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Why do poor adults rate their oral health poorly?

AE Sanders,* AJ Spencer*

Abstract

Background: The reasons why socioeconomic circumstances are associated with oral health are not well understood. This study investigated whether psychosocial factors might play an explanatory role.

Methods: Cross-sectional survey data were used from the 1999 National Dental Telephone Interview Survey together with information from an accompanying questionnaire sent to adult interviewees. Household income and self-rated oral health were assessed with single items and life dissatisfaction, personal constraint and perceived stress were evaluated with standard psychometric scales. Bivariate associations were tested using chi-square and ANOVA and odds ratios estimated for low self-rated oral health using logistic regression.

Results: Response to the questionnaire was 64.6 per cent and analysis was limited to dentate adults (n=3678). Low household income was positively associated with low self-rated oral health. Higher dissatisfaction with life, personal constraint and perceived stress scores were associated with low income and with low self-rated oral health. After adjusting for gender, age, income and missing teeth, adults with high personal constraint scores had greater odds of low self-rated oral health (OR 1.26; 1.10-1.43) as had adults with higher perceived stress scores (OR 1.69; 1.34-2.13).

Conclusion: Psychosocial factors are important in understanding pathways between socioeconomic position and oral health status.

Key words: Socioeconomic position, explaining health inequalities, psychosocial factors.

Abbreviations and acronyms: ANOVA = One-way analysis of variance; CI = confidence interval; NHANES = National Health and Nutrition Examination Survey; ORs = odds ratios.

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of edentulism are decreasing.² Yet policy makers increasingly recognize that average health status statistics are only a partial summary of the health of populations. Indeed reporting only averages conceals the stark inequalities in health found between population groups.

One example of socioeconomic inequality in oral health in the Australian population is income differences in complete tooth loss. The 2002 National Dental Telephone Interview Survey³ of Australians showed a 2.9-fold difference in age-standardized rates of edentulism between low-income (\leq \$12 000 per year) and high income (\$80 000+) households. Income differences in edentulism prevalence were greater among adults in midlife than among older adults. While 18.1 per cent of adults aged 45-64 years were edentulous in low-income households, only 1.2 per cent was edentulous in high-income households. By comparison edentulism among older adults varied from 43.3 to 25 per cent between low and high household income groups respectively.

In the 1990s the oral health concerns of population groups including migrants,⁴ rural and remote dwellers⁵ and Indigenous Australians were highlighted.⁶ Recently Brennan and Spencer⁷ reported that adult public dental patients in 2001-2002 had significantly more decayed and missing teeth and fewer filled teeth than a comparative group in 1995-1996. These results show a worsening in oral health status among disadvantaged adults in the period since the cessation of Commonwealth funding to adult public dental care services in Australia.

Socioeconomic inequalities are not limited to objective measures of oral disease, but are also observed in people's own assessment of their oral health. For instance, compared with more advantaged adults, socioeconomically disadvantaged adults reported having more missing teeth, poor self-rated oral health and they experienced more adverse impacts on quality of life from their dental problems.⁸

Despite the large body of evidence documenting the unequal distribution of oral health status, critical questions remain unanswered. Foremost among these questions is what determines the link between socioeconomic position and oral health status. One

INTRODUCTION

Australia enjoys a high standard of oral health. The oral health status of 12 year olds is ranked second best among the OECD nations¹ and among adults in this country, tooth retention rates are increasing and rates

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prominent hypothesis is the behavioural explanation that contends that the comparatively poorer health of disadvantaged groups reflects the differential distribution of risk behaviour between socioeconomic groups. However, while intuitively appealing, the evidence to support the behavioural hypothesis is not strong. A large prospective cohort study for example found that behavioural factors explained only about 10 per cent of the association between childhood socioeconomic position and adult health status.⁹ Moreover, as behaviours are shaped in social environments (for example social norms, family and peer influences, density of fast food outlets, marketing strategies), behavioural interventions that fail to also target these underlying factors are unlikely to produce lasting change. As Rose observed 'It makes little sense to expect individuals to behave differently from their peers; it is more appropriate to seek a general change in behavioural norms and in the circumstances which facilitate their adoption'.¹⁰

An alternative hypothesis is that the psychosocial consequences of material standards of living and relative social status impact on health.¹¹ Although the biological mechanisms are not yet fully explained, stress is thought to affect health either through the activation of stress-related neuroendocrine, autonomic, and immunological responses or through behavioural pathways. The psychosocial explanation is plausible. Perceived job insecurity and the strain of competing home and job demands were associated with poorer subjective oral health in Australian workers¹² and there is growing evidence that various forms of stress including job stress, financial strain, role strain and chronic stress are associated with periodontal disease.¹³

The objective of this study was to investigate whether psychosocial factors (dissatisfaction with life, a sense of personal constraint and a perception of stress) were associated with both household income and self-rated oral health.

MATERIALS AND METHODS

The data used were from the 1999 National Dental Telephone Interview Survey (NDTIS)¹⁴ and a self-complete questionnaire mailed to adult interviewees (n=6,152) immediately following their interview.

Study population and sampling

In this cross-sectional survey, telephone numbers of households in all Australian States and Territories were randomly sampled and a household occupant was randomly selected for the interview. At the end of the interview the postal address was checked. The self-administered questionnaire investigated social determinants of oral health and included questions on perceptions of life satisfaction, personal control and chronic stress. The interview and questionnaire were linked. The resulting dataset was weighted to account for differing sampling probabilities due to the sampling design and further weighted by age and gender

characteristics for each sampling stratum across all States and Territories as estimated by the Australian Bureau of Statistics.

The dependent variable was low self-rated oral health. Self-ratings were obtained in the telephone interview, with a single question. People were asked, 'How would you rate your dental health? Would you say that it is excellent, very good, good, average, poor, very poor?' Consistent with convention, self-ratings were dichotomized. The top three categories of excellent, very good and good were merged as were average, poor and very poor oral health (low self-rated oral health).

Socioeconomic position was operationalized as total annual household income measured with six categories collapsed to three in this analysis: less than \$20 000 (low), \$20 000-\$50 000 (moderate) and greater than \$50 000 (high).

The psychosocial constructs were measured with standard scales. To obtain a measure of people's cognitive evaluation of their life circumstances we measured perceived life satisfaction with a five-item scale.¹⁵ This is to test the assumption that adults with fewer financial resources do in fact feel less satisfied with their life than do adults with greater financial resources.

Socioeconomic advantage affords greater opportunity and choice, better life chances and a host of economically salient skills that promote personal control to acquire the prerequisites for good health.

Psychosocial measures

Personal control was assessed with a battery of 12 items developed by Lachman and Weaver¹⁶ that evaluates personal constraints and mastery. In this analysis responses were coded so that higher scores indicated greater constraint. A sense of personal mastery or the related constructs of personal control and self-efficacy have been positively associated with greater socioeconomic advantage and better health outcomes in a large number of studies. One of the most notable of these is the prospective cohort study of British civil servants known as Whitehall II. It found that workers' level of control at work explained more of the occupational gradient in incident coronary heart disease than did the conventional risk factors of levels of serum cholesterol levels, hypertension, overweight and obesity, physical inactivity, smoking and family history of heart disease.¹⁷ The pathway by which personal control influences health is not well established but there is evidence that control predicts health via health-related behaviour such as dietary choice/changes and the use of preventive health services. Other research indicates that a sense of control moderates the negative impact on health of psychological stress.¹⁸ Although oral health is distributed over a socioeconomic gradient, in this study, the emphasis was on understanding factors associated with poor self-rated oral health in low-income groups.

Hence the investigation centered on the lack of mastery, or constraint, as Lachman and Weaver¹⁶ labelled the construct in earlier research may be associated with poor self-rated oral health.

In a relatively affluent population like Australia, financial strain does not usually result in absolute deprivation. Nevertheless, relative disadvantage restricts the ability of the individual to purchase goods and services and participate in community activities. Occupying a low position on the social hierarchy induces a sense of inadequacy, injustice, or hostility and these experiences elicit a heightened stress response. The health consequences of stress are widely reported and evidence is growing on the adverse physiological responses to chronic stress.¹⁹ Perceived stress was measured with the 14-item Perceived Stress Scale.²⁰

Coding and scoring

Responses to the three psychosocial scales were assigned numeric codes ranging from zero to four and responses were ordered so that higher scores indicated greater dissatisfaction with life, a greater sense of constraint and more frequent perceptions of stress. Continuous mean scale scores were computed for each scale and the range of scores was divided into tertiles. For bivariate analysis these continuous scores were divided into tertiles labelled 'low', 'moderate' or 'high' with the low tertiles comprising the lowest third of scores for life dissatisfaction, personal constraint and stress.

Because tooth loss diminishes quality of life,^{21,22} and because tooth loss is associated with low socioeconomic position,²³ self-reported number of missing teeth was included to control for its potential confounding in the relationship between socioeconomic position and self-rated oral health.

Statistical analysis

Bivariate associations between gender, age group, household income and self-rated oral health were tested for significance using the Pearson chi-square test. Differences in mean scores for the psychosocial factors within income groups were tested using one-way analysis of variance (ANOVA) and the association

Table 1. Frequency (%) of males and females and four age groups in low, intermediate and high household income groups

	Low (Up to \$20 000)	Intermediate (\$20 000-\$50 000)	High (>\$50 000)
Sex			
Male	280 (16.0)	627 (35.7)	847 (48.3)
Female	344 (20.5)	673 (40.1)	660 (39.4)
Total	624 (18.2)	1300 (37.9)	1507 (43.9)
Age group			
18-34 years	116 (9.4)	482 (38.9)	642 (51.8)
35-44 years	74 (9.3)	322 (40.3)	403 (50.4)
45-64 years	177 (18.3)	367 (38.0)	421 (43.6)
65+ years	257 (60.3)	129 (30.3)	40 (9.4)
Total	624 (18.2)	1300 (37.9)	1506 (43.9)

between psychosocial factors and self-rated oral health were tested with the Pearson Chi-square test. In multivariate analysis odds ratios (ORs) and 95 per cent confidence intervals (95 per cent CI) were used for estimating the association between the potential explanatory factors and low self-rated health.

RESULTS

Participation in the 1999 National Dental Telephone Interview was 56.6 per cent (n=7829). Of the 6152 adult interviewees who were sent the questionnaire, 3973 responded (response = 64.6 per cent). In this study analysis was limited to dentate adults (n=3678), of whom 99.9 per cent (n=3673) rated their oral health in the telephone interview. Reflecting population gender and age distributions, males and females were equally represented. Adults aged 18-34 years comprised the largest proportion of the sample (36.3 per cent) while those aged 65 years or older comprised the smallest (12.8 per cent). The proportion of adults in each household income group was 18.2 per cent (low income) 37.9 per cent (intermediate) and 43.9 per cent (high income). More females than males reported a low household income (Table 1). Also evident was an association between age group and household income with only 9.4 per cent of adults aged 65+ years in the high-income group compared with about half the sample who were aged between 18 and 44 years. Sixty per cent of adults aged 65+ years reported low household income.

Table 2. Per cent (95% CI) of respondents with low self-rated oral health according to gender, age, income and missing teeth characteristics

	%	(95% CI)		%	(95% CI)
Sex ^{ns}			Household income [†]		
Male	23.7	(21.8-25.7)	Up to \$20 000	31.1	(27.5-34.7)
Female	21.2	(19.3-23.0)	\$20 000-\$50 000	22.8	(20.6-25.1)
			>\$50 000	19.0	(17.0-21.0)
Age group [†]			Number of missing teeth [†]		
18-34 years	16.3	(14.3-18.3)	Zero	13.6	(12.0-15.2)
35-44 years	23.4	(20.6-26.3)	1-4	28.5	(25.5-31.4)
45-64 years	29.2	(26.4-32.0)	5-8	30.8	(25.8-35.8)
65+ years	23.5	(19.7-27.3)	>20	46.8	(39.1-54.6)

[†]Low self-rated oral health describes the categories of average, poor and very poor oral health.

^{ns}(p>0.05); [†](p<0.001) Pearson chi-square.

Table 3. Mean (95% CI) scores for dissatisfaction with life, personal constraint and chronic stress for household income categories

Psychological factor	Household income	Mean	(95% CI)
Dissatisfaction with life*	Up to \$20 000	1.69	(1.62-1.76)
	\$20 000-\$50 000	1.63	(1.58-1.67)
	>\$50 000	1.53	(1.49-1.57)
	Total	1.60	(1.57-1.62)
Personal constraint*	Up to \$20 000	1.40	(1.35-1.45)
	\$20 000-\$50 000	1.23	(1.20-1.27)
	>\$50 000	1.13	(1.10-1.16)
	Total	1.22	(1.20-1.24)
Chronic stress*	Up to \$20 000	1.57	(1.53-1.61)
	\$20 000-\$50 000	1.63	(1.61-1.66)
	>\$50 000	1.52	(1.50-1.55)
	Total	1.57	(1.56-1.59)

*($p < 0.001$) ANOVA.

A socioeconomic gradient was observed in self-rated oral health (Table 2). Differences in self-rated oral health between males and females failed to reach statistical significance at the 0.5 per cent level ($p = 0.062$, chi-square). Across age groups, the proportion of adults with low self-rated oral health was greater in 35-44 year group than in the 18-34 year group and also greater in the 45-64 year group than in the 35-44 year group. However, low self-rated oral health was not positively related to age as a smaller proportion of adults aged 65+ rated their oral health as low compared with adults aged 45-64 years (Table 2). Approximately 30 per cent of adults with low household income rated their oral health as excellent or very good, compared with about 40 per cent with moderate income and about 50 per cent with high household income. Self-reported missing teeth were associated with low self-rated oral health.

Socioeconomic gradients were observed in the distribution of psychosocial scores (Table 3). Socioeconomic gradients were observed in the distribution of life dissatisfaction and personal constraint with disadvantaged adults reporting greatest levels of these factors (Table 3). Although adults in the highest income group reported lowest stress scores, the relationship was not linear as adults in the intermediate

Table 4. Per cent of adults with low self-rated oral health for categories of psychosocial factors

	Low
	Per cent (95% CI)
Dissatisfaction with life*	
Low	16.2
Moderate	23.3
High	27.1
Personal constraint*	
Low	14.4
Moderate	21.0
High	30.4
Chronic stress*	
Low	15.6
Moderate	21.9
High	28.8

*($p < 0.001$) Pearson chi-square.

income group (\$20 000-\$50 000 reported higher chronic stress scores than the other two groups (Table 4). A higher proportion of adults with high scores for dissatisfaction with life, personal constraint and chronic stress had low self-rated oral health.

Continuous scores for the three psychosocial factors were entered into a series of logistic regression models where low self-rated oral health was the dependent variable to examine whether these factors were independently associated with oral health after adjusting for the effects of gender, age, income and missing teeth (Table 5). After adjusting for gender and age in years, adults with low household income compared to those with high income had greater odds (OR 1.7; 1.34-2.2) of low self-rated oral health (Model 1). Dissatisfaction with life remained significantly associated with low self-rated oral health (OR 1.4; 1.2-1.5) after adjusting for gender, age and income in Model 2. Personal constraint was significantly associated with greater odds of low self-rated oral health in the presence of the other variables in Model 3 (OR 1.7; 1.5-2.1) as was chronic stress (OR 1.5; 1.2-1.9) entered into Model 4, although dissatisfaction with life no longer remained significant. In the presence of the continuous missing teeth variable entered in Model 5, age and household income were not significantly associated with low self-rated oral health. However, personal constraint and chronic stress remained significant explanatory variables.

The mediating effect of the psychosocial factors in the relationship between household income and self-rated oral health is shown in Fig 1. The proportion of adults with low self-rated oral health was greater among those with low compared with high household income in each tertile of dissatisfaction with life, constraint and stress. Yet, differences across income categories in the proportion with low self-rated oral health are smaller among adults with psychosocial scores in the low tertile. This is particularly apparent for constraint where the proportion of adults with low self-rated oral health differs by only 3.1 percentage points across income categories in the low constraint tertile. By contrast, in the high constraints tertile the difference in the proportion of adults with low self-rated oral health differs by 15 percentage points.

DISCUSSION

In a representative sample of the Australian adult population, adults with greater personal constraint and chronic stress had significantly greater odds for low self-rated oral health, after adjusting for the effects of gender, age, household income and number of missing teeth. The impact of socioeconomic disadvantage on self-rated oral health was not the same for all adults. In particular, the negative impact of low income was moderated by a sense of control. Very little socioeconomic variation in self-rated oral health was observed among adults with low perceptions of personal constraint (thus high mastery). The absence of

Table 5. Associations between low (average or poorer) self-rated oral health and household income (Model 1) adjusted for dissatisfaction with life (Model 2), personal constraint (Model 3) chronic stress (Model 4) and missing teeth (Model 5) presented as odds ratios (OR) and 95% CI

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sex										
Male	1.24	1.05-1.46†	1.21	1.03-1.43*	1.24	1.05-1.46*	1.30	1.10-1.55†	1.25	1.05-1.50*
Female	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Age	1.01	1.00-1.01†	1.01	1.00-1.02‡	1.01	1.00-1.01*	1.01	1.00-1.02†	0.99	0.99-1.00 ^{ns}
Household income										
<\$20 000	1.71	1.35-2.16‡	1.59	1.25-2.02‡	1.52	1.20-1.94†	1.50	1.17-1.91†	1.20	0.93-1.56 ^{ns}
\$20 000-\$50 000	1.25	1.04-1.50*	1.19	0.99-1.44 ^{ns}	1.15	0.95-1.39 ^{ns}	1.10	0.91-1.34 ^{ns}	1.00	0.82-1.22 ^{ns}
>\$50 000	1.00	–	1.00	–	1.00	–	1.00	–	1.00	–
Psychological factors										
Life dissatisfaction			1.37	1.23-1.52‡	1.20	1.07-1.35†	1.06	0.93-1.20 ^{ns}	1.02	0.89-1.17 ^{ns}
Personal constraint					1.41	1.26-1.58‡	1.27	1.12-1.43‡	1.26	1.10-1.43‡
Chronic stress							1.63	1.30-2.04‡	1.69	1.34-2.13‡
Missing teeth									1.08	1.06-1.10‡
Constant	0.15	‡	0.09	‡	0.06	‡	0.04	‡	0.06	‡

^{ns}p>0.05; *P<0.05; †P<0.01; ‡P<0.001.

both dissatisfaction with life and chronic stress also moderated the impact of low income on self-rated oral health, but to a lesser extent. The finding that a higher proportion of adults with poor psychosocial scores rated their oral health poorly even in the high income group shows that poor oral health is not confined to the most disadvantaged population groups.

Females and younger adults had more positive ratings of oral health than males and older adults. The latter might reflect the accumulated burden of oral disease and the consequences of its treatment by tooth extraction. Gender differences are less easily explained but it was not the purpose of this paper to investigate correlates, especially immutable factors, of self-rated oral health, but rather to better understand the pathway leading from socioeconomic position to oral health status. Consequently gender and age were included in the multivariable logistic regression model principally to control for their effects.

In Australia, socially disadvantaged adults face harsh access barriers to public dental care. Public dental services are rationed through a range of strategies including delay (lengthy waiting lists), dilution (limited

range of services) and by price (co-payment).²⁴ Taken together these strategies suppress demand and encourage a problem-oriented approach to utilization that ultimately translates into poor dental outcomes. It could be argued that poor public dental care accounts for the poor oral health of poorer adults, but this argument is not supported. For example, 40 per cent of adults with low income in this sample were not eligible for public dental care and many adults who are eligible seek dental care in the private sector. There is consensus that factors apart from the health care system determine health outcomes^{25,26} including genetic endowment, personal health practices and social determinants such as stress, early life, social exclusion, work and lack of work, and social support.²⁷ Moreover there is evidence that social inequalities in health are wide and may be widening even in populations with universal access to health care.²⁸⁻³⁰ In addition, findings show that the poor self-rated oral health of poor adults is not explained by missing teeth alone. Although disadvantaged adults are less likely to retain their teeth, personal constraint and chronic stress were associated with higher odds of poor self-rated oral health than were missing teeth in the age-adjusted model.

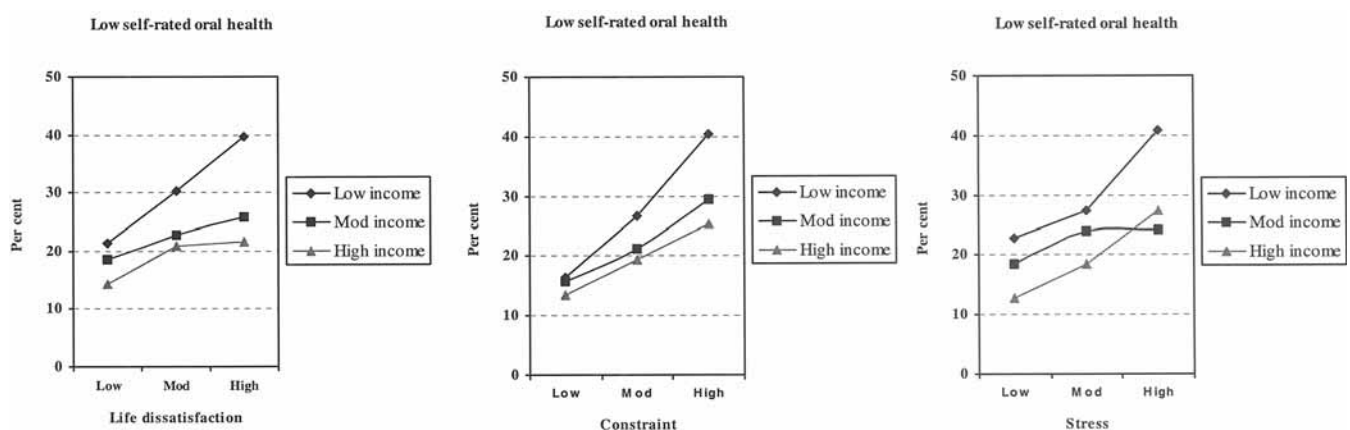


Fig 1. Percentage of adults with low self-rated oral health in household income categories across tertiles of life dissatisfaction, personal constraint and chronic stress.

Few studies have examined these psychosocial factors when investigating oral health status. Where they are examined they are viewed as consequences of oral conditions. For example, in answering the question, 'Does poor oral health compromise the quality of life?' Locker *et al.*^{31,32} examined the impact of oral problems such as chewing difficulties and pain on morale, life stress and life satisfaction among older adults. However, in this study we viewed psychosocial factors as determinants rather than consequences of oral health. Although the cross-sectional design of this study does not establish temporal sequence or permit causal inference, the notion that these psychosocial factors precede health outcomes is conceptually sound and supported by a large and expanding body of prospective research findings. The premise is that the health of populations is sensitive to social conditions.

This study suggests a possible pathway linking poor material standards of living to low self-reported oral health that is based on a conceptual view of health being sensitive to the social and economic conditions in which people live. Poor social and material living conditions give rise to a range of exposures that have adverse consequences for the ability to accumulate purchasing resources (through income) and knowledge resources (through education). Inadequate stocks of these resources directly constrain access to dental services and limit people's exposure to public health promoting messages. Although there is some preliminary evidence of a direct neuroendocrine relationship between financial hardship and periodontal disease it is likely that psychosocial factors operate through more indirect mechanisms that remain to be fully articulated. For example, inadequate resources limit people's opportunities for choice and the potential to gain control over decision-making. The perceptions and interpretations of being constrained in deprived social and material conditions are likely to evoke a chronic level of stress and further erode the sense of life satisfaction in general. The low sense of control may impact health indirectly through behavioural pathways such as an unwillingness to overcome nicotine addiction or to adopt and maintain healthy eating habits.

Self-rated health assesses both favourable and unfavourable health status. In a review of 27 prospective population-based studies, Ider and Benyamini³³ found consistent evidence that self-rated health strongly predicted subsequent health outcomes. A global general health item has been widely used in clinical studies and in large-scale surveys of populations in most OECD countries. It is routinely included in the Australian Bureau of Statistics' National Health Survey and in the National Health and Nutrition Examination Survey (NHANES) in the United States. The allied global oral health item is also used widely in surveys such as the National Dental Telephone Interview Surveys in Australia, as well as in the International Collaborative Study of Oral Health Outcomes and the

NHANES. Gilbert and colleagues reported that self-rated oral health is a multidimensional construct that is informed by oral disease and tissue damage as well as functional capacity, pain and esthetic considerations.³⁴

A sense of personal constraint and perceived stress were associated with low rated oral health even after controlling for age, gender, income and missing teeth. These findings support a growing body of literature linking socioeconomic position to disease risk via psychosocial pathways. Adverse psychosocial experiences are thought to increase susceptibility to illness either directly by overloading the immune system's stress response³⁵ or indirectly by encouraging risk behaviours for health such as smoking or over-eating for immediate comfort.

CONCLUSION

This study examined psychosocial factors associated with low self-rated oral health. Not only do poor adults have poorer oral health than those who are more advantaged, they also have less control over life circumstances and perceive more stress from daily living. In fact, these two psychosocial factors were more strongly associated with low self-rated oral health than was tooth loss in age-adjusted analyses. The findings add to the evidence that health is sensitive to social conditions and this has implications for the positioning of health promotion interventions in the social context in which people live their lives.

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