task difficulty	7	1.6	0	0.0	0	0.0
g. Environment	2	0.45	0	0.0	0	0.0
3. Resources	11	2.5	15	3.8	9	3.3
OTHER RESPONSES						
Student response *'Not successful'*	7	1.6	1	0.25	2	0.7
No comment provided	1	0.2	1	0.25	1	0.4
Total number of responses						
Student factors	342	77.7	317	81.1	218	79.0
Course factors	90	20.5	72	18.4	53	19.2
Other	8	1.8	2	0.5	5	1.8
Total number of post-admission surveys	151		131		106	

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

7.5.5.1 Student factors that contributed to success

The following sections will discuss 'success' factors in further detail including findings from both survey responses and focus group discussions.

Three types of study factors were reported: study patterns, time management and organisation. Several distinct study patterns were identified. There were patterns that aimed to foster learning and understanding eg, making notes/flow charts/summaries, reading essential references, reading additional references (*Putting in a little extra time to read through some alternative text books helped in my understanding of most subjects:* Yr 1), pre-reading, preparing before sessions, self-directed learning, studying with others and revision. In contrast, other study patterns were pragmatic and aimed at accomplishing assessment tasks. These included only studying what was required, focussing on assignments or examinations, using past examination papers to study (*Solving past year exam papers*: Yr 2) and engaging in rote learning. Another type of study pattern used was aimed to support learning/studying eg, seeking help (S*ought help when I didn't understand something:* Yr 3), attending classes and being attentive in classes. Finally, other patterns related to the quantity of work done and the efficiency of studying. Many of the study patterns identified were consistent between year levels. There were some variations in responses between year levels. *Doing additional reading/research* was cited more by first-year students whereas third-year students did not mention this. Second- and third-year students cited use of past examination papers and rote learning whereas first-year students did not.

Two contrasting approaches to managing time were reported to have contributed to success. There were students who engaged in regular studying, who studied before the examination period or who kept up to date and completed tasks on time (*Kept up to date with all work throughout the year:* Yr 1). This contrasted with others who reported they 'crammed' their study (*Cramming hard in exam periods:* Yr 3). Many students responded that they were organised, spent time studying and had 'higher' time management.

Many of the time management approaches identified were consistent between year levels. Organisation was reported by students to denote working to a study plan or timetable, managing time effectively, ensuring notes were up to date and organising assignments. There was a notable variation in some categories of responses between year levels. 'Organisation' was more frequently reported by third- compared with first-year students. Furthermore, several comments by third-year students demonstrated that students perceived that their organisational skills had improved from the previous year. Samples of student responses in this sub-category of 'study' factors are presented in Appendix Tables 7.18 and 7.19.

Focus group discussions elaborated further on why many Adelaide dental students adopted contrasting approaches to time management and study patterns ie, studying consistently during term-

time or studying just prior to examinations. Studying consistently was described by students to refer to the process of learning and understanding basic concepts, going through lecture material and references rather than cramming in swot vac ie, *if you understand as you go along then there's no problem come exam time because you just know it* (F1). Third-year students noted that consistent study was easier in the clinical subject (DCP) because *it is easier to learn because of* (your) *own experience in the clinic* and (then when) *questions asked (in exam) you apply directly what we did in the clinic* (F3). The perceived advantages of studying consistently were that students could answer questions during lectures as they were up-to-date compared with those who postponed studying until the end of the semester. They were also able to *answer questions in the annual oral examination more successfully, if spent time revising consistently rather than wait for end of year when the subject was examined* (F3). Students also reported that consistent and regular studying allowed for the retention of general knowledge (without necessarily knowing all the details) and that this knowledge was supported for a *longer period of time other than just for the exam* (F1).

In contrast, studying prior to examinations was described by students as delaying learning detailed material in the biology based and dental health science subjects, rote learning and studying for many hours during swot vac ie, *sit there and go through basic concepts try and understand them and learn or memorise them* (F3). Other students commented that this type of study pattern was required for *learning all the detail to get extra marks/to do well in your grades* (F1) and to cover the *volume of facts need to know by rote* (F1).

Some students reported adopting both types of study pattern because they perceived there was better retention of information eg, *if you look at something for the first time in swot vac…you get a heart attack. If you've seen it before it is just a matter of learning it better* (F1) and *keeping bases clear by studying regularly but also do cramming in swot vac* (F3).

Several students in each of the three focus groups mentioned that although their preferred study pattern would have been regular and consistent studying, they resorted to 'last minute' cramming during the examination period due to the influence of both course and student factors.

Course factors that were perceived to have influenced approaches to studying included,

- course demands eg, volume of course requirements and time spent doing library research for assignments and PBL sessions
- timetable factors (contact hours/length of day/high number of hours on campus) ie, *long hours at uni; feeling tired after long clinic session and you don't feel like doing any work* (F2) and *whole day at uni, long breaks can't leave if have afternoon lectures- get tired* (F1)

Student factors that were perceived to have influenced approaches to studying included,

- individual study preferences ie.,*work better under pressure – thus leaves things to last minute… motivation by force* (F3) and *level of interest… if you're interested, more likely to study or not* (F1) and
- social factors eg, dealing with personal issues which arise eg, *need to go to bank, Centrelink – use time that could be used to study as can't access services at any other time* (F3); *paid part-time employment* (F2); living arrangements eg, *if live on own need to cook, shop also* (F3) and *takes me an hour to travel* (F1); *other commitments outside the course* (F1); and health issues eg, being *tired* (F1) take time away from studying.

The following student reflections highlight the interplay between course and student factors that influenced the adoption of particular study patterns, namely cramming or working hard during exam time.

> *I start all right and I get through a few weeks. Because I work 3 nights a week … and in holidays, I don't really feel like doing much study in the holidays. Once you start to fall behind, it is hard to then, while you're having lectures in one topic, to be going over stuff you've done a few weeks ago* (F1).
>
> *We've got assignments and outside commitments that we try and do as well and we just run out of time* (F1).

There was no common agreement amongst the students who participated in focus group discussions about which of the two reported approaches to time management and studying were preferred for success in the Adelaide dental course. Some students felt that there was no single approach that was ideal for success. This is exemplified by the following comments: *very individual…. I'm sure if you get the top 5 people in the course. I think they will all be different in their study habits* (F1) and *I'm not sure if there's a majority that would say this is the way you do it* (F3). A third-year student summed up by saying that *learning/study patterns have changed from first, to second to third year and that they can change for some each semester. Students' 'figure out' what works for each individual.* Third-year students were asked if study patterns had changed over the past three years. Interestingly, several students reported that their study patterns had become more strategic. Study patterns changed from studying or learning everything during first year, to studying or learning material specifically for exams during third year. For example, *use of past exam papers - assess consistencies through past exam papers and choose questions to learn for, A gamble – but has worked*. This pattern seemed to have been adopted to cope with course demands, staff expectations, to maximise exam results and to progress satisfactorily through the course. Such comments also helped to clarify responses from the post-admission surveys ie, *use of past exam papers*.

Psychological factors including motivating factors, attitudes and behaviours were perceived to have contributed to success. Sources of motivation that were described by Adelaide dental students

included extrinsic, social, achieving and intrinsic sources of motivation (Biggs 1999). Extrinsic motivators included: fear of failure; desire to return home/have holidays at end of year; desire to remain with same cohort of friends; desire for timely completion of the Adelaide dental course; desire for high grades for future transfer of course or to specialise in future; to be successful; financial implications; and luck. A social motivating factor such as parental influence is illustrated by a first-year student eg, *Having my father as a dentist placed a lot of pressure on me, not from him directly but by living up to the expectations of others.* Achieving motivating factors included competition between classmates. Numerous students also referred to intrinsic motivating factors eg, having an interest in dentistry *I found it easier to study because what I learn was/is relevant to my developing career*. Others were less specific in their responses and reported they were self-motivated or just 'motivated'.

Attitudes (including beliefs) that students perceived contributed to their success included enjoying the course and religious beliefs. Behaviours that students perceived contributed to their success included having goals, being diligent, persistent, persevering, dedicated, determined, committed and focussed. Overall, the most common psychological factor perceived to relate to success by Adelaide dental students during the early years was motivation, in particular extrinsic motivating factors as noted above (Appendix Table 7.20). Many students, in each of the three year levels, also commented that they engaged in 'hard work'. It was difficult to interpret what the students meant by this from survey responses. This was later followed-up in focus group discussions.

Hard work was defined in several ways by Adelaide dental students:

- time commitment ie, *sitting down and studying consistently every week is hard work* (F1) and, *time spent to understand work and keep up with the course* (F1)
- commitment to learning ie, *it is the going home and learning it all, reinforcing what was learnt at uni that is hard work* (F1), *consistent study* (F2) and *understanding (the meaning of) work rather than just reading the notes and rote learning them* (F2)
- sacrifices/dedication eg, *placing dentistry/dental studies (library on weekends, preparing for exam/tests, attending classes) above all/priority number 1 (ie, friends, socialising)* (F2) and
- degree of difficulty of course material ie, *people find things easy or hard to learn* (F1 and 3).

For other students, balancing everything was more important than hard work eg, *choose not to do all that hard work such as extra reading and research in order to get distinctions because it is not worth it, would be unhappy and doesn't necessarily affect job prospects* (F3).

Activities that encompassed hard work included:

- undertaking research, extra reading and going to library for PBL sessions and assignments
- preparing for exams and tests
- attending classes
- undertaking clinic sessions ie,…*can be hard work depending on what is going on* (F3)

- studying for all parts of the course and
- individual learning and 'catching up' ie, *spending a lot of time doing the hard work in Diseases and Disorders of the Body and the Biology based subjects before tests and in swot vac* (F3). Doing *extra reading/reviewing lecture notes/reviewing learning issues which arose from clinic is usually spread out over a period of time. But other things interfere/postpone these activities eg, spend time preparing for a test –sets you back with other learning you need to do, so catching up is hard work* (F2).

Students commented that the goal of hard work was to achieve

- clinical skills ie, *being proficient and confident with your clinical skills rather than just achieving good exam marks* (F1)
- academic skills. In relation to this, several different points of view were given by students ie, *understanding or applying knowledge to new situations and coping with new or difficult situations; broader education better educated* (F1); *working on demand eg, doing tasks-assignments, PBL package presentations or research, preparing for clinic which needs to be done on a weekly basis* (F2) or *to pass in the short term – so as to move on and not to repeat as can't pick up 1 subject in the dental course* (F2) and
- a balance between good grades and being a good clinician. First-year students agreed that they could see the broad picture (ie, becoming a good dentist or clinician and being educated) beyond just focussing on examinations and assignments.

The two most consistent and commonly reported groups of factors that contributed to success of students during the early years were support and lifestyle. Sources of support included peers (classmates, senior students and college friends), friends outside the dental course and family members. The type of support offered included encouragement, a source of motivation, assistance with studying for examinations or assignments or when problems arose and providing social connections. A third-year student's response illustrates the various types of support gained from friendships…*support from friend – showing past exam papers; sharing information; joking about uni and whinging to each other about the workload.* Students balanced dental studies and other activities such as extracurricular activities and paid work. They also took time out from their studies and were involved in activities to relax and maintain a healthy life, as indicated by one second-year student *trying to make myself go out and socialise with friends more often so that I would have a good break from study and stay happier.* Several students mentioned that they reduced the amount of time spent on extracurricular activities when required for their studies. A living environment that was conducive to supporting dental studies was also cited as a factor contributing to success. Finally, not having financial worries was another factor that was mentioned to have contributed to success by some second-year students (Appendix Table 7.21).

Focus group discussions provided an insight into how Adelaide dental students provided support for each other. The structure of the Adelaide dental course enables students to spend a considerable amount of time together which is conducive to forming friendships. It was through these friendships that peers within the same cohort supported each other. Types of support mentioned included, sharing resources, learning together, enhancing the clinical experience, providing reassurance, opportunities for socialising and stress relief. Furthermore, sharing resources was a commonly mentioned source of support. This included, sharing information (eg, changes to schedules, reminding each other when assignments were due and setting up a class email list), borrowing notes and sharing reference material. Supportive peers 'made learning easier' (eg, *helping someone understand content/concepts unsure about tutorial questions…. brainstorming answers together or topic you have not understood but someone has* (F1)). Learning in the clinic setting was perceived to be enhanced by peer support eg, *help whilst treating patients – giving advice/reassurance on procedural tasks* and *create supportive, friendly clinic environment for each other* (F3). Peer support also provided students reassurance eg, *doing the right thing* (F1) and *you're not the only person* (F1). In addition, peer support provided an avenue for socialising eg, *relaxation* (F1) and *networking* (F1). Finally, peer support also provided *stress relief* (F1).

Students in the early stages of the Adelaide dental course also interacted with students from senior year levels and they, too, were a source of support such as sharing their experiences of the subjects they had completed and their personal experience of tutor interactions, thus providing *advice on how to handle everything* (F2) and providing *reassurance that you're like everyone else* (F2). Senior students also provided motivational support eg, *living proof that you'll survive* (F1).

Previous experiences were perceived to have contributed to their success. These factors were mentioned predominantly by first-year non-school leavers. Previous experiences described by these students included having prior background knowledge and previous life experiences in the dental field. Other responses included recognition of prior learning and being experienced with studying at university, as illustrated by this comment, *Having already been at university taught me to study effectively before I came to this dental school*. School leavers also commented that their previous background knowledge and experiences in secondary school were factors perceived to have contributed to their success eg, *My only advantage was my previous studies in human biology which helped me in this particular subject* (Yr 1) and *Study habits from year 12; discipline to sit down and work* (Yr 1) (Appendix Tables 7.22 and 7.23).

Very few students across the three year levels cited 'skills' as a factor that they perceived was related to their success. Knowledge was mentioned by a few first- and second-year students as a factor that contributed to their success. Understanding concepts, having good background knowledge and applying knowledge to the clinic were attributes these students perceived related to their success. For

example, *understanding the concepts and being able to relate them in situation* (Yr 1), *firm grasp of basics* (Yr 1) *and understanding of material taught in class* (Yr 2) (Appendix Table 7.24).

7.5.5.2 Course factors that contributed to success

The most commonly reported group of factors for first- and third-years were 'student-staff interactions'. The 'Adelaide dental course' and 'student-staff interactions' were equally mentioned by second-year students (Table 7.10).

In the Adelaide School of Dentistry there are two classifications of staff, academic and casual staff. Academic staff are those who hold a university academic position. They are often involved with co-ordination of a subject. In contrast, casual or sessional staff (often referred to as tutors) are those who are casually employed for one or two sessions per week and predominantly teach in the clinic, laboratory, tutorial or PBL sessions. Academic staff and casual tutors (clinical and non-clinical) were perceived by students in all three year levels to have contributed to their success. Features of positive student-staff interactions involved staff giving advice, explaining concepts and being helpful as illustrated by a comment from a second-year student, *Staff – willing to help with my problems*. Additional features included students being supported or encouraged by staff. Positive personal qualities of staff were also described by students to have fostered success. Such qualities included friendliness, enthusiasm, a source of inspiration or motivation, professionalism, approachable and accessible or available. A third-year student describes a positive student-staff interaction perceived to have contributed to their success, *Having good clinical tutors who were able to provide constructive advice and were not condescending* (Appendix Table 7.25).

Focus group discussions provided further details of the features of supportive student-staff interactions. These included enhancing the student learning experience, professional behaviour and personal characteristics. Enhancing the general learning experience was perceived by students as a characteristic of supportive academic staff. This support was offered in the form of feedback on assignments, being flexible with due dates, providing quality lecture notes or manuals in electronic or hard copy format at the start of the year (*good, relevant* (F3) and *timely* (F3)) and assisting students learning (*guided students to what is important to learn* (F3)). Another supportive characteristic included academic staff being available to students eg, *contactable outside of class time; give out their email, address, phone number – improves accessibility* (F1) and *…respond promptly to emails and phone calls; don't seem to turn students away when you ask for help* (F1). Furthermore, being approachable was perceived as a supportive characteristic eg, *approachable, warm, don't make you feel uncomfortable approaching them* (F1).

Enhancing the clinical learning experience was perceived by students as a characteristic of supportive casual tutors. This support was offered in a variety of forms such as providing clear

explanations of procedures, furthering knowledge in clinical procedures and providing encouragement, feedback and clinical tips. An additional supportive characteristic included casual tutors being available to students eg, *willing to see student in staff's own time eg: lunch, after uni* (F2) and *glad to stay back and help you* (F2). The organisational skills of casual tutors were also valued by students eg, *being prepared* (F3) and *knowing what they're doing* (F3) for clinical sessions. Finally, being approachable was perceived as supportive eg, *don't make you feel nervous about asking questions* (F3).

Features of the Adelaide dental course that students perceived had contributed to their success included curriculum content, structure and processes, contact hours, assessment features, relative ease of the workload, clear objectives and that the content was easy to understand. Most positive comments were made about aspects of curriculum content such as inclusion of interesting and relevant topics, having theory related to practice, that there were some didactic components, the early introduction to clinic (Year 1) and the increased clinic time (Yr 3). These are illustrated by the following comments: *interesting subject material* (Yr 1); *interesting course material relevant to clinical applications* (Yr 2); and *more clinical experience to back up theory* (Yr 3). The structural aspects of the curriculum that students perceived contributed to their success included that the course was well structured and included a period of time for studying prior to examinations (swot vac period) eg, *course was well organised* (Yr 2). A few positive comments were made about the curriculum processes such as PBL sessions (*Dental Learning Package:* Yr 1). Students perceived that the course contact hours also contributed to success. In particular having large blocks of time allocated during the week to do personal study, group work and to visit the library. In addition, some aspects of the assessment system used in the Adelaide dental course were perceived to contribute to success. These included opportunities for formative assessment, the variety of assessment tasks presented during the year and that the assessment tasks were relevant. Other features of the Adelaide dental course that some students attributed to their success included the relative ease of the workload, that the course objectives were clear and that the content and material required was relatively easy to understand (Appendix Table 7.26).

Students described various resources eg, manuals, lecture notes, past exam papers, library resources and web-based resources that contributed to their success. These resources related to success in terms of the quality of the resource (perceived to be excellent or good), the quantity of the resource (extensive or comprehensive) and the availability/access to the resource (Appendix Table 7.27).

7.5.5.3 'Other' responses

A total of eight students responded that they did not perceive themselves to have had a successful year as illustrated by these comments made by several first-year students *I did not believe I was successful in first year as I only passed* and *First year was not a complete success* (Appendix

Table 7.28). Six of these students were classified as 'lower' achievers and two as 'higher' achievers. One of the students classified as a 'lower' achiever had interrupted progress during the early years of the course. There were also a total of three students who did not respond to the survey question. All these students were classified as 'lower' achievers and all had uninterrupted progress during the early years of the course.

In summary, Adelaide dental students perceived there were a variety of post-admission factors that contributed positively to their success during the early years of the course. The most frequent 'success' factors were all related to students themselves. These factors included various study, time management and organisational behaviours; extrinsic motivating factors; having supportive peers; a balanced life; and not too many personal difficulties. Furthermore, positive student-staff interactions and positive perceptions of the learning environment were also perceived to have been related to success. The next section will discuss factors perceived to have contributed to difficulties.

7.5.6 Factors that contributed to difficulties

There was consistency in the classification of the data between the year levels, with the data fitting the same framework for each year level. Unsurprisingly, most of the 'difficulty' factors were linked to corresponding 'success' factors. Student factors were sub-categorised into six groups: study factors; social factors; transition factors; psychological factors; skills; and knowledge. Course factors were sub-categorised into three groups: the Adelaide dental course; negative student-staff interactions; and resources. In addition, there were some students who responded by stating that they experienced 'no difficulties' or stated 'no comment' (Table 7.11). Only two first-, three second- and five third-year students did not respond to the question (left space blank) about their difficulties. These were categorised as 'no comment'. Hence, the overwhelming majority of students responded to the question about what factors they perceived contributed to their difficulties (Table 7.12).

Third-year students reported more course factors contributed to their difficulties (41.3%) compared with first- (22.4%) and second-year students (29.8%) (x^2=22.3; p=0.00) (Appendix Table 7.29). There were no statistically significant differences in the proportion of student or course factors between the four, first-year cohorts (Appendix Table 7.30). In addition, second-year students in Cohorts B (40.4%) and D (41.8%) reported more course factors contributed to difficulties they experienced compared with students in Cohorts A (11.8%) and C (17.6%) (x^2=22.3; p=0.00) (Appendix Table 7.31). Furthermore, third-year students in Cohorts A (39.3%), B (47.0%) and D (49.2%) reported more course factors contributed to their difficulties compared with students in Cohort C (19.0%) (x^2=11.4; p=0.001) (Appendix Table 7.32).

The three most frequently and consistently reported factors that were perceived to have contributed to difficulties during the early years were social factors (Yr 1: 33.6%; Yr 2: 35.6%; Yr 3: 38.0%), the Adelaide dental course (Yr 1: 17.5%; Yr 2: 20.0%; Yr 3: 23.3%) and study factors (Yr 1: 13.9%; Yr 2: 17.5%; Yr 3: 12.8%). There were some factors that were specific to particular year levels. Transition issues were the fourth most commonly mentioned group of factors for first-year students. This differed for third-year students for whom negative student-staff interactions were the fourth most frequent group of factors (Table 7.12). Details on the frequency of factors reported for success for each cohort within each year level are supplied in Appendix Tables 7.33, 7.34 and 7.35. The following sections will discuss 'difficulties' in further detail, with interpretative findings of both survey responses and focus group discussions.

Table 7.11 Post-admission factors that were perceived to have contributed to student difficulties during the early years

Theme	Difficulties								
Major category	Student factors						Course factors		
Subcategory	Study factors	Psychological factors	Social factors	Transition factors	Skills	Knowledge	Adelaide dental course	Negative student-staff interactions	Resources
Sub-units	Poor study patterns Poor time management and disorganisation	Motivation Attitudes & beliefs Behaviours	Juggling commitments Accommodation problems Health problems Personal problems Financial problems		Communication Group work Manual dexterity		Curriculum content, structure and process Contact hours/timetabling Workload Unclear/demanding expectations Assessment Perceived poor quality teaching Task difficulty		

Group 3 (Cohorts A to D): MAHPBL
MAHPBL: Multifaceted admission, hybrid PBL curriculum

Table 7.12 Frequency of the factors perceived to have contributed to student difficulties during the early years

DIFFICULTY FACTORS	First-year students (1998-2001) n	%	Second-year students (1999-2002) n	%	Third-year students (2000-03) n	%
STUDENT						
1. Social factors	111	33.6	98	35.6	83	38.0
a. Juggling commitments	38	11.5	24	8.7	25	11.5
b. Accommodation problems	27	8.1	17	6.2	7	3.2
c. Health problems	20	6.1	20	7.3	16	7.3
d. Personal problems	20	6.1	24	8.7	26	11.9
e. Financial problems	6	1.8	13	4.7	9	4.1
2. Study factors	46	13.9	48	17.5	28	12.8
a. Poor study patterns	3	0.9	3	1.1	3	1.3
b. Poor time management and disorganisation	43	13.0	45	16.4	25	11.5
3. Psychological factors	32	9.7	22	8.0	8	3.7
a. Attitudes/beliefs	1	0.3	4	1.5	1	0.5
b. Motivation	23	7.0	13	4.7	4	1.8
c. Behaviours	8	2.4	5	1.8	3	1.4
4. Skills	17	5.1	10	3.6	3	1.4
a. Communication	8	2.4	0	0.0	0	0.0
b. Group work	5	1.5	3	1.1	1	0.5
c. Clinic/practical/manual dexterity	4	1.2	7	2.5	2	0.9
5. Transition factors	36	10.9	6	2.2	0	0.0
6. Knowledge	7	2.1	4	1.5	0	0.0
COURSE						
1. Adelaide dental course	58	17.5	55	20.0	51	23.3
a. Curriculum content, structure and process	20	6.1	6	2.2	8	3.7
b. Contact hours/timetabling	15	4.55	12	4.3	9	4.1
c. Workload	9	2.7	25	9.1	15	6.9
d. Unclear/demanding expectations	5	1.5	5	1.8	2	0.9
e. Assessment	2	0.6	3	1.1	9	4.1
f. Perceived poor quality teaching	5	1.5	4	1.5	6	2.7
g. Task difficulty	2	0.6	0	0.0	2	0.9
2. Negative student-staff interactions	7	2.1	16	5.8	23	10.6
3. Resources	9	2.7	11	4.0	16	7.4
OTHER RESPONSES						
No difficulties	5	1.5	2	0.7	1	0.5
No comments	2	0.6	3	1.1	5	2.3
Total number of responses						
Student factors	249	75.5	188	68.4	122	56.0
Course factors	74	22.4	82	29.8	90	41.3
Other	7	2.1	5	1.8	6	2.7
Total number of post-admission surveys	151		131		106	

Group 3 (Cohorts A to D): MAHPBL: Multifaceted admission, hybrid PBL curriculum

7.5.6.1 Student factors that contributed to difficulties

The following social factors were attributed to student difficulties: juggling commitments and problems with health; personal; accommodation; and financial issues. Juggling commitments, personal and health problems were the most commonly reported sources of perceived difficulties in each of the three year levels. 'Lifestyle' factors that contributed to difficulties included difficulty balancing commitments (*Having too many extracurricular activities and interests to waste time on:* Yr 3), engaging in paid employment (*Part-time work interfering with my study:* Yr 1*)* and sacrificing extracurricular activities for the sake of studies. Health issues included stress (*Stress and depression:* Yr 2*)*, being tired or exhausted, illnesses (acute or chronic) and sleep disorders. Personal problems included relationship issues with family, partners or peers, as illustrated by following student comments: *Personal problems, self identity lost, lack of self esteem* (Yr 1) and *Personal problems within individuals in class* (Yr 3). Issues with living arrangements that contributed to difficulties included homesickness, travelling between Adelaide and home (interstate or overseas), managing a household, living at college, access to resources from residence, location of residence and the living environment. The following comments illustrated the difficulties students experienced in relation to their living arrangements: *Maintaining home/house eg, cleaning, shopping etc (daily living)* (Yr 1). *I hated my original accommodation (college) and moved several times* (Yr 1). *Living at college – sleeping and studying was made difficult* (Yr 2). First-year students experienced numerous difficulties associated with their living arrangements. These issues persisted in second-year but were less frequently reported by third-year students. Another source of difficulties was financial issues. Some students reported not having enough money to purchase textbooks, for photocopying and printing. Others reported that the financial difficulties they experienced were associated with feeling stress or resulted in them seeking paid work at the expense of their studies eg, *financial – caused a lot of stress (not eligible for Austudy, parents assisted a little, but had to find time to work during office hours had to miss some lectures in semester 2* (Yr 2) and *need to find work during holidays particularly looking during exams* (Yr 3) (Appendix Tables 7.36 and 7.37). Focus group discussions revealed that social factors contributed to difficulties experienced by students as they were perceived to have impacted on time management and study patterns adopted.

Time management and organisational issues were frequently related to difficulties encountered by students. This included not studying regularly or consistently, not keeping up with work or leaving things to the last minute (*Studying hard right before exams – not keeping consistent:* Yr 3), not having enough time and being disorganised (*Disorganised notes:* Yr 1). Competing course demands also posed time management issues for students as illustrated by this comment *Time was not evenly distributed between the subjects. I had to spend all available time on a particular subject sometimes at the expense of the others* (Yr 3). Study patterns adopted by students were infrequently reported to have

contributed to difficulties experienced. Those mentioned related to habits such as, not preparing prior to sessions, not extending beyond essential references and not seeking assistance (Appendix Table 7.38).

Focus group discussions provided an insight into why students had difficulties with time management and organisation. Both course and student factors were perceived to have impacted on time management eg,

Course factors such as:

- contact hours ie, *long hours – don't feel like studying/lack of energy – mental and physical/lack of mental motivation* (F2)
- course demands (overloading) eg, *staff giving extra work before an assignment due in another subject* (F3) and *fitting study for assignments with clinic sessions and attending lectures results in poor time management* (F3) and thus leaving tasks/revision to the 'last minute'.

Student factors such as:

- behaviours ie, being lazy, having distractions eg, *if there are any breaks – can get distracted, run out of time. A week as gone by and you have to learn at the last minute*
- social factors ie, balancing commitments eg, *need to go to bank, Centrelink* (government agency) *and time is used that could be used to study*
- social factors ie, paid work.

First-year students were aware of counselling services and courses available on campus for students to learn effective study behaviours or time management but they were not sure if they were helpful as those participating in the focus group did not use these services.

Transition factors were often perceived to have contributed to difficulties experienced by first-year students. Students' responses were quite descriptive. They reported difficulties in adjusting to a variety of situations eg, adjusting to studying at university as illustrated by the following comment *Change of learning and lifestyle from secondary school to demanding university course* (Yr 1). Others reported adjusting to a new environment or being in Australia posed difficulties, as illustrated by this comment, *New place (Adelaide) very difficult to adjust to the new situations, environment, people, language etc in the first year* (Yr 1). Adjusting to the Adelaide dental course such as having no prior background in biology, in PBL, clinic or laboratory settings and dental terminology, also posed difficulties for some students. The following comments made by first-year students illustrate these issues: *Never doing biology before ie, during year 12, 11 this made me find it fairly difficult as I had to spend a large majority of my time on this subject doing pre-reading etc* and *Having to get used to PBL system so rapidly,* (and) *different subjects not being clearly separated and clearly defined as they could be in other courses.* Very few transition issues were reported by second-year students and none by third-year students (Appendix Table 7.39).

Overall, few students cited these groups of factors as contributing to difficulties. Those who did mention these factors included first- and second-year students. They mentioned that they had difficulties with effective group work eg, *difficulty in getting together and reaching agreement in group work* (Yr 1), *doing group work with classmates who didn't contribute much* (Yr 2). Furthermore, clinical skills and manual dexterity were also issues for first- and second-year students eg, *lousy clinical skills* (Yr 1), *initial difficulty with cavity preps and using handpiece* (Yr 2) and *building manual dexterity* (Yr 2). In addition first-year international students were almost exclusively the only students to describe difficulties with communication skills eg, *English problems and language difficulties (spend a lot of time finding words using dictionary).*

'Knowledge' was reported to have contributed to difficulties by some first- and second-year students. They reported difficulties with understanding concepts eg, *getting confused with ideas and concepts* (Yr 1), *not being able to comprehend a lot of material in Human biology lectures (some genetics)* (Yr 1) and *comprehending theoretical basis of work with clinical aspects* (Yr 2) (Appendix Table 7.40).

7.5.6.2 Course factors that contributed to difficulties

Under the course factors, the 'Adelaide dental course' was the most often perceived to have contributed to difficulties. Aspects of the course that were perceived to have contributed to difficulties varied between the year levels. First-year students frequently mentioned curriculum content, structure and process and contact hours or timetabling. Second-year students cited workload and contact hours or timetabling, whereas third-year students, mentioned workload, assessment and contact hours or timetabling. There was an increase in the frequency of issues related to negative student-staff interactions (Yr 1: 2.1%; Yr 3: 10.6%) and resources (Yr 1: 2.7%; Yr 3: 7.4%) that were perceived to have contributed to difficulties between first and third year (Table 7.12).

The following factors were attributed to student difficulties: curriculum content, structure and process, contact hours, workload, expectations, assessment, quality of teaching and task difficulty. Features of the curriculum content, structure and process that were perceived to have contributed to difficulties included: perceived irrelevance of course content (*Thought some subjects had some irrelevance:* Yr 1); not enough swot vac (*Not enough swot vac time, need a few extra days:* Yr 2*)*; and problem-based learning and self-directed learning (*Self-directed learning in a group that did nothing:* Yr 3*)*. The main feature of contact hours that contributed to student difficulties included long hours or too many hours at university as illustrated by the following comments: *Seemingly incredibly long hours at uni* (Yr 2); *Too many contact hours* (Yr 1) and *Lots of contact hours and work to do at home* (Yr 3). Perceived workload difficulties related to the overall volume as highlighted by the following comments, *Coping with the huge workload* (*eg, assignments, presentations etc*) (Yr 1) and *Heavy workload* (Yr 3).

Second-year students indicated that the workload was more demanding than during first year or that the workload was more demanding in semester 2 of second year as illustrated by these two comments, *A lot of subjects to study and workload was substantially more than 1st yr* (Yr 2) *and Increased workload in second semester with very new concepts* (Yr 2). Few students mentioned that they had difficulties with unclear expectations, assessment issues (third-year students more so than first- and second-year students), poor quality teaching and task difficulty (Appendix Table 7.41).

Focus group discussions centred on understanding why and how workload issues and contact hours were perceived to have contributed to difficulties. Workload issues that were raised included the volume and type of workload (self-directed learning, group work, assignments and clinic sessions). Students perceived there was a large amount of theory to learn and course requirements to be undertaken eg, *the amount you need to learn* and *the amount of work that needs to be done* (F1). Students perceived that undertaking self-directed learning was demanding. Self-directed learning tasks identified by students included extra reading and research work for PBL sessions, assignments and lectures. Students in all three year levels commented that most of this type of work was done outside of formal contact hours and it *added to the workload* as time had to be invested in doing research work in the library. Students also mentioned being frustrated at not being able to locate reference material in the library and not having adequate copies of the same source available. Carrying out group work was sometimes difficult for some students eg, *trying to organise meetings at mutually agreeable times, which is made more difficult due to personal commitments of students outside university contact hours* (F2); and *Collating and piecing each group member's contributions for assignments* (F2). The number and scheduling of assignments were perceived to have contributed to difficulties eg, *if you get 3 assignments in 1 week then it affects your workload* (F1). Finally, clinic sessions were perceived as demanding and impacted on ability to study eg, *mental exhaustion – want to rest/sleep/eat instead of studying/doing required tasks* (F3).

Timetabling, number of hours and scheduling of swot vac and the examination period were identified as difficulties associated with contact hours. Students reported that there were many unusable non-contact periods between classes, as they considered them either too long or too short. For example, *can't go home or to own environment to study* (F1); *travelling time for some is too much and thus time is lost thus feel still have been on campus all day and thus feel drained when get home* (F1). Non-contact was consumed by other commitments eg, laboratory work in third year, *thus a waste of time/frustrating/tiring* (F3). Students reported that long contact hours were a source of difficulty. Second- and third-year students commented about the long days at university filled with various class activities, scheduled from 8.30 to 5.00pm. In addition, the scheduling of examinations and swot vac period were perceived as a source of difficulty. Some students wanted more time between each examination to allow for time for studying *the large workload* (F3). *If more time (eg, 2 days instead of 1*

day and spread written exams over 2 weeks) given between exams allows time to relax and get into mode of studying and avoid cramming (F3).

Negative interactions between students and academic staff, and between students and casual tutors (clinical and non-clinical) were perceived to have contributed to difficulties. Features of these interactions included staff/tutors being inconsistent (*Dealing with different views of different tutors:* Yr 3), being critical (*Tutor (clinic) Semester 1 seemed very critical:* Yr 1) or giving negative feedback and having high expectations or demands on students (*High expectations from tutors:* Yr 1) (Appendix Table 7.42).

Focus group discussions provided an insight into the perceived difficulties between students and casual tutors. These difficulties were mostly reported by third-year students who participated in the focus group and focussed on interactions with casual clinic tutors. Inconsistent teaching, disorganisation and lack of encouragement were characteristics of clinic tutors which were perceived to have contributed to student difficulties. Students had to deal with variation and inconsistency in clinical techniques taught by clinic tutors. Students seemed to adopt a pragmatic learning approach to cope with this perceived inconsistency so as not to compromise their clinical assessment. For example, *you don't agree with tutor but you have to go along with what they say or you do it their way because we're being assessed* (F3). Some third-year students perceived that some clinic tutors did not provide enough encouragement and gave varying levels of feedback. In addition, some clinic tutors were perceived to be disorganised eg, *they don't know what they are doing in the session that is, not following the set course for the session* (F3).

Students described various resources that were perceived as difficulties. These included, lack of adequate lecture notes or manuals (*Lack of good notes in some subjects: Yr 3*); library resources *(Lack of resources in the library – amount of books:* Yr 1) and clinical resources. Third-year students made more comments about lack of clinic resources. These included, difficulties with patient supply, and patients failing to attend appointment. Students' also highlighted difficulties with patient demands, paperwork and clinic staff issues. The following comments illustrate these difficulties: *Patients failing to attend clinics – I had less opportunities to gain valuable clinical experience* (Yr 3) *and Patients expecting too much* (Yr 3) (Appendix Table 7.43).

7.5.6.3 'Other' responses

Eight students responded that they did not have any major difficulties as illustrated by the following comments by students *No real difficulties* (Yr 1), *I could have done better but was fairly happy all things considered* (Yr 1) *and nil not much difficulties faced* (Yr 2) (Appendix Table 7.44). Five of these students were classified as 'higher' achievers and three were classified as 'lower achievers'. There were 10 students who did not respond to the survey question about difficulties they encountered. The

majority (n=7) were classified as 'higher' achievers. The three students classified as 'lower achievers' who did not respond to the question all had uninterrupted progress.

In summary, Adelaide dental students considered that a variety of post-admission factors contributed to difficulties during the early years of the course. The most frequent 'difficulty' factors related to student and course factors. These factors included social factors (juggling commitments, accommodation, health, personal and financial problems) and course factors (workload and contact hours). Furthermore, first-year students reported difficulties with transition issues. Third-year students were more likely to say that course-related factors had contributed to difficulties compared with first-year students. The next section will discuss factors students classified as 'higher' and 'lower' achievers perceived to have contributed to success and difficulties during the early years of the course.

7.5.7 Factors that contributed to success and difficulties of students classified as 'higher' and 'lower' academic achievers

7.5.7.1 Student characteristics and pattern of responses

There were no statistically significant differences in the characteristics of students who had completed the post-admission surveys and were classified as 'higher' or 'lower' academic achievers between the year levels. The characteristics of students categorised as 'higher' and 'lower' academic achievers are presented in Appendix Tables 7.45, 7.46 and 7.47. There were significantly more second-year, international students classified as 'lower' academic achievers (34.8%) compared with 'higher' academic achievers (17.1%) (x^2=6.15; p=0.04). There were significantly more third-year students who had indicated dentistry as their second-preference course who were classified as 'lower' academic achievers (30.8%) compared with 'higher' academic achievers (11.9%) (x^2=5.35; p=0.02).

Students who were categorised as either 'higher' or 'lower' achievers wrote, on average two or three distinct responses for factors contributing to their success and difficulties. However, third-year students who were classified as 'lower' achievers, wrote, on average, four responses to the question about difficulties they experienced (Appendix Table 7.48). Overall, there were more responses cited for factors contributing to success and difficulties by 'higher' academic achievers compared with 'lower' achievers. This trend was noted across each year level (Appendix Table 7.49). This may be partly due to greater number of students classified as 'higher' achievers who completed the post-admission survey. There were no statistically significant differences between the number of responses reported for success and difficulties, between first-, second- and third-year students who were classified as 'higher' or 'lower' achievers. With regards to the type of responses to the question about factors related to success, the majority of responses by first-, second- and third-year students who were classified as 'higher' or 'lower' academic achievers were categorised as student factors. This differed from the type

of responses to the question about factors related to difficulties. There was a shift in the type of responses across the year levels, from student to course factors, in particular for those students classified as ‘higher’ academic achievers (Appendix Tables 7.50 and 7.51)

7.5.7.2 Factors that contributed to success

Students classified as ‘higher’ and ‘lower’ academic achievers predominantly indicated that student factors contributed to their success. Specifically, the three most frequently and consistently reported factors related to success experienced by first-, second- and third-year ‘higher’ and ‘lower’ academic achievers were study, psychological and social factors (Table 7.13). There were no statistically significant differences in the frequency of student and course factors reported, between students classified as ‘higher’ and ‘lower’ academic achievers.

Table 7.13 Factors that were perceived to have contributed to success of students classified as 'higher' and 'lower' academic achievers during the early years

	First-year students (1998-2001)				Second-year students (1999-2002)				Third-year students (2000-03)			
	'Higher' achievers		'Lower' achievers		'Higher' achievers		'Lower' achievers		'Higher' achievers		'Lower' achievers	
Success Factors	n	%	n	%	n	%	n	%	n	%	n	%
STUDENT												
Study factors	90	29.7	46	33.6	95	33.3	49	46.2	68	37.8	33	34.4
Psychological factors	71	23.4	28	20.4	65	22.8	17	16.0	25	13.9	12	12.6
Social factors	46	15.2	24	17.5	55	19.3	19	17.9	50	27.7	27	28.2
Previous experiences/academic preparedness	18	6.0	6	4.4	9	3.2	3	2.8	1	0.6	1	1.0
Knowledge	6	2.0	2	1.5	3	1.1	0	0.0	0	0.0	1	1.0
Skills	3	1.0	2	1.5	2	0.7	0	0.0	2	1.1	0	0.0
COURSE												
Adelaide dental course	29	9.6	11	8.0	24	8.4	9	8.5	11	6.1	10	10.4
Student-staff interactions	29	9.6	10	7.3	19	6.7	5	4.7	16	8.9	7	7.3
Course resources	9	2.9	2	1.5	13	4.5	2	1.9	6	3.3	3	3.1
OTHER RESPONSES												
Not successful	2	0.7	5	3.6	0	0.0	1	1.0	1	0.6	1	1.0
No comment	0	0.0	1	0.7	0	0.0	1	1.0	0	0.0	1	1.0
Total number of responses												
Student factors	234	77.3	108	78.8	229	80.4	88	82.9	146	81.1	74	77.2
Course factors	67	22.1	23	16.8	56	19.6	16	15.1	33	18.3	20	20.8
Other	2	0.6	6	4.4	0	0.0	2	2.0	1	0.6	2	2.0
Number of surveys	96		55		88		43		67		39	

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7.5.7.3 Factors that contributed to difficulties

The three most frequently reported factors that contributed to difficulties experienced by first-, second- and third-year 'higher' and 'lower' academic achievers were social factors, the Adelaide dental course and study factors. Transition issues were the fourth most frequently mentioned group of factors that contributed to difficulties for first-years students classified as either 'higher' or 'lower' achievers.

First- and second-year students classified as 'higher' and 'lower' academic achievers predominantly cited 'student' factors as the sources of difficulties they had experienced. However, there were statistically significant differences between 'higher' and 'lower' third-year achievers in the category of factors that were perceived to have contributed to difficulties experienced. More third-year students who were classified as 'higher' academic achievers (49.6%) cited 'course' factors as contributing to difficulties compared with 'lower' academic achievers (28.7%) (x^2=9.4; p=0.00) (Table 7.14). Also, there was a statistically significant increase in the frequency of 'higher' academic achievers who cited course factors had contributed to difficulties across the year levels ie, first (22.3%), second (32.1%) and third year (49.6%) compared with those classified as 'lower' achievers (22.6%, 24.4% and 28.7% respectively) (x^2=27.2; p=0.00) (Table 7.14). For third-year students classified as 'higher' academic achievers, features of the Adelaide dental course (25.9%), course resources (12.2%) and negative student-staff interactions (11.5%) were more frequently reported to have contributed to difficulties compared with those classified as 'lower' academic achievers (Adelaide dental course (19.5%), course resources (0.0%) and negative student-staff interactions (9.2%)) (Table 7.14). In contrast, third-year students classified as 'lower' academic achievers, student factors, in particular social factors (48.3%) such as lifestyle, personal, health and financial problems, were more frequently reported to have contributed to difficulties compared with those classified as 'higher' academic achievers (31.3%) (Table 7.14).

On examining the specific types of course related difficulties experienced by third-year students classified as 'higher' or 'lower' achievers, whilst there were more comments made by 'higher' achievers, the type of difficulties cited did not vary between the two groups in relation to features of the course and negative student-staff interactions. Both groups of students encountered difficulties with contact hours, workload, assessment issues and inconsistent tutor feedback. However, one notable difference was that third-year students classified as 'higher' achievers reported difficulties related to patients not attending clinic sessions whereas those classified as 'lower' achievers did not cite this as a difficulty they encountered. Similarily, on reviewing the specific types of student related difficulties experienced by third-year students classified as 'higher' or 'lower' achievers, whilst there were more comments made by 'lower' achievers, the type of difficulties cited did not vary between the two groups in relation to social factors. Both groups of students encountered difficulties with balancing commitments, health, personal and financial problems. Appendix Tables 7.52, 7.53, 7.54 and 7.55 provide examples of written

comments by third-year students classified as ‘higher’ and ‘lower’ achievers, about the most frequently cited factors perceived to have contributed to their difficulties.

In summary, students classified as ‘higher’ academic achievers, in particular during third year, reported experiencing difficulties with course factors whereas those third-year students classified as ‘lower’achievers experienced more difficulties with social factors. No single picture of a typical successful (‘higher’ achiever) student or a less successful (‘lower’) first-, second- or third-year student could be identified. Appendix Table 7.56 provides several examples of the variation in the factors perceived to have contributed to success and difficulties during the early years of the course, by students classified as ‘higher’ or ‘lower’ academic achievers. The next section will discuss factors that students who had failed perceived to have contributed to success and difficulties during the early years of the course.

Table 7.14 Factors that were perceived to have contributed to difficulties of students classified as 'higher' and 'lower' academic achievers during the early years

	First-year students (1998-2001)				Second-year students (1999-2002)				Third-year students (2000-03)			
	'Higher' achievers		'Lower' achievers		'Higher' achievers		'Lower' achievers		'Higher' achievers		'Lower' achievers	
Difficulty Factors	n	%	n	%	n	%	n	%	n	%	n	%
STUDENT												
Social factors	78	37.8	33	26.6	67	34.8	31	37.8	41	31.3	42	48.3
Study factors	24	11.7	22	17.7	33	17.1	15	18.3	14	10.7	14	16.1
Psychological factors	19	9.2	13	10.5	17	8.8	5	6.1	5	3.8	3	3.4
Transition factors	21	10.2	15	12.1	2	1.0	4	4.9	0	0.0	0	0.0
Skills	9	4.4	8	6.5	8	4.1	2	2.4	1	0.8	2	2.3
Knowledge	3	1.5	4	3.2	1	0.5	3	3.7	0	0.0	0	0.0
COURSE												
Adelaide dental course	35	16.9	23	18.6	39	20.2	16	19.5	34	25.9	17	19.5
Resources	8	3.9	4	3.2	8	4.1	1	1.2	16	12.2	0	0.0
Negative student-staff interactions	3	1.5	1	0.8	15	7.8	3	3.7	15	11.5	8	9.2
OTHER												
No difficulties	4	1.9	1	0.8	2	1.0	0	0.0	1	0.8	0	0.0
No comments	2	1.0	0	0.0	1	0.5	2	2.4	4	3.0	1	1.2
Total number of responses												
Student factors	154	74.8	95	76.6	128	66.3	60	73.2	61	46.6	61	70.1
Course factors	46	22.3*	28	22.6	62	32.1*	20	24.4	65	49.6#*	25	28.7#
Other	6	2.9	1	0.8	3	1.5	2	2.4	5	3.8	1	1.2
Number of surveys	96		55		88		43		67		39	

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* significant difference between year levels at $p<0.05$ # significant difference between 'higher' and 'lower' achievers in third year at $p<0.05$

7.5.8 Factors that contributed to success and difficulties of students who had failed during the early years

Given that a total of 26 students failed during the early years of the Adelaide dental course, there are only limited data available. There were no survey results from any of the first-year students who had failed. There were 12 post-admission surveys obtained from students who failed second-year. In terms of factors that related to their success, eight of these 12 students did not respond to the question. One student responded that they were not successful and were repeating the year. For the three students who failed and responded to this question, most of the comments related to student factors eg, *persistence, assistance from class mates* and *I studied quite hard in most subjects.* In relation to factors perceived to have contributed to difficulties that students experienced in second year, two students did not respond to the question. Of the 10 students who did respond there were a total of 25 responses. Student factors dominated with 80.0% of students reporting social factors contributed to difficulties in second year (Table 7.15 and Appendix Table 7.57). Course factors that were perceived to relate to difficulties included curriculum content (*neuroanatomy, anatomy)* and workload (*heavy course load*). There were three surveys obtained from students who failed third year. In terms of factors that were perceived to have related to their success, two of these three students responded they were not successful and were repeating the year. The other student responded *Because I have to do 3rd year again I think factors such as practising past exam papers did help but I did not have a great deal of success in doing this.* In relation of factors associated with difficulties they experienced in third-year, student factors dominated. The most commonly reported group of factors were social factors (Table 7.15). Course factors that were perceived to have contributed to difficulties involved student-staff interactions ie, *personal clashes of opinion* and *politics*.

7.5.9 Post-admission factors and student characteristics

There were no statistically significant differences in the frequency of student and course factors reported for success and difficulties (first-, second- and third-year) between males/females; school leavers/non-school leavers; Australian/international students; and those who chose dentistry as their first-choice career/other career.

Table 7.15 Student-related factors that were attributed to difficulties experienced by students who failed second- and third-year dental studies

Factor	Students (n=10) who had failed second year: verbatim comments	Students (n=3) who had failed third year: verbatim comments
Social factors		
Personal issues	*family issues; personal issues; conflict between classmate; something happened to me in my family. I was very unhappy in 2nd semester and just could not concentrate on my work even if I was sitting in front of my books; pressure*	*emotional; family problems*
Lifestyle	*too many irrelevant extras which took up too much time; a bit too much partying and regrets about socialising ie, should have sacrificed some socialising for studying time; my problem was more related to how busy I was with my business; distractions*	*spending more time socialising than studying*
Health	*stress*	*illness chronically throughout the year*
Living arrangements	*noise from nearby club; it was better fun at home*	*NA*
Financial	*NA*	*financial*
Psychological factors		
Motivation	*lack of motivation to do well*	*NA*
Behaviours	*procrastination; lack of concentration*	*not seeking assistance for subjects I did not understand*
Attitudes	*lack of self-esteem; taking dentistry for granted ie, once in dental course I expected to get through each year*	*NA*
Study factors		
Study patterns	*last minute study for tests and exams. I studied for tests the night before and my exam study started in swot vac; study may work for some people but it did not work for me; also I always have difficulties to read questions in the exam paper (don't know what it is asking); did not see tutors when having difficulties with areas of work*	*consistent studying was difficulty to do*
Time management	*a lack of continuous studying each week*	*time management*

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7.5.10 Seeking support

The frequency of seeking support by Adelaide dental students (MAHPBL: Cohorts B to D) during the early years will be discussed in the following section. Most students (n=106: 87.6%; n=90: 88.2%; n=81: 91.0%; Yrs 1, 2 and 3 respectively) reported that they sought assistance if difficulties arose during the year. Overall, the most common source of support was informal support (peers, friends and family). Seeking support from other dental students was the most frequent source of informal support (Yr 1: 66.1%; Yr 2: 69.6%; Yr 3: 74.2%). There was also an increase in seeking support from friends across the year levels. The most frequent source of formal support was received from academic staff (Yr 1: 37.2%; Yr 2: 37.3%; Yr 3: 43.8%). Only a few students reported seeking support from the dental school counsellor. The frequency of third-year students (12.4%) seeking help from part-time tutors increased compared with first- (5.0%) and second-year (6.9%) students (Appendix Table 7.58). Overall, during the first three year levels, students reported seeking assistance if difficulties arose (n=84: 95.5% there were missing data from four students). The majority of students (79.8%) sought assistance during each of the three year levels (Appendix Table 7.59). There were also no statistically significant associations in patterns of seeking support between: the cohorts; the year levels; male and female students; local and non-local students; and school leavers and non-school leavers. In addition, there were no statistically significant associations in seeking support and first-, second- and third-year between 'higher' and 'lower' academic achievers (Cohorts B to D). Focus group studies revealed that the type of informal support that students sought from peers included social support such as both practical support and social companionship (Table 7.16).

Table 7.16 Type of informal support received by peers during the early years

Type of social support	Adelaide dental student responses
Practical support	o sharing resources (borrowing notes, sharing ref material, exchanging info re: classes; students setting up email list) o learning together (made learning easier) o enhancing the clinic experience (helping each other) o assistance with study for exams or assignments o assistance with problems (academic)
Social companionship	o opportunities to socialise (networks, relaxation), stress relief o providing social connections o providing reassurance (doing the right thing) o encouragement o source of motivation o assistance with problems (non-academic)

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7.5.11 Summary of results

In response to the post-admission survey question about factors students perceived contributed to their success and difficulties in the early years of Adelaide dental course, key findings included:

- the framework that was devised consistently described responses from the four different cohorts within a given year level; between year levels; and over time (ie, 1999-2004). In addition, the framework, derived from students' comments that described success, was consistent with the framework that described difficulties.
- 'success' factors
    - the most common factors that first-, second- and third-year students perceived had contributed to their success were 'student' factors. Study behaviours, external motivating factors, having supportive peers and a balanced life with minimal personal difficulties were perceived to have contributed to success [RQ 6.1].
    - course factors were also related to success. These included, positive student-staff interactions and some features of the Adelaide dental course [RQ 6.1].
- 'difficulty' factors
    - the most common factors that first-, second- and third-year students perceived had contributed to their difficulties were 'student' (social factors) and 'course' factors (the Adelaide dental course) [RQ 6.1]. Thus, students did not attribute all their difficulties on course factors.
    - there were factors that were perceived to have contributed to difficulties in specific year levels. For example, first-year students noted difficulties with transition issues whereas third-year students noted difficulties with negative student-staff interactions.
    - there was a significant increase in the proportion of third-year students who reported that course factors contributed to difficulties that they experienced compared with first- and second-year students [RQs 6.3 and 6.4].
    - third-year students classified as 'higher' academic achievers reported more difficulties with course factors than 'lower' academic achievers. 'Lower' academic achievers reported more difficulties with student (social) factors than 'higher' achievers [RQ 6.5].
    - students who failed did not report more difficulties with personal or course factors compared with those who did not fail [RQ 6.6].
- there were no significant differences in the frequency of factors perceived to have contributed to success or difficulties between male and female students; South Australian, other Australian and international students; school leavers and non-school leavers; and those who had indicated dentistry as their first choice compared with a lower preference [RQ 6.7].

- students classified as ‘lower’ academic achievers (including those who had failed the year) did not always complete survey questions or surveys.
- no single picture of a typical successful student or a less successful first-, second- or third-year student could be identified.
- regarding seeking support if difficulties arose:
    - most Adelaide dental students reported seeking assistance during the early years of the course.
    - the most common source was informal support from peers, friends and family [RQ 6.8].
    - academic staff and casual tutors were also called upon as sources of formal support [RQ 6.8].
    - the type of informal support that was sought included academic support and social companionship [RQ 6.8].
    - patterns in seeking support or sources of support did not vary between: year levels; male and female students; local and non-local students; and school leavers and non-school leavers; and ‘higher’ and ‘lower’ academic achievers [RQs 6.9, 6.10 and 6.11].

7.6 Discussion

7.6.1 Responses

Overall, the response rate to the post-admission survey used in the current study was high (between 82% and 96%). This was similar to the response rate (90%) of a survey administered to Japanese dental students during class time (Karibe et al. 2009) and considerably higher than the 65% response rate reported by McKenzie and Schweitzer (2001) who also administered surveys to Australian university students during class time. Unlike postal or online administered surveys, which may yield low return rates (eg, 33% rate to a mail out survey to random selection of Australian university students: Krause et al. 2005), the administration of surveys directly to students during class probably ensured high return rates.

Most responses to the post-admission survey questions were by first-year students and fewest by third-year students. This is consistent with the finding of Ditcher and Tetley (1999) and may have been due to several reasons. There was a reduction in the overall number of students in third year due to loss of students through failure, deferral and withdrawal. The scheduling of classes for students who had completed their third year of studies and were in fourth year in the subsequent year made it difficult to administer the survey. Class attendance by senior students was not as high as that of first-year students.

There were more responses to the question about what factors were perceived to have related to success compared with the question related to difficulties. This may be due to dental students being more willing to discuss positive experiences rather than negative ones or it may have been due to a relatively high level of satisfaction with their student experience. Tertiary students have also been reported to have cited more positive than negative incidents, which they perceived had influenced their learning (Ramsay et al. 1999).

In general there was minimal non-response (1 to 5%) to both survey questions. Interestingly students who did not respond to the 'success' question tended to be those classified as 'lower' achievers or those who tended to acknowledge they were not successful. Students who did not respond to the 'difficulty' question tended to be classified as 'higher' achievers. This may indicate they were satisfied with their experience. In addition, not all students who had failed the preceding academic year completed the post-admission survey. They were absent at the time of survey administration; did not respond to the request to complete the survey at a subsequent time; or did not respond to the survey questions.

7.6.2 General discussion of post-admission factors Adelaide dental students perceived related to their success and difficulties

A total of 26 individual post-admission factors were identified which were grouped into eight sub-categories. These were refined into two major categories, 'student' and 'course' factors. Subcategories of factors identified for successes were similar to subcategories identified as difficulties (Tables 7.10 and 7.12). This is consistent with the findings of Ditcher and Tetley (1999) eg, good time management/organisational skills and poor time management/organisational skills (refer to Table 7.7 section 7.2.6).

The factors identified in the current study were compared with factors identified by Pargetter et al. (1998) and Krause et al. (2005) in national studies on the first-year Australian university student experience. Whilst these studies focussed on different outcome measures than the current study, there were some similarities between factors identified by Adelaide dental students eg, study patterns, support and course factors, and those noted by Australian university students eg, academic preparedness, approaches to study, family and peer support and the nature of the course (also refer to Appendix Table 7.60). The extent to which findings from use of qualitative analytical methods are consistent with other existing knowledge can be used to judge their substantive significance (rather than statistical significance) (Patton 2002). Hence, the results described previously can be used as some evidence of the substantive significance of this research. The hypothesis [2.1] that Adelaide dental students are likely to attribute their success and difficulties to factors similar to those identified by other university students can be supported.

The range of post-admission factors that were identified by Adelaide dental students was extensive, indicating the multifactorial nature of determinants of academic success. Furthermore the range of factors cited could also have been a reflection of the diverse backgrounds of Adelaide dental students eg, school leavers, non-school leavers, local and non-local students and generational differences (eg, Generation X and Y) between students.

It was anticipated that dental students may have made more mention of difficulties such as practical or manual dexterity problems, examinations or clinic assessment. These difficulties have often been cited as sources of difficulties by dental students in other studies (section 7.2.2). In addition, many of the factors identified by the students in the current study are rather obvious factors eg, being organised and managing time effectively. Likewise factors that related to difficulties experienced such as inefficient time management and heavy course workload were not entirely unexpected. Difficulties in managing time effectively may have arisen due to students having to balance dental studies with other non-dental commitments and/or the demands of a perceived heavy course workload.

The three most frequent types of factors that were perceived to have contributed to success by Adelaide dental students (study factors, motivation and support) were somewhat different to the three most frequent factors identified by Australian university students (interest in the course, self-motivation, self-discipline: Killen 1994 and self-motivation, fair and open assessment, well structured presentations: Ditcher and Tetley 1999). This may be due to generational differences between students in these studies and the current one, rather than differences between dental and non-dental courses. This is supported by a recent study of Australian university students which identified similar factors to those attributed to success by Adelaide dental students ie, support and self-characteristics (eg, time management, organisation and motivation) (Kinnear et al. 2008).

The types of difficulties identified by Adelaide dental students are consistent with those encountered by university students studying in non-health profession courses as well as health profession courses. New Zealand tertiary students attributed difficulties to study-related problems, poor teaching, class-related problems and personal factors (Hunter 2001). Current findings are also consistent with those reported from first-year students across a large number of Australian universities and disciplines. Factors reported to have affected students' progress included workload, teaching style at university, family support and social factors (McInnis et al. 1995). Furthermore, several of the difficulties experienced by Adelaide dental students were consistent with those reported by second-year Australian medical students who had undertaken a PBL course (Treloar et al. 2000). They cited negative staff interactions, reduced access to family support systems, homesickness and financial pressures as difficulties they experienced.

There was a tendency for course factors to be perceived as influencing difficulties in third year. This is not inconsistent with the increasing demands of the Adelaide dental course in this year level

compared with first and second year. In third year there are longer days spent on campus and involvement in direct patient care ie, third-year students spent nine hours (3 x 3 hour sessions) per week providing direct patient care whilst being supervised by casual tutors. The hypothesis [3.1] that Adelaide dental students are more likely to report difficulties in third year compared with first year due to increasing course demands and working in the clinic setting can be supported. In contrast, the hypothesis [4.1] that students are more likely to experience difficulties related to the dental learning environment (eg, patient care) than other sources of difficulties (personal and academic issues) cannot be supported.

Attributions of dental student success and difficulties

Attribution theory provides a useful framework to interpret the findings from the current study. Attribution theory is a cognitive theory of motivation (Eggen and Kauchak 2004). School and tertiary students often explain their successes and failures through reference to a wide range of causal factors (Forsyth 1990). Common explanations or 'unitary' attributions include effort, luck, ability and task difficulty (Forsyth 1990). However, Forsyth (1990) identified many more attributions, such as good or faulty teaching, adequate or inadequate preparation, personal problems, good or bad study habits, knowledge, support from friends and classroom atmosphere (teacher-student interaction). Attributions about educational outcomes can be described in terms of underlying dimensions. Three common underlying dimensions are: location of the cause (locus of control); stability (of the cause); and control (of the learning situation) (Eggen and Kauchak 2004). Students generally attribute external causes (bad luck, difficulty of the test, the teacher, their home life, difficulty of course material, boring topics) after they have experienced failure, but emphasise the causal impact of internal factors (ability, effort, hard work) after experiencing success (Forsyth 1990; Eggen and Kauchak 2004).

A total of 26 unitary attributions (individual post-admission factors) were perceived to have explained Adelaide dental students' success and difficulties (Tables 7.10 and 7.12). The range of unitary attributions was not unlike those cited by Forsyth (1990). Success was mostly attributed to internal factors such as study patterns, time management, seeking support, a balanced lifestyle and particular behaviours (ie, hard work). Students also attributed success to 'others' or external causes such as positive features of the curriculum and positive student-staff relationships. Success was also attributed to external sources of motivation. Difficulties were attributed to both external and internal factors. External causes included having too many commitments, problems with living arrangements, negative student-staff relationships, too heavy workload and too many contact hours. Internal causes of difficulties included personal problems, health problems and poor time management.

Thus, Adelaide dental students seemed to attribute their success and difficulties to both external and internal causes rather than attributing success only to internal factors and difficulties only

to external factors. This is consistent with Hunter (2001) and Krause et al. (2005) but differs from Killen (1994) and Ditcher and Tetley (1999). These latter two studies reported that students were more likely to attribute academic success to internal factors and attribute academic failure to external factors such as staff and course characteristics. Another Australian study also reported that students blamed their study-related problems on course factors rather than their own shortcomings in skills or attributes (Mullins et al.1995). These included inadequacies in the teaching (inadequate access to staff, deficient teaching and communication skills of staff), university services and facilities and the social environment. In addition, differences in students attributions of sources of success or difficulties between studies prior to and post the year 2000, may reflect generational differences in students ie, Generation X (prior to 2000) and Generation Y (post 2000) and course differences ie, generalist university courses versus professional or vocational courses.

The literature has revealed significant relationships between self-efficacy ie, expectation of academic success, and attributional style and academic performance (McKenzie and Schweitzer 2001). Thus, further research into self-efficacy ie, expectation of academic success; attributional style; and influence on academic success of Adelaide dental students would be useful to assist in identifying features of successful students and attributes that need to be supported or developed in students who experience difficulties.

7.6.3 Factors perceived to relate to success

The three most common factors that first-, second- and third-year dental students perceived were related to their success, were study factors (study patterns and time management), psychological factors (motivating factors) and social factors (support and balanced life). The following section will discuss each of these in turn drawing on general higher and dental education literature to explain the results. In addition, two course factors that were perceived to have contributed to student success (positive student-staff interactions and positive features of the curriculum content, structure and processes) will also be discussed briefly.

7.6.3.1 Study factors

Three study patterns emerged that were perceived to be related to success. These included patterns that: fostered learning; supported learning; and accomplished assessment tasks. Adelaide dental students also identified two divergent styles of time management skills that contributed to success. These included timely/consistent time management and untimely time management/last minute work/cramming. Time management skills were cited as a factor that contributed to success, with increasing frequency from first to third year. Second-year university students and students in subsequent year levels also rated time management/organisational skills more frequently as important to their success compared with first-year students (Ditcher and Tetley 1999). Some Adelaide dental

students reported that they used all three types of study patterns and both styles of time management skills because they perceived they would retain information better. Organisational skills were perceived to have contributed to success of third-year students. Organisational skills included working to a study

plan, ensuring notes were up to date and organising assignments. Third-year students perceived that their organisational skills had improved as they progressed from first to third year. Despite the two differing contexts, study patterns identified by Adelaide dental students were consistent with patterns identified by US college students, which included weekly study with reviews before the examination or cramming before the examinations and some study during the week (Schmid and Abell 2003).

Survey replies of Adelaide dental students classified as 'higher' and 'lower' achievers showed no clear difference between the types of study habits used between these two groups. Indeed, regular studying and cramming or leaving work to the last minute were reported to be adopted by those classified as 'higher' achievers as well as those classified as 'lower' achievers. This is in contrast to Lindemann and Cabret (1995) who reported that 'studying weekly from beginning of quarter' was ranked first by second and third-year students classified as high achievers, whilst second and third-year students classified as low achievers rated 'studying from mid-quarter' first. They postulated that this may be because low achievers have poor study strategies that jeopardise success or that low achiever students strategically chose this approach to pass compared with high achievers who want to excel. Furthermore, there was no clear difference between the types of study habits used between Adelaide dental students who had failed and those who were successful. This is in contrast to the findings of Schmid and Abell (2003), who found that consistent study rather than cramming was more likely to bring success (ie, course completion) to US college students. Lack of differences in the current study may have occurred because of the open nature of questions. Specific closed questions with a requirement to rank factors in order of importance may have yielded data that demonstrated differences between Adelaide dental students classified as 'higher' and 'lower' achievers. However, this was an exploratory study and therefore it was not considered appropriate to limit student responses. In addition, there was a small sample size and limited responses by those students who had failed in contrast to those who were successful.

Study behaviours identified for success in the current study have implications for the quality of student learning outcomes. Study and time management behaviours that were adopted by Adelaide dental students could be described as being consistent with 'deep' learning approaches to learning (fostering learning and supporting learning being organised and timely study habits) or 'strategic' approaches to learning (ie, achieving assessment tasks) or 'surface' approaches (ie, being unorganised and untimely study habits). In addition, students described study patterns such as rote learning as conducive to their success. Rote learning is often associated with a surface approach to learning ie,

learning 'unprocessed' information. Memorisation techniques such as rote learning may have resulted because students perceived that is what the assessment required (Kember 2000). Many of the particular study behaviours adopted by Adelaide dental students also seem to be lower order generic study skills (ie, basic self management) rather than higher order meta-cognitive learning skills (ie, independence and self-monitoring) (Biggs 1993).

It is well established that study strategies and approaches to learning adopted by university students are influenced by course and student characteristics (Ramsden 1992). A general surface approach to learning may be promoted by heavy workloads, content that presents too much of a challenge, assessment tasks that only test recall and unapproachable or disinterested staff (Johnston 2001). Dental curricula have been characterised as overcrowded and promoting memorisation of factual knowledge (Divaris et al. 2008). In this environment students usually adopt 'convenient strategies' and adapt themselves by becoming passive learners (Divaris et al. 2008). Dental students often intend to use an organised sustained plan for studying but may be completely overwhelmed by the volume of the material presented. If too much material is to be learned, students who normally use a deep approach may resort to rote learning as a survival skill (Lindemann and Cabret 1995). Thus, whilst rote learning may be more consistent with a surface approach, such an adoption may not necessarily be a sign of disorganisation in every case (Lindemann and Cabret 1995). These findings from the literature are also supported by the current study. For example, Adelaide dental students revealed that they resorted to leaving work to the last minute, cramming just prior to examinations and focusing on passing assessment tasks due to the impact of particular course factors because of long contact hours and a demanding workload. In addition, some third-year students reported these methods of studying and time management were utilised more often as they progressed from first through to third year due to increased course demands, staff expectations, and to maximise examination results. Such 'dysfunctional' learning methods might have also been adopted by students as they progressed through the course as they learnt what was needed to 'pass' or they were not required to 'learn for meaning'.

However, some of the study behaviours used by Adelaide dental students may also be due to poor individual study patterns, time management and organisational skills or other student factors, such as balancing outside activities with study. For example, during third-year student focus group discussions, some students commented that they did not implement a study plan during the early part of the semester. Post-admission survey responses also revealed the competing pressures students had on their study time by external factors.

These findings have implications for academic staff. Strategies to improve study behaviours of dental students could include in-depth evaluation of the reasons for adopting such behaviours. Staff could review course workload and assessment tasks and provide more on-campus self-directed

learning time for students. Training in effective study skills could also be integrated into the curriculum (Divaris et al. 2008).

7.6.3.2 Psychological factors

Psychological factors such as motivating factors, attitudes and beliefs, and behaviours were claimed to have contributed to success. The most frequently mentioned of these factors were extrinsic motivating factors. Intrinsic motivating factors eg, having an interest in dentistry, were infrequently mentioned. Thus, Adelaide dental students may have focussed on attaining short term goals or finishing tasks at hand (eg, extrinsic motivators, such as going home and passing exams) rather than long term goals such as learning to become a dentist. This research was not designed to probe more deeply into students' personal motivation or its association with academic success of dental students, hence from the post-admission survey, it is not clear how motivating factors identified by students impacted on their perceived success.

Within the fields of psychology and general higher education, motivational factors and their relationship with university student academic success have been explored. For example, intrinsic motivation orientation was reported to be a significant positive effect on first-quarter undergraduate GPA whereas an extrinsic motivation orientation had a negative effect (Kaufman et al. 2006). Achievement motivation (ie, one's motivation to achieve) was found to be a good direct predictor of undergraduate GPA (Robbins et al. 2004) and has also been reported to indirectly relate to first semester university grades (via its influence on students' use of self-regulatory learning strategies) (McKenzie et al. 2004). Hence, it would be useful to further explore the role of motivation in the academic success of dental students.

7.6.3.3 Social factors

Adelaide dental students perceived 'support' as a factor that contributed to their success in the early years of the course. Research has also illustrated that students who had failed or withdrawn from their studies were more likely not to seek help (Malik 2000). Due to the small sample of Adelaide dental students who had failed, it is not clear if those who failed were less likely to seek help if difficulties arose compared with those who progressed successfully.

'Peer support'

The current study revealed that Adelaide dental students utilised informal peer support (help and advice) most often compared with other sources of support. Furthermore, the frequency of seeking support from peers increased from first year to third year. Abundant evidence within the literature validates these results. First-year Australian students reported friends were the main source of support (emotional, practical and social companionship) (Ramsay et al. 2007). UK second- and third-year

medical students (Malik 2000) cited friends as the commonest source of help. The primary source of support accessed by other dental students was from peers (classmates and upperclass mates) (Burk and Bender 2005; Wilson et al. 2008). The heavy reliance of dental students for support was postulated to be due to the ease of access and proximity to this source or the fear of disclosing problems to staff members or other professional staff (Burk and Bender 2005). University courses in which there are very large numbers of students and few contact hours are at risk of having fewer opportunities for face-to-face contact with peers (Kantanis 2000). In contrast, dental courses have smaller numbers of students (less than 100 per class) and high contact hours and thus the greater potential for many face-to-face interactions between peers. These reasons may also explain why Adelaide dental students predominantly sought help from classmates. Whilst the current study did not provide a detailed investigation of the type of support and benefits received from peers within the dental course, focus groups provided an insight to this. Specifically, the type of support Adelaide dental students sought from peers included both practical and social companionship. The establishment of supportive peer groups is thought to be beneficial in terms of academic adjustment to university studies. It can act as a buffer against difficulties and provide students with a way to assist each other with academic work (McInnis et al. 1995; Peat et al. 2001). The type of social companionship support that Adelaide dental students gained from peers included opportunities to connect and form networks with peers in a social context, to relax and socialise together and to provide stress relief. The establishment of social networks benefits social adjustment to university eg, friends helping each other with issues such as isolation and anxiety (Peat et al. 2001). The hypothesis [8.1] that Adelaide dental students are more likely to seek support from peers and family than academic staff can be supported.

'Senior students'

Students in the early stages of the Adelaide dental course also interacted with students from senior year levels who were also a source of support, such as sharing their experiences and providing motivational support. American dental students also sought help from senior students but to a lesser extent than peers in the same class (Burk and Bender 2005). It is unclear if this was the same for Adelaide dental students.

'Family support'

Adelaide dental students also reported seeking support from family. This finding is consistent with approximately 50% of first-year Australian university students who perceived that family support was important to them (McInnis et al. 1995, 2000a). The current study did not provide a detailed investigation of the type of support and benefits received from family. Existing research may shed some light on these aspects. Family support has included assistance in the form of financial, household chores, provision of access to the family car, assistance with medical expenses, help with studies and discussion of issues with family members (emotional support) (McInnis et al. 1995). For some

subgroups of students eg, international medical students, reduced family support can lead to homesickness and perceived difficulties with academic progress (Treloar et al. 2000). Presence or absence of any of these aspects of family support may influence how a first-year university student copes (McInnis et al. 1995).

'Formal support'

The major formal source of support obtained by Adelaide dental students was from academic staff. Focus group studies identified that academic staff and casual tutors provided appraisive and informational type of support. The frequency of students who sought support from casual tutors increased from first year to third year. This finding is consistent with the curriculum design of the Adelaide dental course. As students progress through the course they spend more time working in clinics and thus in contact with clinic tutors. Third-year students spend up to nine hours per week in the clinic. American first-year dental students also reported seeking support from their tutor (preclinical laboratory instructor) more often than other sources of professional support (Burk and Bender 2005). From this result they postulated that dental students may use tutors more frequently as a source of formal (professional) support due to their proximity and convenience rather than who may be best able to help them.

Assistance from the Adelaide School of Dentistry counsellor was sought least frequently. This finding is consistent with Burk and Bender (2005), who hypothesised that students who sought support from the school counsellor may have done so after they had exhausted other sources of support. Also it may be that students who sought support from the school counsellor may have had long-standing and complex problems that were not easily solved. Thus these hypotheses may explain why Adelaide dental students did not report seeking assistance from the school counsellor.

There was an increase in frequency of use of peers as a source of support between first and third year students, although this was not statistically significantly different, therefore the hypothesis [9.1] that patterns in seeking support or sources of support are not likely to vary between year levels can be supported. In addition, there were no differences in the patterns in seeking support or sources of support sought between; male and female students; local and non-local students; and school leavers and non-school leavers. This is in contrast to findings from several studies that found differences in sources of support between the sexes (Halamandaris and Power 1999; Burk and Bender 2005) and between local and international students (Ramsay et al. 2007). Hence, the hypothesis [10.1] that patterns in seeking support or sources of support are likely to vary between various types of students cannot be supported.

There were also no differences between students classified as 'higher' and 'lower' academic achievers with regards to sources of support that they used but the measures used in the current study may have been too crude to show such differences. The hypothesis [11.1] that patterns in seeking

support or sources of support are likely to vary between higher and lower achievers cannot be supported. More research is also needed in light of results from Burk and Bender (2005). They reported that academically lower ranked dental students made more use of senior students, formal peer support and some professional sources compared with academically higher ranked students. Lower ranked students also perceived these sources as effective, especially informal peers. In Adelaide, dental students who have had previous academic difficulties are often required to meet with the Associate Dean of Student Affairs and may be referred to the school counsellor. It would be worth investigating whether these students sought professional support because they were required to or were self-motivated in seeking out help.

Overall, the findings from the current study indicated that social support was a factor perceived to contribute to student success. Social support is regarded as a key factor in reducing stress and improving well being (Forshaw 2002). Further research is required to ascertain the precise roles and function of social support in dental students including the type of support and benefits provided by family, friends, peers and staff and the institution and how each in turn influences academic success; perceived levels of, and satisfaction with, each of the support types; and its role in potential reducing dental student stress.

Adelaide dental students indicated that balancing dental studies with other aspects of life was a feature of their success. Other than studying, commitments included participation in paid PT employment and a range of extracurricular activities (mostly non-academic activities). Maintaining a healthy life and taking breaks from study were perceived to help success. The results from this part of the study are supported by those discussed in Chapter 6. In particular Adelaide dental students reported being involved in extracurricular activities as a way of being healthy and balancing their study commitments (Chapter 6, section 6.5.3.5 Table 6.13). These strategies are not surprising given the demands of studying dentistry and the stress experienced by dental students (Tables 7.2 and 7.4). However, some Adelaide dental students also commented that they had reduced time spent on other commitments in order to spend more time studying. This is consistent with the findings of Krause et al. (2005) who reported that Australian first-year university students often decided to cut back on their hours of work as the course demands changed or other circumstances in their lives altered.

7.6.3.4 Positive student-staff interactions

Effective support from academic staff and tutors is essential to reduce difficulties encountered in dental courses and to reduce dental student stress (Heath et al. 1999; Polychronopoulou and Divaris 2005). Furthermore, academic staff play a key role in contributing to students' engagement with their study and learning community (Krause et al. 2005). Collaborative (rather than competitive) interactions between student-staff and a student-friendly approach have been recommended (Heath et al. 1999;

Polychronopoulou and Divaris 2005). Adelaide dental students reported that positive student-staff interactions contributed to their success. Interactions with both academic staff and tutors (casually employed and attend for one or two sessions; often private dental practitioners) were perceived to have contributed to success. Dental students (all year levels) in 21 North American schools perceived that the strongest aspect of their clinical education was their relationship with the staff (Henzi et al. 2006). Characteristics of positive student-staff relationships identified by Adelaide dental students were consistent with those identified by Welsh third- and fourth-year dental students (Fugill 2005).

Whilst the current study did not specifically investigate the benefits of positive student-staff interactions, focus group discussions identified that Adelaide dental students perceived that these relationships enhanced their learning experience in general and in the clinic. The literature identifies other benefits of positive student-staff interactions. Positive perceptions of teaching such as approachable academic staff, staff available to discuss work, academic staff taking an interest in progress, staff good at explaining things, staff providing prompt and helpful feedback were associated with student persistence rather than withdrawal from first year (Krause 2005). Having a sense of personal connectedness is also seen as an important part of a positive transition process to university (Krause et al. 2005). However, only one third of Australian university students felt at least one teacher knew their name and many did not perceive that staff were available to discuss their work, took a personal interest in their work, gave helpful feedback on progress and understood their difficulties (Krause et al. 2005). The Adelaide dental course was characterised by relatively 'small' class sizes (less than 60 at the time of this study) compared with other courses and in the early years regular weekly contact with a small number of core staff, who mostly know each student by name. The course also provides many opportunities to interact with staff. Hence this may partly explain why Adelaide dental students reported perceiving positive student-staff interactions contributing to their success and why the persistence rate was high (ie, very few withdrew; see Chapter 5, section 5.5.3). Furthermore, positive relationships between students and academic staff or casual tutors are important in encouraging students to seek help from academic staff when required (Wilcox et al. 2005). This may partly explain why Adelaide dental students felt comfortable seeking help from academic staff.

7.6.3.5 Positive features of the Adelaide dental course

The positive feature of the Adelaide dental course that was most frequently mentioned by first, second and third-year students as relating to their success was the curriculum. Positive perceptions of course characteristics are conducive to better quality learning outcomes for students (Ramsden 1992; Prosser and Trigwell 1999). One of the key changes made to the Adelaide hybrid PBL curriculum when it was introduced in 1993 was to provide students with early clinical experience and integration between theory and clinical practice. These features of the curriculum were perceived to have contributed to

student success during the early years. North American dental students also reported that early exposure to clinic work and working on each other in first year motivated students, and helped them to learn material better and apply theory to practice (Henzi et al. 2006).

7.6.4 Factors perceived to relate to difficulties

The three most common groups of factors that first-, second- and third-year dental students perceived as relating to their difficulties were social factors, the Adelaide dental course, and study factors. The following section will discuss each of these in turn drawing on the literature to explain the results. In addition, first-year students perceived transition factors contributed to student difficulties and third-year students perceived that negative student-staff interactions contributed to difficulties. These will also be briefly discussed.

In general, the types of difficulties Adelaide students perceived were not dissimilar to those identified in studies of dental students and first-year university students. North American dental students identified adjustment to dental school (transition issues, financial problems, living accommodation and physical well-being), emotional and performance (study skills and time management) as problems they encountered (Burk and Bender 2005). Findings from Burk and Bender's (2005) study may provide some insight into the factors that may cause difficulties for Adelaide dental students in their later years, as the North American dental students in the previous study were in their penultimate or final year of the course. First-year UK university students identified three clusters of difficulties. These included academic problems (course related), personal problems (homesickness, family support) and practical problems (financial, other commitments, poor accommodation, balancing study and work commitments) (Lowe and Cook 2003). Five categories of difficulties were identified by first-year Australian science students who were asked to identify the worst aspects of semester one of first year. These included problems with studying, poor teaching, loneliness, demands on time and general adjustment issues (Peat et al. 2001). Differences in the type of factors, the labelling of categories and the frequency of factors that were sources of student difficulties in the two previously mentioned studies and the current study may relate to contextual factors (eg, type of institution, course, curriculum, living arrangements and tuition fees) and study design.

7.6.4.1 Social factors

Many social (non-academic) factors were perceived by Adelaide dental students as sources of difficulties. Difficulties were not just experienced by first-year Adelaide dental students, indicating that issues are not always fully resolved and may continue to impact on success during second and third year.

The types of non-academic difficulties identified by Adelaide dental students were consistent with those experienced by other university and dental students. Tertiary students have underestimated the difficulties they may run into, in looking after themselves, and the extent to which personal problems may affect their studies (Cook and Leckey 1999). Academic staff have also reported that students presented to them to discuss such problems as financial, health, accommodation, homesickness, lack of confidence, depression and relationship issues (Easton and Van Lar 1995). Personal issues, managing part-time work and study, juggling study and family commitments and student debt were also cited as difficulties encountered by North American dental students (Wilson et al. 2008). Focus group studies revealed that Adelaide dental students had non-academic problems that impacted or had the potential to impact negatively on their study behaviours.

Adelaide dental students claimed they had difficulties with balancing study with social activities, family life and/or paid PT employment. This was a consistent issue across the three year levels. Hence, Adelaide dental students did not seem to differ from other university and medical students. In a recent large Australian national study Hillman (2005) revealed that one of the most common problems first-year university students faced were managing study and other commitments. Juggling paid-work and study, finding time for other commitments and balancing personal relationships and study were frequently cited issues (Hillman 2005). First-year UK medical students also expressed concerns with regards to studying/social life balance. The majority (89%) perceived that their social life interfered with their study (Whittle and Murdoch-Eaton 2004).

Chapter 6 (refer to sections 6.5.2.2 and 6.5.3.2) revealed that a large proportion of Adelaide dental students spent between six to 10 hours per week engaged in either paid PT employment or extracurricular activities unrelated to their studies. The level of participation in such activities did not decrease as students progressed from first to third year, despite the expected increased workload and clinical work. Hence, it is not surprising that Adelaide dental students reported having difficulties balancing their commitments.

Adelaide dental students who lived away from home identified homesickness, managing a household, and living in college as sources of difficulties. In addition, travelling to and from university was a source of difficulty for some students. These problems are certainly not unique to Adelaide dental students. International medical students identified living in a different environment and time and energy focussed on 'surviving' as sources of difficulties (Treloar et al. 2000).

Personal problems are often experienced in the early months of commencing university studies especially if the student has moved away from home eg, homesickness, missing friends, distancing from family support, lack of confidence. One-third of UK first-year students reported experiencing such difficulties more than they expected (Lowe and Cook 2003). Experiences of homesickness are often reported to decrease as the first year of university studies progresses however students post-first year

can still experience episodes of homesickness (Fisher et al. 1985). Reasons for experiencing homesickness include environmental factors and personal factors. Environmental factors include geographical distance of the move, relative lack of satisfaction with features of the psychosocial and physical environment in the new place (eg, reduced satisfaction with residence, friendships and academic work). Personal factors include personality and circumstantial factors (eg, decisional control over the move) (Fisher et al. 1985). Homesickness can impact on students' success at university by affecting lecture attendance, keeping up to date with studies and ability to concentrate (Fisher et al. 1985).

Living arrangements posed difficulties for more first-year Adelaide dental students compared with third-year students. This may imply that as students progressed along the course, over time they adjusted to and learnt how to cope with their living arrangements or modified them (eg, moved out of college, refer to Chapter 6, section 6.5.5) so as to reduce difficulties they were experiencing. Verification of this hypothesis with future cohorts would be worthwhile.

The frequency of personal problems as sources of difficulties experienced increased between first-year to third-year students. In contrast, health problems were reported with similar frequency by first-, second- and third-year students. Few Adelaide dental students perceived that financial problems contributed to their difficulties. This contrasts with several studies that have reported financial difficulties are experienced by many first-year Australian university students (McInnis et al. 1995; Krause et al. 2005), Australian second-year medical students (Treloar et al. 2000) or are a source of stress amongst dental students (Muirhead and Locker 2007; Divaris et al. 2008). Chapter 6, section 6.5.2.5 may provide some insight into this result. Adelaide dental students who were involved in paid PT employment mainly did so to provide for discretionary extras rather than for financial necessity. This may indicate that financial issues were not of great concern, especially for those who lived in their parental home.

Overall, a broad range of social factors contributed to difficulties perceived by Adelaide dental students. Indeed many of these students would have had to manage more than one social factor at any one time eg, some students potentially faced difficulties associated with balancing study and other commitments, issues with living arrangement, personal, health and financial difficulties. Also the range of social factors, the length of time which they caused problems would have undoubtedly varied for each individual student. These aspects were not explored in the current study.

Despite having difficulties, many first-year students did not access services on campus to help them manage the personal aspects of their life that may have interfered with academic success (McInnis et al. 1995). They found that students knew about the services but did not access them. Whilst the current study did not attempt to investigate whether students sought assistance of on-campus services, there was a brief indication that use of the in-house Adelaide School of Dentistry counsellor was not frequently sought and focus group discussions revealed students were aware of on-campus

services but did not access them. Further investigation of why students did not use institutional support services would be useful to determine whether students' needs are being met.

7.6.4.2 Difficulties related to the Adelaide dental course

Aspects of the Adelaide dental course that were attributed to difficulties related to the curriculum, contact hours and workload. There was very little mention of difficulties related to unclear expectations, assessment issues and task difficulty.

Difficulties with the curriculum were mainly reported by first-year students. They perceived that some course content in first year was not relevant. Second-year medical students similarly experienced frustration at spending time on perceived 'irrelevant' or 'peripheral' material (Treloar et al. 2000). Adelaide dental students referred to difficulties with self-directed learning (SDL) that included doing additional research and reading outside of normal contact hours. It is not uncommon for tertiary students to perceive SDL as demanding. For example, 21% of tertiary students found SDL more difficult than they had expected (Lowe and Cook 2003). Difficulties were also encountered in finding reference material in the library. Group work was also a source of difficulty. Organising members to meet at mutually agreed time was problematic. Interestingly other student-centred instructional strategies such as self assessment (which is new to most first-year students and used extensively in the Dental Clinical Practice subjects) did not feature highly as a source of difficulty.

The volume of work was a source of perceived difficulty, especially for second-year students. First-year students did not cite difficulties with workload as often as second or third-year students. Students in all three year levels consistently perceived that there were too many contact hours and long days. There were also remarks that times between classes were 'unusable'. Third-year students also perceived that there was not enough time during swot vac. Clinic sessions were also reported as demanding and exhausting. Perceptions of demanding course workloads are common amongst university students (Mullins et al. 1995; Lowe and Cook 2003). First-year students often underestimate the amount of work they are expected to undertake (Mullins et al. 1995; Cook and Leckey 1999). Many factors contribute to the difficulties students experience coping with workload. Course characteristics include: the quantity of assignments and examinations; the degree of difficulty of assessment tasks; and the timing of assignments. Skill deficits also play a role such as poor time management and insufficient reading and writing skills (Mullins et al. 1995). Time spent on activities outside of university studies and ambition for good grades also influence perceptions of course workload (McInnis et al. 1995). Certainly from results of the current study, Adelaide dental students have alluded to the existence of several of these groups of factors (course characteristics, study behaviours, commitments outside university) contributing to difficulties and thus perceptions that the workload is demanding.

Perceptions of heavy workloads can have undesirable effects on students' approaches to learning. This has been discussed in section 7.6.3.1. Students who perceive the workload to be 'heavy' often adopt 'short cuts' and undesirable study approaches in order to cope with excessive demands (Ramsden 1992; McInnis et al. 1995; Kember 2004). The curriculum and learning environment (course content, degree of difficulty, individual variation, assessment and student-staff relationships) are factors that influence students' perceptions of workload (Kember 2004). Thus to improve perceptions of heavy workload, the curriculum and learning environment must be shaped appropriately (Ramsden 1992; Divaris et al. 2008). Curriculum design must allow time for students to actively engage in academic activities rather than being constantly driven by the need to complete as many tasks as best they can (Chambers 1992; Divaris et al. 2008). These findings have implications for curriculum planners in the Adelaide Dental School. Consideration shold be given to the following:

- staff in first, second and third year should review course content and minimise repetition of material between subjects or across year levels
- first year staff should spend time making sure that relevant course content is made clear to students
- provision should be made in the timetable for all students to undertake group work, including booking of small teaching spaces/computer suites
- the availability of library resources should be increased wherever possible, including making resources available electronically
- the scheduling of different classes should be organised so that they follow-on from each other, thus minimising small blocks of time between classes and increasing blocks of non-class time which can be used for self-directed learning or group work
- the timing and structure of clinic sessions should be reviewed given that students generally find these sessions demanding and tiring
- the examination timetable should be reviewed, including the scheduling of examinations to allow more study time for students.

7.6.4.3 Study factors: poor time management and disorganisation

Adelaide dental students reported difficulties with study factors, specifically poor time management and lack of organisation. Very few students reported difficulties with study patterns. This may be due to students being reluctant to discuss poor study habits or they may not feel that their study habits are an important issue.

Adelaide dental students were not alone in reporting difficulties managing their time. Time management was also seen as a problem by first-year university students in a study by Cook and Leckey (1999). In this study students experienced difficulties primarily because they had inappropriate

study skills and were insufficiently prepared. These students perceived they worked mostly just before exams, concentrated on doing things in order to pass, and did not work steadily as they intended nor did they plan their work ahead of time. Forty-percent of first-year UK students undergoing a PBL medical course cited problems with time management (Whittle and Murdoch-Eaton 2004).

Tertiary students who made greater use of self-regulatory learning strategies (eg, time management, organisation, effort regulation) were found to be more likely to achieve higher grades than those who reported low use of effective learning strategies (McKenzie et al. 2004). In light of the findings from the current study and those reported by McKenzie et al. (2004) it would be valuable to further examine the type self-regulatory learning strategies dental students adopt and the impact on academic success. This is of particular relevance given the Adelaide hybrid PBL dental course expects dental students to be effective self-directed learners.

7.6.4.4 Transition issues

Only some first-year Adelaide dental students experienced difficulties with the transition to dental school. This finding is in agreeance with North American dental students who also did not perceive many problems with adjustment to first year (Burk and Bender 2005). Four areas of adaptational difficulties were identified. These included adapting to learning and lifestyle from secondary school to university, adapting to a new environment (living in Adelaide), adapting to a new language and adapting to the Adelaide dental course. Transition issues for Adelaide dental students included a lack of prior knowledge in biology, no prior experience in PBL, no prior experience learning in a clinic or laboratory setting and no prior experience with dental terminology. These experiences are indeed not unique to first-year students studying at the University of Adelaide or to Adelaide dental students.

As discussed in the literature review (section 7.2), considerable research has and is continuing to be conducted into the 'first-year student experience' and 'transition to university' (Yorke 2000; Krause et al. 2005; Hillman 2005). However, little attention has been focussed specifically on first-year dental student transition. A recent study of North American dental students that focussed on support issues (rather than transition) found that some first-year students reported problems with adjusting to dental school, accommodation, physical well-being and separation issues (Burk and Bender 2005).

The type of transition issues experienced varies for different sub-groups of students eg, school leavers, international students (Krause et al. 2005). The current study also verifies that some of the transition issues faced by Adelaide dental students were specific to particular sub-groups of students.

International Adelaide dental students revealed difficulties with adapting to living in Adelaide and communicating in English. Evidence in the literature indicates that international students do face additional issues that are associated with moving to a new country. Such issues include homesickness and loneliness (Li and Kaye 1998), difficulty in making friends (Chalmers and Volet 1997), financial and employment difficulties (Mullins et al. 1995).

It was not unexpected that some first-year students reported difficulties with adjusting to the Adelaide dental course. The learning and teaching philosophy and environment eg, student-centred approaches to learning (group work, self-directed learning, contextualised learning and early clinical exposure) are very new experiences for most students. Whilst the current study did not focus on student transition to university or to dentistry, findings point to transition being an issue for some first-year school leavers and international students. Further research would be useful to explore how significant transition issues are for first-year dental students and their potential impact on academic success.

7.6.4.5 Negative student-staff interactions

Some Adelaide dental students reported poor quality interactions with academic and casual (sessional) staff as contributing to difficulties they experienced, especially in third year. This was not unexpected given that third-year students spent more time in the clinic working with patients and being supervised by clinic (sessional) tutors. Perceived difficulties with staff are not confined to Adelaide dental students. They have been encountered by other university, medical and dental students. Approximately one-third of UK first-year students found that staff were not helpful and friendly and 41% did not view staff as sympathetic and reassuring (Lowe and Cook 2003). Furthermore poor quality student-staff relationships, such as lack of approachability, failure to listen and lack of availability were also identified by university students in a study by Wilcox et al. (2005). Australian second-year medical students also reported difficulties with staff being unresponsive and unapproachable (Treloar et al. 2000). North American dental students described suboptimal communication between staff and students as the main type of ineffective learning incident. Staff were perceived to be unapproachable or disinterested in the students' learning, discouraging questions or providing unclear directions and feedback (Victoroff and Hogan 2006). In another study, dental students indicated one of the four areas of concern they had regarding the clinical learning environment was inconsistent and sometimes insensitive feedback from clinic tutors (Henzi et al. 2006).

Consequences of negative student-tutor interactions include student dissatisfaction and possible withdrawal (Wilcox et al. 2005). Furthermore, Canadian dental students identified that inconsistent feedback from tutors was the source of most clinic-related stress, with 73% of students identifying this problem as a 'moderately stressful' or 'very stressful' (Muirhead and Locker 2007). Focus group discussions provided some insight into the consequences of these negative student-tutor interactions for Adelaide dental students. The clinical learning experience was compromised as students engaged in strategic behaviours to cope. Students managed by *going along with what tutor said or do it their way because you are being assessed.* Further research into the consequences of negative

student-clinic tutor interactions would be useful given the possible detrimental effects on student learning, assessment (ie. students may receive lesser grade) and stress.

Barriers that may prevent more personalised and positive relationships between students and staff include: pressures on staff time; other commitments that staff have; the number of students; and their varying requirements and expectations (Krause et al. 2005). These reasons would certainly apply to academic staff in the Adelaide School of Dentistry. Since 2006 there has been an increase in the class size from around 50 to 80, increased pressure for staff to do teaching and research, and an increasing complexity of student issues. Additional barriers related to sessional clinic tutors may include the fact that they are casual staff who only teach once or twice a week; they may lack familiarity with current educational research trends (eg, first-year student experience); they may have no or minimal formal professional development of the concepts of learning and teaching; they are required to comply with clinical policies which may take time away from interactions with students; and they are generally only available during their scheduled clinic session.

Fostering positive relations and interactions between students and staff is essential in any educational environment, especially in health profession courses given that teaching, mentoring and patient care co-exist, in an often stressful environment (Krause et al. 2005; Divaris et al. 2008). Hence these findings from the current study have implications for practice and are discussed further in Chapter 8, section 8.4.

7.6.5 Factors that contributed to success and difficulties of students who were classified as 'higher' and 'lower' academic achievers

Despite achieving academic success, dental students classified as 'higher' academic achievers reported more difficulties with course factors, in particular in third year compared with 'lower' academic achievers. This is in contrast to more third-year students classified as 'lower' academic achievers citing more difficulties with student (social) factors. There is evidence in the literature to indicate that factors perceived to contribute to university success and difficulties may vary depending on the level of success attained by a tertiary student (Rickson and Rutherford 1995; Burk and Bender 2005; Krause et al. 2005). It seems that those third year-dental students classified as 'higher' achievers tended to attribute difficulties to external factors such as contact hours, workload and assessment issues, negative student-tutor interactions and patients not attending clinic sessions, whereas those classified as lower achievers tended to attribute difficulties to internal factors such as difficulties balancing commitments, health, personal and financial problems. Further investigation of the types of strategies/coping skills 'higher' achievers used to manage difficulties experienced with course factors would be useful. Furthermore, exploration of the nature of the impact of social factors had on the academic performance of those classified as 'lower' achievers and what could be done to alleviate them, including development

of coping skills, would be valuable. The hypothesis [5.1] that students classified as 'higher' academic achievers are more likely to report fewer difficulties compared with those students classified as 'lower' academic achievers cannot be supported.

7.6.6 Factors that contributed to success and difficulties of students who failed

Data were collected from several students who had failed second year. Very few responded to the question about factors contributing to success. Their non-response suggests that they felt uncomfortable about answering the question. Those who did answer the question acknowledged they were not successful. Most second-year students who failed attributed difficulties to 'themselves' rather than blaming the course. Few surveys were collected from third-year students who had failed. Again most of factors they identified as difficulties related to 'themselves'. Due to the small sample size other inferences could not be drawn from the data. The hypothesis [6.1] that students who fail are more likely to report difficulties (personal and course related) compared with those students who progress successfully cannot be supported. These results highlight the difficulties in trying to understand any common factors with students who had failed and warrant further investigation using different methods eg, a case control study with a group of successful students matched with a group of unsuccessful students and use of qualitative methods such as in-depth interview.

7.6.7 Differences in factors reported to contribute to success and difficulties between different student groups

There was no significant difference in the frequency of factors that were perceived to have contributed to university success or difficulties between the sexes; local and non-local students; and those who had selected dentistry as their first-preference career choice or second-preference career. Hence, hypotheses [7.1] can be supported. Some of these findings are in contrast to other findings in the literature that reported differences in perceived difficulties between: male and female tertiary students (Yorke 2000; Burk and Bender 2005); school leavers and non-school leavers (Krause et al. 2005); and local and non-local students Mullins et al. 1995; Treolar et al. 2000; Krause et al. 2005). The method chosen for this part of the study (refer section 7.4) may not have been sensitive enough to distinguish differences between these different types of students.

7.6.8 Validation of Adelaide hybrid PBL dental curriculum

The results of the current study may be viewed as a further confirmation of earlier findings about the quality of the current curriculum in supporting student success. Previous studies from an Australian medical PBL course (Treloar et al. 2000) and from the Adelaide School of Dentistry (Wetherell et al. 1996), reported that the PBL approach fostered positive staff-student relations.

Specifically, Wetherell et al. (1996) reported that first-year dental students who undertook the new PBL curriculum in 1994 reported better staff-student relationships as a result of greater interaction compared with first-year students who undertook the previous conventional curriculum in 1992. In a subsequent study, stress induced by interpersonal tension between staff and students did not emerge from Adelaide dental students enrolled during 1998 (Sanders and Lushington 1999). Although some negative comments regarding staff-student relations were made by third-year students mainly, the current study confirms that in general one of the aims of the PBL curriculum in Adelaide, ie, to bring about better staff-student relationships, has been achieved.

7.6.9 Limitations

This part of the project was an exploratory investigation of dental students' perceptions of the factors that influenced their success and difficulties during the early years. Some caution is needed in interpreting results as they were based on data collected via a survey method. Students were asked to reflect four months after completing the previous year. Whilst this may have allowed time for students to have completed the entire year and then reflect back on it, they may have forgotten experiences or had distorted or diminished memories (Burk and Bender 2005). Second- and third-year student responses may be further biased by fewer students classified as 'lower' achievers as they had failed or withdrawn or were not present during survey administration. Issues raised and opinions expressed in focus group discussions (sub-sample of the whole class) may not reflect the opinions of all students within a given cohort (Schmid and Abell 2003). In addition, students were not asked to specify what they defined as 'success' (eg, passing the year, achieving good grades or learning to become a dentist) and 'difficulties' (eg, failing the year or not performing to the expected standard). Neither were students asked to rate the level of success or difficulty (eg, on a scale of 1 to 10) they experienced. This information may have allowed more meaningful comparisons between those classified as 'higher' and 'lower' achievers.

Despite these limitations in the method used, it was anticipated that responses would be thoughtful reflections of the students' experiences as the survey was short and simple. Consideration also needs to be given to social desirability bias or the level of honesty in the survey replies. Generally there was a low level of non-response to the survey questions. This suggests that students felt comfortable in answering the survey questions. The wide range of factors identified, especially 'difficulty' factors, also suggests that in general the students answered the questions honestly. Thus the integrity of the data has been assumed to be sound (Burk and Bender 2005). However, students who had failed tended not to complete post-admission surveys (in particular those who had failed first-year studies) and this may partly indicate they did not feel comfortable answering questions and hence their views may not be adequately represented.

7.7 Conclusion

This part of the current study used open-ended questions to identify post-admission factors that students perceived related to their academic success and difficulties. The students themselves decided the factors which they considered important. From the students' perspective, a broad range of factors were perceived to have been related to success and difficulties. These factors were categorised as student and course factors. Factors identified were generally consistent with those experienced by first-year university students in general and dental students in other schools. There was consistency in the categorisation of factors identified relating to success and difficulties across the year levels. The longitudinal nature of this part of the project uncovered relative stability of several key factors related to success and difficulties.

Success was attributed to student factors predominantly. Difficulties were attributed to both student and course factors with student factors predominating. Not unexpectedly course factors became more prominent as students progressed from first to third year. Students were faced with a range of non-academic difficulties that they believed impacted negatively on academic success. Many difficulties persisted beyond first year. This finding adds to existing literature in general higher education as most previous studies have focussed on the 'First-year student' experience. Students' responses also shed light on possible interactions between factors. Social factors (difficulties balancing commitments, personal, health problems, difficulties arising from living arrangements) and course factors (workload, contact hours) seem to have impacted on the type of study patterns and time management strategies adopted.

The current study was not able to identify a 'typical' successful or a 'typical' less successful student. From this exploratory study it is likely that neither exists because of the complex ('multi-dimensional') nature of factors that influence academic performance. The nature of the student experience is also dynamic not static – what happens in one year may not happen in another in terms of personal issues. Further research is warranted into how higher achievers overcome difficulties and achieve success. In addition, further investigation of difficulties faced and their impact on success by those who were unsuccessful, may help to identify resources that staff can use to assist students in future.

8.1 Introduction

Chapter 8 is the final chapter of this thesis. General strengths and limitations of the project are presented, together with key findings in relation to the six research questions that were posed. Implications for practice are considered and potential areas for future research are highlighted. Finally, some general conclusions are provided.

8.2 Strengths

There are several strengths of this research project, including use of a longitudinal and prospective study design. It is also a comprehensive study that addresses characteristics, experiences, and other factors influencing performance of four cohorts of students during the first three years of their dental studies. This contrasts with many previous studies of academic success of tertiary students that have tended to focus on the first-year experience only or on those who withdraw from university. This research evaluated both pre-admission and post-admission factors, allowing a broader insight into issues that may influence academic success. Most studies reported in the health profession literature also tend to examine pre-admission factors but students often do not encounter important influences on their success until after they have enrolled. In addition, both quantitative and qualitative data were collected and appropriate analytical techniques were used rather than relying on one approach or the other. It is felt that the collection of qualitative data and use of qualitative analytical techniques provided a richer understanding of students' perceptions of post-admission factors related to academic success than only using quantitative data. A conceptual framework was also devised for this research contrasting with most research in the health education area which tends to be atheoretical or fails to make a conceptual framework explicit. Data related to students' performance on the admission process and dental school academic performance were derived from university databases rather than reliance on self-reported levels of performance, which may be less accurate. Furthermore, this research used actual admission data (scores or ratings) that were used to make final admission decisions, rather than performance on simulated admission tests that were administered to students after acceptance into their course (McManus et al. 2003). There was also a high participation rate in this research project. Factors that contributed to the high participation rate included students being informed that participation would not influence their academic success (given that the PhD candidate and two of the supervisors were academic staff members involved in assessing students) and students being informed that participation would help improve student experiences and inform the Curriculum Committee at the Adelaide School of Dentistry. In addition, surveys were administered during class time. The surveys were also kept short to minimise survey 'fatigue' in contrast to studies that have used multiple or lengthy standardised questionnaires.

8.3 Limitations

Specific limitations have been discussed in the Results chapters (5, 6 and 7). The following discussion will focus on several general limitations. This study was based on a sample of students within one Australian dental school and, as a consequence some of the results may not be generalisable. Contextual factors which may influence generalisability include the mode of entry to university, the type of admission criteria, type of curricula, student characteristics and institutional characteristics. However, it is considered that the results are most likely to be indicative of the situation in most Australian dental schools. Due to the nature of the admission process to the Adelaide dental course not all students have data relating to all admission criteria. For example, international students did not have data relating to their UMAT performance as at the time of this study they were not required to undertake a cognitive admission test. Hence subgroups of students were created for analyses that related to examining pre-admission factors and subsequent academic performance. As a consequence, sub-group analyses often involved samples less than 100. Hence, some findings need to be interpreted with caution or require further confirmation with larger samples. For the purpose of analysis, student success was dichotomised, with students categorised as either 'higher' or 'lower' achievers. A selected cut-off point of 61% was chosen. Dichotimisation of academic performance into two broad categories may have also masked variations between the two groups of students. For example, there were no major differences in factors perceived to have contributed to success or difficulties between 'higher' and 'lower' achievers. There is no consensus in the literature as to the most appropriate quantitative definition of academic success for research purposes. However, further research could consider use of controlled matched groups of 'higher' and 'lower' achievers which might reveal differences between groups. It is acknowledged that in addition to the factors investigated there are further factors that may impact on academic success of university students. Such pre-admission factors include age, ethnicity and socio-economic factors. Specific post-admission factors that could have also been considered include: psychological factors (anxiety, depression, stress); personality traits; self-efficacy and self-regulatory behaviours, study skills; and commitment/effort (refer to Appendix Table 8.1). However, no single theoretical framework exists that adequately addresses all these factors and their relationships with academic success. There is also a limit to what is possible in a PhD project. Even though the first cohort of students (Generation X and Y) who came into this study commenced 10 years ago, it is considered that current university students share many of the same characteristics (ie, Generation Y). The next generation of students (Generation Z) are due to enter tertiary education after the year 2015. At this point it would be useful to conduct another study into students' experiences and academic success at university.

8.4 Key findings

The following section provides an overview of the key findings of the project in relation to the six main research questions that were posed.

8.4.1 Research Question 1: What factors are related to students choosing to become dentists?

- Choosing to study dentistry tended to be a personal decision, influenced by perceptions that dentistry would be interesting and challenging. A desire to help people and the opportunity to be self-employed were also important factors.
- Most students decided on a dental career in the later stages of secondary school.
- Choosing to study at the University of Adelaide tended to be based on personal choice and the perceived reputation of the school.
- Prior to commencing dental studies, most students had exposure to dentistry as a patient but only some had previous work experience in the dental profession. A few had no previous experience of dentistry, not even as a patient.
- Students selected via a multifaceted admission process were more likely to have indicated dentistry as their first-preference career compared with students admitted via a conventional admission process.

8.4.2 Research Question 2: What are the characteristics of students in this study and how do they perform on admission criteria?

- There was a significant increase in the proportion of female dental students during the period 1993-2001 compared with the period 1983-1986.
- Many students were non-local residents.
- There were few Australian students from rural backgrounds and few who had completed their education in government secondary schools.
- Most students performed well on admission criteria and thus had the potential to be successful academically. Female students performed better on the Adelaide admission interview than males.

8.4.3 Research Question 3: What is the academic success of students in the early years?

- Progress rates for students in the new hybrid PBL curriculum were much better than those in the previous conventional curriculum (1983-86) (4% failure rate compared with 40%).
- Implementation of a multifaceted admission process was associated with improved academic progress rates of international students compared with those admitted via the previous conventional admission process.

- Most Adelaide dental students who were admitted via a multifaceted admission process and who undertook the hybrid PBL curriculum were successful academically during the early years.
    - Withdrawal and deferral rates were low and most students progressed satisfactorily during the early years and graduated on time.
    - Academic failure was the most common reason for interrupted progress.
    - The second year of the course posed difficulties for some students, particularly one cohort of students who commenced in 2000.
    - Those who failed more than once in the first three years of the course, in general, did not proceed to complete the course.

8.4.4 Research Question 4: What factors predict academic success in the early years?

Overall there was no single best predictor or set of consistent predictors for academic success. As expected, previous good academic achievement predicted good academic performance in first year but not subsequent years. Performance on an admission interview had some predictive ability for subsequent academic success. A summary of pre-admission factors that were predictive of subsequent academic success is presented below.

- predictors of academic progress
    - Factors predictive of academic failure during the early years included: 'poor' structured admission interview performance (ie, an average rating on the 'supportiveness and encouraging behaviour'); poor academic performance in Human Biology in first year; and poor academic performance in Dental Clinical Practice in first year. Further exploration of this result using a larger sample size is warranted.
- predictors of academic performance
    - First year:

      Factors predictive of being a 'higher' academic achiever in first year included: being a non-school leaver; being a local student; and receiving a good rating on 'supportiveness and encouraging behaviour' category of the structured admission interview.
    - Specifically, for Australian school leavers, factors predictive of being a 'higher' academic achiever in first year included: attending a non-government secondary school and having a very high matriculation score. Furthermore, attending a non-government secondary school and having a very high matriculation score predicted being a 'higher' academic achiever in Human Biology. Further exploration of this result using a larger sample size would be useful.
    - Second year:

No factors predicted being a 'higher' academic achiever in second year or, specifically for Australian school leavers. However, some factors predicted 'higher' academic performance in individual subjects.

- Third year:

  A factor predictive of being a 'higher' academic achiever in third year included a high rating on the 'motivation to become a dentist' category in the admission interview. In addition, some factors predicted 'higher' academic performance in individual subjects.

8.4.5 Research Question 5: What are the non-academic experiences prior to, and during, the early years and do these experiences influence academic success?

- Despite undertaking a demanding full-time course, students spent considerable time outside of class time (six to 10 hours) on non-academic activities such as paid PT work and ECAs
  - Those who worked had jobs that were not related to dentistry.
  - Students worked so that they were able to afford discretionary extras rather than for financial necessity.
  - Perceived positive benefits of working PT during term-time included the development of skills, but impaired health and stress were recognised as negative effects.
  - Most dental students participated in more than one type of ECA, although sport was often one. In contrast, very few students spent time in volunteer activities or performing community service. Stress relief and health benefits were commonly perceived positive effects of participating in ECAs, whereas reduced study time and compromised study habits were perceived negative effects.
- Contrary to findings in the general education literature, academic performance of dental students involved in regular term-time paid PT work was no different than those who were not involved in these activities. The amount of time spent in paid PT work was also not associated with level of academic performance.
- As expected, academic performance of dental students involved in ECAs was no different than those who were not involved in these activities. It is possible that positive benefits in being involved in ECAs may have helped students cope with their demanding studies.
- More males, non-South Australians, international students and non-school leavers lived independently whereas more females, South Australians and school leavers lived with family members.
- As expected, more non-South Australian and international students lived in residential college or private accommodation whereas more school leavers lived in family accommodation.

- Whilst most students had stable living arrangements during the first three years of the course, some changed living arrangements at least once. There was a significant decrease in the number of students who lived in residential college from first to third year. The college environment was most often cited as the reason why students moved out of college.
- Academic performance did not differ between those students living with family members or independently, nor did it differ between those who resided in the family home or in private accommodation or residential college.

8.4.6 Research Question 6: What factors do students perceive to contribute to success and difficulties during the early years?

- Even though dental courses are quite different to other university courses, the range of factors cited by Adelaide dental students as contributing to their success and difficulties (eg, study patterns, support and course factors) were similar to those cited by other university students (eg, academic preparedness, approaches to study, family and peer support and nature of the course).
- Success was predominantly attributed to individual 'student' factors and various 'course' factors. *'Success' factors* included idiosyncratic study patterns and time management skills, extrinsic sources of motivation, and social factors (supportive peers, friends and family, and a balanced lifestyle). In addition, positive student-staff interactions that enhanced learning and features of the hybrid PBL dental curriculum were cited as course factors related to student success.
- Students were often faced with a range of non-academic difficulties and many of these types of difficulties persisted beyond first year. Difficulties were attributed to both 'student' and 'course' factors. Not unexpectedly, course factors became more prominent as students progressed from first to third year. *'Difficulty' factors* included juggling commitments, problems with health, personal and accommodation issues, demanding workload, poor time management and disorganisation, negative clinic staff-student interactions and transition issues.
- Social and course factors seem to have impacted on the type of study patterns and time management strategies adopted by students.
- There was no clear indication as to which factors characterised a 'higher' academic achiever compared with a 'lower' achiever. Third-year students classified as 'higher' academic achievers cited more course factors (eg, negative student-clinic tutor interactions) as sources of difficulties compared with those classified as 'lower' academic achievers.
- Limited data about factors that contributed to difficulties were available for students who failed academically. However, student factors were cited more frequently.

8.5 Implications for practice

The findings of the current study have implications for curriculum planners in PBL-based and conventional dental and university courses, as well as for admissions committees. Several suggestions are made for curriculum planners to enhance the academic success of students. These include: disseminating information and setting up support systems for first-year students as well as students in later years; monitoring student progress early in the academic year; ensuring course workload and contact hours do not overwhelm students; using student-centred curricula; and fostering positive student-staff interactions. These are discussed in further detail below.

First-year dental students should be informed during orientation period or the early weeks of first year of key factors that may play a role in their success and factors that may contribute to difficulties. They should also be informed about how and from whom they can seek help, if required. For example, they should be informed about keeping up to date and not leaving studies to the 'last minute'. The importance of establishing a support group of peers, friends and senior students and seeking help early from such groups and from academic staff should be emphasised. Information should be disseminated by academic staff and student counsellors in the classroom and via the web. Setting up a face-to-face and an online peer mentor system with previous first year students may also be useful in establishing support groups and disseminating information.

Findings from the current study suggest that students who may be having academic difficulties and who are not involved in any ECAs eg, sports, should also consider allocating some time to pursue them, to help manage stress and as a 'break' from their studies. However, they should ensure that time spent on ECAs and/or paid work does not compromise their studies. Academic staff should have in place mechanisms to identify students who are having academic difficulties and specific policies and action plans on how to support such students, including in-house support and access to university-wide support systems. Performance in formative or early summative assessment tasks in first-year subjects should examined closely by staff. Students who are having difficulties should be identified early and provided with appropriate support. This should include one-on-one counselling with appropriately trained first-year academic staff who can work closely with the student to identify areas of difficulties and assist with identifying and implementing strategies to overcome these issues. Follow-up sessions should also be included to monitor the outcomes of proposed strategies. In addition, the academic performance of school leavers and non-local students should be monitored closely in the early stages of first year. This study revealed that university students continue to be involved in non-academic activities and contend with difficulties beyond first year, such as juggling personal commitments and increasingly demanding study commitments. Thus, students in second and subsequent years should be provided with further information on how to enhance their success.

Dental (and other health profession) curricula have been noted for being demanding in terms of course workload and contact hours. These features can be perceived as sources of difficulties and impact on the quality of study behaviours adopted by students. They may be compounded by the busy lifestyles that the current generation of university students lead. Staff in PBL-based or conventional dental (health profession) curricula could consider providing more on-campus self-directed learning time for students to do private study or to be able to conduct group work with all group members present. Staff could ensure that a common time is allocated in the academic timetable to enable all students to be able to conduct these activities as well as ensuring that appropriate small room teaching spaces or computer suites are available. The number and timing of assessment tasks within and between subjects also needs to be taken into account. Academic staff should meet regularly and ensure that assessments within a given academic year are appropriate in number and spaced out across the year. Use of a combination of formative as well as summative assessment tasks should be considered. Consideration should be given to the use of integrated examinations that examine content across a number of subjects rather than separate examinations for all subjects. In conjunction with reviewing contact hours and course workload, additional training in effective study skills (within context), time management and organisational skills should be integrated into curricula. Consideration could be given to the curriculum structure so as not to preclude, but rather encourage, students participating in ECAs, such as sports. Pursuit of these activities was perceived by students in this research to help them cope with a demanding course such as dentistry. Hence the academic timetable should include some common non-contact time for all students.

Given that positive outcomes were noted with a move to a student-centred curriculum at the School of Dentistry, University of Adelaide, it is considered that this approach offers advantages over teacher-centred curricula in terms of academic success, establishing positive student-staff interactions (eg, having a small number of academic staff who work closely with students and commencing clinic sessions from week 1 in first year) and fostering peer support networks (eg, weekly PBL and clinic sessions). However, staff need to minimise negative student-clinic tutor interactions especially during the later years of dental courses, as they may contribute to difficulties. Often sessional clinic tutors are practising dentists (health professionals) who graduated from more conventional courses. Interventions to improve relationships between students and clinic tutors should include professional development for such staff. It is imperative to ensure that clinic tutors understand the teaching and learning philosophy of the course and learn about the characteristics of the current generation of university students. In particular, training should focus on assessment issues with a view to decreasing inconsistent feedback given to students and improving the quality of verbal feedback given to students during clinic sessions. Informing students about some of the difficulties they may encounter with clinic tutors and offering them strategies to manage issues should they arise could be a further approach to reduce negative student-

tutor interactions. Currently within many dental schools/universities there has been an increase in number of students and an increase in number of casual tutors that academic staff need to manage. Hence, there is added importance in fostering positive relationships between students and clinic tutors.

The findings of the current study have implications for admission committees including those faculties that are changing to multifaceted admission processes. Given that positive outcomes were noted with the move to a multifaceted admission process at the School of Dentistry, University of Adelaide, it is considered that this approach offers advantages over selection based on academic merit only. However, any method of selection should be reviewed and revised based on an evaluation process rather than on anecdotal evidence. Such an evaluation process should include analysis of students' performance relating to admission criteria and subsequent academic performance. Results from the current study will be presented to the Adelaide School of Dentistry Admission Committee. Dental admission committees may want to encourage (via clear information booklets/online admission materials) all applicants to undertake work experience in some field of dentistry. This would help to ensure that applicants are better informed about the different aspects of a dental career and dental training.

Participation in ECAs, prior to dental studies, such as sport, may reflect non-academic interests, leadership potential and long-term commitment, while participation in volunteer work may indicate social awareness, interpersonal skills and dedication to the community. Such qualities are desirable personal characteristics of health care practitioners. Thus examining health care/dental applicants' involvement in ECAs (or other activities) undertaken prior to commencing their university studies may be worth consideration by admission committees. Admission committees may also consider researching the perceived reputation of their dental school and how potential dental students might be influenced by its reputation. This may be particularly relevant for those schools that have introduced PBL curricula. Applicants are becoming increasingly aware of various aspects of curriculum design and hence may consider the type of curriculum offered by a dental school in the process of deciding where to apply.

Finally, it is recommended that university administrative staff should create a secure admission database that is checked regularly for completeness of data entry and maintained over the long term. This would enable accurate recording of university admission data for all applicants to enable researchers to fully examine relationships between admission factors and university achievement. In addition, the type of information collected in such databases would need to be reviewed and updated over time as admission processes change.

8.6 Future research

Specific areas of future research have been discussed in the Results chapters (3, 4, 5, 6 and 7; sections 3.6, 4.6, 5.6, 6.6 and 7.6 respectively). Details related to proposed new research questions and suggested methods that can be used to investigate these questions are provided in Table 8.1.
Further investigation of research question 4 *'What factors are associated with/or predict academic success in the early years?'* is warranted in light of changes to the Adelaide dental course and admissions process over time. Changes to the Adelaide dental course intake and admission process post-2001 have included: an increase in overall student numbers per year from 50 to around 80; an increase in the number of international students; and an increase in students from other Australian states. During 2003 to 2004, Section 2 of the UMAT was revised extensively. It was formerly known as "Interaction skills' and is now known as "Understanding people". The new section relates to the constructs of empathy, emotional intelligence and social intelligence. In addition, Section 3: Non-verbal reasoning, has also been modified recently. The embedded figures items have been removed and the remaining items consist solely of sequences of shapes. Furthermore, in 2006, the Adelaide structured admission interview was modified. The length of the interview was shortened from 45 minutes to 30 minutes. Two categories, ie, 'perseverance' and 'tolerance of ambiguity' were removed. These changes to the UMAT and admission interview will have implications in any future research as data from different cohorts may not be able to be pooled. Furthermore, a recent study examining the relationship between pre-admission factors and academic success Curtis et al. 2007), used a different method to that adopted in the current study, ie, a case control study and this method could be considered in future analyses.

Further investigation of research question 6 *'What factors do students perceive to contribute to success and difficulties during the early years?'* is also warranted. In light of a new generation of students commencing university (Generation Y), the sample should be drawn from current dental student populations to provide contemporary data. In addition, from limitations identified in Chapter 7 sections (7.6.3.1), use of a larger sample size and purpose designed close-ended surveys (using themes identified from the current study) with a requirement to rank factors in order of importance, may yield data that demonstrates differences in factors contributing to success/difficulties between students classified as 'higher' versus 'lower' achievers. Several themes identified in this study that are worthy of further investigation amongst dental student populations include: psychosocial factors such as social support; cognitive appraisal (self-efficacy and attributional style); motivation and academic study skills. These themes have also been reported in the general higher education literature (McKenzie et al. 2004; Zeegers 2004; van Den Berg and Hofman 2005). Better understanding of these post-admission factors should be helpful in improving the success of dental students.

It is recommended that any further research into factors that influence academic success of dental students should use a conceptual framework that includes both pre-admission and post-admission factors simultaneously as has been done in recent studies in the general higher education area, for example the Multidisciplinary Framework (which encompasses five theoretical frameworks): Theory of Human Capital Used; Cultural theory; Interactive theory; Organisational effects/economic rationality model; and Time studies (van Den Berg and Hofman 2005).

Finally a larger multi-site project would be worthwhile, to compare and contrast patterns of academic success, factors predictive of success, non-academic experiences, and student perceptions of factors associated with success/difficulties. Comparisons could also be made with students in other demanding health courses, such as medicine and physiotherapy. One would anticipate some differences depending on student allowances or loan arrangements, university systems, student characteristics, course organisation, and the structure and design of curricula. In addition, research within and across institutions could be carried out to confirm the generalisability of results obtained in the current study.

Table 8.1 Suggested areas of further research including proposed research questions and research methods

Research Question (Chapter)	Proposed research question(s)	Proposed research method(s)
3. What factors are related to students choosing to become dentists?	What factors influence the perceived reputation of a dental school/course? What are the reasons for some dental applicants/students not having any prior experience in the dental field?	Qualitative method: Survey of applicants Survey of first year dental students
4. What are the characteristics of students in this study and how do they perform on admission criteria?	Why is there an apparent increase in the number of female dental students/decrease in the number of male dental students? Why is there an apparent increase in the number of non-South Australian dental students? Why is there an apparent small number of rural students admitted to the dental course?	Quantitative methods: Descriptive statistical analysis: Examining any 'gender' bias or 'place of residence bias' of the applicant pool at each stage of the admission process Qualitative methods: Survey or interview of applicants on reasons for career choice. Survey or interview secondary school students on reasons for career choice. Compare responses between males/females; non-South Australians/South Australians; metropolitan students/rural students.
5. What factors are associated with/or predict academic success in the early years?	Refer to text (section 8.6) Additional pre-admission factor that could be investigated: Does a lack of prior experience in the dental field impact on dental school academic success?	Refer to text (section 8.6)

6. What are the non-academic experiences of students prior to, and during, the early years and do these influence academic success?	What are the specific effects (including timing and level of impact) of participating in term-time paid PT work on dental studies? What are the specific effects (including timing and level of impact) of participating in term-time paid PT work on psychological well-being? How do (eg, what specific strategies) students who are involved in term-time paid PT work/ECAs balance commitments and dental studies?	Qualitative methods: Use of a weekly diary or electronic hand held device (PDA) to track students' feelings and activities. Survey and interviews.
7. What factors do students perceive to contribute to success and difficulties during the early years?	What are the specific effects (including timing and level of impact) of social factors (eg, personal, health, financial) on the academic performance of students who are classified as 'higher academic achievers' and 'lower academic achievers'? What specific strategies/coping skills do students who are classified as 'higher academic achievers' use to overcome perceived difficulties and subsequently perform well academically? What difficulties are encountered by students who are unsuccessful? How do such difficulties impact on dental studies? What impact does a perceived demanding course workload and balancing commitments have on the type of study habits students use and approaches to learning students engage in? What are the specific effects on negative student-clinic tutor interactions on student learning, assessment and stress? Refer to text (section 8.6)	Qualitative methods: Survey and interviews - prospectively Qualitative methods: Interviews, retrospectively, of unsuccessful students (in the current study it was found that those who had failed tended not to complete surveys – thus a method is needed that encourages participation of unsuccessful students) Qualitative methods: Survey and interviews - prospectively Use of a weekly diary or electronic hand held device (PDA) to track students activities Qualitative methods: Survey and interviews - prospectively Refer to text (section 8.6)

8.7 Conclusions

Becoming a dentist is a challenging experience and not all dental students are successful academically, especially in the early years. There are important implications for the individual involved, the institution, and society in general when dental students are unsuccessful or do not graduate in a timely manner. Educational changes in dental schools over the past decade or so, including broadening of admissions processes and a greater focus on student-centred approaches to learning, have heightened the need to investigate factors influencing success of dental students. Generational changes are also occurring in the attitudes of students. The majority of studies addressing these issues have been performed in the US but they have generally not been based on a theoretical framework to inform study design. In addition, cross-sectional studies have been the norm. There has been no study, as far as this researcher is aware, that has explored factors that dental students themselves perceive to be related to their success or difficulties during their dental studies and to track these longitudinally.

This thesis explored the factors associated with success and difficulties of students in the early years of the 5-year dental course at the University of Adelaide. It is the first comprehensive, longitudinal study of the characteristics, experiences and performance of Australian dental students during the early years of their education.

It was found that the decision to become a dentist was most often a personal one made in the later years of secondary school, but it was influenced by vocational and social factors, and the perceived reputation of the school. The majority of students had chosen dentistry as their first-career choice which is represents a reversal of the past trend when most dental students who were admitted to dental courses wanted to become medical practitioners. Interestingly, many did not have any previous work experience in a dental surgery and hence may have lacked insight into their chosen career. The present dental student body is heterogeneous unlike the past when most students were local, male school leavers. Students are predominantly females, non-South Australians and school leavers with only a few rural students and students from government secondary schools. These trends may provide valuable insights for admission committees when making decisions regarding recruitment strategies. In addition, there may be workforce implications if such trends are replicated in other Australian dental schools. There are also implications for academic staff in terms of the ability of non-local students to adjust to a new environment and achieve academic success.

Despite the demanding lives lead by the current generation of students, such as balancing studies with other commitments including paid work, extracurricular activities and living away from home, the majority of first-year dental students are successful academically and progress to second-year studies. Second year was found to be more academically demanding by some students, however most progressed uninterrupted to third year. Introduction of a hybrid PBL curriculum was associated with improved academic progress rates compared with the previous conventional curriculum.

Introduction of a multifaceted admission process was also associated with an improvement in academic progress rates of international students.

No single picture of a typically successful or less successful student emerged. Previous academic achievement, having previous tertiary educational experience and being a local student, predicted good academic performance in first year but not subsequent years. Academic achievement in some first-year dental subjects (eg, biology and dental clinical practice) predicted subsequent academic success. In addition, performance on an admission interview had some predictive ability for subsequent academic success. For Australian school leavers, very high academic achievement at school, attending a non-government school, and performing well in certain aspects of the admissions interview were factors that predicted good academic achievement. Study behaviours, external motivating factors, having supportive peers and positive staff-student interactions were perceived to have contributed to success. Personal difficulties, heavy workload and contact hours, negative student-staff interactions and adjusting to first-year university studies, were perceived to have contributed to difficulties.

Thus to enhance student success, staff should consider instigating programs that identify students who may be having academic difficulties early in first year and offer appropriate support. Peers could be used to inform students of factors that can influence their success. In addition, to mitigate potential negative effects on student success, staff could design a curriculum with a balanced course workload, especially as students progress beyond first year, and provide time for self or group study. Such strategies should also encourage students to undertake study habits that promote 'deeper' learning rather than developing strategies that focus on passing assessment tasks. In addition, professional development should be provided for sessional clinic tutors. Planners of other university courses could consider implementation of PBL style curricula and multifaceted admission processes as they seemed to have positive effects on academic success of dental students compared with teacher-centred curricula and admission based on previous academic performance alone.

Further research is certainly warranted to gain greater insight into how successful students manage despite encountering difficulties and to determine which factors specifically impinge on students who fail academically. This information then needs to be fed back to students and curriculum designers. Ongoing studies that use an appropriate conceptual framework, methods such as case control studies, and large samples of contemporary student populations are also warranted in order to continue to evaluate the effectiveness of admission processes and to gain further insights into factors that influence academic success of dental/health professional students.

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