RACISM AND ABORIGINAL AUSTRALIAN CHILDREN'S WELLBEING: IMPACT AND PROTECTIVE FACTORS

Davi Manzini Macedo

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

January 2020

ADELAIDE DENTAL SCHOOL
UNIVERSITY OF ADELAIDE
SOUTH AUSTRALIA

Table of Contents

Contents

Citation Listing of Included Publications

1. Macedo DM, Smithers LG, Roberts RM, Jamieson LM. Racism, stress, and sense of personal control among Aboriginal Australian pregnant women. Aust Psychol. 2019. doi: 10.1111/ap.12435.

2. Macedo DM, Smithers LG, Roberts RM, Paradies Y, Jamieson LM. Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children. Int J Equity Health. 2019;18(1):132. doi: 10.1186/s12939-019-1036-9.

3. Macedo DM, Santiago PR, Roberts RM, Smithers LG, Paradies Y, Jamieson LM. Ethnic-racial identity affirmation: Validation in Aboriginal Australian children. PLoS One. 2019;14(11):e0224736. doi: 10.1371/journal.pone.0224736.

4. Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM. Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? PLoS One. 2019;14(8):e0220744. doi: 10.1371/journal.pone.0220744.

Thesis Abstract

The present thesis explores the effects of racism on Aboriginal children's social and emotional wellbeing (SEWB) and Aboriginal pregnant women's mental health and wellbeing. Identification of protective factors against the effects of racism on child wellbeing was also contemplated. The thesis comprises seven chapters. Chapter 1 includes a review of the literature on characteristics of the Aboriginal Australian population and the effects of racism across the lifespan. This chapter also contemplates the Aboriginal Australian perspective on health and wellbeing and the role of ethnic-racial identity on Aboriginal Australian's positive development. Chapter 2 describes the thesis's aims and expected contributions. It describes the data sources in which the findings are based and the research questions explored.

Chapters 3-6 include four peer-reviewed and published studies. The first study (chapter 3) is based on data from 369 Aboriginal pregnant women participating in the South Australian Aboriginal Birth Cohort Study. The findings show that racism is a pervasive experience, manifesting in the different settings (e.g., educational settings; public transport) in which Aboriginal pregnant women perform their daily activities. Racism was shown to be associated with increased stress and lower sense of personal control in this population. The next studies (chapters 4-6) were based on data from the Longitudinal Study of Indigenous Children (LSIC). Sample sizes varied according to the waves of the study included in the analyses. The second study (chapter 4) shows the effects of racism on Aboriginal children's different social and emotional wellbeing (SEWB) domains. Risk ratios were calculated to estimate the effects on children's emotional difficulties, peer problems, hyperactivity, conduct problems, and overall

emotional and behavioural difficulties. The effect-measures indicated that the effects of racism on SEWB can be observed 1-2 years after exposure.

In the third study (chapter 5), evidence was found for construct validity, reliability, criterion-validity, and measurement invariance by gender for a brief measure of Aboriginal children's ethnic-racial identity (ERI) affirmation. These results provided evidence indicating the measure of ERI is valid, and it was then used in the subsequent study. The fourth study (chapter 6) showed that the effects of racism on SEWB was attenuated among Aboriginal children who had pronounced ERI affirmation. Implications for the protective role of ERI to different domains of SEWB were discussed. Finally, chapter 7 offers a summary of the overall findings and implication for this area of research. A list of references is provided within each chapter

The findings presented provide evidence of the impact of racism on Aboriginal pregnant women and Aboriginal children's SEWB. Results from two modern cohorts indicated that Aboriginal pregnant women and Aboriginal children are subjected to racism in everyday settings, with associations between racism and poor SEWB and mental health. Evidence of validity and reliability was found for a measure of ERI affirmation in Aboriginal children. Furthermore, it was found that ERI affirmation might protect Aboriginal children against the impact of racism on SEWB. The findings show the effects of racism from a longitudinal perspective. The use of LSIC data is another strength, as LSIC is potentially the largest cohort study on determinants of Aboriginal children's development and wellbeing. Future research can monitor the intergenerational effects of racism among Aboriginal Australians and the protective role of ERI affirmation across development.

Statement on Originality of Work

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution 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. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree. I acknowledge that copyright of published works contained within this thesis resides with the copyright holder(s) of those works. I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time

Davi Manzini Macedo –
15/01/2020

Thesis Acknowledgment

The first person I would like to thank is my primary supervisor Professor Lisa Jamieson. Lisa's commitment to conducting research aiming to improve the lives of vulnerable populations is inspiring. I have previously had the opportunity of working with female figures that have shown me that it is possible to lead with patience and kindness. I feel privileged that I could again have learned so much from a competent leader who provided me so many opportunities to develop my skills as a researcher and human being. Lisa has been a really accessible supervisor, always encouraging and supportive of my ideas. Whenever we faced challenges, Lisa modelled the most incredible problem-solving strategies I could have testified. Her insights assisted me in improving interpretation of the findings and exploring research questions I had not visualised before. I never felt I lacked support from her throughout my candidature. To Professor Lisa Jamieson, my sincere thanks.

I can only be equally grateful to my secondary supervisors, Lisa Smithers and Rachel Roberts. To work in a multidisciplinary team was a privilege and joy. I appreciated all the guidance throughout the challenging pathway of a Doctor of Philosophy. Lisa S. and Rachel have always been attentive and demonstrated their understanding of the learning process of a PhD candidate. Their suggestions contributed to shaping the direction of my research project and gave the studies higher theoretical and methodological consistency. Again, I have never heard a word different from encouragement from you. Thank you for having made the PhD a remarkable experience.

All my supervisors have contributed to guide me in selecting the appropriate theories, methods, and provided me with examples for presenting arguments in

discussing my findings in an outstanding scientific way. In addition, I also received ongoing assistance in selecting the most suitable journals to submit my publications to. From the start of my candidature, I have also been able to attend to trainings and conferences inside Australia and overseas, which enriched my experience beyond what I could have ever imagined. To Lisa Jamieson, Lisa Smithers, and Rachel Roberts, once again, my sincere thanks to you.

It is with tenderness and gratitude that I would also like to thank my dear friend Dandara Haag. I am not sure words can express the bond we developed during the past two years or so. I really thank you for having held my hand no matter what. And not only for having understood me so fully but for being willing to do so. You have patiently assisted me in whatever you could have, providing advice in regards to both the PhD trajectory and adapting to Australia. Thank you for generously having shared your research skills with me and for all you taught me. Thank you for listening to my ongoing dramas and repeated stories. I feel our friendship sometimes is the only shelter I can find from the burden-carrying. To be crying at the office whilst I write is probably a good indicator of how much you mean to me.

I also want to mention my comrade psychologist, Pedro Santiago. Pedro has been in a similar journey to mine, having the same background both in terms of nationality and education. We have started our PhD together thus having progressed in a similar pace. Throughout this period, Pedro has been nothing but approachable, kind, and was always happy to share insights and ideas. We were able to work together in one of the papers that comprises the present thesis, a very gratifying project in which we had the opportunity of joining our skills. I want to say thank you, Pedro, and wish we can continue to progress towards our goals, as we have.

Continuing with what I thought would be a three-sentences-only acknowledgment session, I will briefly mention other important people I would like and need to acknowledge. In special, my Master's supervisors, Silvia Helena Koller, and Luisa Habigzang. By working with Luisa and Silvia, I could explore risk and protective factors for positive child development for the first time. I would like to thank you for being inspiring and competent professionals, who have also supported me on a personal level, when I moved interstate in Brazil. I carry tender memories of the time we shared together. Hope we can meet again soon.

I need to also mention the family-alike friends I made, whom gave me support and help throughout my personal and professional trajectories. To the friends I met in Australia, Mariah Alves, Bruna Lanzoni, and Christo Johnson: I thank you for your support and companionship. It has made the difference for me.The friends I made when moving to the South of Brazil: Luisa Maciel, Beatriz Cattani, Guilherme Oliveira, Emily Haddad, Jacqueline Giordani, Bruna Wendt. Thank you for being there. To those I met during that distant-dream-like period called undergrad: Giovana Valiati, Claudio Horst, Gustavo Roberto, Iasmyn Cerutti, Natalia Pozzato, Eliane Barcellos, Nara Carneiro, (…). The memories we shared, time cannot erase. I miss you.

To finish what felt like an iconic exercise of gratitude, I want to thank my family. To my brothers Daniel and Danilo, thank you for teaching me from an early age what competition for resources is like. I love you both. And finally, I thank my humble and loving parents. I understand you feel proud of this accomplishment. Thank you for supporting my decision of moving overseas and so fully cheering for my happiness. You have been so understanding of it all, this thesis is for you. Eu amo vocês.

1. Chapter 1: Introduction

1.1. Defining racism

Racism can be defined as a system of beliefs and practices based on the hierarchical segmentation of different groups according to ethnic and racial characteristics. [1, 2]. This system operates through the perpetuation of positions of inferiority and superiority attributed according to ethnic and racial membership. It ascribes better access to important resources and power to privileged groups whilst impairing ethnic-racial minorities' mobility in the social structure [2]. The term ethnic-racial minority is used throughout this thesis as a comprehensive term that encompasses the range of phenotypes, racial socialization experiences, cultural heritages and ancestry that characterizes groups socially defined by their ethnicity and race [3].

The power dynamics of racism presents itself in different levels. At a structural level, racism corresponds to educational, economic, political, and broader social inequalities [4]. Ethnic-racial minorities are disadvantaged in terms of educational attainment, employment opportunities, access to health prevention and care, adequate nutrition, access to civil rights, and political representation [4]. In its interpersonal facet, racism is shown as discriminatory treatment in person to person interactions in the daily lives of ethnic-racial minorities [2]. This discriminatory treatment happens in a spectrum of subtle to overt forms, ranging from avoidance of contact to verbal and physical violence and damaging of property [2, 4]. Experiences of interpersonal racism happens in the home, neighbourhood, school, and work environment, affecting daily life [5]. Ethnic-racial minorities' anticipation of discriminatory encounters and the associated psychological stress can be considered another detrimental aspect of interpersonal racism [2, 5].

Racism can also have an internalized form. This corresponds to the assimilation of negative messages about ethnic-racial groups by its members, impacting self-representation, wellbeing, and influencing one's evaluation of worth and capacity [2, 4]. It can contribute to one's own group devaluation and allocation of effort to adjust to other groups' norms and expectations [2]. The effects of racism are commonly treated as a product of individual choices or resultant from the interaction of unavoidable factors. Nonetheless, the different facets of racism corresponds to the mechanism through which preventable and unfair differences among ethnic-racial groups are constantly created and sustained [2, 4].

1.2. Characterizing the Aboriginal Australian population

Aboriginal Australians and Torres Strait Islanders can be defined as the descendants of inhabitants of the Australian continent and adjacent islands prior to European colonization. They correspond to distinct descent groups who are diverse in language, culture, social organisation, and political systems [6]. Aboriginal Australians are estimated to comprise approximately 3.3% of the Australian population. A total of 798,400 inhabitants self-identified as Aboriginal Australians and/or Torres Strait Islander, according to the 2016 Australian Bureau of Statistics Census [7]. The Aboriginal Australian population lives across the Australian territory – from metropolitan to remote areas. In 2016, over one-third (37%) lived in major cities, whilst 44% lived in inner and outer regional Australia. Around 19% of Aboriginal Australians lived in remote or very remote areas [7]. The Aboriginal population has a younger age-structure than the non-Indigenous population. In 2016, the median age of Aboriginal Australians was 23.0 years whilst that of the non-Indigenous was 37.8 years [7]. This

age-difference derives from higher fertility rates and higher mortality rates among Aboriginal Australians when compared to non-Indigenous people [7, 8].

1.3. Contextualizing the inequalities faced by Aboriginal Australians

Aboriginal Australians face a range of entrenched socioeconomic and health-related disadvantages as a consequence of an historic process of oppression and denial of rights [9]. Colonisation provoked disruptions in Aboriginal societies and economy, and in the ability of Aboriginal persons to develop and support themselves [10,11]. The lack of access to resources and rights, in relation to the broader Australian population, can be observed in almost every socioeconomic indicator [12]. A recent report of the Australian Institute of Health and Welfare (AIHW) described population socioeconomic data from the past decade and established relevant comparisons between the Aboriginal and non-Aboriginal population. Educational attainment rates were lower for Aboriginal Australians when compared to their non-Aboriginal counterparts. Although retention rates for Indigenous students that completed Year 12 rose from 36% in 2001 to 55% in 2013, approximately 43% of Indigenous adults aged 20 and over had completed Year 12 or above in 2012-13 (against 70% in the non-Aboriginal population) [6]. In the same period, the unemployment rate was 21% for Aboriginal Australians aged 15 to 64 years, 4.2 times for the rate of non-Aboriginal Australians [6]. The homelessness rate was 14 times higher, as was the rate of hospitalization for assault. Likewise, the incarceration rate for Aboriginal people was 13 times that of their non-Aboriginal counterparts [6].

A similar pattern of inequalities can be observed in regard to health indicators. Aboriginal mothers were found to be 4 times as likely to have smoked during pregnancy, Aboriginal new-borns were more than twice as likely to have been born with low birth

weight, and Aboriginal children were 1.6 times more likely to be obese between age 2 and fourteen years [6]. Aboriginal adults were 2.7 times more likely to experience high psychological distress, 2.6 times more likely to smoke tobacco daily and 1.6 times more likely to be obese [6]. In 2012-13, 24% of Aboriginal Australians reported their health as fair or poor, with 67% having reported at least one long-term health condition (e.g., respiratory, musculoskeletal, and cardiovascular diseases)[6]. Finally, the estimate of Aboriginal life-expectancy is 13 years lower than that of non-Aboriginals. Furthermore, the Australian Aboriginals' mortality gap is greater than the estimates from other high income countries with disadvantaged Indigenous populations [13].

Of particular concern are the high and increasing rates of self-harm and suicide amongst Aboriginal Australians [6, 14]. The rates of hospitalization due to self-harm among Aboriginal adults, for example, increased by 56% from the early 2000s to 2015 (increasing from 1.7 to 2.6 times the rate of other Australians) [6]. Suicide occurrence among Aboriginals is a health issue that affects both adults and young individuals [14]. Between 2001 and 2006, the suicide rate amongst Aboriginal children under 15 years in the Northern Territory was five times the national rate for non-Aboriginal children. Suicides of youths aged 10 to 17 years increased from 18.8 to 30.1 per 100,000 between 2006 and 2010. The rate for non-Aboriginal Australians decreased in the same period from 4.1 to 2.6 per 100,000 (Legislative Assembly of the Northern Territory, 2012). In the period from 2011 to 2015, data from New South Wales, Queensland, South Australia, Western Australia and the Northern Territory showed that the age-specific death-rate for Aboriginal children aged 5-17 years was 9.3 per 100.000 against 1.8 per 100.000 for the non-Aboriginal community [14].

Indicators of Aboriginal Australian's poor mental health and wellbeing can be observed from an early age. Around 33% of Aboriginal Australians aged 15-24 years

reported having experienced high to very high levels of psychological distress in the past year, compared with 13% among non-Indigenous Australians [6, 8]. Data from the 2014-15 National Aboriginal and Torres Strait Islander Social Survey indicate that 52% of Aboriginal Australians aged 15-24 years reported experiencing 1-2 personal stressors (e.g., not being able to get a job, serious illness, mental illness, overcrowding at home) in the previous 12 months, whilst 13% reported 3 or more [8]. Around 17% reported having experienced physical violence in the past 12 months (21% of those living in remote areas). Suicide together with self-inflicted injuries contributed most to the total burden of disease for Aboriginal Australians aged 10-24 (13%), followed by anxiety disorders (8%), alcohol use-related disorders (7%), and depressive disorder (7%) [8].

1.4. Research Findings on Aboriginal Australians' Experiences of Racism

Aboriginal adults experience episodes of direct discrimination on a regular basis. Research in four Aboriginal communities (two metropolitan and two rural) indicated that 70% of respondents experienced more than 8 racism episodes a year (the average number of experiences was 13.7 episodes). Also alarming is that 92% of participants reported being called by racist names or racially teased, 67% reported being spat at or having something thrown at them and 55% alleged having property vandalised. The episodes were more frequent in shops (67%) and public spaces (59%). In addition, 30% of respondents reported avoiding some daily activity because of fear of discrimination, indicating the profound and sustained way in which racism impacts Aboriginal people's daily lives and personal well-being [15].

Discrimination experienced by Aboriginal children has also been documented [16]. Aboriginal children aged 8 to 12 years worry about experiencing bullying within and

outside school environments due to racist Aboriginal stereotypes [16]. A study based on parental reports showed that 14% of 1239 Aboriginal children aged five to ten years have experienced racial discrimination. Furthermore, 40% of children's primary carers reported being submitted to discriminatory episodes themselves, and 45% stated the same about their extended family members. Further, 31% of respondents characterized the discrimination experience as recurrent [17].

Racism is a frequent experience for Aboriginal people across the lifespan [8, 18]. A survey conducted in 2014-15 described that 7% of Indigenous people aged 10-14 years reported having been treated unfairly in the last 12 months because of their Aboriginal/Torres Strait Islander status. That proportion increased with age, with 34% of 15-24 year-old Aboriginal people experiencing unfair treatment in the same 12-months period. Among those, 69% reported hearing racially-based comments and/or jokes, 56% reported being called names, teased or sworn at and 29% reported not being trusted due to their Aboriginal background. The most common place of occurrence was identified to be school, university, or other educational settings [8]. In a different survey, 52.3% of participants aged 12-26 years reported experiencing racism in the previous 12 months. Among this group, racism was associated with poor overall general health, mental health, and more specifically, increased depression [18]. A third study described that 32% of the 16-20 year-old participants reported having experienced racism [19]. The exposure of both children and caregivers to racism is thought to negatively affect child health and development, as well as youth and adult health and wellbeing [17, 20].

1.5. The impact of racism on health and wellbeing across the lifespan

There is extensive literature linking racism to ethnic-racial minorities' health and wellbeing. International studies from the last 30 years with adult populations demonstrate that experiencing racism is associated with a range of poor physical health outcomes, such as high blood pressure, hypertension, overweight, diabetes, high cholesterol, and low self-rated general health. [21] Racism is also shown to be associated with poor mental health outcomes, such as depression, psychological stress, anxiety, suicide ideation and attempts, and lower levels of self-esteem and sense of control [20, 21]. More specifically to its effects on children's and adolescent's health, a systematic review examining 461 health-related outcomes amongst 121 studies identified that the most commonly reported outcomes were mental health related issues. Consistent associations were identified between race-based discrimination and worst mental health states. Such experiences were significantly associated with higher levels of anxiety, depression, loneliness, hopelessness, stress, social and emotional difficulties, and negative self-esteem [20].

In the Aboriginal Australian context, similar patterns of associations between racism and health are observed [18, 22, 23]. The impact of racism on mental health and wellbeing from an early age is documented. Among Aborignal Australian youth, associations have been noted between racism and poor overall wellbeing and increased depression, anxiety, and suicide risk [19]. Among 3993 Aboriginal children aged 4-17 years in Western Australia, almost a quarter (24%) presented emotional and behavioural difficulties (e.g., emotional difficulties; conduct problems; hyperactivity) with racism being identified as a potential explanatory mechanism [24]. Similarly, analysis of national data from 1239 Aboriginal children aged 5-10 years reports associations

between primary carer and child experiences of racism and child increased emotional difficulties and behavioural problems, sleep difficulties, obesity, and asthma [17]. These findings, however, have not yet precised the effects of racism on more specific symptomatology (.e.g, hyperactivity, conduct problems) or compared effects across specific age-groups [17,24].

These findings suggest that addressing racism needs to be a central component of the research and policy agenda on Indigenous health across the life span [25]. Racism has been argued to be an adverse childhood experience – as poor parent's mental health, parental incarceration, physical abuse, and domestic violence in the household – that can compromise children's wellbeing and positive development [26, 27]. It is plausible that early and recurrent exposure to life stressors can compromise physiology by altering neuroendocrine functions. For example, there may be changes in the stress response system, leading to metabolic alterations that negatively compromise child development and lead to poor physical and mental health outcomes [28]. Another plausible action mechanism is the impact racism can have on mother's wellbeing during pregnancy. Maternal experience of racism is shown to be associated with preterm birth, low birth weight, and small birth weight for gestational age [29-31].

Besides exposing children and their mothers to a psychosocial stressor, racism can indirectly affect child wellbeing through its impact on their mother's mental health [32, 33]. Evidence suggests that mother's experience of racism can affect children's social and emotional development (e.g., increases in child hyperactivity, inhibition/separation problems, conduct problems) via a worsening in maternal mental health [34, 35]. Mothers from minority ethnic-racial backgrounds report experiencing greater parenting stress, resulting from increased levels of structural disadvantage [36]. Stress, in turn, can lead to increases in harsh parenting practices [34, 37]. More specifically, racism-related stress

is linked to mother-child intrusive interactions and decreased maternal sensitivity to child emotional needs at 36-months postpartum [33]. This body of research indicates the need to target reducing racism as a strategy to increase ethnic-minority family's health and wellbeing, and to promote the positive development of ethnic-minority children [38]. Nonetheless, research on the effects of racism on Aboriginal Australian mothers and the knock-on consequences on child upbringing and wellbeing is still limited. To the best of our knowledge, no research has yet addressed the extent of racism experienced during pregnancy and its impact on mother's wellbeing and/or child development.

1.6. Aboriginal Australians conceptions of social and emotional wellbeing and positive child development

The health disparities experienced by Aboriginal Australians and its link to racism is well documented in the literature. Whilst studies linking racism and ill-health are recognised as an important step in promoting better health and wellbeing outcomes for these populations, scholars have advocated for the need to better understand resilience and protective factors in the Indigenous health literature. Whilst recognising the impact of colonization, unresolved grief and trauma, and the current inequalities in Aboriginal Australian communities, scholars [11, 39, 40] have suggested focusing on the resilience showed by Aboriginal communities in preserving their culture and traditions, and advocating for a culturally-oriented approach when promoting Aboriginal Australian's health and social and emotional wellbeing.

The use of the term social and emotional wellbeing has been proposed by Aboriginal Australians as a substitute for 'mental health' as it encompass the Aboriginal holistic conception of health. According to this perspective, health is not

centred on biomedical diagnostic labels, but also encompasses sociocultural and spiritual aspects [11, 39]. The conception of social determinants of health - promulgated by the World Health Organisation - highlights the role of psychosocial conditions on the environments in which development occurs [41]. Its adaptation to the Aboriginal Australian context notes the wellbeing of individuals, families, and communities are highly dependent on their connection to culture and cultural heritage [11, 39]. It involves a sense of community belonging, and connection to spirituality, ancestry, kinship, land, and culture [11, 39]. Maintaining a secure sense of cultural identity (e.g., participating in cultural practices, connection to land and traditional ways of life) is shown to promote resilience and to protect Aboriginal Australians against adversity [39].

Fostering exploration and connection to culture is also a central tenet of the Aboriginal perspectives of child and youth health and wellbeing [40, 42]. Research on Aboriginal Australians conceptions of positive child development points to the centrality of a sense of identification to the Aboriginal Australian culture [40]. The development of self-concept is intertwined with a sense of cultural identity, including a sense of pride about one's Aboriginal identity. Practices cited as important features in promoting cultural identification includes connection to community, kinship, and family respect for elders, connection to country, practice of an Aboriginal language, and involvement in cultural ceremonies and traditions [40]. More specifically, propositions of childhood resilience factors highlights the importance of instilling cultural identity in Aboriginal children. Awareness of the historical oppression Aboriginal people faced, their resilience in preserving their cultural roots and history, and pride about ancestry and cultural belonging were cited as a source of protection to mitigate against adversity [42].

A survey conducted at a national level in 2017 provide examples of the extent of cultural connection in the lives of Aboriginal youths [8]. The study showed that in 2016, 1 in 10 young Indigenous people (10-24 years) spoke an Indigenous language at home. However, almost half of all youth living in remote areas spoke an Indigenous language at home. Among children aged 10 to 14 years, 19% reported to be currently learning an Indigenous language. In addition, 53% of Indigenous youth (10-24 years) identified with an Aboriginal clan, tribal, or language group, 61% were able to recognise their traditional country, and 69% reported having been involved in cultural events in the past year (e.g., cultural ceremonies, events celebrating Aboriginal culture and history, sorry businesses) [8]. As though connection to culture has been pointed as a central tenet of Aboriginal Australians' wellbeing, limited research has examined its developmental pathways [42]. There is also need to expand this line of research to understand whether this sense of identification can promote resilience among Aboriginal Australians.

1.7. Ethnic-racial identity and ethnic minority children's social and emotional wellbeing

The individual perception and feelings about identification to one's ethnic-racial group have been operationalized in the international literature as ethnic-racial identity (ERI) [43]. This sense of identification encompasses different cognitive and affective components [43, 44]. At a cognitive level, it corresponds to knowledge of history, exploration of cultural practices, values attached to ethnic-racial membership, and appraisal of in-group members [45]. Affective components are feelings of pride, affirmation, and commitment towards ethnic-racial identification [43, 44]. These components intersect in shaping ERI and become more complex as individuals age [44, 45]. Nonetheless, ERI can be observed from

childhood. Children as young as five-years demonstrate a level of affiliation, commitment, and preferences based on ethnic-racial membership [46]. Research on cognitive development suggests that during middle childhood children are capable of showing concrete-operational thinking (e.g., multiple classification skills) and acquire the notion of ethnic-racial constancy, or the understanding that ethnicity-race remains constant despite other external changes [47, 48]. It is in this developmental period that socialization processes – including racial socialization – broadens, as children start to explore social environments outside the family, such as school, recreational spaces, sports teams, and the broader community [49].

International research on ERI suggests it can provide a sense of self-understanding and acceptance that can assist ethnic-racial minorities to negotiate external demands and environmental challenges. A positive commitment to ERI is known to contribute to ethnic minorities' positive development. This is a line of research that has encompassed Indigenous young people from different countries. The positive effect of an affirmative ERI is shown in Indigenous youth of the US, New Zealand, and Canada, for example. Among these populations, ERI has been associated with increased self-efficacy, school engagement, academic achievement, psychosocial adjustment, wellbeing, and life satisfaction [50-52]. More specifically to its effects on childhood, positive ERI was found to be associated with increased self-esteem among First-Nation children aged 5-11 years in Canada, which suggests the importance of ERI for self-concept related processes from early in development [53].

Beyond the empirical evidence on the positive effect of ERI on development, research suggests positive ERI can be protective against the effects of adversity. ERI affirmation was shown to be protective against the effects of racial

discrimination on depressive symptoms and self-esteem among Mexican-American and Native American adolescents [54]. This protective effect was observed to extend to early developmental periods. For example, commitment to ERI was shown to buffer the effects of perceived-discrimination on behavioural adjustment among Black and Latin-American 7-year olds [55]. This was particularly salient for internalizing problems (e.g., withdrawing, depressive symptoms, anxiety) [55]. ERI's protective role was also observed for the effects of racism on externalizing (e.g., hyperactivity, aggression) and internalising problems among 4-5year old Mexican and Dominican American children [56].

Despite initial evidence of the protective role of ERI for ethnic-minority children and the relevance of a sense of pride and commitment to culture among Aboriginal Australians, little research has examined the role of ERI in the social and emotional wellbeing of Aboriginal Australian children [41, 42]. The studies that comprise this thesis aim to overcome this literature gap and contribute evidence of the effects of racism – and the role of ERI – on the developmental wellbeing of Aboriginal Australians from early ages.

1.8. Measuring Ethnic-Racial Identity: Limitations of research in the Aboriginal Australian context

The exploration of the meaning of ERI changes as children mature, with different domains considered [45]. ERI domains can be divided into the areas of development and content [43]. ERI development refers to the degree of exploration of history, cultural practices, and meaning of ethnic-racial belonging, leading to a state of resolution and commitment to one's ERI [43, 57]. The ERI content aspect

refers to the centrality – or salience – of ERI for one's self-concept and the valence, or attitudes, including a sense of affirmation towards one's ERI [43, 44].

Scholars have argued that ERI processes and attitudes can be combined in different ways [58], with a sense of commitment to one's ERI not necessarily implying positive attitudes. Indeed, one can achieve resolution in terms of understanding group belonging, but this might not have a positive impact on self-esteem [57]. One of the main criticisms made by scholars in the ERI field is the lack of specification about which ERI domain is being assessed [43, 58]. In this manner, understanding the components separately is an important step in differentiating pathways in ERI development and the relationship between different degrees of identification and related-attitudes towards membership [43].

There is limited availability of validated tools examining the ERI concept in Aboriginal Australian children. Although considered a central component for Aboriginal children's development and wellbeing [42], there is only one tool developed to assess Aboriginal children's ERI [59]. Developed to assess ERI and self-esteem among Aboriginal 8 to 12-year-olds from rural, regional, and urban Western Australia, the measure presents some limitations. The psychometric analysis of the scale provides evidence for subdomains involving knowledge and salience of both Aboriginal culture and ERI. The scale focuses on knowledge of Aboriginal cultural practices and salience of ERI for child self-concept, with no clear specification of an attitudinal domain that informs children's feelings about their ERI [59]. In summary, it is necessary to providence reliable and valid measures of ERI attitudes in Aboriginal Australian children. This would enable a more precise understanding of the role of ERI attitudes to child positive adjustment and wellbeing, independently of their degree of exploration of ERI.

1.9. References

1. Bonilla-Silva E. Rethinking racism: toward a structural interpretation. Am Sociol Rev. 1997;62:465-80. doi: 10.2307/2657316.
2. Berman G, Paradies Y. Racism, disadvantage and multiculturalism: towards effective anti-racist praxis. Ethnic and Racial Studies. 2010:1-19. doi: 10.1080/01419870802302272.
3. Cross WE, Cross TB. Theory, research, and models. In: Quintana SM, McKown C, editors. Handbook of race, racism, and the developing child. Hoboken, NJ, US: John Wiley & Sons Inc; 2008. pp. 154-81.
4. Jones CP. Levels of Racism - A theoretical framework and a Gardner's tale. In: LaVEIST TA, editor. A public health reader - Race, ethnicity and health. San Francisco, CA: Jossey-Bass; 2002. pp. 311-8.
5. Ferdinand, Paradies Y, Kelaher M. Mental health impacts of racial discrimination in Australian culturally and linguistically diverse communities: a cross-sectional survey. BMC Public Health. 2015;15:401. doi: 10.1186/s12889-015-1661-1.
6. Australian Institute of Health and Welfare 2015. The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2015. Cat. no. IHW 147. Canberra:AIHW.
7. Australian Bureau of Statistics. Estimates of Aboriginal and Torres Strait Islander Australians, June 2016. 2018 Sept 17. In; Australian Bureau of Statistics [Internet]. Available from: https://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001.

8. Australian Institute of Health and Welfare 2018. Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018: in brief. Cat. no. IHW 198. Canberra: AIHW.
9. Walter M, Saggers S. Poverty and Social Class. In: Carson B, Dunbar T, Chenhall R, Bailie R, editors. Social determinants of Indigenous health. Australia: Allen & Unwin; 2007. pp. 87-104.
10. Smith LR. The Aboriginal population of Australia. Canberra: Australian National University Press; 1980.
11. Zubrick SR, Shepherd C, Dudgeon P, Gee G, Paradies Y, Scrine C, et al. Social determinants of social and emotional wellbeing for Aboriginal Australians. In: Dudgeon P, Milroy H, Walker R, editors. Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice. Canberra: Australian Government, Department of The Prime Minister and Cabinet; 2014. pp. 93-112.
12. Wilson T. The future of Australia's Indigenous Population, 2011-61. Population Studies (Camb). 2016;70(3):311-26. doi: 10.1080/00324728.2016.1224372.
13. Hill K, Barker B, Vos T. Excess Indigenous mortality: are Indigenous Australians more severely disadvantaged than other Indigenous populations? Int J Epidemiol. 2007;36(3):580-9. doi: 10.1093/ije/dym011.
14. Australian Bureau of Statistics. Causes of death, Australia, 2015. 2018 Sept 25. In: Australian Bureau of Statistics [Internet]. Available from: https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/3303.0~2015~Main%20Features~Intentional%20self-harm%20in%20Aboriginal%20and%20Torres%20Strait%20Islander%20people~9.

15. Ferdinand ZZ, Paradies Y, Kelaher M. Mental health impacts of racial discrimination in Victorian Aboriginal communities - The Localities Embracing and Accepting Diversity (LEAD) Experiences of Racism Survey. Melbourne: The Lowitja Institute, 2013.
16. Priest N, Thompson L, Mackean T, Baker A, Waters E. 'Yarning up with Koori kids' - hearing the voices of Australian urban Indigenous children about their health and well-being. Ethn Health. 2017;22(6):631-47. doi: 10.1080/13557858.2016.1246418.
17. Shepherd C, Li J, Cooper MN, Hopkins KD, Farrant BM. The impact of racial discrimination on the health of Australian Indigenous children aged 5-10 years: analysis of national longitudinal data. Int J Equity Health. 2017;16(1):116. doi: 10.1186/s12939-017-0612-0.
18. Priest N, Paradies Y, Stewart P, Luke J. Racism and health among urban Aboriginal young people. BMC Public Health. 2011;11(568):1-9. doi: 10.1186/1471-2458-11-568.
19. Priest N, Paradies Y, Gunthorpe W, Cairney S, Sayers S. Racism as a determinant of social and emotional wellbeing for Aboriginal Australian youth. Med J Aus. 2011;194(10):546-50. doi: 10.5694/j.1326-5377.2011.tb03099.x.
20. Priest N, Paradies Y, Trenerry B, Truong M, Karlsen S, Kelly Y. A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. Soc Sci Med. 2013;95:115-27. doi: 10.1016/j.socscimed.2012.11.031.
21. Paradies Y, Ben J, Denson N, Elias A, Priest N, Pieterse A, et al. Racism as a Determinant of Health: A Systematic Review and Meta-Analysis. PLoS One. 2015;10(9):e0138511. doi: 10.1371/journal.pone.0138511.

22. Kelaher MA, Ferdinand AS, Paradies Y. Experiencing racism in health care: the mental health impacts for Victorian Aboriginal communities. Med J Aust. 2014;201(1):44-7.
23. Priest N, Perry R, Ferdinand A, Kelaher M, Paradies Y. Effects over time of self-reported direct and vicarious racial discrimination on depressive symptoms and loneliness among Australian school students. BMC Psychiatry. 2017;17(1):50. doi: 10.1186/s12888-017-1216-3.
24. Shepherd C, Li J, Mitrou F, Zubrick SR. Socioeconomic disparities in the mental health of Indigenous children in Western Australia. BMC Public Health. 2012;12:756. doi: 10.1186/1471-2458-12-756.
25. Paradies Y, Harris R, Anderson I. The impact of racism on Indigenous health in Australia and Aotearoa: Towards a research agenda. Darwin: Cooperative Research Centre for Aboriginal Health, 2008.
26. Hunt TKA, Slack KS, Berger LM. Adverse childhood experiences and behavioral problems in middle childhood. Child Abuse Negl. 2017;67:391-402. doi: 10.1016/j.chiabu.2016.11.005.
27. Finkelhor D, Shattuck A, Turner H, Hamby S. A revised inventory of Adverse Childhood Experiences. Child Abuse Negl. 2015;48:13-21. doi: 10.1016/j.chiabu.2015.07.011.
28. Yam KY, Naninck EF, Schmidt MV, Lucassen PJ, Korosi A. Early-life adversity programs emotional functions and the neuroendocrine stress system: the contribution of nutrition, metabolic hormones and epigenetic mechanisms. Stress. 2015;18(3):328-42.

29. Alhusen JL, Bower KM, Epstein E, Sharps P. Racial Discrimination and Adverse Birth Outcomes: An Integrative Review. J Midwifery Womens Health. 2016;61(6):707-20. doi: 10.1111/jmwh.12490.
30. Dominguez TP, Dunkel-Schetter C, Glynn LM, Hobel C, Sandman CA. Racial differences in birth outcomes: the role of general, pregnancy, and racism stress. Health Psychol. 2008;27(2):194-203. doi: 10.1037/0278-6133.27.2.194.
31. Giscombe CL, Lobel M. Explaining disproportionately high rates of adverse birth outcomes among African Americans: the impact of stress, racism, and related factors in pregnancy. Psychol Bull. 2005;131(5):662-83. doi: 10.1037/0033-2909.131.5.662.
32. Heldreth C, C. G, Wong LH, Schetter CD, Shapiro JR, Schafer P, et al. Childhood racism experiences and postpartum depressive symptoms in African American mothers. J Soc Clin Psychol. 2016;35(10):840-64. doi: 10.1521/jscp.2016.35.10.840.
33. Zeiders KH, Umana-Taylor AJ, Jahromi LB, Updegraff KA, White RM. Discrimination and Acculturation Stress: A Longitudinal Study of Children's Well-Being from Prenatal Development to 5 Years of Age. J Dev Behav Pediatr. 2016;37(7):557-64. doi: 10.1097/DBP.0000000000000321.
34. Becares L, Nazroo J, Kelly Y. A longitudinal examination of maternal, family, and area-level experiences of racism on children's socioemotional development: Patterns and possible explanations. Soc Sci Med. 2015;142:128-35. doi: 10.1016/j.socscimed.2015.08.025.
35. Rosenthal L, Earnshaw VA, Moore JM, Ferguson DN, Lewis TT, Reid AE, et al. Intergenerational Consequences: Women's Experiences of Discrimination in Pregnancy Predict Infant Social-Emotional Development at 6 Months and 1

Year. J Dev Behav Pediatr. 2018;39(3):228-37. doi: 10.1097/DBP.0000000000000529.

36. Nomaguchi K, House AN. Racial-ethnic disparities in maternal parenting stress: the role of structural disadvantages and parenting values. J Health Soc Behav. 2013;54(3):386-404. doi: 10.1177/0022146513498511.

37. Simons RL, Murry V, McLoyd V, Lin K, Cutrona C, Conger RD. Discrimination, crime, ethnic identity, and parenting as correlates of depressive symptoms among African American children: A multilevel analysis. Dev Psychopathol. 2002;14:371-93. doi: https://doi.org/10.1017/S0954579402002109.

38. Paradies Y, Chandrakumar L, Klocker M, Frere M, Webster K, Burrell M, et al. Building on our strengths - A framework to reduce race-based discrimination and support diversity in Victoria. Full Report. Melbourne: Victorian Health Promotion Foundation, 2009.

39. Ypinazar VA, Margolis SA, Haswell-Elkins M, Tsey K. Indigenous Australians' understandings regarding mental health and disorders. Aust N Z J Psychiatry. 207;41(6). doi: 10.1080/00048670701332953.

40. Priest N, Mackean T, Davis E, Briggs L, Waters E. Aboriginal perspectives of child health and wellbeing in an urban setting: developing a conceptual framework. Health Soc Rev. 2014;21(2):180-95. doi: 10.5172/hesr.2012.21.2.180.

41. CSHD (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva, World Health Organisation.

42. Young C, Tong A, Nixon J, Fernando P, Kalucy D, Sherriff S, et al. Perspectives on childhood resilience among the Aboriginal community: an interview study. Aust N Z J Public Health. 2017;41(4):405-10. doi: 10.1111/1753-6405.12681.
43. Schwartz SJ, Syed M, Yip T, Knight GP, Umana-Taylor AJ, Rivas-Drake D, et al. Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. Child Dev. 2014;85(1):58-76. doi: 10.1111/cdev.12201.
44. Ashmore RD, Kay D, McLaughlin-Volpe T. An organizing framework for collective identity: articulation and significance of multidimensionality. Psychol Bull. 2004;130(1):80-114. doi: 10.1037/0033-2909.130.1.80.
45. Phinney JS, Ong AD. Conceptualization and measurement of ethnic identity: Current status and future directions. J Couns Psychol. 2007;54(3):271-81. doi: 10.1037/0022-0167.54.3.271.
46. Corenblum B, Armstrong HD. Racial-ethnic identity development in children in a racial-ethnic minority group. Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement. 2012;44(2):124-37. doi: 10.1037/a0027154.
47. Corenblum B. Development of racial-ethnic identity among First Nation children. J Youth Adolesc. 2014;43(3):356-74. doi: 10.1007/s10964-013-0007-5.
48. Aboud FE. Social and Cognitive Bases of Ethnic Identity Constancy. The Journal of Genetic Psychology. 1984;145(2):217-29. doi: 10.1080/00221325.1984.10532269.

49. Hughes DL, Watford JA, Del Toro J. A transactional/ecological perspective on ethnic-racial identity, socialization, and discrimination. In: Horny S, Ruck M, Liben L, editors. Equity and justice in developmental science: implications for young people, families, and communities: Academic Press; 2016. pp. 1-41.
50. Jaramillo J, Mello ZR, Worrell FC. Ethnic Identity, Stereotype Threat, and Perceived Discrimination Among Native American Adolescents. J Res Adolesc. 2016;26(4):769-75. doi: 10.1111/jora.12228.
51. Williams AD, Clark TC, Lewycka S. The associations between cultural identity and mental health outcomes for Indigenous Maori youth in New Zealand. Front Public Health. 2018;6:319. doi: 10.3389/fpubh.2018.00319.
52. Jones M, Galliher RV. Ethnic identity and psychological functionning in Navajo adolescents. J Res Adolesc. 2007;17(4):683-96. doi: 10.1111/j.1532-7795.2007.00541.x.
53. Corenblum B. Relationships between racial-ethnic identity, self-esteem and in-group attitudes among First Nation children. J Youth Adolesc. 2014;43(3):387-404. doi: 10.1007/s10964-013-0081-8.
54. Romero AJ, Edwards LM, Fryberg SA, Orduña M. Resilience to discrimination stress across ethnic identity stages of development. J Appl Soc Psychol. 2014;44(1):1-11. doi: 10.1111/jasp.12192.
55. Serrano-Villar M, Calzada EJ. Ethnic identity: evidence of protective effects for young, Latino children. J Appl Dev Psychol. 2016;42:21-30. doi: 10.1016/j.appdev.2015.11.002.
56. Marcelo AK, Yates TM. Young children's ethnic-racial identity moderates the impact of early discrimination experiences on child behavior problems. Cultur Divers Ethnic Minor Psychol. 2019;25(2):253-65. doi: 10.1037/cdp0000220.

57. Umaña-Taylor AJ, Yazedjian A, Bámaca-Gómez M. Developing the Ethnic Identity Scale using Eriksonian and Social Identity perspectives. Identity. 2004;4(1):9-38. doi: 10.1207/s1532706xid0401_2.

58. Umana-Taylor AJ, Gonzales-backen MA, Guimond AB. Latino adolescents' ethnic identity: is there a developmental progression and does growth in ethnic identity predict growth in self-esteem? Child Dev. 2009;80(2):391-405. doi: 10.1111/j.1467-8624.2009.01267.x.

59. Kickett-Tucker CS, Christensen D, Lawrence D, Zubrick SR, Johnson DJ, Stanley F. Development and validation of the Australian Aboriginal racial identity and self-esteem survey for 8-12 year old children (IRISE_C). Int J Equity Health. 2015;14:103. doi: 10.1186/s12939-015-0234-3.

2. Chapter 2: Scope of the Thesis

2.1. Aims and Expected Contributions

The thesis presented herein comprises four studies. The research questions were formulated with the aim of addressing gaps identified in the research on racism and Aboriginal children and their families' social and emotional wellbeing. I expanded this line of research to explore ERI as a potential resilience factor for the association between racism and wellbeing. The studies were based on data from different sources, to maximise the ability to answer the research questions. The data sources used in the thesis are presented in the following section.

2.2. The South Australian Aboriginal Birth Cohort Study (SAABCS): Associated studies

The SAABCS started in 2011 at the Indigenous Oral Health Unit – Australian Research Centre for Population Oral Health, University of Adelaide. The study is coordinated by Professor Lisa M. Jamieson, main supervisor of this PhD thesis. The SAABCS was originally developed as an intervention-study to reduce the burden of early childhood caries among a cohort of 446 South-Australian Aboriginal children [1]. It aimed to improve mother's literacy regarding oral health and applied motivational interviewing to change mother's sense of efficacy in managing children's oral health. To achieve the desired outcomes, the intervention started during pregnancy [1]. An Indigenous reference group provided critical feedback on SAABCS project design and data collection procedures, particularly data pertaining to social determinants of health among Aboriginal Australians, including experiences of racism and mental health [1]. Ethics approval for the SAABCS and the data collection questionnaire are included in Appendix I and II, respectively.

The first study of this thesis is entitled "Racism, stress, and sense of control among Aboriginal Australian pregnant women". It aimed to expand the research on racism experienced by Aboriginal Australians during pregnancy, a sensitive period of development for mothers and their children. Studies have shown that experiences of stress during pregnancy can affect mothers' mental health and, potentially, parenting abilities and child development [2, 3]. To the best of our knowledge, no study has yet explored the effects of racism on Aboriginal Australian pregnant women's mental health and wellbeing. The aim of this first study was thus to characterize levels of racism experienced by Aboriginal pregnant women and verify its association with stress and sense of personal control. More specifically, it aimed to identify if racism would increase mothers' stress levels and reduce their perception of being able to influence life events. This research question intended to further contribute to the literature on the deleterious effects of racism on Aboriginal Australian's lives. These findings would contribute evidence for understanding the intergenerational effect of racism on this population. This study has been published in the Australian Psychologist journal [4].

2.3. Footprints in Time: The Longitudinal Study of Indigenous Children (LSIC): Associated studies

The LSIC is a national study including over a thousand Aboriginal children residing all across the Australian territory [5]. It started in 2008, initiated and funded by the Australian Government Department of Social Services (DSS). LSIC applies a cross-sequential design encompassing two cohorts of children. The B-Cohort (or Baby-Cohort) comprises children who were 0.5 to 2 years when collection started, having been born between December 2006 and November 2007. The K-Cohort (Child-Cohort) is composed by children born between December 2003 and November 2004, aged 3.5 to 5 years at baseline [5]. LSIC collects information on a range of determinants of child

health, wellbeing, and development. Its aim is to identify how early life events can shape developmental trajectories of Aboriginal children. The study is conducted annually. Data from waves 1 to 9 can be accessed under a signed deed of license and authorization from the Australian Government DSS. Data from waves 1 to 8 only were used in the studies included herein. These were the waves available at the time of study design and analysis. Information on 1,617 children was obtained in wave 1, with participants' retention rate ranging between 86% and 89% across all 8 waves [6].

LSIC is a pioneering study in covering social determinants of health and wellbeing among Aboriginal children, including experiences of racism and ERI [5, 7]. It is also the first study to include a broad range of the socioeconomic and community environments where Aboriginal Australian children live, having involved participants from very remote communities to metropolitan cities [5]. Data were collected through questionnaire-guided interviews conducted by trained Aboriginal and Torres Strait Islander Research Administration Officers from multiple informants (e.g., study child main caregiver, main caregiver's partner, study child, study child teacher). The study design and selection of data collection procedures involved consulting with Aboriginal community stakeholders and researchers with expertise on the topic of Aboriginal children's health and development [7].

Due to its rigorous methodological design and the suitability of the LSIC for my doctoral research, I applied for authorization to access the LSIC data waves 1-8. The LSIC documents, data collection forms, and data sets obtained were carefully examined. From there, the original research proposal was refined into the three studies included in the present thesis (chapters 2, 3, and 4). The individual deed of license for accessing LSIC Wave 8.1 data release is included in Appendix III. The LSIC participants' questionnaires are not included as appendices as access to LSIC

documentation is subject to DSS approval and copyright and confidentiality restrictions apply.

The second paper presented in this thesis is entitled “Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children”, published in the international Journal for Equity in Health [8]. The aim of this work was to test the association of racism and Aboriginal children’s social and emotional wellbeing. I conducted separate analyses for the associations in the two different aged cohorts, as they had different opportunities of being exposed to racism, and due to potential developmental differences in the onset of symptoms. A meta-analytical technique was then used to generate an overall effect-measure for the effect of interest. This research design allowed me to maximize the longitudinal potential of the data. It is a current limitation of the literature that associations between racism and wellbeing are mostly based on cross-sectional data [9].

Herein, longitudinal data was used to explore the association between racism and Aboriginal children’s social and emotional wellbeing one-to-two years after exposure was reported. Data also allowed for analysis of the impact of racism on five domains of social and emotional wellbeing (SEWB), as informed by the Strengths and Difficulties Questionnaire (SDQ): hyperactivity, conduct problems, emotional difficulties, peer problems, and a total score for emotional and behavioural difficulties. The expected contribution of testing the hypothesis that racism would impact child SEWB one-to-two years after exposure was to suggest that the deleterious effects of racism potentially persist over time, affecting key childhood developmental stages. Another aim was to identify the impact on different SEWB domains, as to explore potential nuances in the onset of symptoms. Age-related differentes were also investigated, aiming to examine if symptoms would differ among age groups. These

results could potentially inform early symptoms identification and facilitate development of timely intervention.

The third study is entitled “Ethnic-racial identity affirmation: validation in Aboriginal Australian children”. This study was published in PLOS ONE [10]. Information available in LSIC on Aboriginal children’s attitudes towards ERI was used in the analysis. I contacted the LSIC research team to obtain information on publications informing on the development of the ERI items used and any validation tests to inform on the scale psychometric properties. I was informed that the original items had been developed to assess cultural and Aboriginal educational strategies [11]. No analysis on the validity and reliability of the ERI items had yet been conducted or published. To verify the ERI validity was a step necessary to contribute with the evidence that the LSIC measures were methodologically sound and to provide evidence on the reliability of results for the next study planned, which was going to be based on the ERI information.

The study goal was to verify the psychometric properties of the items used in LSIC as a brief measure of an attitudinal component of ERI in Aboriginal Australian children aged 10-12 years. It was proposed that the items would fit a unidimensional model as they were hypothesized to represent a single construct, nominated as ERI affirmation. The study aimed to provide evidence of construct validity (e.g., the items are associated under a common factorial structure, corresponding to the number of constructs they are designed to represent), criterion-validity (e.g., the items are associated with other constructs/outcomes in the expected direction) , and reliability (.e.g, the degree to which a scale produces stable/consistent measures).

Confirmatory Factor Analysis was used to verify if the data would fit a unidimensional factorial structure, providing evidence of construct validity. Reliability was assessed by analyzing the ordinal α and hierarchical α. Construct validity was assessed by exploring the association of ERI, as measured by the scale, and children's social and emotional development. Measurement invariance according to sex was also tested, to assure that the scale would work similarly among boys and girls. Recommendations of scholars on ERI assessment [12] were followed, by clearly specifying the ERI domain being assessed (ERI attitudes). The main expected contribution of this study was to provide evidence that the LSIC items work as a valid and reliable measure of ERI attitudes among Aboriginal Australian children. Future users of LSIC data would then be able to use the questions with confidence. The findings would also allow for confident use of the measure in future studies with Aboriginal children of similar age.

The final study is entitled "Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children?" [13]. This study was published in PLOS ONE. Data from waves 6 to 8 of LSIC were used to verify if ERI affirmation could modify the longitudinal association between racism and children's wellbeing. The association tested was longitudinal, which is an advancement in the field of ERI research. By hypothesizing that the observed effects of racism would be reduced among children with higher levels of ERI affirmation, the findings could provide evidence that promoting ERI affirmation might assist Aboriginal children to cope with racism in a more adaptive manner. Additionally, to verify if the effect of racism on wellbeing would vary per strata of ERI, a novel methodological approach - effect-measure modification analysis – was used. This approach allows for comparisons of the size of the effect-measures (in this case, risk ratios) among levels of exposure to

racism and ERI. The method is epidemiologically correct and overcomes the limitations of methods based on dichotomous interpretation of statistical significance [14, 15] .

The main expected contribution of this final study was to identify resilience factors against adversity, specifically racism, a common experience among Aboriginal Australians across the life span. This study intended to contribute with the evidence of the importance of a sense of commitment and connection to culture and ethnicity for the development and wellbeing of Aboriginal Australian children, to reinforce the Aboriginal claim of their rights of preserving and promoting cultural bonds. To the best of my knowledge, this is the first study to examine the protective role of ERI on the effects of racism on Aboriginal child social and emotional wellbeing.

2.4.Overall aims

The scope of the present thesis is to examine the impact of racism on Aboriginal children's and their caregiver's wellbeing. The research questions were designed with the aim of overcoming gaps in the literature. The specific aims of the present body of work are: 1) to examine the association between racism and Aboriginal pregnant women's mental health and wellbeing; 2) to explore associations between racism and different domains of social and emotional wellbeing of Aboriginal Australian children using longitudinal data; 3) to test the psychometric properties of a measure of Aboriginal children's ERI attitudes; and 4) to explore whether ERI offers some resilience for Aboriginal children exposed to racism. All research findings have been peer-reviewed and accepted for publication.

A study conducted in parallel with the present thesis is also attached (Appendix IV). The study proposed to validate a measure of attitudes towards multiculturalism based on data from 2,714 Australian adults participating in the National Dental

Telephone Interview Survey (NDTIS). As this was a parallel study not specifically related to Aboriginal Australian's SEWB, its findings are not discussed in relation to the main body of work that comprises this thesis. It is attached to illustrate efforts to collaborate with other researchers and expand my research skills. The scope of the study – attitudes towards multiculturalism – is considered to intersect with the concept of racism, which is of fundamental importance for the present thesis.

2.5.References

1. Merrick J, Chong A, Parker E, Roberts-Thomson K, Misan G, Spencer J, et al. Reducing disease burden and health inequalities arising from chronic disease among Indigenous children: an early childhood caries intervention. BMC Public Health. 2012;12:1-6. doi: 10.1186/1471-2458-12-323.
2. Rosenthal L, Earnshaw VA, Moore JM, Ferguson DN, Lewis TT, Reid AE, et al. Intergenerational Consequences: Women's Experiences of Discrimination in Pregnancy Predict Infant Social-Emotional Development at 6 Months and 1 Year. J Dev Behav Pediatr. 2018;39(3):228-37. doi: 10.1097/DBP.0000000000000529.
3. Becares L, Nazroo J, Kelly Y. A longitudinal examination of maternal, family, and area-level experiences of racism on children's socioemotional development: Patterns and possible explanations. Soc Sci Med. 2015;142:128-35. doi: 10.1016/j.socscimed.2015.08.025.
4. Macedo DM, Smithers LG, Roberts RM, Jamieson LM. Racism, stress, and sense of personal control among Aboriginal Australian pregnant women. Aust Psychol. 2019. doi: 10.1111/ap.12435.
5. Footprints in Time: The Longitudinal Study of Indigenous Children - Data user guide, Release 9.0. Department of Social Services, 2018.
6. Footprints in Time - The Longitudinal Study of Indigenous Children [Internet]. Department of Social Services; 2019 [2019 May 14]. Available from: https://www.dss.gov.au/about-the-department/publications-articles/research-publications/longitudinal-data-initiatives/footprints-in-time-the-longitudinal-study-of-indigenous-children-lsic#1.

7. Salmon M, Skelton F, Thurber KA, Bennetts Kneebone L, Gosling J, Lovett R, et al. Intergenerational and early life influences on the well-being of Australian Aboriginal and Torres Strait Islander children: overview and selected findings from Footprints in Time, the Longitudinal Study of Indigenous Children. J Dev Orig Health Dis. 2018:1-7. doi: 10.1017/S204017441800017X.
8. Macedo DM, Smithers LG, Roberts RM, Paradies Y, Jamieson LM. Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children. Int J Equity Health. 2019;18(1):132. doi: 10.1186/s12939-019-1036-9.
9. Paradies Y, Ben J, Denson N, Elias A, Priest N, Pieterse A, et al. Racism as a Determinant of Health: A Systematic Review and Meta-Analysis. PLoS One. 2015;10(9):e0138511. doi: 10.1371/journal.pone.0138511.
10. Macedo DM, Santiago PR, Roberts RM, Smithers LG, Paradies Y, Jamieson LM. Ethnic-racial identity affirmation: Validation in Aboriginal Australian children. PLoS One. 2019;14(11):e0224736. doi: 10.1371/journal.pone.0224736.
11. Craven RG, Alex Y, Munns G, Bodkin-Andrews G, Nida D, O'Rourke V. Seeding success for Aboriginal primary students. Centre for Positive Psychology and Education and NSW Aboriginal Education Consultative Group, 2016.
12. Schwartz SJ, Syed M, Yip T, Knight GP, Umana-Taylor AJ, Rivas-Drake D, et al. Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. Child Dev. 2014;85(1):58-76. doi: 10.1111/cdev.12201.
13. Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM. Does ethnic-racial identity modify the effects of racism on the social and

emotional wellbeing of Aboriginal Australian children? PLoS One. 2019;14(8):e0220744. doi: 10.1371/journal.pone.0220744.

14. Knol MJ, VanderWeele TJ. Recommendations for presenting analyses of effect modification and interaction. Int J Epidemiol. 2012;41(2):514-20. doi: 10.1093/ije/dyr218.
15. Greenland S, Senn SJ, Rothman KJ, Carlin JB, Poole C, Goodman SN, et al. Statistical tests, P values, confidence intervals, and power: a guide to misinterpretations. Eur J Epidemiol. 2016;31(4):337-50. doi: 10.1007/s10654-016-0149-3

3. Chapter 3: Racism, stress, and sense of personal control among Aboriginal Australian pregnant women

3.1. Highlights

- The results confirm previous evidence that racism is experienced within the community and extends the evidence to the period of pregnancy. Aboriginal pregnant women reported experiencing racism in different settings where they perform their daily activities, demonstrating that racism is a pervasive experience that affects Aboriginal Australians in different developmental periods.

  Racism was associated with stress and sense of personal control in Australian Aboriginal pregnant women, which impacts on mental health and wellbeing.

- Microsocial policies are necessary to buffer the effects of racism on the Aboriginal Australian community whilst macrosocial policies are required to be designed and implemented to reduce racism in Australian society more generally.

3.2. Statement of Authorship

Statement of Authorship

Title of Paper	Racism, stress, and sense of personal control among Aboriginal Australian pregnant women
Publication Status	☑ Published ☐ Accepted for Publication ☐ Submitted for Publication ☐ Unpublished and Unsubmitted w ork w ritten in manuscript style
Publication Details	Macedo DM, Smithers LG, Roberts RM, Jamieson LM. Racism, stress, and sense of personal control among Aboriginal Australian pregnant women. Aust Psychol. 2019. doi: 10.1111/ap.12435.

Principal Author

Name of Principal Author (Candidate)	Davi Manzini Macedo		
Contribution to the Paper	Conceiving of research question Data Analysis Manuscript Writing Editing and revisions Paper submission for publication Correspondence with Editors in the publication process		
Overall percentage (%)	75%		
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	01/12/2019

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Lisa G. Smithers		
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in data analysis procedures Input in interpretation of results Revision of manuscript		
Signature		Date	01/12/2019

Name of Co-Author	Rachel M. Roberts

Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript		
Signature		Date	5/12/19

Name of Co-Author	Lisa M. Jamieson		
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript		
Signature		Date	01/12/2019

3.3. Published paper: Racism, stress, and sense of personal control among Aboriginal Australian pregnant women

Citation: Macedo DM, Smithers LG, Roberts RM, Jamieson LM. Racism, stress, and sense of personal control among Aboriginal Australian pregnant women. Aust Psychol. 2019. doi: 10.1111/ap.12435.

Received: 4 October 2018 | Revised: 23 July 2019 | Accepted: 5 September 2019

DOI: 10.1111/ap.12435

ORIGINAL ARTICLE

Australian Psychologist WILEY

Racism, stress, and sense of personal control among Aboriginal Australian pregnant women

Davi M. Macedo[1] | **Lisa G. Smithers**[2] | **Rachel M. Roberts**[3] | **Lisa M. Jamieson**[1]

[1]School of Dentistry, University of Adelaide, Adelaide, South Australia, Australia

[2]School of Public Health, University of Adelaide, Adelaide, South Australia, Australia

[3]School of Psychology, University of Adelaide, Adelaide, South Australia, Australia

Correspondence
Davi M. Macedo, ARCPOH, AHMS Building Level 9, University of Adelaide, North Terrace, Adelaide, SA 5005, Australia.
Email: davi.manzinimacedo@adelaide.edu.au

Abstract

Objectives: To characterise racism experiences in the past year and to investigate a causal association between racism, stress, and sense of personal control in a sample of pregnant South Australian Aboriginal women.

Methods: Data was from the baseline sample of 369 Aboriginal women participating in a randomised controlled trial to prevent early caries in children. Data on demographics, racism experiences, stress, sense of personal control, and health behaviours were collected through interview-guided questionnaires. Linear regression modelling was used to test the association between racism and stress and sense of personal control in separate models. The final models presented were adjusted for confounding.

Results: Participant mean age was 24.7 years (*SD* ±0.30; Min–Max: 14–43 years). Almost two-thirds (64.7%) resided in rural and regional areas and the highest educational attainment for almost three-quarters (73.7%) was high school or less. Nearly half (48.3%) reported at least one experience of racism in the previous year and almost one third (31.8%) reported racism occurring in a public setting. The adjusted regression coefficients for the effect of racism on stress and sense of personal control were respectively 0.61 (95% confidence interval [CI] 0.28, 0.93) and −0.36 (95% CI −0.68, −0.04).

Conclusions: Our findings contribute with evidence that racism is one of the psychosocial causes of poor mental health among Aboriginal Australians. Culturally sensitive and safe mental health interventions may be beneficial in buffering racism effects during pregnancy. Societal-level policies aimed at both naming and reducing institutionalised racism against Aboriginal Australian Aboriginals are necessary.

KEYWORDS

Aboriginal Australians, Indigenous, pregnancy, racism, sense of personal control, stress

Racism can be defined as a systemic set of beliefs, attitudes and practices based on ethnic-racial differences. It results in the oppression of citizens due to ethnic-racial membership and maintenance of other racial groups' privileged position (Berman & Paradies, 2010). At an institutional level, racism might result in inequalities in accessing education, employment, political representation, and health and socioeconomic resources. Personal interactions might also be

In beloved memory of Uncle Tauto Sansbury, esteemed friend and mentor.

influenced by racially determined stereotypes and prejudice, as well as ethno-racial minorities' sense of self-worth and capacity (Berman & Paradies, 2010; Jones, 2002). The different manifestations of racism are both a result of a historical process of exclusion and contemporary factors that contribute to the perpetuation of inequalities (Berman & Paradies, 2010). In Australia, the cumulative effect of a historic process of oppression of Australian Aboriginal people has resulted in entrenched socioeconomic inequalities between the Aboriginal and non-Aboriginal population (Walter & Saggers, 2007).

Aboriginal Australian's experiences of racism are persistent, and can be repeatedly observed in multiple points across time (Shepherd, Li, Cooper, Hopkins, & Farrant, 2017). Racism experience is observed in childhood and adolescence, with students reporting either direct or vicarious experiences of racism (e.g., name-calling or teasing due to Aboriginality) (Priest, Thompson, Mackean, Baker, & Waters, 2017). Aboriginal adults report their experience of racial discrimination in different settings including public spaces such as shops and public transport. Such experiences can lead to avoidance of daily activities due to fear of discrimination (Ferdinand, Paradies, & Kelaher, 2013; Paradies & Cunningham, 2012).

Racism can be understood as a psychosocial stressor considering the cognitive and affective processes involved in identification and coping with it. Experience of discrimination involves constant vigilance over environmental clues that can indicate its re-occurrence, besides the assessment of approach or avoidance strategies to manage the episode and its consequences for one's self concept (Berjot & Gillet, 2011; Contrada et al., 2000). Anticipation of discriminatory encounters is shown to increase psychological and physiological responses, such as worries, rumination, threat cognitions, cardiovascular reactivity, and sympathetic system activation (Brosschot, Gerin, & Thayer, 2006; Sawyer, Major, Casad, Townsend, & Mendes, 2012).

As a psychosocial chronic stressor, racism effects on psychological processes and physiological responses are likely to affect both clinical health and subjective sense of wellbeing (Harrell et al., 2011). A systematic review and meta-analysis of 293 studies from the last 30 years demonstrate that experiences of racism are associated with poorer physical health, such as high blood pressure, hypertension, high cholesterol, and low self-rated general health (Paradies et al., 2015). Racism is also shown to be associated with poor mental health outcomes, such as depression, psychological stress, anxiety, suicide ideation and attempts, and lower levels of self-esteem and sense of personal control (Paradies et al., 2015; Priest et al., 2013). In the Aboriginal Australian context, similar patterns of associations between racism and health are observed (Kelaher, Ferdinand, & Paradies, 2014; Priest, Paradies, Stewart, & Luke, 2011; Priest, Perry, Ferdinand, Kelaher, & Paradies, 2017).

In addition to the harmful effects to health and wellbeing, the effects of stressors during pregnancy are of special concern due to its effect on mother's mental health and on labour, delivery, and child development. Exposure to racism during both pre- and post-natal periods is linked to depressive symptoms and poorer mental health among mothers of

WHAT IS ALREADY KNOWN ON THIS TOPIC

1. Aboriginal people report experiencing racism in different developmental periods and contexts in Australia, as well as avoidance of daily activities due to fear of discrimination.
2. Experiences of racism during pregnancy are thought to increase stress levels and compromise mother's mental health and future child development. Research on the impact of racism among Aboriginal Australian pregnant women is limited.
3. Policies aimed to reduce health inequalities among Aboriginal and non-Aboriginal Australians have focused on individual health behaviours and might need to target psychosocial causes of poor mental health.

WHAT THIS PAPER ADDS

1. Our results confirm previous evidence that racism is experienced at the community level, extending findings to the period of pregnancy. Racism effects on the stress and sense of personal control among Australian Aboriginal pregnant women reflect the impact on the mental health and wellbeing of this population.
2. Screening for the need of mental health support during pregnancy and the design and testing of interventions based on Aboriginal cultural values might reduce the effects of psychosocial stressors and increase self-empowerment and sense of personal control among this population.
3. Microsocial policies are necessary to buffer the effect of racism on the Aboriginal Australian community whilst macrosocial policies are designed and implemented to reduce racism in Australian society more generally.

ethnic minority groups (e.g., Mexicans, Pakistani, Black African, Indian, Bangladeshi) living in the United States and United Kingdom (Becares, Nazroo, & Kelly, 2015; Zeiders, Umana-Taylor, Jahromi, Updegraff, & White, 2016). In turn, high stress levels during pregnancy—such as racial discrimination—are associated with preterm birth and lower birthweight infants, outcomes that might affect long term infant development (Alhusen, Bower, Epstein, & Sharps, 2016; Dunkel Schetter & Tanner, 2012; Shapiro, Fraser, Frasch, & Seguin, 2013; Witt, Litzelman, Cheng, Wakeel, & Barker, 2014). More specifically, worry about racial discrimination was associated with pre-term birth among Black women in a state-wide representative sample in California, United States (Braveman et al., 2017). Maternal and family exposure to racism can also directly affect child socio-emotional development indicators, such as conduct problems, hyperactivity, peer problems, inhibition/separation problems, and negative emotionality (Becares et al., 2015; Rosenthal et al., 2018). The negative impact of racism on maternal mental health can also contribute to maternal use of harsh parenting practices and negatively affect maternal sensitivity to the child emotional needs (Becares et al., 2015; Zeiders et al., 2016).

Another important mental health indicator affected by racism is sense of personal control (Stock, Peterson, Molloy, & Lambert, 2017). It can be defined as one's beliefs about their capacity to achieve goals and control any factors that might interfere with goal achievement (Lachman & Weaver, 1998). Sense of personal control is associated with psychological distress during transition to parenthood as well as with parents' depression and anxiety during the first year of parenthood (Keeton, Perry-Jenkins, & Sayer, 2008). Higher sense of personal control over discriminatory experiences is shown to be associated with improved problem-solving and social support seeking (Scott & House, 2005). On the contrary, there is evidence of associations between poorer sense of control and vulnerability to anxiety in response to challenging situations, as well as dysfunctional coping strategies and poor psychological adjustment (Henselmans et al., 2010; Keeton et al., 2008). Associations with poor physical and mental health outcomes are also reported (Lachman & Weaver, 1998; Moradi & Hasan, 2004).

Racism is not dependent on individual intentions but, rather, on its social effects in terms of reproduction of historical inequalities and maintenance of the *status quo* of the power distribution between ethno-racial groups. It is manifested systemically through attitudes, behaviours, norms, practices, and stereotypes that contribute to its perpetuation (Berman & Paradies, 2010; Paradies, 2007). Racist stereotypes about the Aboriginal community include poor health habits (e.g., smoking, problematic alcohol consumption, and poor diet) and other complex health issues (e.g., high rates of unplanned pregnancy) attributed to that population as being a matter of personal choice (Pyett, Waples-Crowe, & Sterren, 2008; Reilly et al., 2008). Aboriginal people are then considered to be responsible for the health inequalities they face as a result of poor lifestyle choices, an assumption that deflects attention from the institutionalised deprivation of resources and rights that historically characterises this population (Marwick, Ansari, Sullivan, Parsons, & McNeil, 2014; Mitchell, 2007; Prandl, Rooney, & Bishop, 2012). Continuous research on the effects of racism on health and wellbeing in different periods across the lifespan can contribute with the evidence that investments in providence of support and in reduction of racism across society are necessary (Ferdinand, Paradies, & Kelaher, 2015).

Although racism is pervasive in Australian society (Paradies et al., 2009; Paradies & Cunningham, 2012; Priest et al., 2011; Shepherd et al., 2017), research on its effects on the mental health and wellbeing of Aboriginal Australian women during pregnancy is limited. Our first goal, in this article, is thus to characterise the experience of racial discrimination among a sample of Aboriginal South Australian pregnant women. To explore the negative effect of racism on mental health and wellbeing, the second objective is to test the association of racism with stress and sense of personal control during pregnancy. Our main hypothesis is that increases in the experience of racial discrimination is associated with higher levels of maternal stress and lower levels of sense of personal control after adjusting for socioeconomic indicators and health-related behaviours.

1 | METHODS

1.1 | Study design

This is a cross-sectional study from a convenience sample of pregnant South Australian Aboriginal women participating in a randomised controlled trial aimed to prevent early childhood caries among Aboriginal children (Merrick et al., 2012). The recruitment phase of the study was February 2011 to May 2012. Ethics approval was obtained from the University of Adelaide Human Research Ethics Committee, and the Aboriginal Health Council of South Australia. The project design and data collection procedures were based on consultancy with an Indigenous reference group and in collaboration with Aboriginal researchers on the topic of social determinants of health among Aboriginal Australians (Merrick et al., 2012). Participants were fully informed about the confidential nature of the study and written informed consent was obtained. Consent was obtained in accordance to the National Health and Medical Research

Council of Australia (NHMRC) Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research (NHMRC, 2003).

1.2 | Participants

Participants were 446 women pregnant with an Aboriginal child residing in South Australia. Only data from respondents identifying as being Aboriginal or Torres Strait Islander background (or both) were included ($n = 369$). Participants were recruited from referrals from antenatal clinics, hospitals, community services, and Aboriginal reference groups. The mean age of participants was 24.7 years (*SD* ±5.30; Min–Max: 14–43 years) and 64.7% of them resided in rural and regional parts of South Australia.

1.3 | Data collection procedures

Data was collected through an interview-guided questionnaire conducted by an Aboriginal research officer in a place of participants' choice (e.g., their homes, the local Aboriginal Community Controlled Health Organisation).

1.4 | Variables measurement and categorisation

1.4.1 | Racism (exposure)

Prevalence of racism was estimated by the Measure of Indigenous Racism Experiences instrument, developed and validated by Paradies and Cunningham (2008) to assess experience of racism among Aboriginal Australians. The instrument asks "In the last twelve months, have you felt that you have been treated unfairly in any of the following ways because you are Aboriginal?" A "Yes" or "No" option was presented to a range of nine contexts. Examples include "Applying for work, or when at work"; "At home, by neighbours or at somebody else's house"; "While doing any sporting, recreational or leisure activities"; and "By staff of government agencies." Response options were summed to estimate levels of exposure to discrimination in different settings, ranging from 0 to 9.

1.4.2 | Stress and sense of personal control (outcomes)

Stress was measured by the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983), which assesses the frequency of threatening/stressful situations and perceptions of coping abilities to manage these situations. The PSS comprises 14 items with response options presented on a 5-point Likert Scale ranging from "*Not at all*" (0); "*Rarely*" (1); "*Sometimes*" (2); "*Fairly often*" (3); and "*Very often*" (4). Statements include "How often during the last twelve months did you felt troubles were piling up so high you could not deal with them?" and "How often during the last twelve months did felt thing were going your way?." Scores range from 0 to 56, with high scores indicating higher stress levels (Cronbach's alpha = 0.75). The PSS acceptable psychometric properties have been demonstrated across different populations and cultures (Lee, 2012).

The Midlife Developmental Inventory Sense of Personal Control Scale measures perceptions of personal effectiveness over goal achievements (personal mastery domain) and personal beliefs of factors beyond one's control that interfere in goals achievement (perceived restraints domain) (Lachman & Weaver, 1998;). Twelve items are presented on a 5-point Likert scale with responses ranging from "*Strongly disagree*" (0) to "*Strongly agree*" (4). Personal mastery domain includes statements such as "I can do just about anything I really set my mind to" and "What happens to me in the future mostly depends on me." Perceived restraint statements include "I sometimes feel I am being pushed around in my life" and "I often feel helpless in dealing with life problems." Response values were summed (perceived restraint domain items were reverse-scored) generating a score range from 0 to 48. Higher scores indicated a higher sense of personal control (Cronbach's alpha was 0.83). The measure is validated for use with adolescents, young adults and adults in the mid-life period (Lachman & Weaver, 1998; Lewis, Ross, & Mirowsky, 1999).

1.4.3 | Confounding variables

Adjustment for confounding based on previous evidence of its association with both exposure and outcomes is an analytical strategy to reduce bias in testing for casual associations (Greenland & Morgenstern, 2001). The variables selected were based on their theoretical relevance as elicited from evidence in the literature with Indigenous populations (Maxson, Edwards, Ingram, & Miranda, 2012; Shepherd et al., 2017). Socio-demographic variables included age, residential location, education and income, shown to be associated with both racial discrimination and mental health outcomes (Shepherd et al., 2017). Age was calculated through participant's date of birth. Residence was obtained through the open question "Where do you live (suburb, town, city)?," with responses dichotomised into "Metropolitan" and "Rural or Regional." Highest level of educational attainment was computed through a single item with response options being "No schooling," "Primary School," "High School," "Technical or Further Education (TAFE)," and "University." Income was measured through a single item specifying source of income with the options "Private job" and "Centrelink." Centrelink is part of the Department

TABLE 1 Frequency distribution of racism, stress, sense of personal control, and confounding variables

Means (95% CI)	
Racism	1.6 (1.3, 1.8)
Stress	25.1 (24.3, 25.8)
Sense of control	31.8 (31.0, 32.5)
Age	24.7 (24.1, 25.3)
Number of children cared for	1.4 (1.2, 1.5)
Prevalence (95% CI)	
Location	
Rural or regional	64.7 (59.8, 69.6)
Metropolitan	35.2 (30.3, 40.1)
Education	
No schooling	1.9 (0.5, 3.3)
Primary school	1.3 (0.1, 2.5)
High school	70.4 (65.7, 75.1)
Technical	19.3 (15.2, 23.4)
University	6.9 (4.3, 9.5)
Income	
Private job	12.4 (0.9, 15.8)
Centrelink	87.5 (84.1, 90.9)
Smoking status	
Currently do	52.0 (46.8, 57.1)
Used to	27.1 (22.5, 31.7)
Never did	20.8 (16.6, 25.0)
Alcohol consumption	
Currently do	9.6 (6.5, 12.6)
Used to	82.4 (78.4, 86.3)
Never did	7.9 (5.1, 10.7)
Felt uncomfortable about teeth appearance	
Very often	20.3 (16.2, 24.4)
Often	13.5 (10.0, 17.0)
Sometimes	28.3 (23.6, 32.9)
Hardly ever	14.1 (10.5, 17.6)
Never	23.6 (19.2, 28.0)
Identify with a tribal group, language, group, or clan?	
Yes	43.0 (37.4, 48.6)
No	57.0 (51.3, 62.5)

of Human Services of Australia which provides social security payments for people who are unemployed or unable to work (Australian Government Department of Human Services, 2018).

Health behaviour variables included tobacco smoking and alcohol drinking, both associated with racial discrimination and mental health outcomes in pregnant women from racial minority groups (Maxson et al., 2012). These were assessed through single items with the options "Currently do," "Used to," and "Never did." Perception of oral health (teeth appearance), number of children under care, and identification with an Aboriginal group were also selected as to approximate social stereotypes associated with racism and mental health outcomes (Ferdinand et al., 2013; Pyett et al., 2008; (Reilly et al., 2008). Perception of oral health was assessed by the item "How often during the last year did you

TABLE 2 Frequency of exposure to discrimination in the previous 12 months

Setting of exposure to racism	Prevalence (95% CI)
Applying for work or when at work ($n = 367$)	14.7 (11.4, 18.7)
At home, by neighbours, or at somebody else's house ($n = 368$)	19.8 (16.0, 24.2)
At school, university, training course, or other educational setting ($n = 367$)	15.5 (12.1, 19.6)
While doing any sporting, recreational, or leisure activities ($n = 367$)	12.2 (9.2, 16.0)
By the police, security people, lawyers, or in a court of law ($n = 368$)	22.8 (18.8, 27.4)
By doctors, dentists, nurses, or other staff at hospitals, dental clinics, or doctor's surgeries ($n = 369$)	10.8 (8.0, 14.4)
By staff of government agencies ($n = 369$)	14.3 (11.1, 18.3)
When seeking any other services ($n = 369$)	18.1 (14.5, 22.4)
By members of the general public ($n = 368$)	31.7 (27.2, 36.7)
Overall experience of racism	**Prevalence (95% CI)**
Experience of racism in at least one setting ($n = 364$)	48.3 (46.4, 56.7)
Experience of racism in 1–3 settings ($n = 364$)	29.1 (24.6, 34.0)
Experience of racism in 4–9 settings ($n = 364$)	19.2 (15.4, 23.6)
No experience of racism ($n = 364$)	51.6 (46.4, 56.7)

feel uncomfortable about the way your teeth looked?" with response options ranging from "Very often" to "Never." Number of children cared for was composed by a single item with an open response option. Finally, identification with an Aboriginal group was assessed through the question "Do you identify with a tribal group, a language group, or clan?" with response options being "Yes" or "No."

1.4.4 | Auxiliary variables to the imputation model

Social support was assessed through four items with response options ranging from "*Strongly disagree* (1)" to "*Strongly agree* (5)." The items were "There are people in my life who pay attention to my feelings and problems," "There are people in my life who appreciate what I do," "There are people in my life who I can get help from if I need it," and "There are people in my life who I can talk to about how to handle things." A summary score variable was generated by summing up participants' responses.

2 | ANALYSIS

Analyses were performed using Stata (v. 14.0). Based on the assumption of missing at random, or that the probability of the observed pattern of missing data is the same for all possible values of the missing data (Rubin, 1976), multiple imputation with chained equations was used. Sequential regression models for each variable with missing values were generated conditional on complete case variables. Twenty imputed datasets were generated using 50 cycles of regression switching for imputation on discrimination, stress, sense of personal control, and the confounding variables. Social support was also inserted as an auxiliary variable to the imputed model due to its association with the outcome variables (Chong et al., 2016). Imputed data was predicted conditional on the complete case variables, age, and residential location. The frequency of missing values for each variable is presented in Appendix I (Table A1).

The analyses were based on the imputed datasets. Descriptive frequencies on the percentage of participants experiencing discrimination in each given setting were generated based on the respondent sample, as the individual items for each setting where discrimination occurred were not entered in the imputation model. Means and proportions with respective 95% confidence intervals were generated to describe the sample and to inform on the prevalence of discrimination, stress, and sense of personal control per level of the confounding variables. It was verified that the distribution of the outcome variables stress, and sense of personal control were normally distributed. Linear regression models tested the association between racism, stress and sense of personal control in separate models. The associations were tested before and after adjustment for confounding.

3 | RESULTS

The mean age of participants was 24.7 years (*SD* ±5.30; Min–Max: 14–43 years). Almost two thirds (64.7%) resided in rural and regional parts of South Australia and 73.7% had high school or less as their highest educational attainment. The mean number of children already being cared for by the mothers was 1.4 (*SD* ±1.4). Around 90% (87.5%) of respondents had Centrelink as their income source. Half the participants (52.0%) reported being a current tobacco smoker and 9.6% reported current consumption of alcohol. Discomfort over teeth appearance at least sometimes was reported by nearly two-thirds of respondents (62.2%). Just under half (43%) reported identifying with an Aboriginal group, language group, or clan. The prevalence characteristics of the sample are described in Table 1. As shown in Appendix I, the prevalence and estimates of the imputed and complete cases are very similar.

TABLE 3 Distribution of discrimination, stress, and sense of personal control per strata of confounding

	Mean discrimination (95% CI)	Mean stress (95% CI)	Mean sense of personal control (95% CI)
Location			
Regional	1.5 (1.2, 1.8)	25.1 (24.2, 25.9)	31.5 (30.6, 32.4)
Metropolitan	1.7 (1.3, 2.1)	25.1 (23.8, 26.5)	32.4 (31.2, 33.5)
Education			
No schooling	2.6 (2.3, 4.9)	26.3 (22.3, 30.3)	31.4 (26.3, 36.5)
Primary school	3.3 (2.3, 6.5)	29.3 (21.8, 36.8)	25.7 (18.6, 32.8)
High school	1.4 (1.2, 1.7)	25.4 (24.5, 26.3)	31.2 (30.3, 32.0)
Technical	1.3 (0.9, 1.8)	24.3 (22.6, 26.0)	33.3 (31.7, 35.0)
University	2.9 (1.6, 4.2)	22.4 (19.9, 24.9)	35.2 (32.9, 37.6)
Income			
Private job	1.8 (1.0, 2.6)	21.5 (19.6, 23.5)	35.3 (33.5, 37.2)
Centrelink	1.5 (1.3, 1.8)	25.6 (24.8, 26.4)	31.3 (30.5, 32.0)
Smoking status			
Currently do	1.6 (1.3, 1.9)	26.1 (25.1, 27.2)	31.0 (30.0, 32.0)
Used to	1.4 (1.0, 1.9)	24.7 (23.3, 26.2)	32.6 (31.2, 34.1)
Never did	1.5 (1.0, 2.1)	22.9 (21.5, 24.4)	32.7 (31.3, 34.1)
Alcohol consumption			
Currently do	1.9 (1.1, 2.8)	26.6 (24.5, 28.6)	29.7 (27.8, 31.7)
Used to	1.6 (1.3, 1.8)	25.1 (24.3, 25.9)	32.0 (31.2, 32.8)
Never did	1.1 (0.3, 1.9)	23.2 (20.6, 25.8)	32.2 (29.6, 34.8)
Felt uncomfortable about teeth appearance			
Very often	2.2 (1.6, 2.8)	27.3 (25.6, 29.1)	31.1 (29.4, 32.8)
Often	1.9 (1.2, 2.6)	26.9 (24.8, 28.9)	30.8 (28.9, 32.8)
Sometimes	1.4 (0.9, 1.8)	24.5 (23.3, 25.6)	31.1 (29.8, 32.4)
Hardly ever	1.2 (0.6, 1.6)	24.8 (23.2, 26.3)	31.8 (30.0, 33.5)
Never	1.3 (0.9, 1.7)	23.0 (21.3, 24.8)	33.8 (32.3, 35.3)
Identify with a tribal group, language, group, or clan?			
Yes	1.1 (0.8, 1.5)	25.1 (23.9, 26.3)	32.1 (31.0, 33.2)
No	1.9 (1.5, 2.4)	25.1 (24.1, 26.1)	31.6 (30.6, 32.6)

The mean score for discrimination experience over the previous year was 1.6 (*SD* ±2.24). Any experience of discrimination was reported by almost half the participants (48.2%) with 29.1% reporting 1 to 3 experiences and 19.2% indicating 4 to 9 experiences. The most frequent experience was being discriminated by members of the general public (31.8%), whilst also common was: "By the police, security people, lawyers or in a court of law (22.8%)," "At home, by neighbours or at somebody else's house (19.8%)," "When seeking any other services (18.1%)," and "By staff of government agencies (14.3%)." Table 2 presents the prevalence of discrimination by scenario and the respective confidence intervals. The mean stress and sense of personal control scores were respectively 25.1 (*SD* ±7.17) and 31.8 (*SD* ±6.96). The distribution of means of racism, stress, and sense of personal control per strata of the confounding variables with respective confidence intervals are summarised in Table 3.

The regression analyses showed that stress scores increase by 0.69 for each one unit increase in number of settings where racism was experienced (β = .69, 95% confidence interval [CI] 0.36, 1.01). After adjusting for socio demographics and health-related behaviours, the effect decreased slightly (β = .61, 95% CI 0.29, 0.94).

TABLE 4 Regression coefficients for the unadjusted and adjusted effects of racism on stress and sense of personal control

	Unadjusted β (95% CI)	Adjusted[a] β (95% CI)
Perceived stress	0.67 (0.35, 1.00)	0.61 (0.28, 0.93)
Sense of personal control	−0.39 (−0.71, −.0.07)	−0.36 (−0.68, −0.04)

[a]Adjusted for age, education, income, residential location, smoking status, alcohol consumption, oral health perception, number of children being cared for, and cultural identification.

The unadjusted model for the effect of racism on sense of personal control indicated that one unit increase in racism experiences was associated with a decrease of 0.39 on the sense of personal control score ($\beta = -.39$, 95% CI −0.71, −.0.07). The adjusted model showed a decrease of 0.35 on sense of personal control score points ($\beta = -.35$, 95% CI (−0.67, −0.03). Table 4 summarises the coefficients obtained in each model and the respective confidence intervals.

4 | DISCUSSION

The results add to the evidence that racism is present in different settings of Aboriginal Australians daily activities. The fact that 48.3% of the sample reported at least one episode of racism in the previous year indicates that racism is pervasive among Aboriginal Australian women during pregnancy. The results support previous evidence showing that the frequency and pervasiveness of racism experienced can contribute to worse mental health indicators among a socially marginalised group (Ferdinand et al., 2013). An increase in experiences of racism was shown to be associated with higher levels of stress and decreased sense of personal control through levels of demographics, health behaviours, and discriminatory stereotypes. The observation of a casual association between racism, stress, and sense of personal control after adjustment for confounding according to a theoretically based model further corroborates the evidence of the deleterious effects of racism on Aboriginal people mental health.

To our knowledge, no studies on the impact of racism on the mental health of Aboriginal Australian women who are pregnant have been published. Our findings thus highlight an important concern given that, for mothers in our study, pregnancy was a time when they were planning and raising their families whilst dealing with poor socioeconomic conditions and a range of psychosocial stressors, including racism. The sample of this study is not representative of the Aboriginal population. Nonetheless, for the purposes of the present study, non-representativeness is not likely to be an issue as it is not a requirement for identification of casual associations (Richiardi, Pizzi, & Pearce, 2013; Rothman, Gallacher, & Hatch, 2013). The associations between racism and mental health have been observed in multiple studies with Indigenous people in different developmental periods (Ferdinand et al., 2015; Prandl et al., 2012; Priest, Thompson, et al., 2017). Our results extend that findings to the period of pregnancy.

Although public health interventions usually target changes in poor health habits, the inequalities in health between Aboriginal and non-Aboriginal Australians are not solely due to differences in lifestyle risk behaviours (Marwick et al., 2014; Prandl et al., 2012). The results in this study suggest that interventions aimed to address stress and its psychosocial causes among Aboriginal Australian mothers might need to be contemplated (Adams, Halacas, Cincotta, & Pesich, 2014; Marwick et al., 2014). Focusing on antenatal screening for racism experiences and provision of mental health support may address some of the causes of this population's poor mental and physical health indicators (Baba, Brolan, & Hill, 2014), although wider measures addressing societal acceptance of racism are also important. The perinatal period might be an optimistic time for intervention, as there is the potential to elicit much change in parent–child interactions (Shorey et al., 2019). Opportunistic intervention in such a period can change life trajectories and contribute to the interruption of the intergenerational effects of oppression Aboriginal people face (Chamberlain et al., 2019).

One of the few strategies reported to be effective in reduction of discrimination-related stress among Aboriginal Australians was talking to someone about it (Ferdinand et al., 2013). In general terms, social support and group identification are shown to buffer psychosocial stressors and assist in health promotion through enhancement of sense of personal control (Greenaway et al., 2015). In other words, group membership assists people in feeling in control over their actions and life outcomes and promote functional coping and adjustment when facing adversities (Greenaway et al., 2015; Outten, Schmitt, Garcia, & Branscombe, 2009). This might suggest that the planning of mental health support for this population might benefit from the creation of collective spaces in which experiences can be shared and cultural bonds reinforced. Such an approach is also in accordance with Aboriginal cultural centrality of collectiveness (Baba et al., 2014; Hepworth et al., 2015).

Cognitive therapy principles and techniques (e.g., psychoeducation and cognitive restructuring) could help to address unhelpful cognitive schemes and less helpful coping strategies related to racism, including worrying, rumination, and emotional suppression (Harrell et al., 2011). The changes in unhelpful ways of thinking could also contribute to the enhancement of sense of personal control (Keeton

et al., 2008). Adaptation of such techniques to the Australian Aboriginal context and the effectiveness of its use in a culturally safe environment to buffer racism effects during pregnancy might be important directions for future research. There is also evidence of interventions with Australian Aboriginal families that benefitted from using narrative therapy principles such as sharing of stories and use of art work to engage participants and create a sense of self-empowerment (Smith, O'Grady, Cubillo, & Cavanagh, 2017). Narrative therapy can be easily assimilated by Australian Aboriginals due to the cultural practice of sharing stories for connecting people and transmitting knowledge (Denborough et al., 2006). Narrative therapy might permit sharing stories of resilience and acting to empower current initiatives and inspire communities based on past experience (Denborough et al., 2006; Smith et al., 2017; Stock, Mares, & Robinson, 2012).

The insertion of cultural values, consultation, and participation of community members is pointed as an effective strategy in the success of mental health care of Indigenous people (Gone, 2013; Nelson & Wilson, 2017). The Australian experience of implementing Aboriginal Community Controlled Health Services, which are autonomous and culturally appropriate services controlled by Aboriginal communities, showed an increase in Aboriginal people seeking and reporting satisfaction with health care (Hepworth et al., 2015). Such improvement was reported to be due to users' perception of respect for the cultural values on the importance of kinship, community, and oral transmission of knowledge and experience (Baba et al., 2014; Hepworth et al., 2015).

Health services controlled by Aboriginal communities may additionally assist in identifying Aboriginal people's real needs and exert a positive effect on Aboriginal people's autonomy (Baba et al., 2014). By fostering initiatives to take action, this strategy may assist in developing a stronger sense of personal control that can be generalised to different life domains (Keeton et al., 2008). Regarding mainstream health care institutions, the integration of culturally sensitive mental health professionals (e.g., social workers and psychologists) might be an important step in ensuring Aboriginal people's adherence and satisfaction with health care (Hepworth et al., 2015). More specifically, a study with Aboriginal Maternal and Infant Care workers in South Australia suggests health professionals and midwives' cultural sensitivity as a key factor in antenatal education and care, support in labour, and postnatal care (Stamp et al., 2008).

Beyond and above tackling the consequences of racism at an individual level, anti-racist policies must promote macrosocial changes that could prevent racist discrimination on a societal level (Ferdinand et al., 2015). Specifically, for the antenatal care of Aboriginal pregnant women, education of health professionals on the complex factors that characterises institutionalised racism and shape health inequalities among the Aboriginal population is a must (Berman & Paradies, 2010; Harrell et al., 2011; Prandl et al., 2012). Promotion of cultural competency in health care settings—or the capacity to provide quality healthcare for diverse patient populations—is also shown to increase positive diversity attitudes among health professionals (Weech-Maldonado et al., 2018). Education and promotion of cultural competency could thus contribute to avoidance of prejudgment of risky health behaviours (e.g., smoking during pregnancy), support of patients in health promotion as well as reduction of perceived racism by the Aboriginal population in health care settings (Ferdinand et al., 2013; Prandl et al., 2012; Weech-Maldonado et al., 2018). Such a change could contribute to reduction of stress-related consequences to mother, child, and their families, as well as the creation of a sense of trust between patients and health professionals (Kelaher et al., 2014).

The present study contributes to the evidence base demonstrating the association between racism and determinants of Aboriginal pregnant women's mental health. Limitations do exist, however. It is possible that individualistic Western values could bias the conception of sense of personal control as a determinant of mental health. It is argued that this concept might not be entirely relevant for the comprehension of stress and coping in more collectivist societies (O'Connor & Shimizu, 2002). On the other hand, research on Aboriginal Australian people's perception on determinants of health shows that sense of personal control is valued as an important feature to promote personal well-being and to be balanced with obligations towards the community (Reilly et al., 2008). Culturally appropriated measures that encompass Aboriginal Australian's understanding of well-being and collective coping strategies might further contribute to the understanding on how psychosocial stressors impact these communities and provide insight into interventions that could reduce health inequalities among the Aboriginal population (Le Grande et al., 2017).

The results are based on a cross-sectional sample thus causality should be inferred with care. Investigation of mental health indicators with a longitudinal perspective might permit greater understanding of the associations between exposure to racism during pregnancy and Aboriginal Australian mother and child physical and mental health. In addition, though bias due to confounding was addressed and multiple imputation was used to address any non-response bias, residual and unmeasured confounding might remain, as for all observational studies.

5 | CONCLUSION

Our findings demonstrate the scale to which racial discrimination manifests in almost every context of Aboriginal women's lives, impacting their daily activities, and adding extra difficulties to the already large spectrum of social inequalities faced. As a psychosocial cause of poor mental health and an indirect determinant of physical health, interventions aimed to reduce racism effects are suggested. By the empowerment of Aboriginal communities in health promotion decisions, research initiatives, and respect of Aboriginal holistic cultural values of health and well-being, collective strategies of coping to psychosocial stress can be built and a sense of self-worth and personal control can be achieved. More generally, our results align with the view that microsocial policies are necessary to buffer the effect of racism on the Aboriginal Australian community whilst macrosocial policies are designed and implemented to reduce racism in Australian society more generally.

ORCID

Davi M. Macedo https://orcid.org/0000-0001-9342-0888
Rachel M. Roberts https://orcid.org/0000-0002-9547-9995

REFERENCES

Adams, K., Halacas, C., Cincotta, M., & Pesich, C. (2014). Mental health and Victorian aboriginal people: What can data mining tell us? *Australian Journal of Primary Health*, *20*(4), 350–355. https://doi.org/10.1071/PY14036

Alhusen, J. L., Bower, K. M., Epstein, E., & Sharps, P. (2016). Racial discrimination and adverse birth outcomes: An integrative review. *Journal of Midwifery & Women's Health*, *61*(6), 707–720. https://doi.org/10.1111/jmwh.12490

Australian Government Department of Human Services. (2018, June). *Centrelink*. Retrieved from https://www.humanservices.gov.au/individuals/centrelink.

Baba, J. T., Brolan, C. E., & Hill, P. S. (2014). Aboriginal medical services cure more than illness: A qualitative study of how Indigenous services address the health impacts of discrimination in Brisbane communities. *International Journal for Equity in Health*, *13*(56), 1–10. https://doi.org/10.1186/1475-9276-13-56

Becares, L., Nazroo, J., & Kelly, Y. (2015). A longitudinal examination of maternal, family, and area-level experiences of racism on children's socioemotional development: Patterns and possible explanations. *Social Science and Medicine*, *142*, 128–135. https://doi.org/10.1016/j.socscimed.2015.08.025

Berjot, S., & Gillet, N. (2011). Stress and coping with discrimination and stigmatization. *Frontiers in Psychology*, *2*, 33. https://doi.org/10.3389/fpsyg.2011.00033

Berman, G., & Paradies, Y. (2010). Racism, disadvantage and multiculturalism: Towards effective anti-racist praxis. *Ethnic and Racial Studies*, *33*, 1–19. https://doi.org/10.1080/01419870802302272

Braveman, P., Heck, K., Egerter, S., Dominguez, T. P., Rinki, C., Marchi, K. S., & Curtis, M. (2017). Worry about racial discrimination: A missing piece of the puzzle of Black-White disparities in preterm birth? *PLoS One*, *12*(10), e0186151. https://doi.org/10.1371/journal.pone.0186151

Brosschot, J. F., Gerin, W., & Thayer, J. F. (2006). The perseverative cognition hypothesis: A review of worry, prolonged stress-related physiological activation, and health. *Journal of Psychosomatic Research*, *60*(2), 113–124. https://doi.org/10.1016/j.jpsychores.2005.06.074

Chamberlain, C., Gee, G., Brown, S. J., Atkinson, J., Herrman, H., Gartland, D., … Atkinson, C. (2019). Healing the past by nurturing the future—Co-designing perinatal strategies for Aboriginal and Torres Strait Islander parents experiencing complex trauma: Framework and protocol for a community-based participatory action research study. *BMJ Open*, *9*(6), e028397.

Chong, S. Y., Chittleborough, C. R., Gregory, T., Mittinty, M. N., Lynch, J. W., & Smithers, L. G. (2016). Parenting practices at 24 to 47 months and IQ at age 8: Effect-measure modification by infant temperament. *PLoS One*, *11*(3), e0152452. https://doi.org/10.1371/journal.pone.0152452

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396. https://doi.org/10.2307/2136404

Contrada, R. J., Ashmore, R. D., Gary, M. L., Coups, E., Egeth, J. D., Sewell, A., … Chasse, V. (2000). Ethnicity-related sources of stress and their effects on well-being. *Current Directions in Psychological Science*, *9*(4), 136–139. https://doi.org/10.1111/1467-8721.00078

Denborough, D., Koolmatrie, C., Mununggirritj, D., Marika, D., Dhurrkay, W., & Yunupingu, M. (2006). Linking stories and initiatives: A narrative approach to working with the skills and knowledge of communities. *International Journal of Narrative Therapy & Community Work*, *2006*(2), 19–51.

Dunkel Schetter, C., & Tanner, L. (2012). Anxiety, depression and stress in pregnancy: Implications for mothers, children, research, and practice. *Current Opinion in Psychiatry*, *25*(2), 141–148. https://doi.org/10.1097/YCO.0b013e3283503680

Ferdinand, A. S., Paradies, Y., & Kelaher, M. (2015). Mental health impacts of racial discrimination in Australian culturally and linguistically diverse communities: A cross-sectional survey. *BMC Public Health*, *15*, 401. https://doi.org/10.1186/s12889-015-1661-1

Ferdinand, A. S., Paradies, Y., & Kelaher, M. (2013). *Mental health impacts of racial discrimination in Victorian Aboriginal communities—The Localities Embracing and Accepting Diversity (LEAD) Experiences of Racism Survey*. Melbourne, Australia: The Lowitja Institute.

Gone, J. P. (2013). Redressing First Nations historical trauma: Theorizing mechanisms for Indigenous culture as mental health treatment. *Transcultural Psychiatry*, *50*(5), 683–706. https://doi.org/10.1177/1363461513487669

Greenaway, K. H., Haslam, S. A., Cruwys, T., Branscombe, N. R., Ysseldyk, R., & Heldreth, C. (2015). From "we" to "me": Group identification enhances perceived personal control with consequences for health and well-being. *Journal of Personality and Social Psychology*, *109*(1), 53–74. https://doi.org/10.1037/pspi0000019

Greenland, S., & Morgenstern, H. (2001). Confouding in health research. *Annual Review of Public Health*, *22*, 189–212. https://doi.org/10.1146/annurev.publhealth.22.1.189

Harrell, C. J., Burford, T. I., Cage, B. N., Nelson, T. M., Shearon, S., Thompson, A., & Green, S. (2011). Multiple pathways linking racism to health outcomes. *Du Bois Review*, *8*(1), 143–157. https://doi.org/10.1017/S1742058X11000178

Henselmans, I., Fleer, J., de Vries, J., Baas, P. C., Sanderman, R., & Ranchor, A. V. (2010). The adaptive effect of personal control when facing breast cancer: Cognitive and behavioural mediators. *Psychology & Health*, *25*(9), 1023–1040. https://doi.org/10.1080/08870440902935921

Hepworth, J., Askew, D., Foley, W., Duthie, D., Shuter, P., Combo, M., & Clements, L. A. (2015). How an urban Aboriginal and Torres Strait Islander primary health care service improved access to mental health care. *International Journal for Equity and Health*, *14*(51), 01–08. https://doi.org/10.1186/s12939-015-0183-x

Jones, C. P. (2002). Levels of racism—A theoretical framework and a Gardner's tale. In T. A. LaVEIST (Ed.), *A public health reader—Race, ethnicity and health* (pp. 311–318). San Francisco, CA: Jossey-Bass.

Keeton, C. P., Perry-Jenkins, M., & Sayer, A. G. (2008). Sense of control predicts depressive and anxious symptoms across the transition to parenthood. *Journal of Family Psychology*, *22*(2), 212–221. https://doi.org/10.1037/0893-3200.22.2.212

Kelaher, M. A., Ferdinand, A. S., & Paradies, Y. (2014). Experiencing racism in health care: The mental health impacts for Victorian Aboriginal communities. *Medical Journal of Australia*, *201*(1), 44–47. https://doi.org/10.5694/mja13.10503

Lachman, M. E., & Weaver, S. L. (1998). Sociodemographic variations in the sense of control by domain—Findings from the MacArthur studies of midlife. *Psychology and Aging*, *13*(4), 553–562. https://doi.org/10.1037/0882-7974.13.4.553

Le Grande, M., Ski, C. F., Thompson, D. R., Scuffham, P., Kularatna, S., Jackson, A. C., & Brown, A. (2017). Social and emotional wellbeing assessment instruments for use with Indigenous Australians: A critical review. *Social Science & Medicine*, *187*, 164–173. https://doi.org/10.1016/j.socscimed.2017.06.046

Lee, E. (2012). Review of the psychometric evidence of the Perceived Stress Scale. *Asian Nurse Research*, *6*, 121–127. https://doi.org/10.1016/j.anr.2012.08.004

Lewis, S. K., Ross, C. E., & Mirowsky, J. (1999). Establishing a sense of personal control in the transition to adulthood. *Social Forces*, *77*(4), 1573–1599. https://doi.org/10.2307/3005887

Marwick, A., Ansari, Z., Sullivan, M., Parsons, L., & McNeil, J. (2014). Inequalities in the social determinants of health of Aboriginal and Torres Strait Islander People—A cross-sectional population-based study in the Australian state of Victoria. *International Journal for Equity in Health*, *13*(91), 1–12. https://doi.org/10.1186/s12939-014-0091-5

Maxson, P. J., Edwards, S. E., Ingram, A., & Miranda, M. L. (2012). Psychosocial differences between smokers and non-smokers during pregnancy. *Addictive Behaviors*, *37*(2), 153–159. https://doi.org/10.1016/j.addbeh.2011.08.011

Merrick, J., Chong, A., Parker, E., Roberts-Thomson, K., Misan, G., Spencer, J., … Jamieson, L. (2012). Reducing disease burden and health inequalities arising from chronic disease among Indigenous children: An early childhood caries intervention. *BMC Public Health*, *12*, 1–6. https://doi.org/10.1186/1471-2458-12-323

Mitchell, J. (2007). History. In B. Carson, T. Dunbar, R. Chenhall, & R. Bailie (Eds.), *Social determinants of Indigenous health* (pp. 41–62). Crowns Nest, Australia: Allen&Unwin.

Moradi, B., & Hasan, N. T. (2004). Arab American persons' reported experiences of discrimination and mental health: The mediating role of personal control. *Journal of Counselling Psychology*, *51*(4), 418–428. https://doi.org/10.1037/0022-0167.51.4.418

National Health and Medical Research Council (Australia). (2003). *Values and ethics: Guidelines for ethical conduct in Aboriginal and Torres Strait Islander health research*. Canberra, Australia: The Council.

Nelson, S. E., & Wilson, K. (2017). The mental health of Indigenous peoples in Canada: A critical review of research. *Social Science and Medicine*, *176*, 93–112. https://doi.org/10.1016/j.socscimed.2017.01.021

O'Connor, D. B., & Shimizu, M. (2002). Sense of personal control, stress, and coping style: A cross-cultural study. *Stress and Health*, *18*, 173–183. https://doi.org/10.1002/smi.939

Outten, H. R., Schmitt, M. T., Garcia, D. M., & Branscombe, N. R. (2009). Coping options: Missing links between minority group identification and psychological well-being. *Applied Psychology*, *58*(1), 146–170. https://doi.org/10.1111/j.1464-0597.2008.00386.x

Paradies, Y. (2007). Racism. In B. Carson, T. Dunbar, R. Chenhall, & R. bailie (Eds.), *Social determinants of Indigenous health* (pp. 65–80). Crows Nest, Australia: Allen&Unwin.

Paradies, Y., Ben, J., Denson, N., Elias, A., Priest, N., Pieterse, A., … Gee, G. (2015). Racism as a determinant of health: A systematic review and meta-analysis. *PLoS One*, *10*(9), e0138511. https://doi.org/10.1371/journal.pone.0138511

Paradies, Y., Chandrakumar, L., Klocker, M., Frere, M., Webster, K., Burrell, M., & McLean, P. (2009). *Building on our strengths—A framework to reduce race-based discrimination and support diversity in Victoria*. Melbourne, Australia: Health Promotion Foundation.

Paradies, Y., & Cunningham, J. (2012). The DRUID study: Racism and self-assessed health status in an Indigenous population. *BMC Public Health*, *12*, 131. https://doi.org/10.1186/1471-2458-12-131

Paradies, Y. C., & Cunningham, J. (2008). Development and validation of the Measure of Indigenous Racism Experiences (MIRE). *International Journal for Equity in Health*, *7*, 9. https://doi.org/10.1186/1475-9276-7-9

Prandl, K. J., Rooney, R., & Bishop, B. J. (2012). Mental health of Australian Aboriginal women during pregnancy: Identifying the gaps. *Archives of Womens Mental Health*, *15*(3), 149–154. https://doi.org/10.1007/s00737-012-0276-0

Priest, N., Paradies, Y., Stewart, P., & Luke, J. (2011). Racism and health among urban Aboriginal young people. *BMC Public Health*, *11*, 568. https://doi.org/10.1186/1471-2458-11-568

Priest, N., Paradies, Y., Trenerry, B., Truong, M., Karlsen, S., & Kelly, Y. (2013). A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. *Social Science and Medicine*, *95*, 115–127. https://doi.org/10.1016/j.socscimed.2012.11.031

Priest, N., Perry, R., Ferdinand, A., Kelaher, M., & Paradies, Y. (2017). Effects over time of self-reported direct and vicarious racial discrimination on depressive symptoms and loneliness among Australian school students. *BMC Psychiatry*, *17*(1), 50. https://doi.org/10.1186/s12888-017-1216-3

Priest, N., Thompson, L., Mackean, T., Baker, A., & Waters, E. (2017). Yarning up with Koori kids'—hearing the voices of Australian urban Indigenous children about their health and well-being. *Ethnicity and Health*, *22*(6), 631–647. https://doi.org/10.1080/13557858.2016.1246418

Pyett, P., Waples-Crowe, P., & Sterren, A. V. (2008). Challenging our own practices in Indigenous health promotion and research. *Health Professional Journal of Australia*, *19*, 179–183. https://doi.org/10.1071/HE08179

Reilly, R. E., Doyle, J., Bretherton, D., Rowley, K. G., Harvey, J. L., Briggs, P., … Atkinson, V. (2008). Identifying psychosocial mediators of health amongst Indigenous Australians for the Heart Health Project. *Ethnicity and Health*, *13*(4), 351–373. https://doi.org/10.1080/13557850801903046

Richiardi, L., Pizzi, C., & Pearce, N. (2013). Commentary: Representativeness is usually not necessary and often should be avoided. *International Journal of Epidemiology*, *42*, 1018–1022. https://doi.org/10.1093/ije/dyt103

Rosenthal, L., Earnshaw, V. A., Moore, J. M., Ferguson, D. N., Lewis, T. T., Reid, A. E., … Ickovics, J. R. (2018). Intergenerational consequences: Women's experiences of discrimination in pregnancy predict infant social-emotional development at 6 months and 1 year. *Journal of Developmental and Behavioral Pediatrics*, *39*(3), 228–237. https://doi.org/10.1097/DBP.0000000000000529

Rothman, K., Gallacher, J., & Hatch, E. (2013). Why representativeness should be avoided. *International Journal of Epidemiology*, *42*, 1012–1014. https://doi.org/10.1093/ije/dys223

Rubin, D. B. (1976). Inference and missing data. *Biometrika*, *63*(3), 581–592.

Sawyer, P. J., Major, B., Casad, B. J., Townsend, S. S. M., & Mendes, W. B. (2012). Discrimination and stress response: Psychological and physiological consequences of anticipating prejudice in interethnic interactions. *American Journal of Public Health*, *102*(5), 1020–1026. https://doi.org/10.2105/AJPH.2011.300620

Scott, L. D., & House, L. E. (2005). Relationship of distress and perceived control to coping with perceived racial discrimination among Black youth. *Journal of Black Psychology*, *31*(3), 254–272. https://doi.org/10.1177/0095798405278494

Shapiro, G. D., Fraser, W. D., Frasch, M. G., & Seguin, J. R. (2013). Psychosocial stress in pregnancy and preterm birth: Associations and mechanisms. *Journal of Perinatal Medicine*, *41*(6), 631–645. https://doi.org/10.1515/jpm-2012-0295

Shepherd, C. C. J., Li, J., Cooper, M. N., Hopkins, K. D., & Farrant, B. M. (2017). The impact of racial discrimination on the health of Australian Indigenous children aged 5-10 years: Analysis of national longitudinal data. *International Journal for Equity and Health*, *16*(1), 116. https://doi.org/10.1186/s12939-017-0612-0

Shorey, S., Ng, Y. P. M., Ng, E. D., Siew, A. L., Morelius, E., Yoong, J., & Gandhi, M. (2019). Effectiveness of a technology-based supportive educational parenting program on parental outcomes (part 1): Randomized controlled trial. *Journal of Medical Internet Research*, *21*(2), e10816.

Smith, S., O'Grady, L., Cubillo, C., & Cavanagh, S. (2017). Using culturally appropriate approaches to the development of KidsMatter resources to support the social and emotional wellbeing of aboriginal children. *Australian Psychologist*, *52*(4), 299–305. https://doi.org/10.1111/ap.12284

Stamp, G. E., Champion, S., Anderson, G., Warren, B., Stuart-Butler, D., Doolan, J., … Muyambi, C. (2008). Aboriginal maternal and infant care workers: Partners in caring for Aboriginal mothers and babies. *Rural & Remote Health*, *8*(3), 1–12.

Stock, C., Mares, S., & Robinson, G. (2012). Telling and re-telling stories: The use of narrative and drawing in a group intervention with parents and children in a remote Aboriginal community. *Australian and New Zealand Journal of Family Therapy*, *33*(02), 157–170. https://doi.org/10.1017/aft.2012.17

Stock, M. L., Peterson, L. M., Molloy, B. K., & Lambert, S. F. (2017). Past racial discrimination exacerbates the effects of racial exclusion on negative affect, perceived control, and alcohol-risk cognitions among Black young adults. *Journal of Behavioral Medicine*, *40*(3), 377–391. https://doi.org/10.1007/s10865-016-9793-z

Walter, M., & Saggers, S. (2007). Poverty and social class. In B. Carson, T. Dunbar, R. Chenhall, & R. bailie (Eds.), *Social determinants of Indigenous health* (pp. 87–104). Crows Nest, Australia: Allen&Unwin.

Weech-Maldonado, R., Dreachslin, J. L., Epane, J. P., Gail, J., Gupta, S., & Wainio, J. A. (2018). Hospital cultural competency as a systematic organizational intervention: Key findings from the national center for healthcare leadership diversity demonstration project. *Health Care Management Review*, *43*(1), 30–41. https://doi.org/10.1097/HMR.0000000000000128

Witt, W. P., Litzelman, K., Cheng, E. R., Wakeel, F., & Barker, E. S. (2014). Measuring stress before and during pregnancy: A review of population-based studies of obstetric outcomes. *Maternal and Child Health Journal*, *18*(1), 52–63. https://doi.org/10.1007/s10995-013-1233-x

Zeiders, K. H., Umana-Taylor, A. J., Jahromi, L. B., Updegraff, K. A., & White, R. M. (2016). Discrimination and acculturation stress: A longitudinal study of children's well-being from prenatal development to 5 years of age. *Journal of Developmental and Behavioral Pediatrics*, *37*(7), 557–564. https://doi.org/10.1097/DBP.0000000000000321

How to cite this article: Macedo DM, Smithers LG, Roberts RM, Jamieson LM. Racism, stress, and sense of personal control among Aboriginal Australian pregnant women. *Aust Psychol*. 2019;1–13. https://doi.org/10.1111/ap.12435

APPENDIX I

TABLE A1

	Imputed sample (n = 369)	Complete cases sample (n = 259)[a]	Missing values
	Means (95% CI)		**Frequency**
Racism	1.6 (1.3, 1.8)	1.6 (1.3, 1.9)	05
Stress	25.1 (24.3, 25.8)	24.9 (24.0, 25.8)	14
Sense of control	31.8 (31.0, 32.5)	32.5 (31.6, 33.4)	11
Age	24.7 (24.1, 25.3)	25.3 (24.6, 26.0)	0
Number of children cared for	1.4 (1.2, 1.5)	1.4 (1.2, 1.5)	29
	Prevalence (95% CI)		
Location			0
Rural or regional	64.7 (59.8, 69.6)	65.2 (59.2, 70.8)	
Metropolitan	35.3 (30.3, 40.1)	34.8 (29.1, 40.8)	
Education			03
No schooling	1.9 (0.5, 3.3)	1.9 (0.08, 4.5)	
Primary school	1.4 (0.1, 2.6)	1.5 (0.05, 4.0)	
High school	70.4 (65.7, 75.1)	69.9 (63.9, 75.2)	
Technical	19.3 (15.3, 23.4)	18.9 (14.6, 24.2)	
University	6.9 (4.3, 9.5)	7.7 (5.0, 11.7)	
Income			05
Private job	12.4 (0.9, 15.8)	13.9 (10.1, 18.7)	
Centrelink	87.6 (84.1, 90.9)	86.1 (81.2, 89.8)	
Smoking status			04
Currently do	52.0 (46.9, 57.1)	53.2 (47.1, 59.3)	
Used to	27.1 (22.5, 31.7)	28.5 (23.3, 34.4)	
Never did	20.9 (16.6, 25.0)	18.1 (13.8, 23.3)	
Alcohol consumption			05
Currently do	9.6 (6.5, 12.6)	8.5 (5.6, 12.5)	
Used to	82.4 (78.4, 86.3)	84.9 (80.0, 88.8)	
Never did	7.9 (5.1, 10.7)	6.5 (4.1, 10.3)	
Felt uncomfortable about teeth appearance			01
Very often	20.3 (16.2, 24.4)	22.7 (18.0, 28.3)	
Often	13.5 (10.0, 17.0)	12.7 (9.1, 17.4)	
Sometimes	28.3 (23.6, 32.9)	26.2 (21.2, 31.9)	
Hardly ever	14.1 (10.5, 17.6)	14.6 (10.8, 19.5)	
Never	23.6 (19.2, 28.0)	23.5 (18.7, 29.1)	
Identify with a tribal group, language, group or clan?			62
Yes	43.0 (37.4, 48.6)	43.6 (37.6, 49.7)	
No	57.0 (51.3, 62.6)	56.3 (50.2, 62.3)	

Note: Comparison of frequency distributions between the imputed and complete cases and presentation of missing values in the respondent sample.
[a]Complete cases on all exposure, outcome, and confounding variables.

4. Chapter 4: Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children

4.1. Highlights:

- Among Aboriginal children aged 6-12 years, racism was associated with poorer social and emotional wellbeing (SEWB) 1 to 2 years after exposure.

- Racism impacted all SEWB domains analysed. Children who reported experiencing racism at school were at increased risk of presenting hyperactivity, conduct problems, peer problems, emotional difficulties, and overall emotional and behavioural difficulties.

- Children in the younger cohort (6-8 years) exhibited a range of emotional and behavioural difficulties, showing a less defined pattern of symptoms. The older cohort (8-12 years) presented a clearer tendency toward hyperactivity symptoms, although difficulties in all domains were identified.

- The findings have implications for caregivers and professionals working in educational settings where Aboriginal children might experience racism. Identifying such symptoms as a consequence of racism might allow for early intervention aimed to promote discussions around multicultural diversity and resilience to prevent symptoms from escalating.

4.2.Statement of Authorship

Statement of Authorship

Title of Paper	Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children
Publication Status	☑ Published ☐ Accepted for Publication ☐ Submitted for Publication ☐ Unpublished and Unsubmitted w ork w ritten in manuscript style
Publication Details	Macedo DM, Smithers LG, Roberts RM, Paradies Y, Jamieson LM. Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children. Int J Equity Health. 2019;18(1):132. doi: 10.1186/s12939-019-1036-9.

Principal Author

Name of Principal Author (Candidate)	Davi Manzini Macedo		
Contribution to the Paper	Conceiving of research question Data Analysis Manuscript Writing Editing and revisions Paper submission for publication Correspondence with Editors in the publication process		
Overall percentage (%)	75%		
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	01/12/19

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Lisa G. Smithers		
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in data analysis procedures Input in interpretation of results Revision of manuscript		
Signature		Date	2-DEC-2019

Name of Co-Author	Rachel M. Roberts

Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript
Signature	Date 5/12/19

Name of Co-Author	Yin Paradies
Contribution to the Paper	Revision of methodology Input in interpretation of results Revision of manuscript
Signature	Date 01/12/2019

Name of Co-Author	Lisa M. Jamieson
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript
Signature	Date 01/12/2019

4.3. Published Paper: Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children

Citation: Macedo DM, Smithers LG, Roberts RM, Paradies Y, Jamieson LM. Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children. Int J Equity Health. 2019;18(1):132. doi: 10.1186/s12939-019-1036-9

Macedo et al. International Journal for Equity in Health (2019) 18:132
https://doi.org/10.1186/s12939-019-1036-9

International Journal for Equity in Health

RESEARCH Open Access

Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children

D. M. Macedo[1*], L. G. Smithers[2], R. M. Roberts[3], Y. Paradies[4] and L. M. Jamieson[1]

Abstract

Background: Racism is a pervasive experience in the life of Aboriginal Australians that begins in childhood. As a psychosocial stressor, racism compromises wellbeing and impacts developmental trajectories. The purpose of the present study was to estimate the effect of racism on indicators of Australian Aboriginal child socio-emotional wellbeing (SEWB) at one to two years after exposure. Age-related differences in the onset of symptoms were explored.

Methods: Data from the B- and K-cohorts of the Longitudinal Study of Indigenous Children were used (aged 6 to 12 years). Racism, confounding variables, and the Strengths and Difficulties Questionnaire (a measure of SEWB) were collected by questionnaires and guided interviews with each child's main caregiver. Adjusted Poisson regression was used to estimate the relative risk (RR_a) effects of racism on SEWB for both cohorts separately. RR_a were pooled in a random effects meta-analysis.

Results: Exposure to racism was associated with an adjusted point estimate indicating a 41% increased risk for total emotional and behavioural difficulties, although the confidence intervals were wide (pooled RR_a 1.41, 95% CI 0.75, 2.07). Analyses by cohort showed younger children had higher RR_a for total difficulties (RR_a 1.72, 95% CI 1.16, 2.54), whilst older children had higher RR_a for hyperactive behaviour (RR_a 1.66, 95% CI 1.01, 2.73).

Conclusions: The effects observed contributes to our understanding of the impact of racism on Aboriginal Australian children. Support for emotional and behavioural difficulties, and hyperactive behaviour, for Aboriginal children might help counteract the effects of racism. Future longitudinal research and policies aimed at reducing racism in Australian society are necessary.

Keywords: Racism, Social and emotional wellbeing, Mental health, Aboriginal Australian children, Childhood

Background

The concept of racism corresponds to a set of attitudes, behaviours and practices that maintain an imbalance in the distribution of power across ethnic-racial groups [1]. Racism is the oppression of specific ethnic-racial groups in association with maintaining the privileges of others, fostering and perpetuating social disparities [2]. At an institutional level, racism can be observed through historical and structural inequalities in socioeconomic indicators, and educational and health parameters. In its interpersonal facet, racism permeates daily interactions, with negative discriminatory behaviour targeted at ethnic-racial minority members. Racism can be internalised by the assimilation of negative messages that influence self-concept formation and well-being [1–3]. Interpersonal racism is the focus of the present study, as such experiences are reported by members of different ethnic-racial minority groups at different ages across the life-span, with documented impacts on health and wellbeing [4, 5]. Accordingly, racism will be the term used throughout this paper in reference to racially-based discriminatory encounters experienced at an interpersonal level. The impact racism has on ethnic-racial minorities' health and wellbeing makes it a public health issue and a central component of the political agenda worldwide [4].

The World Health Organisation framework to strengthen health equities globally and within countries

* Correspondence: davi.manzinimacedo@adelaide.edu.au
[1]ARCPOH, AHMS Building Level 9, The University of Adelaide, North Terrace, Adelaide/SA 5005, Australia
Full list of author information is available at the end of the article

is based on the social determinants of health [6]. This framework highlights how social stratification influences early life and the social and physical environments in which individuals develop and interact [6, 7]. Among these structural factors, biases and values within society, social position, ethnicity and race, and psychosocial factors are central determinants of the distribution of health and wellbeing in the population [6]. This framework has been suggested as relevant to the understanding of health and wellbeing inequalities in the Aboriginal Australian context [8]. Aboriginal people report being exposed to racism during childhood, adolescence, and adulthood, in a range of different settings where they perform their daily activities [9–11]. Accordingly, Aboriginal health and wellbeing cannot be promoted without considering the impact of the social and structural conditions that shape their life trajectories [8]. Due to its link to a history of dispossession, marginalisation, disempowerment, and inequalities, racism is a central determinant of the health and socio-emotional wellbeing of Aboriginal Australians from an early age [8, 12].

The effects of racism among ethnic-racial minorities can be observed from childhood and early adolescence [11]. A systematic review of 121 studies offers a panoramic perspective of the main findings in the field. It indicates that the most consistent effects of racism among children and adolescents are for negative mental health outcomes [13]. Associations between racism and lower self-esteem and higher anxiety, stress, depression, suicide ideation and attempts, aggression, Attention Deficit and Hyperactive Disorder, and behavioural problems have been reported [13]. Similar associations were reported in a systematic review that analysed 47 papers on the health and wellbeing of Indigenous youth (4–20 years) from high income countries (U.S., Canada, and Australia) [14]. More specifically, research with Aboriginal Australian adolescents and young adults indicates associations of racism and poor overall mental health and higher anxiety, depression, and suicide risk [15, 16]. A study focused on 5–10-year olds showed an increased risk for overall emotional and behavioural difficulties amongst Aboriginal children exposed to interpersonal racism [17].

Research in the Aboriginal Australian context is still limited, generally reporting cross-sectional data and including relatively large age-range groups [15].The present study intends to provide further insight on the impact of racism on the social and emotional wellbeing (SEWB) of Aboriginal Australian children. Following on from the previous work of Shepherd et al. [17], we used longitudinal data to estimate the effect of racism on specific domains of SEWB including emotional difficulties, hyperactivity, peer and conduct problems, as well as a total score for psychological difficulties. We hypothesised that experiencing racism would be associated with higher risk for clinically significant symptomatology in all domains considered one-to-two years after exposure. Estimating the effects of racism on different mental health domains can contribute to the understanding of symptoms that might be more closely associated with experiences of racism in Aboriginal children, assisting in identifying periods for optimal intervention and in designing appropriate support.

The analyses were designed to maximize the longitudinal potential of the data. Temporal ordering of exposure and outcome is required to account for the possibility of reverse causation, thus contributing to the investigation of causal associations and the long-term effects of exposure to racism amongst racial minorities [13, 17]. Age-related differences in the onset of symptoms were also investigated. Differences in the onset of symptoms might be relevant for mental health clinicians, health practitioners, and professionals in educational settings who interact with Aboriginal children and might have opportunities to identify symptomatology and recommend early intervention.

Methods

Data collection procedures

Data were from the Footprints in Time - Longitudinal Study of Indigenous Children (LSIC). Initiated and funded by the Australian Government Department of Social Services (DSS), the LSIC is a national survey focused on gathering data on determinants of Aboriginal child physical and mental health. Its main goal is to provide information on how experience in the early years can affect Aboriginal children health and development [18]. The LSIC employs a cross-sequential design involving two cohorts of children. The Baby Cohort (B Cohort) comprises Indigenous children born between December 2006 and November 2007, with data collection commencing when children were aged 6 months to 2 years. The Child Cohort (K Cohort) includes children aged 3.5 to 5 years in the first wave. They were born between December 2003 and November 2004. We used data from both cohorts of LSIC to maximise our sample size. The study commenced in 2008 with subsequent waves conducted annually thereafter [18].

The first stage of sampling was the selection of 11 sites across Australia representative of the socioeconomic and community environments where Aboriginal children lived. Locations ranged from very remote communities to capital cities. A non-representative purposive sample was recruited using addresses provided by Centrelink and Medicare Australia of children registered as Aboriginal or Torres Strait Islander. Centrelink is part of the Australian Government Department of Human Services, which delivers social security payments for those unemployed or

unable to work [19]. Medicare Australia provides benefits, payments, and services to assist all Australians with the costs of health services, prescriptive medicines, and medical equipment [20]. Children were also recruited via recommendation of study families and local knowledge of Research Administration Officers involved in the study. Promotion of the study occurred during community events such as National Aboriginal and Islander Day Observance Committee week [21].

Eligible families were thus approached, and voluntary consent obtained. The probability of being selected to participate was not random across the total Australian Indigenous population, neither were children and families selected at random within each specific location [18]. Data were collected through questionnaire-guided interviews conducted by trained Aboriginal and Torres Strait Islander Research Administration Officers. Information was collected from multiple informants (e.g., study child main caregiver, main caregiver's partner, study child, study child teacher) [22].

Participants

Data on 1060 Aboriginal children participating in waves 6, 7, and 8 of LSIC were used. Data collection occurred in 2012, 2013, and 2015 respectively. The children included in the analysis were aged 6 to 12 years. The number of interviews conducted ranged from 1239 to 1255 between the three waves and the study participants' retention rate ranged from 85 to 87%. The information used was provided by the self-identified main caregiver of the child, usually the mother (86% in the K Cohort and 87% in the B Cohort).

Variables measurement and categorization

Study child experience of racism (exposure)

Information on racism experienced by the children in school was obtained through the question "Has study child been bullied or treated unfairly at school because he/she is Aboriginal and/or Torres Strait Islander?" Answer options were "Yes, bullied (kids being mean to him/her", "Yes, treated unfairly (adults being mean to him/her)", "Yes, both bullied and treated unfairly", "No", "Don't know", and "Refused". In both cohorts, only one answer pointed to discriminatory treatment by adults. The item "Yes, both bullied and treated unfairly" was endorsed by 7 and 12 participants in the K and B cohorts, respectively. As it was not possible to discriminate if the perpetrators reported in this item were peers or adults, answers were dichotomized in "Yes" and "No" as to reflect overall experiences of racism. The "Don't know" and "Refused" responses were classified as missing data. To verify the effect of racism over time, the exposure was collected at wave 6 (K cohort) and wave 7 (B cohort). Children were aged 6.5 to 8 years (B Cohort) and 8.5 to 10 years (K Cohort) when information on racism was obtained. No information on the timing of racism exposure was specified by the question.

Children socio-emotional wellbeing (outcome)

The Strengths and Difficulties Questionnaire (SDQ) [23] scores were used to assess risk for clinically significant emotional or behavioural difficulties, or difficulties that might require further investigation for mental health-related diagnosis. Comprising 25 questions, the SDQ assesses difficulties in five domains: emotional symptoms, conduct problems, hyperactivity, peer problems and pro-social behaviour. Scores range from 0 to 10, with higher scores indicating higher difficulties; reverse applied to the pro-social behaviour domain. The scores of the emotional symptoms (anxiety, emotional withdrawal, somatic complaints), conduct problems (rule breaking, emotional outburst, defiant behaviour), hyperactivity (inattention, impulsivity, restless), and peer problems (relationship with other children, experience of being bullied) were used separately to analyse domain-specific difficulties. A SDQ Total score was the sum of all domains (excluding Prosocial), with scores ranging from 0 to 40 (higher scores indicating higher socio-emotional problems).

SDQ scores were collected at wave 8, dated from 2015, when children were 7.5 to 12 years old. All scores were dichotomised based on cut-off points for high risk of emotional or behavioural difficulties, based on a UK sample of 10,438 5–15 year-old children [24]. Scores ≥5 were considered at risk for emotional symptoms, ≥4 for both conduct and peer problems, ≥7 for hyperactivity, and ≥ 17 for the total SDQ score. These cut-off points represents the children above the 90th percentile in the Meltzer et al. [23] sample, suggesting elevated risk of presenting emotional and behavioural difficulties. The SDQ is a widely used measure to assess child risk for emotional and behavioural difficulties across a different range of countries and contexts [24]. The acceptability, face, and construct validity of the SDQ has been demonstrated among urban Aboriginal children and adolescents in New South Wales, Australia [25, 26]. No specific cut-off scores for Aboriginal Australian children are available.

Confounding variables

Demographic characteristics and socio-economic status were used to adjust for potential bias due to confounding. Confounders were conceptualised as a common cause of the exposure and the outcomes [27]. Confounders were selected based on content-knowledge and literature-based evidence amongst racial minority children, including Aboriginal Australian children [13, 28, 29]. Child sex, child age (years), main language spoken by the study child, main caregiver level of education, the Index of Relative

Indigenous Socioeconomic Outcomes (IRISEO), and level of relative geographic isolation were included in the adjusted models. Sex and age were provided in wave 1. The dominant language spoken by the Study child was derived from the question "What language (s) is Study Child learning?" Responses included English, foreign languages, and a set of Aboriginal languages (e.g. Alyawarr, Pitjantjatjara, Yorta-Yorta). The final categories of the variable were "Equally fluent in English and in an Indigenous language", "Dominant in an Indigenous language" and "Dominant in English". Information on children's dominant language was collected at Wave 8 and is considered to approximate the language proficiency in previous waves.

The main caregiver highest level of education attainment was collected at waves 2 and 3 with fourteen response options ranging from "Never attended school" to "Post graduate degree". Caregiver education data was collected from waves 6 and 7. Participants responses were recategorized in four categories: "Year ten or below of high school", "Year 11 or 12 of High School", "Post school certificate/Advanced diploma", "Graduate degree or above". Socioeconomic status was adjusted for using the Index of Relative Indigenous Socioeconomic Outcomes (IRISEO), a measure of community level socioeconomic advantage. Based on the 2006 Australian Census of Population and Housing, the measure is derived from information on education, housing, and income and is calculated specifically for Indigenous Australians. The measure presents continuous values ranging from 1 (most disadvantaged) to 10 (most advantaged) [30]. The Level of Relative Isolation (LORI) is a measure of geographic remoteness/isolation based on the Accessibility/Remoteness index of Australia, which in turn is calculated based on relative distance to service centres. The LORI categories range from "No isolation", which corresponds to metropolitan areas to "Low isolation", "Moderation isolation", "High isolation" and "Extreme isolation" [31].

Analytical approach

Descriptive analytical procedures were used to obtain estimates of the frequency distributions with confidence intervals (CI) for each cohort separately. Risk Ratios (RR_a) and 95% CI were calculated from Poisson regression analysis with robust errors to estimate the effects of child exposure to racism on socio-emotional wellbeing for each cohort. Models were adjusted for confounding, as above. Multiple imputation with chained equations (MICE) were conducted for each cohort separately to address potential bias due to missing information. It also accounted for the loss of precision and statistical power resulting from the exclusion of participants with incomplete information [32]. MICE was conducted under the assumption that missing values occurred at random, conditional on the observed data [33]. Models of imputation included all the exposure, outcomes, and confounding variables used in the association models. The variables with complete data were the same in both cohorts: child age; child sex; IRISEO; and LORI. The variables with missing values in the K Cohort were: SDQ scores (1); parental education (7); racism (9); and child dominant language (18). The same variables presented missing values in the B Cohort: SDQ scores (4); racism (9); parental education (33); and child dominant language (40). Twenty data sets with imputed values were generated to reduce sampling variability from the imputation process [34]. After imputation, the association model tested from the K cohort included 412 observations. The model tested from the B Cohort included 648. The descriptive estimates of prevalence (95% CI) generated represent the frequency distribution of data across the twenty imputed data sets. No final N per variable was informed as they vary between data sets, as is the case of analyses using imputed data. The results from the imputed analysis were considered the primary findings for each cohort.

Children in the K Cohort were two years older when information on racism was collected (wave 6) and had SEWB assessed after a two-year interval (wave 8). The children in the B Cohort were assessed for racism at wave 7 and their SEWB after a one-year interval (wave 8). The pooled effect estimates were analysed as an average measure of the effect of racism on child SEWB. A single parameter nonetheless is limited in summarising heterogeneous effects [35]. Thus, the meta-analysis allowed examination of consistency across the effects in two different-aged cohorts that had different times of assessment for exposure and outcomes and thus had different opportunities to be exposed and develop symptoms. This was considered more appropriate than combining both samples.

The focus of our analysis was effect sizes as an indication of the impact of racism on child SEWB and their precision. As recommended by the American Statistical Association and the American Psychological Association, we do not interpret statistical significance [36, 37]. Thus, no p values are reported, and the CIs are interpreted as measures of precision and not containing a true effect in the population [37, 38]. We understand the limitations of our study and report all information for these results to be included in any future meta-analysis on estimating the effects of racism, assisting the research in the area to move forward [37]. All analysis were performed in Stata 14.

Results

The mean ages of children at measurement of racism in the K and B cohorts were 8.5 (SD 0.57) and 6.6 years (SD 0.54), respectively. Mean age when the outcome was

assessed was 10.5 (SD 0.58) and 7.6 years (SD 0.56), respectively. The data in Table 1 describes the two cohorts and illustrates that the cohorts were similar for most variables. There were slightly more female children, corresponding to 52% of participants in both waves. English was the child's dominant language in 90% of cases for both cohorts and the IRISEO means were 5.8 (SD 2.21) and 5.7 (SD 2.54) for the K and B cohorts respectively. The highest level of caregiver education attainment was high school or below for approximately 60% of the two samples and at least three quarters of each of the two cohorts presented low to no levels of relative geographic isolation. Exposure to racism was similar across both cohorts (K Cohort, 15%; B Cohort, 14%), as was the proportion of children with clinically-significant symptoms on the SDQ Table 1.

Table 1 Descriptive distributions of exposure, outcomes and confounding variables for waves 6 and 7

Means (Standard Deviations)	K Cohort	B Cohort
Child Age	8.5 (SD 0.57)	6.6 (SD 0.54)
IRISEO	5.8 (SD 2.21)	5.7 (SD 2.54)
Prevalence (95% CI)	K Cohort	B Cohort
Racism		
Yes	15.3 (11.8, 19.0)	14.0 (11.2, 16.6)
No	84.7 (81.2, 88.2)	86.0 (83.3, 88.7)
Socioemotional wellbeing		
SDQ – High Emotional symptoms scores	14.8 (11.3, 18.2)	18.3 (15.3, 21.3)
SDQ – High Conduct problems scores	17.9 (14.2, 21.6)	22.4 (19.2, 25.6)
SDQ - High Hyperactivity scores	17.7 (14.0, 21.4)	20.7 (17.6, 23.9)
SDQ – High Peer problems scores	20.1 (16.2, 24.0)	20.1 (17.0, 23.2)
SDQ – High Total difficulties scores	14.5 (11.1, 17.9)	18.1 (15.1, 21.1)
Sex		
Male	47.4 (44.0, 50.7)	47.2 (43.3, 51.0)
Female	52.5 (49.2, 55.9)	52.7 (48.9, 56.6)
Child dominant language		
Equally fluent – English/Indigenous language	5.4 (2.4, 5.0)	3.8 (2.2, 5.3)
Indigenous language	4.7 (2.6, 6.9)	6.3 (4.4, 8.2)
English	89.8 (86.8, 92.7)	89.8 (87.4, 92.2)
Main caregiver level of education		
Year ten of High School or below	31.5 (27.0, 36.0)	33.8 (30.0, 37.5)
Year 11 or 12 of High School	26.2 (22.0, 30.5)	30.0 (26.4, 33.6)
Post School certificate or Advanced diploma	32.3 (27.7, 36.8)	26.8 (23.2, 30.3)
Graduate degree or above	10.0 (7.0, 13.0)	9.3 (7.0, 11.6)
Level of Relative Isolation		
None	28.3 (24.0, 32.7)	27.4 (24.0, 30.9)
Low	54.3 (49.5, 59.1)	49.7 (45.8, 53.5)
Moderate	9.7 (6.8, 12.5)	15.6 (12.7, 18.3)
High/Extreme	7.5 (4.9, 10.0)	7.2 (5.2, 9.2)

Figure 1 shows the RR_a for each cohort and each domain. The point estimates were consistent for most domains although CIs were generally wider for the K cohort compared with the B cohort. However, in the hyperactivity domain, there was a considerably higher RR_a for the K cohort (RR_a 1.66, 95% CI 1.01, 2.73) than the B cohort (RR_a 1.12, 95% CI 0.77, 1.65). The B cohort in turn presented higher RR_a for total clinically significant difficulties (RR_a 1.72, 95% CI 1.16, 2.54) than the K cohort (RR_a 1.05, 95% CI 0.52, 2.09). The pooled estimates between cohorts showed larger RR_a for total difficulties (RR_a 1.41, 95% CI 0.75, 2.07), peer problems (RR_a 1.27, 95% CI 0.85, 1.70), and hyperactive behaviour (RR_a 1.26, 95% CI 0.80, 1.71). The I^2 for the effects on emotional symptoms, conduct problems, and peer problems was equal to 0%, suggesting the variability of the estimates between the cohorts was entirely due to chance. The observed I^2 in the hyperactivity and the total difficulties domains suggest that 14.1 and 37.6% respectively of the variability among the estimates of each domain was due to heterogeneity between the cohorts [Insert Fig. 1 near here; Title: 'Cohort-specific and pooled estimates of the effects of racism on social and emotional wellbeing domains'].

Discussion

The findings support our hypothesis that experiencing racism in childhood is associated with higher risks of clinically significant symptomatology in all SDQ domains. The risk ratios discussed are the effects with highest compatibility with the models tested. Nonetheless, careful interpretation is required as the null values were also compatible, although less likely. The effects observed might reflect an initial understanding of a psychosocial stressor such as racism and the implied oppression based on ethnic-racial membership. Children in both waves are still in the process of assigning meaning to the racially determined distribution of power in society, as they mature biologically, cognitively, and socially [39]. There is evidence that from early childhood individuals possess cognitive representations of social dominance, expecting that socially dominant individuals will be more competent and have more resources [40, 41]. It is possible that, although some children might be less prone to identifying racism prior to adolescence, there might be an increased risk for the mental health and well-being of those who do [17]. Our results suggest that these effects might persist over time, with the temporal association applied in the analysis indicating that racism may impact children one to two years after initial exposure.

Previous findings using LSIC data demonstrated an associated odds ratio of 2.32 (95% CI 1.52, 3.53) in the

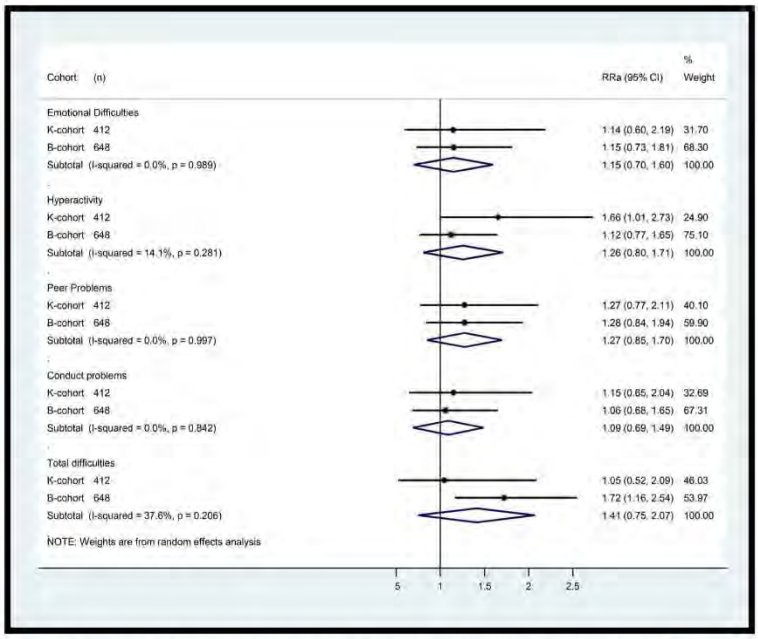


Fig. 1 Confounder-adjusted relative risks of racism on socio-emotional wellbeing of Aboriginal Australian children

total SDQ emotional and behavioural difficulties score for children assessed for racism experiences at ages 5 to 10 [17]. Our results align with these findings. Although the direction of the effect is the same, comparisons regarding its size are limited by the different effect measures presented (risk ratios and odds ratios). We calculated risk ratios rather than odds ratios because the odds ratios are overestimated when the outcome has a close or higher prevalence than 20%, as it is in this case [42]. In that sense, our effect measures are more conservative. Shepherd et al. [17] combined exposure to racism data from four waves of LSIC (between waves 1–6), which 'averaged' the effect and potentially obscured age-related effects that we observed in the study reported here. The study follows a research approach focused on the cumulative effects of primary and vicarious racism. No analysis on specific domains of child SEWB –or age-related differences - were reported, not permitting further comparisons [17].

As children age, affective and cognitive maturation might influence how racism is perceived and how its impact manifests [39]. Our results provide an insight into its effects on specific SEWB domains in different age-groups. The children in the older cohort were at increased risk of presenting hyperactive behaviour. A less precise effect was also observed for increased risk of conduct problems. This might indicate that professionals aiming to reduce externalizing symptoms, especially hyperactive behaviour, among Aboriginal children in later years of childhood need to consider the role of racism in the onset of symptoms. Prevalence data from Australian schools suggests that bullying and discrimination tends to increase during middle primary school up until the transition to secondary school [43], which includes the age-range of children in our sample. Strategies to identify and respond to racist episodes might help to reduce such effects and need to be the focus of future research and intervention [44].

The younger children in our study were shown to be at higher risk for total emotional and behavioural difficulties. This suggests the effects of racism were not especially pronounced in a given domain but were observed through different emotional and behavioural difficulties for that age group. Both cohorts showed an increased risk, again less precise, for the onset of emotional difficulties. Such effects demonstrate how children in both age-groups might present anxiety, emotional withdrawal, somatic complaints and other internalising symptoms due to racism. Comorbidity between the two symptoms' typology is reported in the literature and explains the effects observed in different domains, as children who are presenting behavioural difficulties are likely to also be experiencing internalising problems [45].

Both cohorts exhibited increased risk for the onset of peer problems, although the poor internal consistency of the SDQ Peer problems scale among Aboriginal Australians [26] indicates its results should be interpreted with care. It is argued that its items might not reflect the importance culturally given to different interpersonal relationships (e..g, relationship with elders and the broader community; importance of kinship) for the wellbeing of a child. Thus, in the Aboriginal Australian context, problems with peers might not be conceptualized as a threat to child SEWB, provided the child has positive relationships with family and community members [25, 26]. Removing the peer relationship subscale, however, did not improve the fit of the original SDQ model, showing it is still appropriate for Aboriginal Australian children [26]. It should be noted that poor internal consistency of the peer problems scale was also observed in other populations [46, 47]. Future qualitative studies are needed to inform the direction of further modifications for using the Peer Problem scale among Aboriginal children [26].

It is important to observe that our sample was assessed for the risk of presenting future clinically significant symptomatology, requiring care for comparisons with clinical diagnoses. Nonetheless, the effects presented here are relevant to primary care practitioners, mental health care providers, and school professionals who work with Aboriginal children. They suggest that Aboriginal children might show emotional and behavioural difficulties as the outcome of experiencing racism. Older children might be especially prone to presenting hyperactive behaviour (e.g., lack of attention, agitated behaviour) and conduct problems (e.g., defiant behaviour, and small infractions).

Aboriginal Australian conceptions of resilience in children include the centrality of culture, connection to country, kinship, and community [48, 49]. Accordingly, promotion of a strong ethnic-racial identity has been shown to be an important component in promoting social and emotional wellbeing among Indigenous youth of Australia, U.S., and Canada [50–52]. Future research and interventions that take into consideration the Aboriginal Australian concepts of wellbeing and resilience might assist in fostering connection to culture and sense of pride about one's ethnic-racial identity [48]. Research on the effectiveness of ethnic-racial identity in reducing the effects of racism from an early age can inform future policy and intervention [53].

Our results were obtained from a large sample of children of a stigmatised racial minority group in Australia. The children participating in the LSIC are diverse culturally and geographically, with more than 80 Aboriginal or Torres Strait Islander tribal groups (e.g., Wiradjuri, Yorta Yorta, Arrernt, Gamilaroi) being represented [54]. It can thus be argued that LSIC data is one of the best information sources on determinants of the health and development of Aboriginal Australian children, considering the unprecedented number of participating children, the annual follow up, and the sampling covering a range of localities where Aboriginal children live [18, 55].

Compared with the few longitudinal studies on this topic [5, 17], the longitudinal design of LSIC ensured temporal order of the exposure before the outcome. As for other strengths of the study, the SDQ is a valid and reliable instrument for using with different cultural groups, also being the most common tool used in studies involving Aboriginal children [25]. The analysis of effects per domain of SEWB also contributed to understanding which aspects of development might be most sensitive to racism amongst different age groups. For the method's rigor in estimating the effects of interest, adjustment for confounding was adopted for bias reduction and MICE was performed to reduce non-response bias.

We also highlight that our models were not adjusted for SDQ scores at baseline. First, information at baseline was only available for the K-cohort. Second, our research question was not related to the effects of racism on changes in SDQ scores between waves. Considering the complex dynamics of racism, we cannot be sure that a child's exposure started at baseline as to justify adjusting for SDQ score at this point in time. We believe that our measure of racism is an approximation of children's experiences and might reflect an ongoing process. Finally, adjustment for baseline outcomes might reduce certain bias but can introduce others. In a paper published in the American Journal of Epidemiology, Glymor and collaborators [56] argue that the bias introduced can surpass the bias eliminated. It not only fails to remove confounding but also can induces spurious correlations between exposure and measured change. When adjustment for baseline functions is measured prior to exposure, as would be the case for one of our cohorts, such adjustment could introduce regression-to-the-mean bias if baseline values are measured with error [56].

Despite adjusting for several cofounders, residual and unmeasured confounding may remain. Another limitation is the two-year difference between assessment for exposure and outcomes for children in wave 6 (K-cohort), while it was one year for children in wave 7 (B-cohort). Children in the K-cohort, due to their already higher age and the larger time interval between assessments, had more opportunity to be exposed to new episodes of racism that were not captured. Consequently, there may be more children in the K-cohort who experienced a negative impact on SEWB due to racism but who were counted as unexposed, underestimating the effect sizes presented. It could also be the case that the children were continuously exposed to racism in the intervals between assessments, reflecting a cumulative

effect when SDQ scores were captured. It is important to note that the exposure variable was racism in the school environment and not in other settings and, as such, this potentially underestimates children's exposure to racism. It is possible that only the more severe episodes of racism will be reported by children to their parents, which again, would contribute to underestimating racism exposure. Although caregivers believe their children would tell them about bullying/victimization at school, children who suffer discrimination refer not telling their caregivers about such experiences [57]. Therefore, future research should seek to understand experiences of racism from the child's perspective and across all contexts [13].

All the point estimates of the risk ratios indicated that racism was associated with increased risks of poorer SEWB. However, the CIs were wide and 'non-significant'. We deliberately avoid interpreting 'statistical significance' and focus on effect sizes, as recommended by the leading professional organisations in statistics and the health sciences [37, 38, 58, 59]. Larger sample sizes might address the wide CIs [59]. However, this is the largest cohort available in Australia, and one of few in the world [60, 61], with data available to study effects of racism in childhood. Therefore, it is unlikely that larger samples are available. We felt it was inappropriate to combine data from the B and K cohorts due to differences in the ages when racism and SEWB were measured, and differences in the intervening period (the two cohorts had different opportunities to be exposed). Furthermore, the separation of the two cohorts has added a unique insight that age might influence which aspects of SEWB are affected by racism, which would have been masked if the cohorts were combined. Irrespective, our data from two cohorts are presented in such a way that they could be used in future meta-analyses that aim to more precisely estimate the effect of racism on SEWB.

Conclusions

The present study demonstrated the effect of racism on the socio-emotional wellbeing of Aboriginal Australian children aged 6 to 12 years. Differences of this effect within subgroups based on age were observed, with important implications for identification of exposure to racism and management of specific symptomatology in children. Neglecting such signs could contribute to the perpetuation of the intergenerational effect of racism experiences. Future research with longitudinal data should be conducted to help elucidate how this symptomatology evolves over adolescence and into adulthood. Although mental health support may be necessary for children's wellbeing, reduction of racism must be a target of public policies that aim to build a more equal and diverse society for all Australians [62].

Abbreviations

DHS: Department of human services; DSS: Department of social services; IRISEO: Index of relative indigenous socioeconomic outcomes; LORI: Level of relative isolation; LSIC: Longitudinal study of indigenous children; MICE: Multiple imputation with chained equations; SDQ: Strengths and difficulties questionnaire; SEWB: Social and emotional wellbeing

Acknowledgements

Not applicable.

Authors' contributions

All authors were involved in the design of the study. DMM and LMJ applied for data access. DMM conducted the analysis and wrote the first drafts. RR, LGS, YP and LMJ revised the analysis and the subsequent manuscript versions. All authors agreed in the manuscript version presented. All authors read and approved the final manuscript.

Funding

No funding was applied for the consecution of the present study.

Availability of data and materials

There are security and confidentiality protocols for accessing LSIC data. Interested parts must submit an application and sign a deed of license. Information can be found on the LSIC webpage: http://www.dss.gov.au/lsic.

Ethics approval and consent to participate

The LSIC ethical clearance was obtained from the Australian Government Department of Health Departmental Ethics Committee. Approval from state and territory Human Research Ethics Committees was also obtained for the different regions included in the study. Participants were reassured of the confidential nature of data collection, storage and analysis and that they could drop out of the study at any time [19].

Consent for publication

Not applicable.

Competing interests

The authors declare that are no financial or non-financial competing interests involved in the consecution of this study.

Author details

[1]ARCPOH, AHMS Building Level 9, The University of Adelaide, North Terrace, Adelaide/SA 5005, Australia. [2]BetterStart Child Health and Development Research Group, School of Public Health, The University of Adelaide, Adelaide, Australia. [3]School of Psychology, The University of Adelaide, Adelaide, Australia. [4]Alfred Deakin Institute for Citizenship and Globalisation, Deakin University, Melbourne, Australia.

Received: 28 March 2019 Accepted: 13 August 2019
Published online: 22 August 2019

References

1. Paradies Y. Defining, conceptualizing and characterizing racism in health research. Crit Public Health. 2006. https://doi.org/10.1080/09581590600828881.
2. Berman G, Paradies Y. Racism, disadvantage and multiculturalism: towards effective anti-racist praxis. Ethn Racial Stud. 2010. https://doi.org/10.1080/01419870802302272.
3. Jones CP. Levels of racism – a theoretical framework and a gardner's tale. In: LaVeist TA, Isaac LA, editors. A public health reader - race, ethnicity and health. San Francisco: Jossey-Bass; 2002. p. 311–8.
4. Paradies Y, Ben J, Denson N, Elias A, Priest N, Pieterse A, et al. Racism as a determinant of health: a systematic review and meta-analysis. PLoS One. 2015. https://doi.org/10.1371/journal.pone.0138511.
5. Priest N, Perry R, Ferdinand A, Kelaher M, Paradies Y. Effects over time of self-reported direct and vicarious racial discrimination on depressive symptoms and loneliness among australian school students. BMC Psychiatry. 2017. https://doi.org/10.1186/s12888-017-1216-3.
6. Comission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of

health. In: Final report on the Comission on social determinants of health. Geneva: World Health Organization; 2008. p. 256.
7. Solar O, Irwin A. A conceptual framework for action on the social determinants of health. In: Discussion paper for the commission on social determinants of health discussion paper 2 (policy and practice). Geneva: World Health Organization; 2010. 79 p. Repor No. p. 2.
8. Zubrick SR, Shepherd CC, Dudgeon P, Gee G, Paradies Y, Scrine C, et al. Social determinants of social and emotional wellbeing. In: Dudgeon P, Milroy H, Walker R, editors. Working together: aboriginal and Torres Strait islander mental health and wellbeing principles and practice. Canberra: Australian government Department of the Prime Minister and Cabinet; 2008. p. 93–112.
9. Ferdinand A, Paradies Y, Kelaher M. Mental health impacts of racial discrimination in Victorian aboriginal communities - the localities embracing and accepting diversity (LEAD) experiences of racism survey. Melbourne: The Lowitja Institute; 2013. https://www.lowitja.org.au/sites/default/files/docs/LEAD%20Report-WEB_0.pdf. Accessed 10 Mar 2019.
10. Kelaher MA, Ferdinand AS, Paradies Y. Experiencing racism in health care: the mental health impacts for Victorian aboriginal communities. Med J Aust. 2014. https://doi.org/10.5694/mja13.10503.
11. Priest N, Thompson L, Mackean T, Baker A, Waters E. Yarning up with koori kids' - hearing the voices of australian urban indigenous children about their health and well-being. Ethn Health. 2017. https://doi.org/10.1080/13557858.2016.1246418.
12. Walter M, Saggers S. Poverty and social class In: Carson B, Dunbar T, Chenhall R, Bailie R, editors. Social determinants of indigenous health. Crows Nest: Allen&Unwin; 2007. p. 87–104.
13. Priest N, Paradies Y, Trenerry B, Truong M, Karlsen S, Kelly Y. A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. Soc Sci Med. 2013. https://doi.org/10.1016/j.socscimed.2012.11.031.
14. Young C, Hanson C, Craig JC, Clapham K, Williamson A. Psychosocial factors associated with the mental health of indigenous children living in high income countries: a systematic review. Int J Equity Health. 2017;16(1):153.
15. Priest N, Paradies Y, Gunthorpe W, Cairney S, Sayers S. Racism as a determinant of social and emotional wellbeing for aboriginal australian youth. Med J Aust. 2011. https://doi.org/10.5694/j.1326-5377.2011.tb03099.x.
16. Priest N, Paradies Y, Stewart P, Luke J. Racism and health among urban aboriginal young people. BMC Public Health. 2011. https://doi.org/10.1186/1471-2458-11-568.
17. Shepherd C, Li J, Cooper MN, Hopkins KD, Farrant BM. The impact of racial discrimination on the health of Australian indigenous children aged 5-10 years: analysis of national longitudinal data. Int J Equity Health. 2017. https://doi.org/10.1186/s12939-017-0612-0.
18. Australian Government Department of Social Services. Footprints in time: the longitudinal study of indigenous children - data user guide, release 8.1. Canberra: Department of Social Services; 2017. p. 72.
19. Australian Government Department of Human Services: Centrelink. https://www.humanservices.gov.au/individuals/centrelink (2018). Accessed 3 Sep 2018.
20. Australian Government Department of Human Services: Medicare services. https://www.humanservices.gov.au/individuals/subjects/medicare-services (2018). Accessed 3 Sep 2018.
21. Department of Families, Housing, Community Services and Indigenous Affairs. Footprints in Time: The Longitudinal Study of Indigenous Children—Key Summary Report from Wave 1. Canberra: FaHCSIA; 2009. 64p. Report No.:1
22. Australian Government Department of Social Services: Footprints in Time: The Longitudinal Study of Indigenous Children (LSIC). http://www.dss.gov.au/lsic. Accessed 3 Sep 2018.
23. Meltzer H, Gatward R, Goodman R, Ford F. The mental health of children and adolescents in Great Britain. London: The stationery office; 2000.
24. Stone L, Otten R, Rutger CM, Engels E, Vermulst A, Janssens JM. Psychometric properties of the parent and teacher versions of the Strenghts and difficulties questionnaire for 4-to 12-year-olds: a review. Clin Child Fam Psychol Rev. 2010. https://doi.org/10.1007/s10567-010-0071-2.
25. Williamson A, Redman S, Dadds MJ, D'Este C, Raphael B, Eades S, et al. Acceptability of an emotional and behavioural screening tool for children in aboriginal community controlled health services in urban NSW. Aust N Z J Psychiatry. 2010. https://doi.org/10.3109/00048674.2010.489505.
26. Williamson A, McElduff P, Dadds M, D' Este C, Redman S, Raphael B, et al. The construct validity of the strengths and difficulties questionnaire for aboriginal children living in urban New South Wales, Australia Aust Psychol 2014; doi: https://doi.org/10.1111/ap.12045.
27. Greenland S, Morgenstern H. Confouding in Health Research. Annu Rev Public Health. 2001. https://doi.org/10.1146/annurev.publhealth.22.1.189.
28. Assari S, Gibbons FX, Simons RL. Perceived discrimination among black youth: an 18-year longitudinal study. Behav Sci. 2018. https://doi.org/10.3390/bs8050044.
29. Shepherd C, Li J, Mitrou F, Zubrick SR. Socioeconomic disparities in the mental health of indigenous children in Western Australia. BMC Public Health. 2012. https://doi.org/10.1186/1471-2458-12-756.
30. Biddle N. Ranking regions: revisiting an index of relative indigenous socioeconomic outcomes. Centre for Aboriginal Economic Policy Research. 2009. http://caepr.cass.anu.edu.au/sites/default/files/docs/CAEPRWP50_0.pdf. Accessed 14 Oct 2018.
31. Zubrick SR, Lawrence DM, Silburn SR, Blair E, Milroy H, Wilkes T, et al. The Western Australian aboriginal child health survey: the health of aboriginal children and young people. Perth: Telethon Institute for Child Health Research; 2004. 357 p. Report No.:1
32. Stern JA, White IR, Carlin JB, Spratt M, Royston P, Kenward MG, et al. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. BMJ. 2009. https://doi.org/10.1136/bmj.b2393.
33. Bhaskaran K, Smeeth L. What is the difference between missing completely at random and missing at random? Int J Epidemiol. 2014. https://doi.org/10.1093/ije/dyu080.
34. Horton NJ, Lipsitz SR. Multiple imputation in practice: comparison of software packages for regression models with missing variables. Am Stat. 2001. https://doi.org/10.1198/000313001317098266.
35. Higgins JP, Thompson SG, Spiegelhalter DJ. A re-evaluation of random-effects meta-analysis. J R Stat Soc Ser A Stat Soc. 2009. https://doi.org/10.1111/j.1467-985X.2008.00552.x.
36. Wasserstein R, Lazar N. The ASA's statement on p-values: context, process, and purpose. Am Stat. 2016. https://doi.org/10.1080/00031305.2016.1154108.
37. Wilkinson L, and Taskforce on Statistical Inference, American Psychological AssociationScience directorate. Statistical methods in psychology journals - guidelines and explanations. Am Psychol. 1999. https://doi.org/10.1037/0003-066X.54.8.594.
38. Morey RD, Hoekstra R, Rouder JN, Lee MD, Wagenmakers EJ. The fallacy of placing confidence in confidence intervals. Psychon Bull Rev. 2016. https://doi.org/10.3758/s13423-015-0947-8.
39. Hughes DL, Watford JA, Del Toro J. A transactional/ecological perspective on ethnic-racial identity, socialization, and discrimination. In: Horn S, Ruck M, Liben L, editors. Equity and justice in developmental science: implications for young people, families, and communities. Cambridge: Academic Press; 2016. p. 1–41.
40. Charafeddine R, Mercier H, Clément F, Kaufmann L, Berchtold A, Reboul A, et al. How preschoolers use cues of dominance to make sense of their social environment. J Cogn Dev. 2014. https://doi.org/10.1080/15248372.2014.926269.
41. Pun A, Birch SA, Baron AS. Foundations of reasoning about social dominance. Child Dev Perspect. 2017. https://doi.org/10.1111/cdep.12235.
42. Ranganathan P, Aggarwal R, Pramesh CS. Common pitfalls in statistical analysis: odds versus risk. Perspect Clin Res. 2015. https://doi.org/10.4103/2229-3485.167092.
43. Lester L, Cross D, Dooley J, Shaw T. Bullying victimization and adolescents: implications for school-based intervention programs. Aust J Educ. 2013. https://doi.org/10.1177/0004944113485835.
44. Zierch A, Gallaher G, Baum F, Bentley M. Responding to racism: insights on how racism can damage health from an urban study of Australian aboriginal people. Soc Sci Med. 2011. https://doi.org/10.1016/j.socscimed.2011.06.058.
45. Liu J. Childhood externalizing behavior: theory and implications. J Child Adolesc Psychiatr Nurs. 2004. https://doi.org/10.1111/j.1744-6171.2004.tb00003.x.
46. Bourdon KH, Goodman R, Rae DS, Simpson G, Koretz DS. The strengths and difficulties questionnaire: U.S. normative data and psychometric properties. J Am Acad Child Adolesc Psychiatry. 2005. https://doi.org/10.1097/01.chi.0000159157.57075.c8.
47. Hawes DJ, Dadds MR. Australian data and psychometric properties of the Strenghts and difficulties questionnaire. Aust N Z J Psychiatry. 2004. https://doi.org/10.1080/j.1440-1614.2004.01427.x.

48. Priest N, Mackean T, Davis E, Briggs L, Water E. Aboriginal perspectives of child health and wellbeing in an urban setting: developing a conceptual framework. Health Sociol Rev. 2012. https://doi.org/10.5172/hesr.2012.21.2.180.
49. Young C, Tong A, Nixon J, Fernando P, Kalucy D, Sherriff S. Perspectives on childhood resilience among the aboriginal community: an interview study. Aust N Z J Public Health. 2017. https://doi.org/10.1111/1753-6405.12681.
50. Corenblum B. Relatiosnhips between racial-ethnic identity, self-esteem, and in-group attitudes among first nation children. J Youth Adolescence. 2014. https://doi.org/10.1007/s10964-013-0081-8.
51. Kickett-Tucker C. Moorn (black)? Djardak (White)? How come I don't fit in, mum? Exploring the racial identity of Australian aboriginal children and youth. Health Sociol Rev. 2009. https://doi.org/10.5172/hesr.18.1.119.
52. Smokowski PR, Evans CB, Cotter KL, Webber KC. Ethnic identity and mental health in American Indian youth: examining mediation pathways through self-esteem, and future optmism. J Youth Adolescence. 2014. https://doi.org/10.1007/s10964-013-9992-7.
53. Yip T. Ethnic/racial identity – a double-edged sword? Associations with discrimination and psychological outcomes. Curr Dir Psychol Sci. 2018. https://doi.org/10.1177/0963721417739348.
54. Salmon M, Skelton F, Thurber KA, Bennetts-Kneebone L, Gosling G, Lovett R, et al. Intergenerational and early life influences on the well-being of Australian aboriginal and Torres Strait islander children: overview and selected findings from footprints in time, the longitudinal study of indigenous children. J Dev Orig Health Dis. 2018. https://doi.org/10.1017/S2040017441800017X.
55. Rothman KJ, Gallacher JE, Hatch EE. Why representativeness should be avoided. Int J Epidemiol. 2013. https://doi.org/10.1093/ije/dys223.
56. Glymour MM, Weuve J, Berkman LF, Kawachi I, Robins JM. When is baseline adjustment useful in analyses of change? An example with education and cognitive change. Am J Epidemiol. 2005;162(3):267–78.
57. Duran LG, Schernuk Schroh JC, Panizoni EP, Jouglard EF, Serralunga MG, Esandi ME. Bullying at school: agreement between caregivers' and children's perception. Arch Argent Pediatr. 2017;115(1):35–42.
58. Goodman SN. Aligning statistical and scientific reasoning. Science. 2016. https://doi.org/10.1126/science.aaf5406.
59. Greenland S, Senn SJ, Rothman KJ, Carlin JB, Poole C, Goodman SN, et al. Statistical tests, P values, confidence intervals, and power: a guide to misinterpretations. Eur J Epidemiol. 2016. https://doi.org/10.1007/s10654-016-0149-3.
60. Priest N, King T, Becares L, Kavanagh A. Bullying victimization and racial discrimination among Australian children. Am J Public Health. 2016. https://doi.org/10.2105/AJPH.2016.303328.
61. Kenney MK, Singh GK. Adverse childhood experiences among American Indian/Alaska native children: the 2011-2012 National Survey of Children's health. Scientifica. 2016. https://doi.org/10.1155/2016/7424239.
62. Paradies Y. Racism and indigenous health. Oxford Research Encyclopedia of Global Public Health 2018; doi: https://doi.org/10.1093/acrefore/9780190632366.013.86.

Publisher's Note

5. Chapter 5: Ethnic-racial identity affirmation: validation in Aboriginal Australian children

5.1. Highlights

- The items used to assess Aboriginal children's ethnic-racial identity (ERI) were shown to be a reliable measure of ERI attitudes (ERI affirmation) after testing for its psychometric properties.

- The ERI affirmation measure was found to fit a unidimensional model, after Confirmatory Factor analysis was performed and items 1 ("I feel good about being Aboriginal and/or Torres Strait Islander in class") and 3 ("I feel safe about being Aboriginal and/or Torres Strait Islander in class) were adjusted for correlated uniqueness.

- Besides construct validity, evidence for internal consistency reliability was found by the calculation of ordinal Ω and hierarchical Ω. Evidence of criterion validity was observed by estimating risk-ratios for the effects of ERI on Aboriginal child social and emotional wellbeing. Analysis of configural, metric, and scalar invariance showed that the unidimensional model was invariant by gender, suggesting that the measure works appropriately among Aboriginal boys and girls.

- The findings provide evidence that the results based on the LSIC ERI data are reliable. It demonstrates that the items tested can be used in future studies as a brief measure of Aboriginal children's attitudes towards ERI.

5.2. Statement of Authorship

Statement of Authorship

Title of Paper	Ethnic-racial identity affirmation: Validation in Aboriginal Australian children
Publication Status	☑ Published ☐ Accepted for Publication ☐ Submitted for Publication ☐ Unpublished and Unsubmitted w ork w ritten in manuscript style
Publication Details	Macedo DM, Santiago PR, Roberts RM, Smithers LG, Paradies Y, Jamieson LM. Ethnic-racial identity affirmation: Validation in Aboriginal Australian children. PLoS One. 2019;14(11):e0224736. doi: 10.1371/journal.pone.0224736.

Principal Author

Name of Principal Author (Candidate)	Davi Manzini Macedo
Contribution to the Paper	Conceiving of research question Data Analysis Manuscript Writing Editing and revisions Paper submission for publication Correspondence with Editors in the publication process
Overall percentage (%)	75%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date 12/12/19

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Pedro Ribeiro Santiago
Contribution to the Paper	Input in Methodology Data analysis Interpretation and writing of results Revision of manuscript
Signature	Date 09/12/2019

Name of Co-Author	Lisa G. Smithers

Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in data analysis procedures Input in interpretation of results Revision of manuscript
Signature	Date: 2-DEC-2019

Name of Co-Author	Rachel M. Roberts
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript
Signature	Date: 5 Dec 2019

Name of Co-Author	Yin Paradies
Contribution to the Paper	Revision of methodology Input in interpretation of results Revision of manuscript
Signature	Date: 01/12/2019

Name of Co-Author	Lisa M. Jamieson
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript
Signature	Date: 01/12/2019

5.3. Published Paper: Ethnic-racial identity affirmation: validation in Aboriginal Australian children

Citation: Macedo DM, Santiago PR, Roberts RM, Smithers LG, Paradies Y, Jamieson LM. Ethnic-racial identity affirmation: Validation in Aboriginal Australian children. PLoS One. 2019;14(11):e0224736. doi: 10.1371/journal.pone.0224736.

PLOS ONE

RESEARCH ARTICLE

Ethnic-racial identity affirmation: Validation in Aboriginal Australian children

Davi Manzini Macedo[1]*, Pedro Ribeiro Santiago[1], Rachel M. Roberts[2], Lisa G. Smithers[3], Yin Paradies[4], Lisa M. Jamieson[1]

1 Indigenous Oral Health Unit, Adelaide Dental School, The University of Adelaide, Adelaide, Australia, **2** School of Psychology, The University of Adelaide, Adelaide, Australia, **3** BetterStart Child Health and Development Research Group, School of Public Health, The University of Adelaide, Adelaide, Australia, **4** Alfred Deakin Institute for Citizenship and Globalisation, Deakin University, Melbourne, Australia

* davi.manzinimacedo@adelaide.edu.au

OPEN ACCESS

Citation: Macedo DM, Santiago PR, Roberts RM, Smithers LG, Paradies Y, Jamieson LM (2019) Ethnic-racial identity affirmation: Validation in Aboriginal Australian children. PLoS ONE 14(11): e0224736. https://doi.org/10.1371/journal.pone.0224736

Editor: Geilson Lima Santana, University of Sao Paulo Medical School, BRAZIL

Received: June 5, 2019

Accepted: October 20, 2019

Published: November 7, 2019

Data Availability Statement: The data used in this study is property of the Australian Government Department of Social Services. Thus it cannot be shared publicly by the authors. There are security and confidentiality protocols for accessing LSIC data. Interested parts must submit an application and sign a deed of license. Information can be found on the LSIC webpage: http://www.dss.gov.au/lsic. The authors did not receive special access privileges to the data that others would not have. Interested researchers will be able to access the data in the same manner as the authors.

Abstract

Introduction

Positive attitudes towards ethnic-racial identity (ERI) is a key factor in Aboriginal Australian children's development. The present study aims to offer evidence of construct and criterion validity, reliability, and measurement invariance of a brief measure of Aboriginal children's ERI affirmation.

Methods

Data was from 424 children aged 10–12 years (mean 10.5 years; SD 0.56) participating in the 8th wave of the Longitudinal Study of Indigenous Children (LSIC). Information on ERI was obtained from 4 child-reported items. Sociodemographic characteristics and child social and emotional outcomes were caregiver-reported. A factorial structure was tested by Confirmatory Factor Analysis. The estimation method was weighted least squares with mean and variance adjusted test statistic (WLSMV). For reliability verification, the ordinal α and Ω hierarchical α were assessed. For construct validity, a generalized linear model with log-Poisson link estimated the association between ERI and children's social and emotional outcomes. We hypothesized that children with positive ERI would have lower behavioural and emotional difficulties.

Results

We found evidence of excellent fit for a unidimensional model of ERI affirmation after adjusting for correlated uniqueness between items 1 and 3 ($\chi^2(2) = 0.06$, $p = 0.80$; RMSEA = 0.000 [90% CI 0.000–0.080], $p = 0.088$; CFI = 1.000). Internal consistency reliability was considered adequate (ordinal $\alpha = 0.83$; Ω hierarchical $\alpha = 0.72$). The unidimensional model was shown to be invariant among boys and girls ($\Delta\chi^2$ (4) = 6.20, $p = 0.18$; ΔCFI = 0.000). Higher ERI was associated with lower risk of problematic scores (>17) on the SDQ (Risk Ratio$_a$ = 0.91, 95% CI 0.64, 1.29).

Funding: The author(s) received no specific funding for this work.

Competing interests: The authors have declared that no competing interests exist.

Discussion

The four LSIC items perform as a brief measure of Aboriginal children ERI affirmation among boys and girls. Results contribute much needed evidence for LSIC's ongoing success and to future research on Aboriginal children's development and wellbeing.

Introduction

Ethnic and racial minorities' feelings and beliefs about their ethnic and racial memberships have been a topic of interest in the social sciences for decades [1]. A recent effort to unify this field of research–the Ethnic and Racial Identity in the 21st Century Study Group- has proposed the adoption of a meta-construct to refer to this process of self-understanding and self-categorization. The ethnic-racial identity (ERI) concept was proposed to represent the perception of belonging to a social group across ethnic and racial groups from different heritages, nationalities, cultural backgrounds, and socialization experiences [1].

The process of identification with one's ethnic-racial group starts early in development. Children as young as five-years possess a sense of ERI and demonstrate that they explore, commit, and consolidate attitudes and preferences based on ethnic-racial membership [2–4]. During childhood ERI is associated with higher self-esteem, better adaptive behaviour and fewer externalizing and internalizing problems [3, 5]. Furthermore, positive attitudes and a sense of commitment to ERI are shown to exert a protective role against the effects of racism on racial minority children and adolescents' wellbeing [6, 7]. The attitude component of ERI has been referred to as ERI affirmation and can be observed from an early age [8]. Attitudes towards ERI are central to wellbeing and mental health, as feelings towards social identities (e.g., gender, race-ethnicity, nationality) are decisive in perceptions of self-esteem and global self-worth [9, 10].

Aboriginal Australians are the descendants of the occupants of the Australian continent prior to European colonisation [11]. There are diverse communities of Aboriginal Australians with unique traditions, political systems, cultural characteristics, and languages, living all across the Australian territory (from metropolitan centres to remote communities) [11]. It is estimated that Aboriginal Australians comprise approximately 3.3% of the Australian population, corresponding to 798,365 inhabitants accordingly to the last Australian Bureau of Statistics census, dated from 2016 [12]. As a disadvantaged group in Australia, due to a history of colonization and dispossession [13], Aboriginal Australians face a range of social inequalities (e.g. lower educational attainment and income, poor access to health services) [11] and can experience discrimination from early ages [14, 15]. Discrepancies in their mental health and wellbeing are also documented. A recent report on Aboriginal youth wellbeing suggested one third of participants (33%) indicated experiencing high to very high levels of psychological distress, against 13% of their non-Indigenous counterparts. Alarmingly, suicide was identified as one of the leading causes of death among Aboriginal Australians aged 10–24 between 2011 and 2015. [16].

Nonetheless, approaches have been proposed emphasizing the resilience of Aboriginal people in facing the adversities that affects this population. The importance of culture, spirituality, connection to land, ancestry, kinship, and a sense of pride about being Aboriginal have been consistently reported as a central determinant of Aboriginal Australians' health and social and emotional wellbeing across the lifespan [13, 17]. Research on Aboriginal perspectives of positive child development highlights the importance of a strong sense of attachment to culture

and pride about their Aboriginal identity [14, 18]. Despite the relevance of ERI to both developmental psychology and the Aboriginal holistic perspective of health and development, limited data measuring this construct among Aboriginal children is currently available.

Footprints in Time: The Longitudinal Study of Indigenous Children (LSIC) is one of the few initiatives that have assessed ERI among Aboriginal children [19]. LSIC collects information on determinants of Aboriginal children's development across a wide range of communities and environments, including more than 80 Aboriginal clans and tribal groups across Australia. [20]Nonetheless, there is no published evidence regarding the validity and reliability of the ERI items used in data collection. Therefore, the present study aims to evaluate the construct validity and reliability of the ERI items as a measure of content/attitudinal ERI. Our hypothesis is that the 4 items used provide a brief unidimensional psychological instrument of how Aboriginal children perceive and feel about their ethnic-racial membership. A unidimensional instrument is one which the responses to all items (or, alternatively, the covariance between items) can be explained by a single latent variable [21]. That is, all the items measure a single underlying construct. In practical terms, methods such as factor analysis can show whether an instrument is unidimensional by evaluating if a one-factor model is a good fit for the data (compared to other models such as two or three-factor models, for example) and checking if "all items have substantial factor loadings on a single factor" [22]. The psychometric analysis will evaluate: a) the factorial structure of the items; b) measurement invariance by gender; c) reliability; and d) criterion validity.

To the best of our knowledge, this is the first study to assess the efficacy of a brief instrument targeting an affective component of Aboriginal children ERI (ERI affirmation). Additionally, LSIC is a pioneer study due not only to its longevity, but the diversity of children and families represented and the integration of Aboriginal cultural values and perspectives in its design and data collection [19]. Therefore, the verification of the validity of the measures applied, especially when concerning an aspect of central importance for Aboriginal Australians, may aid in its continued success.

Methods

Study design

LSIC employs an accelerated cross-sequential design aimed to collect information on the first nine to ten years of Aboriginal children's development in a six-year period. The study involves two cohorts. The B cohort includes children who were aged 0.5 to 2 years at wave 1. The K cohort consists of children aged 3.5 to 5 years at the beginning of the study. The content of the questionnaires is selected through consultation with working reference groups, community stakeholders from urban, regional and rural Indigenous communities, as well as academic institutions and government agencies [20]. Ethical approval for the content selection and data collection processes is obtained from the Human Research Ethics Committee of the Australian Institute of Aboriginal and Torres Strait Islander Studies [20]. LSIC waves occur annually between February and December. Data from waves 1 to 9 (2008–2016) is currently available upon application and a signed deed of license from the Australian Government Department of Social Services (DSS), the party responsible for conducting LSIC [23].

Data collection procedures

A non-random purposive sample was recruited from records of Centrelink and Medicare Australia, welfare and health-assistance programs, respectively [24, 25]. Signed consent was obtained from the eligible families who agreed to participate. Participants were also recruited through informal means of communication such as local study promotion and personal

communication among community members. Interviews were conducted by Department of Social Services Aboriginal and Torres Strait Islander Research Administration Officers [20]. In wave 1, over 1,680 interviews were conducted with children's primary caregivers. A total of 1,255 interviews were conducted in wave 8 (2016), corresponding to an 87.2 retention rate from the previous wave [20]. Authors received permission to access de-identified data upon DSS's authorization [23]

Participants

Children in the K-Cohort participating in Wave 8 of LSIC were included in the analysis. Between both cohorts, there were 1,240 participating children. However, ERI was only assessed among the children in the K cohort (n = 496). Of those, 47 were excluded as caregivers did not authorize the research administration officers to administer the ERI affirmation items. Among the 449 children that responded to the measure, 9 were excluded due to missing values in at least one of the 4 items. Since our aim was to evaluate the validity and reliability of the 4-items for a specific age range, we focused on children aged 10–12 years (n = 435). Children aged 9 years (n = 5) or who had already turned 12 (n = 11) were removed due to small sample sizes. Our final sample thus comprised 424 Aboriginal children (51.3% males; mean age: 10.5 (SD 0.5) years).

Measures

Ethnic-racial identity affirmation measure. A set of four child self-report items was used to assess participant's ERI affirmation. All items had a 6-point Likert Scale response option, ranging from "Yes (Always)", "Yes (Most of the time)", "Sometimes (Fair bit)", "Sometimes (Little bit)", "No (Not much)", "No (Never)". Values from 1 to 6 were assigned to responses and reverse-coded so higher values would suggest higher ERI affirmation. Two other alternative response options were "Don't know" and "Refused", coded as missing. The 4-items were: 1) "I feel good about being Aboriginal and/or Torres Strait Islander in class"; 2) "I want to share (tell others) things about being Aboriginal and/or Torres Strait Islander in class"; 3) "I feel safe about being Aboriginal and/or Torres Strait Islander in class"; and 4) "I like people to know I am Aboriginal and/or Torres Strait Islander in class".

The measure was selected by the LSIC team after consultation with the LSIC steering committee and community stakeholders, as a standard procedure adopted to guarantee community participation and the integration of Aboriginal cultural values and perspectives [20]. The original items are part of a measure to assess cultural and Aboriginal educational strategies [26]. The items were originally presented as the factor "Strength of Cultural Identity". Two of the items were modified for use in LSIC. Item 3 was originally worded "I feel comfortable about my culture in class" and item 4 was "I am proud of my culture when I am in class".

Socio-demographic characteristics. Information on participant's age and sex was collected at wave 1 through an open and caregiver-reported question. For confounding adjustment in the criterion validity analysis, information on the family Level of Relative Isolation (LORI), and the index for Indigenous Socio-Economic Outcomes (IRISEO) were also used. The LORI is based on the Accessibility/Remoteness index of Australia and is a measure of remoteness that reflects distance to service centers. The LORI index is an area level indicator and it ranges from 1 to 5, from "no isolation", which corresponds to metropolitan areas, to "extreme isolation" [27]. The IRISEO is calculated specifically for Aboriginal Australians and is an area-level measure of community socioeconomic disadvantage based on education, employment, income, and housing. It ranges from (1) disadvantaged to (10) advantaged [28].

Strengths and difficulties questionnaire (SDQ). Child social and emotional outcomes were assessed by the caregiver's version of the SDQ. The instrument is validated for use among 4 to 17 years old [29]. The SQD has been recently validated for Aboriginal children of this age range (4–17 years), displaying good psychometric properties and excellent overall reliability [30]. It assesses levels of emotional and behavioral difficulties in four domains: emotional difficulties, conduct problems, hyperactivity, and peer problems. Each domain is composed of five items with responses ranging from 0 "Not true" to 2 "Certainly true". Examples of items are "often unhappy, depressed, or tearful" (emotional difficulties), "steals from home, school, or elsewhere" (conduct problems) and "restless, overactive, cannot stay sill for long" (hyperactivity). A score-range from 0 to 10 is obtained for each domain. A total score for emotional and behavioral difficulties is computed by summing the scores on the four domains (0–40). Higher scores indicate higher levels of difficulties that might represent risk for future clinical symptomatology [29].

Statistical analysis

The first step of the analysis was a Confirmatory Factor Analysis (CFA) to evaluate the fit of the hypothesized one-factor model. The estimation method was weighted least squares (WLSMV) with mean and variance adjusted test statistic [31]. WLSMV estimation is recommended for use with non-normal distributions [32], such as the four *ordinal* ERI items, and skewed data [33]. Considering that the percentage of missing data in individual items was below 1%, multiple imputation would not be likely to change the results and listwise deletion was employed. Furthermore, WLSMV estimation with listwise deletion can be used when the amount of missing data is unsubstantial, producing unbiased estimates for the parameters and their standard errors [34].

The sample size used (n = 424) was considered adequate for our analytical purposes. In general, there are two guidelines for sample size requirements in CFA models: (1) the absolute sample size (N), in which $N \geq 300$ guarantees accurate parameters and fit statistics in WLSMV estimation [35]; and the relative sample size to number of estimated parameters (q), namely the N:q ratio, which should have a value above 10:1 [36]. In our study, considering that the most complex model had 25 estimated parameters (q = 25), the sample size requirements were achieved both in an absolute (n = 435) and relative (N:q = 17.4) sense. Model fit was evaluated with the scaled χ^2, in addition to the scaled Comparative Fit Index (CFI) and the scaled Root Mean Square Error of Approximation (RMSEA). Values of CFI $\geq$ 0.96 and RMSEA $\leq$ 0.5 indicated good fit [37]. Values of RMSEA > 1.0 were considered to be indicative of poor fit [38] and the hypothesis of close-fit (RMSEA $\leq$ 0.5) was evaluated [39].

In case of a poor fitting model, model re-specifications were conducted by the evaluation of standardized residual correlations, modification indices (MI) and standardized expected parameter change (SEPC) [40]. After a model was established, we proceeded to evaluate measurement invariance by gender to check whether the items functioned differently between boys and girls. Testing invariance by gender intends to account for possible differences among boys and girls regarding transmission of cultural practices and racial socialization, which can influence children's attitudes towards ERI [41, 42]. Configural, metric and scalar invariance were evaluated with $\chi 2$ [43]. In the event $\chi 2$ was statistically significant, the ΔCFI [44] was used, with invariance being assumed when the CFI values do not vary above 0.002 points between models. Finally, reliability was evaluated with the ordinal $\boldsymbol{\alpha}$ [45]. The use of the ordinal $\boldsymbol{\alpha}$ is required since Cronbach's $\boldsymbol{\alpha}$ [46] underestimates reliability in ordinal items, such as Likert scales [45]. Reliability above 0.80 is usually deemed acceptable for validation studies

such as ours [47]. Analyses were conducted in R software [48], R packages lavaan 0.6–2 [49] and semTools [50].

For the criterion validity analysis, the association between ERI affirmation and child total emotional and behavioural difficulties was tested. Our hypothesis was that children with high ERI affirmation would be at decreased risk for the onset of emotional and behavioural difficulties, as per the associations of ERI and positive developmental outcomes among ethnic-racial minority children [51]. Generalized linear models were preferred as the specification of the link function allows accommodation of non-normal distributions and skewed data [52]. We estimated risk ratios as a measure of the effect by testing a generalized linear model with a log-Poisson link and robust errors (model 2). The log Poisson link was chosen as we aimed for risk ratios as effect-measures and robust errors were specified to generate unbiased effect estimates in case of model misspecification [53]. The exposure and outcome variables were dichotomized. ERI affirmation was divided into "high" and "low". The high ERI affirmation category was composed of the children who endorsed "Yes (Always)" and "Yes (Most of the time)" to all four items of ERI affirmation ($\geq$20). The SDQ total score was dichotomized in "high difficulties" (scores $\geq$17), and "low difficulties" (scores $\leq$ 17) [54]. The two models were adjusted for child age and sex, and family LORI, and IRISEO, confounding selected as per associations reported in the literature among these sociodemographics and both ERI and wellbeing [42, 55, 56]. The models were tested with 419 children, as five children had no information on the SDQ total score, LORI and IRISEO variables.

Results

The first model tested was the one-factor model and the fit indices provided mixed evidence regarding model fit (Table 1). The sample of the fitted model was 424 participants. Although the CFI was above the threshold of 0.96, a statistically significant $\chi 2$ and a RMSEA of 0.128 were observed. Additionally, the p-value of 0.01 indicates that the hypothesis of close-fit (RMSEA<0.5) was rejected. We explored possible adjustments to improve the model by carrying specification searches. The examination of the standardized expected parameter changes (SEPC) showed that items 1 and 3 residuals had a correlation of 0.65. Therefore, we observed that correlated uniqueness between two items could be limiting the fit of the data to the confirmatory structure tested.

We proceeded to test a second model that accounted for correlated uniqueness between items 1 and 3. The model had an excellent fit to the data (χ^2 (1) = 0.121, p = 0.72). The RMSEA value of 0.000–90% CI [0.000, 0.091] for this second model suggested that the covariance of item responses was sufficiently explained by the underlying one-factor model specified. The 90% CI shows that the range of compatible values with the model are mostly below the threshold of 0.05, although values above it could also be compatible. Nonetheless, testing for the alternative hypothesis that the RMSEA value falls below the value of 0.05 resulted in a p-value of 0.83, suggesting that the hypothesis of close-fit should not be rejected. The CFI value was above the 0.96 threshold, suggesting excellent model fit. The interpretation of the fit indices and the available CI and significance tests suggest there is evidence of construct validity for this one-factor model of ERI affirmation. Comparisons between the fit indices from the two

Table 1. Fit indices for the two unidimensional models of ERI affirmation.

Model	χ^2	*df*	*p*-value	RMSEA	90% CI	p-close	CFI
Model 1	15.89	2	0.000	0.128	0.075–0.190	0.01	0.983
Model 2	0.121	1	0.72	0.000	0.000–0.091	0.837	1.000

https://doi.org/10.1371/journal.pone.0224736.t001

Table 2. Item loading estimates of the two unidimensional models of ERI affirmation.

Items	Model 1		Model 2	
	Estimate	95% CI	Estimate	95% CI
1."I feel good about being Aboriginal and/or Torres Strait Islander in class"	0.77	(0.70, 0.85)	0.66	(0.56, 0.76)
2."I want to share (tell others) things about being Aboriginal and/or Torres Strait Islander in class"	0.63	(0.56, 0.73)	0.65	(0.57, 0.73)
3."I feel safe about being Aboriginal and/or Torres Strait Islander in class"	0.82	(0.74, 0.88)	0.72	(0.64, 0.81)
4."I like people to know I am Aboriginal and/or Torres Strait Islander in class"	0.79	(0.73, 0.87)	0.86	(0.79, 0.94)

https://doi.org/10.1371/journal.pone.0224736.t002

CFA models tested are showed in Table 1. Table 2 presents the second model items' loadings on the underlying ERI affirmation factor.

The unidmensional structural model of ethnic-racial identity affirmation is illustrated in Fig 1, accounting for correlated uniqueness between items 1 and 3. Internal consistency reliability for the measure was considered adequate, as was the ordinal α of 0.83. The Ω hierarchical α, a reliability index that accounts for correlated uniqueness among items, was also assessed and its value of 0.72 was considered satisfactory [57]. Finally, the analysis of measurement invariance indicated scalar invariance ($\Delta\chi^2$ (4) = 8.86, p = 0.78; ΔCFI = 0.000), demonstrating that the unidimensional model is invariant among boys and girls (Table 3).

The next step of the analysis was the criterion validity. The results of the generalized linear model (n = 419) confirmed the hypothesis tested. Results showed that children with high ERI affirmation had a 9% decreased risk for presenting high SDQ scores (RR_a = 0.91, 95% CI 0.64, 1.29). The CI, however, showed that values above 1 could be compatible with the model, affecting the precision of the effect-estimate. Nonetheless, the results indicated that ERI affirmation had a protective effect for the onset of emotional and behavioural difficulties over and above levels of age, sex, geographical location, and socio-economic status. This suggests evidence of criterion validity of the ERI affirmation measure tested. Table 4 includes the frequency distribution of the exposure, outcomes, and confounding variables included in the analysis.

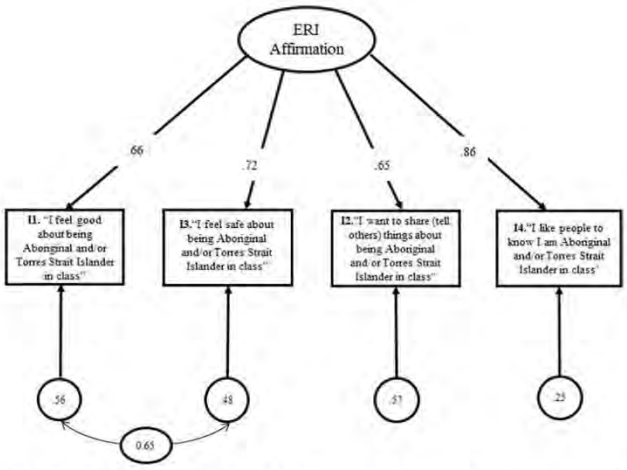


Fig 1. Unidmensional structural model of ethnic-racial identity affirmation accouting for correlated uniqueness.

https://doi.org/10.1371/journal.pone.0224736.g001

Table 3. Fit statistics for measurement invariance according to gender.

Model	χ^2	*df*	*p*-value	RMSEA	90% CI	CFI	Δ χ2 (df)	*p*-value	Δ CFI
Configural	0.25	2	0.88	0.000	[0.000, 0.066]	1.000	-	-	-
Metric	2.16	5	0.83	0.000	[0.000, 0.057]	1.000	2.10 (3)	0.55	0.000
Scalar	8.86	13	0.78	0.000	[0.000, 0.046]	1.000	8.26 (8)	0.41	0.000

Note. χ2 = chi-square; df = degrees of freedom; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; Δ χ2 (df) = chi-square difference and degrees of freedom; Δ CFI = CFI difference. The χ2 column reports scaled χ2. Δ χ2 (df) is a function of standard (not the scaled) χ2 statistics.

https://doi.org/10.1371/journal.pone.0224736.t003

Discussion

The CFA analysis provided evidence of construct validity that the brief measure of ERI affirmation works as a unidimensional scale among Australian Aboriginal children aged 10–12 years. The ordinal **α** and Ω hierarchical provided evidence that internal consistency reliability was adequate [47, 57]. In addition, the results of the generalized linear model tested contributes to evidence of criterion validity. The association between ERI affirmation and children's emotional and behavioural difficulties reflect literature on the protective effect of positive attitudes towards ERI on the wellbeing of ethnic-racial minorities, including Indigenous youth from the U.S., Canada, and New Zealand [5, 58–60]. It also reflects Aboriginal Australians' perspective on the importance of pride (positive attitudes) over ERI for positive Aboriginal children's health and development [14, 18]. Such results contributes to the necessary evidence for research based on ERI data from LSIC, as it demonstrates that ERI affirmation is being assessed with a valid and reliable measure.

Table 4. Participant's characteristics (n = 419).

Characteristic	Prevalence (95%CI)	n =
Child Age (years)		
10	47.0 (42.7, 52.3)	199
11	52.5 (47.7, 57.2)	220
Mean(SD)	10.5 (0.5)	
Gender		
Male	51.3 (46.5, 56.0)	215
Female	48.7 (44.0, 53.5)	204
ERI affirmation		
High ERI affirmation (≥20)	49.4 (44.6, 54.2)	207
Low ERI affirmation (<20)	50.5 (45.8, 55.4)	212
Mean (SD)	20.6 (3.6)	
Emotional and Behavioural difficulties		
Low difficulties (<17)	76.8 (72.5, 80.6)	322
High difficulties (≥17)	23.1 (19.3, 27.4)	97
Mean (SD)	10.4 (5.9)	
Level of Relative Isolation (LORI)		
None	28.9 (24.7, 32.4)	121
Low	55.1 (50.3, 59.8)	231
Moderate	7.6 (5.4, 10.6)	32
High/Extreme	8.3 (6.0, 11.4)	35
Indigenous Index of Socioeconomic Outcomes (IRISEO)		
Mean (SD)	5.8 (2.1)	

https://doi.org/10.1371/journal.pone.0224736.t004

The initial model tested was a unidimensional model and the evidence regarding model fit was mixed. The results indicated strong correlated uniqueness between items 1 and 3. MacCallum, Roznowski [61] have discussed additional parameters due to specification searches, such as correlated uniqueness, and recommend that these parameters should be included only when justified by the theoretical background of the construct [62]. In our study, such a theoretical justification exists. The strong correlation between items 1 and 3 reflects the association between positive in-group attitudes ("I feel good about being Aboriginal and/or Torres Strait Islander in class") and the levels of cultural safety perceived by respondents ("I feel safe about being Aboriginal or Torres-Strait Islander in class"). The perception of one's social environment as accepting of cultural diversity might be linked, for example, to reduced experiences of racial discrimination and more positive experiences of ERI expression. Promoting cultural safety features as a key factor in improving Aboriginal health, education, and community wellness [63, 64]. For example, perceptions of cultural respect, peer acceptance of ERI, community involvement, and teacher's cultural sensitivity–all contribute to a culturally safe environment—and are associated with less school absenteeism, higher classroom participation, and importance placed on school among Aboriginal students [26, 65].

After the inclusion of the correlated uniqueness between items 1 and 3, the model was correctly specified and achieved excellent fit. Therefore, the final measurement model was a unidimensional model *with* correlated uniqueness between items 1 and 3. The unidimensionality of the ERI items (i.e. the four items constitute a one-factor model) after the inclusion of the correlated uniqueness indicates that, although feelings of safety and positive experiences regarding ERI are more highly correlated with each other than others aspects of the construct (e.g., "I want to share (tell others) things about being Aboriginal and/or Torres Strait Islander in class"), the four items measure a single construct. That is, although the four items measure four distinct attitudes towards ERI ((1) feeling good about being Aboriginal and Torres Strait Islander; (2) wanting to share things about being Aboriginal and Torres Strait Islander; (3) feeling safe about being Aboriginal and Torres Strait Islander; and (4) liking people to know that they are Aboriginal and Torres Strait Islander), the CFA indicated that these attitudes constitute the broader construct of ERI affirmation. These findings are consistent with previous psychometric studies of ERI measures showing ERI affirmation as a distinct construct that encompasses several attitudes towards ERI (e.g. "I feel negatively about my ethnicity") [8]. Finally, one practical implication of the four items measuring a common underlying construct is that item scores can be summated to create a total score [22] and this total score provides a measure of ERI affirmation.

To the best of our knowledge, there is just one validated scale to assess Aboriginal Australian children's ERI [66]. The scale, however, focuses on exploration of cultural practices (knowledge of Aboriginal culture) and salience of racial identity, with no specific assessment of attitudes towards ERI [66]. The 40-item-length of the scale might also limit its applicability to large-scale studies such as LSIC. Here we provide evidence for a measure that's strength resides in its brevity and specificity of content. This permits its inclusion in surveys desiring a holistic and comprehensive perspective of Aboriginal children's wellbeing. The specificity of the measure reflects the debate on the importance of clearly defining which ERI component is being assessed [1]. Such accuracy might permit researchers to investigate how affective components of ERI relate, for example, to exploration of cultural practices and levels of commitment to one's ERI (ERI processes) later in development [1, 8, 67, 68]. These distinctions might shed light onto how ERI develops among Aboriginal children and how the interplay between ERI processes and content relates to racial socialization processes and discrimination [67, 69].

Finally, investing on promotion of positive development from early age might assist in reducing health inequalities among Aboriginal children and youth and their non-Indigenous

counterparts [16]. Due to its centrality to positive development and wellbeing, promotion of positive ERI attitudes might protect Aboriginal children against adversity and increase wellbeing [58, 70]. Research on evaluation of programs whose purpose is to increase the social and emotional wellbeing of Aboriginal children is still limited [71]. However, there is evidence of the efficacy of school-based interventions designed to increase affirmative ERI among other ethnic-minority youth (e.g., Latin, African, and Native-Americans), with reported effects on wellbeing and learning outcomes [72, 73]. Valid and reliable measurement of ERI can assist at baseline measurement and monitoring of outcomes for future interventions targeting cultural socialization and promotion of ERI in the Aboriginal Australian context [73].

We conclude that the LSIC items tested work as a brief measure of ERI affirmation by providing evidence of construct and criterion validity on a sample of 424 Aboriginal children aged 10 to 12 years. We recognise the limitation of not using a representative sample of the Aboriginal Australian children population. Nonetheless, the sample size used was considered sufficient for the analytical purposes of this study [35]. It is also noticeable that the LSIC is possibly the largest currently available source of information on ERI and other determinants of this population health and wellbeing [20]. The LSIC team has been committed to involving community stakeholders and field specialists in the selection of content and data collection procedures. The ERI items used were based on previous work on Aboriginal perspectives of wellbeing, which further contributes to the content validity of the measure. This is one of the few empirical demonstrations of the psychometric properties of a measure assessing components of Aboriginal children ERI. As such, it contributes to the development of this area of research in the Aboriginal Australian context.

Author Contributions

Conceptualization: Davi Manzini Macedo, Lisa M. Jamieson.

Formal analysis: Davi Manzini Macedo, Pedro Ribeiro Santiago.

Methodology: Davi Manzini Macedo, Pedro Ribeiro Santiago.

Software: Pedro Ribeiro Santiago.

Supervision: Rachel M. Roberts, Lisa G. Smithers, Lisa M. Jamieson.

Visualization: Rachel M. Roberts, Lisa G. Smithers, Yin Paradies, Lisa M. Jamieson.

Writing – original draft: Davi Manzini Macedo, Pedro Ribeiro Santiago.

Writing – review & editing: Davi Manzini Macedo, Rachel M. Roberts, Lisa G. Smithers, Yin Paradies, Lisa M. Jamieson.

References

1. Schwartz SJ, Syed M, Yip T, Knight GP, Umana-Taylor AJ, Rivas-Drake D, et al. Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. Child Dev. 2014; 85(1):58–76. https://doi.org/10.1111/cdev.12201 PMID: 24490892
2. Corenblum B. Development of racial-ethnic identity among First Nation children. J Youth Adolesc. 2014; 43(3):356–74. https://doi.org/10.1007/s10964-013-0007-5 PMID: 23982921
3. Serrano-Villar M, Calzada EJ. Ethnic identity: evidence of protective effects for young, Latino children. J Appl Dev Psychol. 2016; 42:21–30. https://doi.org/10.1016/j.appdev.2015.11.002 PMID: 26778873
4. Derlan CL, Umana-Taylor AJ, Updegraff KA, Jahromi LB. Longitudinal relations among Mexican-origin mothers' cultural characteristics, cultural socialization, and 5-year-old children's ethnic-racial identification. Dev Psychol. 2017; 53(11):2078–91. https://doi.org/10.1037/dev0000386 PMID: 29094971

5. Corenblum B. Relationships between racial-ethnic identity, self-esteem and in-group attitudes among First Nation children. J Youth Adolesc. 2014; 43(3):387–404. https://doi.org/10.1007/s10964-013-0081-8 PMID: 24343260
6. Marcelo AK, Yates TM. Young children's ethnic-racial identity moderates the impact of early discrimination experiences on child behavior problems. Cultur Divers Ethnic Minor Psychol. 2019; 25(2):253–65. https://doi.org/10.1037/cdp0000220 PMID: 30058832
7. Romero AJ, Edwards LM, Fryberg SA, Orduña M. Resilience to discrimination stress across ethnic identity stages of development. J Appl Soc Psychol. 2014; 44(1):1–11. https://doi.org/10.1111/jasp.12192
8. Umaña-Taylor AJ, Yazedjian A, Bámaca-Gómez M. Developing the Ethnic Identity Scale using Eriksonian and Social Identity perspectives. Identity. 2004; 4(1):9–38. https://doi.org/10.1207/s1532706xid0401_2
9. Tajfel H, C. Turner J. The Social Identity Theory of intergroup behavior. In: Worchel S, Austin WG, editors. Psychology of intergroup relations. Chicago: Nelson-Hall; 1986. pp. 7–24.
10. Ashmore RD, Kay D, McLaughlin-Volpe T. An organizing framework for collective identity: articulation and significance of multidimensionality. Psychol Bull. 2004; 130(1):80–114. https://doi.org/10.1037/0033-2909.130.1.80 PMID: 14717651
11. Australia Institute of Health and Welfare. The health and welfare of Australia's Aboriginal and Torres Istrait Islander peoples 2015. Canberra: Australia Institute of Health and Welfare; 2015. 200 p. Report No. IHW 147
12. Australian Bureau of Statistics [Internet]. Estimates of Aboriginal and Torres Strait Islander Australians [cited 2019 September 25]. Available from: https://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.0.55.001.
13. Zubrick SR, Shepherd C, Dudgeon P, Gee G, Paradies Y, Scrine C, et al. Social determinants of social and emotional wellbeing for Aboriginal Australians. In: Dudgeon P, Milroy H, Walker R, editors. Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice. Canberra: Australian Government, Department of The Prime Minister and Cabinet; 2014. pp. 93–112.
14. Priest N, Thompson L, Mackean T, Baker A, Waters E. 'Yarning up with Koori kids'—hearing the voices of Australian urban Indigenous children about their health and well-being. Ethn Health. 2017; 22(6):631–47. https://doi.org/10.1080/13557858.2016.1246418 PMID: 27764969
15. Priest N, Paradies Y, Stewart P, Luke J. Racism and health among urban Aboriginal young people. BMC Public Health. 2011; 11(568):1–9. https://doi.org/10.1186/1471-2458-11-568 PMID: 21756369
16. Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing. Canberra: Australian Institute of Health and Welfare; 2018. 38 p. Report No. IHW 198.
17. Tonkinson R. Australian Aboriginal society and culture: an overview. International Encyclopedia of the Social & Behavioral Sciences. 2nd ed: Elsevier; 2015. p. 234–8.
18. Priest N, Mackean T, Davis E, Briggs L, Waters E. Aboriginal perspectives of child health and wellbeing in an urban setting: developing a conceptual framework. Health Soc Rev. 2014; 21(2):180–95. https://doi.org/10.5172/hesr.2012.21.2.180
19. Thurber KA, Banks E, Banwell C, Team L. Cohort profile: Footprints in Time, the Australian Longitudinal Study of Indigenous Children. Int J Epidemiol. 2015; 44(3):789–800. https://doi.org/10.1093/ije/dyu122 PMID: 25011454
20. Footprints in Time: The Longitudinal Study of Indigenous Children—Data user guide, Release 9.0. Department of Social Services, 2018.
21. Gessaroli ME, Champlain AF. Test Dimensionality: Assessment of. Wiley StatsRef: Statistics Reference Online: John Wiley & Sons, Ltd; 2014.
22. Gardner PL. Measuring attitudes to science: Unidimensionality and internal consistency revisited. Res Sci Educ. 1995; 25(3):283–9.
23. Footprints in Time—The Longitudinal Study of Indigenous Children [Internet]. Department of Social Services; 2019 [2019 May 14]. Available from: https://www.dss.gov.au/about-the-department/publications-articles/research-publications/longitudinal-data-initiatives/footprints-in-time-the-longitudinal-study-of-indigenous-children-lsic#1.
24. Payments and support for Indigenous Australians [Internet]. Australian Government Department of Human Services; 2019 [14 May 2019]. Available from: https://www.humanservices.gov.au/individuals/subjects/payments-and-support-for-indigenous-australians.
25. Medicare services for Indigenous Australians [Internet]. Department of Human Services; 2019 [14 May 2019]. Available from: https://www.humanservices.gov.au/individuals/subjects/whats-covered-medicare/medicare-services-indigenous-australians.

26. Craven RG, Alex Y, Munns G, Bodkin-Andrews G, Nida D, O'Rourke V. Seeding success for Aboriginal primary students. Centre for Positive Psychology and Education and NSW Aboriginal Education Consultative Group, 2016.
27. Zubrick SR, Lawrence DM, Silburn SR, Blair E, Milroy H, Wilkes T, et al. The Western Australian Aboriginal Child Health Study: the health of Aboriginal children and young people. Perth: Telethon Institute for Child Health Research, 2004.
28. Biddle N. Ranking regions: revisiting an Index of Relative Indigenous Socioeconomic Outcomes. Canberra: Centre for Aboriginal Economic Policy Research, 2009.
29. Goodman R. The Strengths and Difficulties Questionnaire: a research note. The Journal of Child Psychology and Psychiatry. 1997; 38:581–6. https://doi.org/10.1111/j.1469-7610.1997.tb01545.x PMID: 9255702
30. Williamson A, McElduff P, Dadds M, D'Este C, Redman S, Raphael B, et al. The construct validity of the S trengths and D ifficulties Questionnaire for A boriginal children living in urban New South Wales, Australia. Aust Psychol. 2014; 49(3):163–70. https://doi.org/10.1111/ap.12045
31. Asparouhov T, Muthén B. Simple second order chi-square correction. Mplus technical appendix. 2010.
32. Beauducel A, Herzberg PY. On the performance of Maximum Likelihood versus Means and Variance Adjusted Weighted Least Squares Estimation in CFA. Structural Equation Modeling: A Multidisciplinary Journal. 2006; 13(2):186–203. https://doi.org/10.1207/s15328007sem1302_2
33. Muthén B, du Toit S, Spisic D. Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes. 1997.
34. Asparouhov T, Muthén B. Weighted least squares estimation with missing data. Mplus Technical Appendix. 2010; 2010:1–10.
35. Moshagen M, Musch J. Sample size requirements of the robust weighted least squares estimator. Meth Eur J Res Meth Behav Soc Sci. 2014; 10(2):60–70. https://doi.org/10.1027/1614-2241/a000068
36. Jackson DL. Revisiting sample size and number of parameter estimates: Some support for the n:q hypothesis. Struct Equ modeling. 2003; 10(1):128–41. https://doi.org/10.1207/s15328007sem1001_6
37. Y Yu C. Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes. Los Angeles: University of California; 2002.
38. Kline RB. Principles and practice of structural equation modeling. New York, NY: Guilford publications; 2015.
39. Hayduk LA, Pazderka-Robinson H, Cummings GG, Levers M-JD, Beres MA. Structural equation model testing and the quality of natural killer cell activity measurements. BMC Med Res Methodol. 2005; 5 (1):1.
40. Saris WE, Satorra A, Van der Veld WM. Testing structural equation models or detection of misspecifications? Structural Equation Modeling. 2009; 16(4):561–82.
41. Lohoar S, Butera N, Kennedy E. Strength of Australian Aboriginal cultural practices in family life and child rearing. Canberra: Australian Institute of Families Studies. 2014. 20p. Paper No. 25.
42. Rogers LO, Meltzoff AN. Is gender more important and meaningful than race? An analysis of racial and gender identity among Black, White, and mixed-race children. Cultur Divers Ethnic Minor Psychol. 2017; 23(3):323–34. https://doi.org/10.1037/cdp0000125 PMID: 27736104
43. Satorra A. Scaled and adjusted restricted tests in multi-sample analysis of moment structures. Innovations in multivariate statistical analysis: Springer; 2000. pp. 233–47.
44. Meade A, C Johnson E, Braddy P. Power and sensitivity of alternative fit indices in tests of measurement invariance. J Appl Psychol. 2008; 93(3):568–92. https://doi.org/10.1037/0021-9010.93.3.568 PMID: 18457487
45. Zumbo BD, Gadermann AM, Zeisser C. Ordinal versions of coefficients alpha and theta for Likert rating scales. Journal of modern applied statistical methods. 2007; 6(1):4.
46. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika. 1951; 16(3):297–334.
47. Wells CS, Wollack JA. An instructor's guide to understanding test reliability. Testing & Evaluation Services University of Wisconsin. 2003.
48. R Core Team. R: A language and environment for statistical computing. 2013.
49. Rosseel Y. Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). Journal of statistical software. 2012; 48(2):1–36.
50. Jorgensen T, Pornprasertmanit S, Schoemann A, Rosseel Y. semTools: Useful tools for structural equation modeling. R Package Version 0.5–1. 2018.

51. Priest N, Paradies Y, Trenerry B, Truong M, Karlsen S, Kelly Y. A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. Soc Sci Med. 2013; 95:115–27. https://doi.org/10.1016/j.socscimed.2012.11.031 PMID: 23312306

52. Fahrmeir L, Tutz G. Modelling and analysis of cross-sectional data: a review of univariate. Multivariate statistical modelling based on generalized linear models. 2nd ed. New York: Springer-Verlag New York; 2001. pp. 15–68.

53. Chen W, Qian L, Shi J, Franklin M. Comparing performance between log-binomial and robust Poisson regression models for estimating risk ratios under model misspecification. BMC Med Res Methodol. 2018; 18(1):63. https://doi.org/10.1186/s12874-018-0519-5 PMID: 29929477

54. Meltzer H, Gatward R, Goodman R, Ford T. Mental health of children and adolescents in Great Britain. Int Rev Psychiatry. 2003; 15(1–2):185–7. https://doi.org/10.1080/0954026021000046155 PMID: 12745331

55. Shepherd C, Li J, Mitrou F, Zubrick SR. Socioeconomic disparities in the mental health of Indigenous children in Western Australia. BMC Public Health. 2012; 12:756. https://doi.org/10.1186/1471-2458-12-756 PMID: 22958495

56. Cooper SM, Banerjee M, Griffin CB, Glover CS, Shaheed J, McBride M, et al. African American fathers' race-related discussions with their children: Associations with racial identity beliefs and sociodemographic factors. J Child Fam Stud. 2019; 28(10):2800–12. https://doi.org/10.1007/s10826-019-01460-2

57. Dunn TJ, Baguley T, Brunsden V. From alpha to omega: a practical solution to the pervasive problem of internal consistency estimation. Br J Psychol. 2014; 105(3):399–412. https://doi.org/10.1111/bjop.12046 PMID: 24844115

58. Snowshoe A, Crooks C, F. Tremblay P, E. Hinson R. Cultural connectedness and its relation to mental wellness for First Nations youth. J Prim Prev. 2017; 38:67–86. https://doi.org/10.1007/s10935-016-0454-3 PMID: 27807659

59. Smokowski PR, Evans CB, Cotter KL, Webber KC. Ethnic identity and mental health in American Indian youth: examining mediation pathways through self-esteem, and future optimism. J Youth Adolesc. 2014; 43(3):343–55. https://doi.org/10.1007/s10964-013-9992-7 PMID: 23929530

60. Williams AD, Clark TC, Lewycka S. The associations between cultural identity and mental health outcomes for Indigenous Maori youth in New Zealand. Front Public Health. 2018; 6:319. https://doi.org/10.3389/fpubh.2018.00319 PMID: 30483490

61. MacCallum RC, Roznowski M, Necowitz LB. Model modifications in covariance structure analysis: The problem of capitalization on chance. Psychol Bull. 1992; 111(3):490. https://doi.org/10.1037/0033-2909.111.3.490 PMID: 16250105

62. Brown TA. Confirmatory factor analysis for applied research. New York, NY: Guilford Publications; 2014.

63. Brascoupé S, Waters C. Cultural Safety: exploring the applicability of the concept of cultural safety to Aboriginal health and community wellness. Journal of Aboriginal Health. 2009; 5(2):6–41. https://doi.org/doi.org/10.3138/ijih.v5i2.28981

64. Rigby W, Duffy E, Manners J, Latham H, Lyons L, Crawford L, et al. Closing the gap: cultural safety in Indigenous health education. Contemp Nurse. 2010; 37(1):21–30. https://doi.org/10.5172/conu.2011.37.1.021 PMID: 21591823

65. Bodkin-Andrews G, O'Rourke V, Grant R, Denson N, Craven RG. Validating racism and cultural respect: testing the psychometric properties and educational impact of perceived discrimination and multiculturation for Indigenous and non-Indigenous students. Educational Research and Evaluation. 2011; 16(6):471–93. https://doi.org/10.1080/13803611.2010.550497

66. Kickett-Tucker CS, Christensen D, Lawrence D, Zubrick SR, Johnson DJ, Stanley F. Development and validation of the Australian Aboriginal racial identity and self-esteem survey for 8–12 year old children (IRISE_C). Int J Equity Health. 2015; 14:103. https://doi.org/10.1186/s12939-015-0234-3 PMID: 26499852

67. Umana-Taylor AJ, Quintana SM, Lee RM, Cross WE Jr., Rivas-Drake D, Schwartz SJ, et al. Ethnic and racial identity during adolescence and into young adulthood: an integrated conceptualization. Child Dev. 2014; 85(1):21–39. https://doi.org/10.1111/cdev.12196 PMID: 24490890

68. Phinney JS. Ethnic identity in adolescents and adults: review of research. Psychol Bull. 1990; 108(3):499–514. https://doi.org/10.1037/0033-2909.108.3.499 PMID: 2270238

69. Hughes DL, Watford JA, Del Toro J. A transactional/ecological perspective on ethnic-racial identity, socialization, and discrimination. In: SS H, MD H, LS L, editors. Equity and justice in developmental science: implications for young people, families, and communities: Academic Press; 2016. pp. 1–41.

70. Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM. Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? PLoS One. 2019; 14(8):e0220744. https://doi.org/10.1371/journal.pone.0220744 PMID: 31390371

71. Australian Institute of Health and Welfare. Strategies and practices for promoting the social and emotional wellbeing of Aboriginal and Torres Strait Islander people. Canberra: Australian Institute of Health and Welfare; 2013. 15 p. Report No. IHW 82.

72. Zamora AL, Curtis H, Lancaster L. Promoting racial and ethnic identity: A school-based intervention to support Latino youth. Journal of Latinos and Education. 2017; 18(3):215–27. https://doi.org/10.1080/15348431.2017.1386104

73. Umana-Taylor AJ, Kornienko O, Douglass Bayless S, Updegraff KA. A universal intervention program increases ethnic-racial identity exploration and resolution to predict adolescent psychosocial functioning one year later. J Youth Adolesc. 2018; 47(1):1–15. https://doi.org/10.1007/s10964-017-0766-5 PMID: 29030792

6. Chapter 6: Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children?

6.1. Highlights:

- Ethnic-racial identity (ERI) affirmation was found to modify the effects of racism on Aboriginal Australian children's social and emotional wellbeing (SEWB).

- The protective effect of ERI affirmation was consistent for specific SEWB domains: emotional difficulties, hyperactivity, conduct problems, and overall emotional and behavioural problems. Children with increased levels of ERI affirmation were shown to be at decreased risk of having problems in these domains.

- Conversely, the children with high ERI affirmation were observed to be at increased risk of peer problems. This was discussed as a possible tendency of children with more positive attitudes towards ERI to stand up against racist bullying. Potential limitations in the use of the Peer Problems scale of the Strengths and Difficulties questionnaire among Aboriginal children were discussed.

- The results highlight the importance of promoting positive attitudes towards ERI for resilience building among Aboriginal children. It also corroborates the claims of the Aboriginal community on the importance of preserving cultural bonds and transmitting cultural values and rituals to future generations. This is

the first study to analyse the buffering effect of ERI on racism effects among Aboriginal Australian children.

6.2. Statement of Authorship

Statement of Authorship

Title of Paper	Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children?
Publication Status	☑ Published ☐ Accepted for Publication ☐ Submitted for Publication ☐ Unpublished and Unsubmitted w ork w ritten in manuscript style
Publication Details	Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM. Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? PLoS One. 2019;14(8):e0220744. doi: 10.1371/journal.pone.0220744.

Principal Author

Name of Principal Author (Candidate)	Davi Manzini Macedo
Contribution to the Paper	Conceiving of research question Data Analysis Manuscript Writing Editing and revisions Paper submission for publication Correspondence with Editors in the publication process
Overall percentage (%)	75%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date: 02/12/19

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Lisa G. Smithers
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in data analysis procedures Input in interpretation of results Revision of manuscript
Signature	Date: 2-DEC-2019

Name of Co-Author	Rachel M. Roberts
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results

	Revision of manuscript
Signature	Date: 5 Dec 2019

Name of Co-Author	Dandara Haag
Contribution to the Paper	Input in Methodology Data analysis Interpretation of results Revision of manuscript
Signature	Date: 12/12/19

Name of Co-Author	Yin Paradies
Contribution to the Paper	Revision of methodology Input in interpretation of results Revision of manuscript
Signature	Date: 12/12/19

Name of Co-Author	Lisa M. Jamieson
Contribution to the Paper	Orientation on formulation of research question Revision of methodology Input in theory application Input in interpretation of results Revision of manuscript
Signature	Date

6.3. Published paper: Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children?

Citation: Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM. Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? PLoS One. 2019;14(8):e0220744. doi: 10.1371/journal.pone.0220744

PLOS ONE

RESEARCH ARTICLE

Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children?

Davi M. Macedo[1]*, Lisa G. Smithers[2], Rachel M. Roberts[3], Dandara G. Haag[1,2], Yin Paradies[4], Lisa M. Jamieson[1]

1 Indigenous Oral Health Unit, Adelaide Dental School, The University of Adelaide, Adelaide, Australia, **2** BetterStart Child Health and Development Research Group, School of Public Health, The University of Adelaide, Adelaide, Australia, **3** School of Psychology, The University of Adelaide, Adelaide, Australia, **4** Alfred Deakin Institute for Citizenship and Globalisation, Deakin University, Melbourne, Australia

* davi.manzinimacedo@adelaide.edu.au

OPEN ACCESS

Citation: Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM (2019) Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? PLoS ONE 14(8): e0220744. https://doi.org/10.1371/journal.pone.0220744

Editor: Valsamma Eapen, University of New South Wales, AUSTRALIA

Received: April 2, 2019

Accepted: July 21, 2019

Published: August 7, 2019

Data Availability Statement: The present study was based on de-identified data from the Longitudinal Study of Indigenous Children (LSIC). The data are owned by a third party, the Australian Government Department of Social Services. There are security and confidentiality protocols for accessing LSIC data. Interested parties must submit an application and sign a deed of license. Information can be found on the LSIC webpage: http://www.dss.gov.au/lsic. The authors did not receive any special access privileges that others would not have. Interested researchers will be able

Abstract

Objectives

This study investigates the protective role of ethnic-racial identity (ERI) affirmation on the longitudinal association between racism and Aboriginal Australian children's social and emotional well-being (SEWB).

Methods

408 children from the K-Cohort of the Longitudinal Study of Indigenous Children were included in the analysis. Data were collected through questionnaire-guided interviews at 7–10 and 9–12 years of age. Children's racism experience, SEWB (Strengths and Difficulties Questionnaire), and confounding were reported by caregivers. ERI was reported by children and dichotomized into high versus low. Generalized linear models with log-Poisson links and robust errors were used to estimate adjusted Risk Ratios (RR_a) for the effect of racism on SEWB domains. Effect-measure modification analysis was used to verify differences on effect sizes per strata of ERI affirmation. The presence of modification was indicated by the Relative Excess Risk due to Interaction (RERI).

Results

Slightly above half (51.4%) of the children presented high ERI affirmation. Children exposed to racism and with low ERI affirmation were at increased risk of hyperactive behavior (RR_a 2.53, 95% CI 1.17, 5.48), conduct problems (RR_a 2.35, 95% CI 1.07, 5.15), and total difficulties (RR_a 1.73, 95% CI 0.84, 3.55). Positive RERIs indicated the joint effects of racism and low ERI affirmation surpassed the sum of their separate effects in these domains. Children with high ERI affirmation were at increased risk of peer problems (RR_a 1.66, 95% CI 0.78, 3.52).

to replicate the results of our study using the protocol outlined in the Methods section of this paper.

Funding: The authors received no specific funding for this work.

Competing interests: The authors have declared that no competing interests exist.

Conclusions

These findings suggest that ERI may mitigate the risk of poor SEWB due to racism. Fostering affirmative ERI can be an important strategy in promoting resilience in Aboriginal Australian children.

Introduction

Racism can be defined as a system of practices, attitudes and beliefs that assumes the inferiority of certain ethnic-racial groups in relation to others which are considered superior, sustaining an unequal and avoidable distribution of resources based on ethnic-racial membership [1, 2]. The maintenance of oppression occurs structurally (differences in education, income, health, and political representation), interpersonally (direct experiences of race-based discrimination), and individually (internalization of societal messages of inferiority by ethnic-racial minorities or superiority by ethnic-racial majorities) [1, 2]. In Australia, racism against Aboriginal people is a pervasive social problem and a public health issue [3], with significant economic costs [4]. Disadvantages are observed in levels of education, income, employment opportunities, health indicators, and life-expectancy relative to the non-Aboriginal population [5].

Experiences of interpersonal race-based discrimination are reported by Aboriginal Australians across the lifespan, starting from childhood [6] and continuing through to older years [7]. Interpersonal racism negatively compromises daily routines and impacts Aboriginal Australians' health and well-being. It is established that racism is a normative experience among ethnic-racial minority youths and its effects can be observed from childhood [8]. Among children racism is shown to be associated with higher levels of anxiety, depression, aggression, conduct problems, social and emotional difficulties, and also lower levels of self-esteem, psychological well-being, and quality of life [9]. Research with Aboriginal Australian children and youth shows similar associations, with racism being linked to depressive symptoms, emotional and behavioral difficulties, and poor overall mental health [3].

Identification of protective factors and early intervention is relevant to preventing negative outcomes from escalating and promoting positive development among children experiencing adversity [10]. The present study focuses on the role of ethnic-racial identity as a protective factor against the detrimental effects of racism on child well-being. ERI can be defined as one's beliefs and attitudes about belonging to a given ethnic-racial group [11, 12]. Ethnic and racial identity have been previously theoretically distinguished as separate terms. Ethnic identity has been used to refer to perceptions relative to one's cultural beliefs, values, and behaviors [13]. Racial identity is claimed to be the construct of interest when researchers are interested in identity formation processes in a racialized society, being generally focused on responses and attitudes to racism [13, 14]. ERI in this context refers to experiences that are not uniquely ethnic or racial, but that interact with race and ethnicity in a dynamic process [11, 12]. This is the orientation of the Ethnic and Racial Identity in the 21st Century Study Group, formed to provide guidance on future research in the area [11]. The justification for adopting the ERI metaconstruct is that race and ethnicity might be inseparable for some ethnic-racial groups due to the interplay of heritages, phenotypes, racial socialization experiences, and exposure to racism [11, 12].

A sense of ERI is as a multidimensional concept [15] that can be observed from early age [16]. It involves perceptions and attitudes about group belonging, exploration of cultural practices and behaviors, understanding of stereotypes held by in-group and out-group members,

and the levels of commitment and attachment to one's ethnic racial group [11, 12, 16]. The degree of exploration of one's ERI and how they feel about such identity influences how youths experience and respond to racism. The link between racism and ERI helps to elucidate how ethnic-racial minority youths reconcile the need for a positive and healthy identity in a context that communicate their marginalized status [17].

Phinney's model might be one of the most important proposals of ERI development, focusing on exploration of cultural practices and commitment to ERI [11, 15]. The author's Multigroup Ethnic Identity Measure (MEIM) grounds several studies in adolescence and adulthood [11, 18]. This reflects the increase of complexity of ERI exploration during these developmental periods and is shown in the level of complexity in the phrasing of the items used (e.g, "I understand pretty well what my ethnic group membership means to me") [15]. Critics of these approach suggest that the ERI attitudinal component might be distinct from the level of exploration of cultural practices and commitment to one's ERI [19]. Orientation for future research is that these domains be assessed separately [11, 12, 19] Though recognizing the relevance of understanding ERI increased complexity over time, the present study focuses on ERI content.

As the understanding of one-self as a member of a social group, the positive and negative affects attached to membership are especially relevant to the perception of one's ERI [20]. Scholars suggest that a sense of belonging and positive affect towards the ethnic-racial in-group can be considered one of ERI's most important aspects [15, 20, 21]. This perspective is in accordance with the Social Identity Theory rationale, according to which positive attitudes about a given social identity contributes to increased self-esteem, well-being and assuring a positive self-concept in the present of threat to one's social group [22,23]. In a developmental perspective, in middle childhood children possess the levels of cognitive maturation (e.g, social comparison and perspective-taking abilities) and socialization that allow for the assessment of in-group and out-group attitudes [12]. A strong sense of belonging and pride in regard to the Aboriginal culture is also emphasized as a central determinant of Aboriginal children's well-being and resilience by Aboriginal Australians [24, 25]. For the purposes of the present study, positive feelings towards ERI is understood as ERI affirmation [11, 19].

ERI has been internationally identified as an important determinant of positive Indigenous youth mental health and development. Canadian First Nation children in middle childhood are shown to possess a sense of ERI from age 6, with positive in-group evaluation and relevance of ERI for self-concept increasing with age [16, 21]. In the Australian context, Aboriginal children in middle childhood are shown to possess a sense of ERI with an important focus on exploration of cultural values and beliefs [26, 27]. Among First Nation Canadian youth, a clear sense about one's ERI was shown to contribute to the establishment of a consistent and defined sense of self, positive self-esteem, and psychological well-being [28], being also associated with self-efficacy, school connectedness, and life satisfaction [29]. Among American Indian youth, ERI is found to be inversely associated with depression, anxiety, and externalizing behaviors and to have a positive relationship with psychosocial functioning [30, 31]. Despite evidence of the association between ERI and positive development in childhood [32], most studies are conducted with children in the late years of childhood and adolescence [29, 32, 33].

The protective role of ERI on the detrimental effects of racism is also acknowledged in the literature [34, 35]. Positive regard and commitment towards ERI is shown to buffer the association between racism and depressive symptoms among African American adults and adolescents [34, 36]. At a physiological level, African American men and women to whom ERI was a central component of self were shown to present low stress-response system reactivity during discriminatory encounters. Facilitated protective inflammatory processes during episode recovery was also observed [37]. Once more, most of the research is conducted in adulthood and adolescence [34, 36]. Nonetheless, there is initial evidence of the protective role of ERI for

the effects of racism in childhood. A strong sense of ERI was found to buffer the effects of racism on children's internalizing and externalizing symptomatology among 7–8 years old from different racial-ethnic backgrounds (e.g., African-American, Latin-American, multi-ethnic racial). Commitment to ERI was especially salient to mitigate racism effects on internalizing symptoms, suggesting the importance of ERI to self-concept related psychological processes in childhood [35].

Despite initial evidence, further research on how ERI helps to promote children's positive development in the context of racial discrimination is still necessary [16, 35]. The present study aims to investigate if positive ERI can modify the association between racism and Aboriginal children's social and emotional wellbeing (SEWB). As most studies on the effects of racism are still cross-sectional [9], we sought to investigate associations and the protective role of ERI in a longitudinal study. In other words, we investigated if the longitudinal effect of racism on different domains of child SEWB (hyperactive behavior, peer problems, conduct problems, and emotional difficulties) differs among children with different levels of ERI affirmation. Our main hypothesis is that the effects of racism will be smaller among children with high levels of ERI affirmation in all domains of SEWB analyzed.

We propose effect-measure modification analysis as an innovative approach to this area of research due to its applicability to public health research and policy formulation. The presentation of risk ratios per strata of the exposure and the effect-modifier provides a more transparent analysis as we disclose effect sizes under each condition [38]. Previous research results are based on structural equation models [35]. Under many circumstances, the assumptions underpinning structural equation modelling, including linearity and no confounding, are untenable [39]. These assumptions must hold for the relationships between all exposure, outcomes, confounding, mediator, and modifier variables in the model [39]. Effect-measure modification in the counterfactual framework makes assumptions that hold for the exposure and outcome relationship only. Additionally, to the best of our knowledge no research has investigated the relationship between racism, ERI, and well-being among Aboriginal Australian children. We aim to add to the evidence of the role of ERI for the well-being and development of Aboriginal Australians. We are limited to the data available, which is subject to small samples in some strata. We present the results in a way that will allow future inclusion in a meta-analysis, should more data become available in the future.

Methods

Study design

Data were from the Longitudinal Study of Indigenous Children, a national survey funded by the Australian Government Department of Social Services to collect information on determinants of Aboriginal Australian and Torres Strait Islander children's health and development. The study is a pioneer in collecting information on experiences of racism and resilience factors among Aboriginal children at a national level [40]. Its accelerated cross-sequential design involves two cohorts of children: The Baby Cohort (B Cohort) and the Child Cohort (K Cohort). Data used in this study was from the K Cohort, which includes children who were 3.5 to 5 years old at wave 1. The following waves occurred annually. Access to data from waves 1 to 9 is currently available upon application and a signed deed of license from legislated bodies. More information is available at the Australian Government Department of Social Services website [40].

Data collection procedures

The first stage of sampling involved the selection of 11 sites—including remote communities to capital cities—representative of the socioeconomic and community environments where

Aboriginal children lived [40]. A non-representative purposive sample was recruited using addresses provided by Centrelink and Medicare Australia. Centrelink is part of the Australian Department of Human Services, delivering social security payments for people who are unemployed or unable to work [41]. Medicare Australia provides benefits to assist with the costs of health services [42]. Eligible participants were approached, and signed consent obtained. Neither the probability of being selected for the study among the total Australian Indigenous population, nor the selection of families within each study site, occurred through a randomized process. Details about the interviewing process across waves are explained elsewhere [40].

Information was obtained through questionnaire-guided interviews conducted by trained Aboriginal and Torres Strait Islander Research Administration officers. The child's main caregiver, child's secondary caregiver, child's teacher, and the study child were interviewed. Written consent was provided by all informants and authorization for data collection with the study child was signed by caregivers. Participants were fully informed that they could withdraw from the study at any time. Each child received a unique identifier that remained constant in all the subsequent waves for all interviews related to that child. Ethical approval was obtained from the Australian Government Department of Health Departmental Ethics Committee, State/territory and or regional ethics clearance from the LSIC locations Human Research Ethics Committees were also obtained [40].

Participants

Information on ERI was assessed solely at wave 8 among children in the K-Cohort. All the children with available information on ERI (n = 408) were included in the analysis. Information on racism and all confounding variables was collected in wave 6 (2013), when the children were aged 7 to 10 years. Data on SEWB was collected two years later at wave 8. The child's main caregiver provided the data on exposure, outcomes, and confounding variables. The effect-modifier (ERI) was collected through child self-report. The children were aged 9 to 12 years (wave 8).

Measures

Racism (exposure). Caregivers answered the question "Has study child been bullied or treated unfairly at school because he/she is Aboriginal and/or Torres Strait Islander?". Answer options were "Yes, bullied (kids being mean to him/her)", "Yes, treated unfairly (adults being mean to him/her)", "Yes, both bullied and treated unfairly", and "No". Answers were dichotomized in "Yes" and "No" for analysis purposes.

Child social and emotional well-being (outcome). The Strengths and Difficulties Questionnaire (SDQ) was used to assess emotional and behavioral difficulties associated with higher risk for the onset of future psychological disorders. The measure is valid for use among 4 to 17 years old and is comprised of 25 questions that assesses child difficulties and potentialities in five domains: emotional symptoms, hyperactive behavior, conduct problems, peer problems, and pro-social behavior [43]. Only the first four domains were included in the analysis as to focus on potential difficulties on SEWB. The score range is from 0 to 10, with higher scores indicating greater difficulties. A SDQ Total score for emotional and behavioral problems was also used, ranging from 0 to 40. All scores were dichotomized based on cut-off points for above the threshold for emotional and behavioral difficulties. Scores equal or above 5 were considered risk for emotional symptoms, equal or above 7 to hyperactivity, equal or above 4 for both conduct and peer problems, and equal or above 14 for the total SDQ score [44].

ERI affirmation (potential effect-modifier). The study child answered a set of four questions regarding ERI at school, all with a 6-point Likert Scale ranging from "Yes (Always)", "Yes

(Most of the time)", "Sometimes (Fair bit)", "Sometimes (Little bit)", "No (Not much)", "No (Never)". The questions were: 1) "I feel good about being Aboriginal and/or Torres Strait Islander in class"; 2) "I want to share (tell others) things about being Aboriginal and/or Torres Strait Islander in class"; 3) "I feel safe about being Aboriginal and/or Torres Strait Islander in class"; and 4) "I like people to know I am Aboriginal and/or Torres Strait Islander in class". Item's reliability was considered satisfactory (Cronbach's Alpha: 0.71). A single dichotomized variable was generated for different levels of ERI affirmation. Children who answered to "Yes (Always)" and "Yes (Most of the time)" to all four questions were included in the "High ERI affirmation" category.

Confounding variables. Confounders were conceptualized as variables that share a causal association with both exposures and outcomes [45]. The confounders included in our adjusted models were study child sex, age, and dominant language, main caregiver level of education, family Index of Relative Indigenous Socioeconomic Outcomes (IRISEO), and Level of Relative Isolation (LORI) [9, 46, 47]. The Study Child dominant language was derived from the question "What language (s) is Study Child learning?", collected at wave 8. Response options were English, foreign languages, and Aboriginal languages (e.g. Alyawarr, Pitjantjatjara, Yorta-Yorta). Answers were categorized in "Equally fluent in English and in an Indigenous language", "Dominant in an Indigenous language" and "Dominant in English".

The main caregiver highest level of education attainment was collected at waves 2 and 3 and response options ranged from "Never attended school" to "Post-graduate degree". Responses were reclassified in four categories: "Year ten or below of high school", "Year 11 or 12 of High School", "Post school certificate/Advanced diploma", "Graduate degree or above". The IRISEO is a measure of community level socioeconomic advantage linked to the LSIC data set. It is calculated specifically for Indigenous people, based on income, employment, education and housing indexes from the Australian 2006 Census. The IRISEO is measured in deciles, ranging from most disadvantaged (1) to most advantaged (10) [48]. Family LORI is a measure of remoteness/isolation based on the Accessibility/Remoteness index of Australia. It is calculated based on relative distance to service centers. The LORI categories range from "no isolation", which corresponds to metropolitan areas to "low isolation", "moderate isolation", "high isolation" and "extreme isolation"[49].

Analysis

Analyses were conducted in Stata 14. Multiple imputation with chained equations (MICE) was used to address potential bias due to missing data. Twenty data sets were generated from imputation models using all the variables tested in the association models. MICE analyses were based on the assumption of missingness at random conditional on the observed data [50]. Imputed values were generated for children's experience of racism (missing = 10), main caregiver level of education (missing = 7), study child dominant language (missing = 18), child ERI affirmation (missing = 26), and the multi-level effect-modifier variable (missing = 35), explained below. All other variables were respondent sample complete cases. After imputation, all analyses were conducted based on a final sample of 408 children.

Descriptive analyses were performed to characterize the sample. We present prevalence estimates with confidence intervals as the number of participants varies among the imputed data sets, as is always the case when using imputed data. Generalized linear models with a log-Poisson link and robust errors were used to calculate Risk Ratios (RR) as unadjusted effect estimates of racism on the four individual domains of child SEWB and on the SDQ total difficulties score. Next, adjusted RR (RR_a) were obtained after the inclusion of confounding variables in the analysis, as above. Risk Ratios were calculated rather than odds ratio as the latter tends

to be inflated when the outcome is not rare. Risk Ratios are also more relevant for public health purposes as it considers the proportion of the outcome among the entire population at risk [51]. For the effect-measure modification analysis, RR_a were obtained for the different stratum of the exposure (racism) and the effect-modifier (ERI affirmation) [38, 52]. A categorical variable with four levels was entered into the adjusted model as exposure to represent the following stratum:

a. non-exposure to racism and high ERI affirmation (reference group);

b. non-exposure to racism and low ERI affirmation;

c. exposure to racism and high ERI affirmation; and

d. exposure to racism and low ERI affirmation.

Subsequently, the RR_a for the effects of racism on the SEWB domains within strata of ERI affirmation was estimated separately [38]. Effect-measure modification occurs when the effect of a main exposure differs across levels of a second exposure [53]. We present an effect-measure modification analysis because our main interest is the protective role of ERI affirmation on the effects of racism. Although it is important to reduce racism against Aboriginal people in society [54], we aim to verify if ERI can assist Australian Aboriginal children to navigate through racist discrimination experiences whilst initiatives to reduce societal levels of racism are designed and implemented. The effect-measure modification is presented in the risk-difference scale. The risk-difference scale estimates if the effect of the interaction of both exposures surpasses the sum of the two separate effects added together. It allows us to identify differences in the levels of the outcome per strata of the effect modifier [53]. In the case of the present study, it enables us to identify the reduction on the detrimental effect of racism on child SEWB when child ERI affirmation is high.

The effect-measure modification on the additive scale was obtained by the calculation of a Relative Excess Risk due to Interaction (RERI). The RERI was calculated through the formula RR(d)–RR(b)–RR(c) + RR(a), where a, b, c, and d represent the levels of the exposure and effect-modifier presented above. A RERI higher than 0 suggests that the effects of the two exposures operating together is higher than that of each added together (the effect measure modification is positive). In other words, it suggests that the effect of racism interacting with low ERI affirmation is higher than the sum of the independent effects of racism and low ERI affirmation. A RERI of 0 suggests no effect-measure modification is present, whilst a negative value suggest the effect-measure modification operates in a negative direction [35]. Rather than interpreting the RERI size, we interpret the RERI in terms of the direction in which the effect-measure modification estimated occurs, as recommended by Knol & VanderWeele [38].

In the present study, we focus on the size of the effects and compare effects across strata of the variables of interest (racism exposure and level of ERI affirmation), as recommended by the American Statistical Association and the American Psychological Association [55, 56]. P-values and confidence intervals are shown to be highly dependent on the sample size, which can bias conclusions driven by interpretation of statistical significance [57, 58, 59]. Confidence intervals were interpreted as indicators of the precision of the effect estimate, and not as having a 95% probability of including the true effect size in the population, as commonly misinterpreted [59, 60]. Comparisons of effect-sizes per stratum of exposure provided useful information on the risk differences among groups and on the verification of the protective role of ERI affirmation for children exposed to racism.

Results

The mean child age when information on racism was collected was 8.5 years (SD 0.5) and the sample consisted of 51% girls and 49% boys. Approximately 15% of children were reported to have experienced racism at school and between 15% and 22% of the children presented difficulties in any of the investigated SEWB domains. Slightly above half of the children (51.4%) presented high ERI affirmation. Further information is presented in Table 1.

The adjusted risk ratios for the longitudinal effects of racism on child SEWB (Table 2) show that the point estimates were more prominent for hyperactive behavior (RR 1.65, 95% CI 0.65, 2.06), and peer problems (RR 1.25, 95% CI 0.76, 2.07), though the 95% confidence intervals were wide. The risk of total behavioral and emotional difficulties due to exposure to racism was of 18% (RR 1.18, 95%CI 0.72, 1.94) when compared to children not exposed.

The analysis of the effect-measure modification of ERI on racism effects on children's SEWB are shown in Table 3. Among children with low ERI, there was a 43% increased risk (RR_a 1.43, 95%CI 0.52, 3.90) of emotional difficulties for the children who experienced racism, although the estimate is imprecise, as indicated by the wide confidence intervals. Whereas among children with high ERI, the point estimate indicates a 10% lower risk of emotional difficulties, and again, the confidence intervals were wide and we cannot reasonably rule out a null association (RR_a 0.90, 95% CI 0.31, 2.59). In the analysis including all children, the highest risk of having emotional problems was among children who had low ERI and were also exposed to racism (RR_a 1.76 (95%CI 0.66. 4.64)). This was confirmed by the RERI, where there appears to be effect measure modification on the additive scale. A RERI = 0.51 (95%CI -1.36, 2.38) suggests that the effect of racism operating together with low ERI affirmation on emotional difficulties (RR_a 1.76) was higher than the sum of the individual effects of racism (RR_a1.05) and low ERI affirmation (RR_a 1.19).

Consistent with the results on the emotional domain, the risks of hyperactive behavior was doubled (RR_a 2.16, 95%CI 1.00, 4.67), conduct problems was 76% higher (RR_a 1.76, 95% CI 0.81, 3.83), and total difficulties were 94% higher (RR_a 1.94, 95% CI 0.92, 4.11) for low ERI children who experienced racism, compared with children who did not experience racism. Among all children, the ones with low ERI exposed to racism had the higher risks for hyperactivity (RR_a 2.53, 95% CI 1.17, 5.48), conduct problems (RR_a 2.35, 95% CI 1.07, 5.15), and total difficulties (RR_a 1.73, 95% CI 0.84, 3.55). An effect-measure modification on the additive scale was confirmed for each of these domains, with values ranging from 1.08 to 1.39.

The opposite pattern for the previous domains was observed for peer problems. Among the children with high ERI affirmation, experiencing racism was associated with an 80% higher risk of presenting peer problems (RR_a 1.80, 95% CI 0.83, 3.90). Among all children, those discriminated with high ERI affirmation had the higher risk (RR_a 1.66, 95% CI 0.78, 3.52). A RERI of -0.75 suggests a negative effect measure modification in the additive scale. In other words, the effects of racism and low ERI affirmation (RR_a 1.19) was lower than the expected sum of the individual effects of racism (RR_a 1.66) and low ERI affirmation (RR_a 1.28).

Discussion

The results demonstrate the protective role of ERI affirmation on the longitudinal effects of racism on Aboriginal Australian children SEWB. As hypothesized, our findings suggest the longitudinal association between racism and SEWB varies according to ERI affirmation. Children with low ERI affirmation whose parents reported they experienced discrimination/racism were at increased risk of poor SEWB two years later, with more prominent effects for the onset of hyperactive behavior, conduct problems, and total difficulties. A positive effect-measure modification was found for the effects on child emotional difficulties, hyperactive behavior,

Table 1. Means and frequencies (95% CI) of exposure, outcomes, effect-modifier and confounding variables.

	Means (Standard Error)
Child Age (years)	8.5 (0.03)
Family IRISEO[a]	5.8 (0.11)
	Prevalence (95% CI)
Racism[b]	
Yes	15.6 (12.0, 19.2)
No	84.3 (81.0, 88.0)
Child social and emotional wellbeing[c]	
High SDQ Emotional difficulties	15.0 (11.2, 18.41
High SDQ Hyperactive behaviour	18.0 (14.0, 21.6)
High SDQ Conduct problems	18.0 (14.1, 21.6)
High SDQ Peer problems	20.3 (16.4, 24.2)
High SDQ Total difficulties score	22.5 (18.5, 26.6)
Ethnic-racial identity[d]	
High	51.4 (46.0, 56.5)
Low	48.6 (43.6, 53.6)
Sex	
Male	49.0 (44.0, 54.0)
Female	51.0 (46.0, 56.0)
Child dominant language	
Equally fluent—English and Indigenous language	5.8 (3.5, 8.1)
Indigenous language	4.6 (2.5, 6.8)
English	89.5 (86.5, 92.5)
Main caregiver level of education	
Year 10 of High School or below	31.6 (27.0, 36.2)
Year 11 or 12 of High School	26.0 (22.0, 30.4)
Post School certificate or Advanced diploma	32.2 (28.0, 37.0)
Graduate degree or above	10.0 (7.0, 13.0)
Family Level of Relative Isolation (LORI)[e]	
None	28.6 (24.2, 33.0)
Low	54.0 (49.0, 59.0)
Moderate	9.8 (7.0, 12.7)
High/Extreme	7.5 (5.0, 10.0)

[a] Index of Relative Indigenous Socioeconomic Outcomes (IRISEO) is a measure of community level socioeconomic advantage calculated specifically for Indigenous people, based on income, employment, education and housing indexes from the Australian 2006 Census. The IRISEO is measured in deciles, ranging from most disadvantaged (1) to most advantaged (10).

[b] Child experience of racism was caregiver-informed. Answers to the question "Has study child been bullied or treated unfairly at school because he/she is Aboriginal and/or Torres Strait Islander?" were dichotomized into "Yes" or "No".

[c] Child social and emotional wellbeing was reported by caregivers' response to the Strengths and Difficulties Questionnaire. The measure provides domain-specific indicators and a total indicator of emotional and behavioural difficulties.

[d] Child report of Ethnic-Racial Identity affirmation was assessed by the questions: 1) "I feel good about being Aboriginal and/or Torres Strait Islander in class"; 2) "I want to share (tell others) things about being Aboriginal and/or Torres Strait Islander in class"; 3) "I feel safe about being Aboriginal and/or Torres Strait Islander in class"; and 4) "I like people to know I am Aboriginal and/or Torres Strait Islander in class". Children who answered "Yes (Always)" and "Yes (Most of the time)" to all questions were included in the "High ERI affirmation" category.

[e] Family LORI is a measure of remoteness/isolation based on the Accessibility/Remoteness Index of Australia (ARIA). It is calculated based on relative distance to service centres. The LORI categories range from "no isolation", which corresponds to metropolitan areas to "low isolation", "moderate isolation", "high isolation" and "extreme isolation".

https://doi.org/10.1371/journal.pone.0220744.t001

Table 2. Effects of racism at school on children's social and emotional wellbeing[a].

	Emotional Symptoms	Conduct problems	Hyperactivity	Peer problems	Total difficulties
Unadjusted Risk Ratios (95% CI)	1.18 (0.63, 2.20)	1.19 (0.70, 2.04)	1.48 (0.89, 2.46)	1.23 (0.75, 2.01)	1.12 (0.69, 1.81)
Adjusted Risk Ratios (95% CI)	1.17 (0.61, 2.26)	1.16 (0.65, 2.06)	1.65 (0.99, 2.75)	1.25 (0.76, 2.07)	1.18 (0.72, 1.94)

[a] Child social and emotional wellbeing was caregiver-informed through the Strengths and Difficulties Questionnaire. The measure provides domain-specific indicators and a total indicator of emotional and behavioural difficulties.

https://doi.org/10.1371/journal.pone.0220744.t002

conduct problems, and the total difficulties score. In other words, it shows that promoting ERI affirmation can mitigate the effects of racism on these SEWB domains. Effect-measure modification is informative to identify groups in which a specific intervention might be more effective [53]. Here we use it as to demonstrate the protective role of ERI on the effects of racism on Aboriginal children SEWB.

Contrary to our hypotheses, a negative effect-measure modification was found in the peer problems domain. Analysis per strata showed a double increased risk for children in the high ERI affirmation group. This raises the question of whether Aboriginal children with higher ERI affirmation might be targeted for discriminatory peer behavior because their ERI is more salient [17]. It is also possible that peer problems arise as a result of confronting peer racial discrimination, which might be more common among children in the higher ERI affirmation group. The increase in peer problems amongst Aboriginal children with higher ERI might indicate the need to discuss multi-culturalism and racism in the school setting to reduce racially motivated conflict among students [6]. Broadly speaking, interventions to promote awareness and prevent racism against Aboriginal people in Australia are an important public health goal [61].

The results observed in the peer problem scale, however, should be interpreted with caution. Although Aboriginal caregivers stated peer relationships as important, relationships with the extended family and the Aboriginal community generally were thought to be substantially more relevant [62]. Considering the centrality of family and kinship for Aboriginal people [24], caregivers did not see having few friends as dysfunctional, provided connection with family members and the broader Aboriginal community were strong [62]. Research on the psychometric properties of the SDQ among Aboriginal Australian children suggest the peer problem scale is the least reliable, with the scale performing more poorly among children residing in remote locations [63, 64]. Removing the peer problems scale, however, did not improve the fit of the five-item original model of the instrument, suggesting the complete version of the SDQ is still valid for use with Aboriginal children [63]. Additionally, poor internal consistency of the SDQ peer problems scale have been found in other populations [65]. Future studies might address how applicable the peer problems subscale is for the understanding of SEWB among Aboriginal Australian children.

Our results are in accordance with the literature on the importance of ERI as a determinant of Aboriginal Australian children's SEWB and its potential as a protective factor against risk exposure [25, 28, 35]. It corroborates the importance of promoting ERI affirmation and integrating Aboriginal Australians' cultural values and beliefs for health and well-being promotion [24]. Results should be interpreted with care as the confidence intervals were wide, likely because of the small number of children in some subgroups. We believe that although larger samples might improve the precision of the estimates, our results are based on one of the best available information sources on determinants of Aboriginal children's development. The LSIC has a large sample size, with annual follow-ups, and covers a range of geographical

Table 3. Effect-measure modification of ERI on the effects of racism on all domains of SEWB.

	Racism = No		Racism = Yes		
	N High Score /Low Score	RR_a[a] (95% CI)	N High Score /Low Score	RR_a (95% CI)	RR (95% CI) for racism within strata of ERI
Emotional Difficulties					
Low ERI	26/149	1.19 (0.65, 2.19)	6/19	1.76 (0.66, 4.64)	1.43 (0.52, 3.90)
High ERI	24/147	1	5/32	1.05 (0.38, 2.88)	0.90 (0.31, 2.59)
Effect-measure modification on the risk-difference scale: RERI = 0.51 (-1.36, 2.38) p = 0.59.					
Hyperactivity					
Low ERI	32/143	1.10 (0.64, 1.90)	9/16	2.53 (1.17, 5.48)	2.16 (1.00, 4.67)
High ERI	26/145	1	6/31	1.34 (0.54, 3.30)	1.38 (0.63, 3.00)
Effect-measure modification on the risk-difference scale: RERI = 1.08 (-0.93, 3.11) p = 0.29					
Conduct Problems					
Low ERI	35/140	1.25 (0.73, 2.13)	9/16	2.35 (1.07, 5.15)	1.76 (0.81, 3.83)
High ERI	26/145	1	4/33	0.70 (0.23, 2.07)	0.77 (0.31, 1.93)
Effect-measure modification on the risk-difference scale: RERI = 1.39 (-0.40, 3.20) p = 0.12					
Peer problems					
Low ERI	39/136	1.28 (0.77, 2.13)	5/20	1.19 (0.46, 3.07)	0.88 (0.33, 2.34)
High ERI	29/142	1	10/27	1.66 (0.78, 3.52)	1.80 (0.83, 3.90)
Effect-measure modification on the risk-difference scale: RERI = -0.75 (-2.47, 0.97) p = 0.39.					
Total emotional and behavioural difficulties					
Low ERI	37/138	0.84 (0.52, 1.36)	10/15	1.73 (0.84, 3.55)	1.94 (0.92, 4.11)
High ERI	41/130	1	6/31	0.74 (0.30, 1.79)	0.74 (0.30, 1.83)
Effect-measure modification on the risk-difference scale: RERI = 1.14 (-0.15, 2.44), p = 0.08.					

[a] RR_a are adjusted for child age, sex, dominant language, parental education, family IRISEO, and LORI.

https://doi.org/10.1371/journal.pone.0220744.t003

locations, and health and well-being indicators [40]. Thus, larger samples are not available in Australia. The LSIC is also one of the few and largest studies to include information on Indigenous experiences of racism and ERI in childhood [66, 67]. We acknowledge that the LSIC sample is not-representative of the Aboriginal children population, as a non-random purposive sampling design was used [40]. Nonetheless, representativeness is not required for estimating casual associations [68].

The ASA emphasizes that research results must be interpreted according to the study design, methods to minimize chance, bias, and confounding, and previous evidence shown in the literature [55, 69]. We believe we addressed adjustment for confounding based on available evidence of variables that can be a source of confounding bias in the effects estimated. We also used multiple imputation with chained equations to address potential non-response bias. The calculated RERI as an indication of effect-measure modification in the additive scale provided a clear comparison between the effects of a risk factor (racism) among different subpopulations. This is important information to help facilitate evidence-based public policy design and resource allocation [38]. The interpretation of statistical results followed guides of reference associations in the Statistics and Psychology fields [55, 56]. While we are concerned about the small sample sizes, this is possibly the only data available of this kind and is therefore an important contribution to the literature. Furthermore, we have presented in a way that would allow for the inclusion of the estimates in future meta-analysis, shall these variables be collected in future studies.

The literature acknowledges the tendency of ethnic-racial minorities to underestimate experiences of racism [70]. Besides, information on racism was caregiver-informed, which might translate only the racism experiences that they were aware of, again underestimating levels of racism exposure from the child's perspective [9]. Nonetheless, self-report measures of

racism are generally used in samples aged 12 or older in the context of Aboriginal Australian research [71, 72]. The LSIC research team and community stakeholders consulted possibly considered the children to be too young to respond to such a sensitive topic. Our results, however, are in the same direction of another finding on the protective role of ERI against racism effects using a child-report measure of racism [35]. It is possible larger and more representative samples that includes child-report measures of racism might yield even greater levels of poor SEWB and exposure to racism. Notwithstanding, our results reflect, at least partially, Aboriginal Australian children's experiences of racism.

Another aspect to consider is that the ERI measure used in our study was not validated in the Australian Aboriginal context. Nevertheless, the items used to assess ERI reflect the Aboriginal community views on the importance of sense of belonging and pride to Aboriginal culture [24, 25]. LSIC measures and data collection procedures were conducted with extensive and ongoing community engagement. Across all waves, the LSIC study has involved close consultation with community stakeholders and therefore items such as ERI could be considered to be culturally appropriate [73]. Measures that can assist in identifying differences between the domains of process (e.g., exploration of the cultural practices and history of one's ethnic-racial group) and content (e.g., feelings, beliefs, and the centrality of one's ERI) in the development of Aboriginal children's ERI might also assist in identifying specific variations in the relationship between their ERI and well-being [11, 19].

Conclusions

The findings of the present study have a potential impact on public health. If ERI affirmation can modify the longitudinal effects of racism on child SEWB, promotion of a positive ERI can guide racial socialization practices, health communications, and integrate therapeutic approaches aimed to improve the mental health and well-being of Aboriginal Australian children [74]. The suggestion of the protective role of ERI affirmation is also relevant to mental health professionals' clinical practice and interventions aimed to contribute to Aboriginal children's positive development. The present study contributes to the evidence that ERI is a determinant of health and well-being to Aboriginal Australians. It corroborates the perspective that promotion of connection to culture and a positive regard towards being Aboriginal can assist in buffering the effects of risk factors, such as racism, in childhood. Future research should address specificities of the relationship between ERI components and SEWB in this population. Future studies will also be able to inform if increases in ERI over time contributes to improve SEWB and if its protective effects against risk exposure extends to adolescence and adulthood.

Author Contributions

Conceptualization: Davi M. Macedo, Lisa M. Jamieson.

Formal analysis: Davi M. Macedo, Dandara G. Haag.

Methodology: Davi M. Macedo, Lisa G. Smithers, Dandara G. Haag.

Project administration: Lisa M. Jamieson.

Supervision: Lisa G. Smithers, Rachel M. Roberts.

Visualization: Lisa G. Smithers, Rachel M. Roberts, Yin Paradies, Lisa M. Jamieson.

Writing – original draft: Davi M. Macedo.

Writing – review & editing: Lisa G. Smithers, Rachel M. Roberts, Dandara G. Haag, Yin Paradies, Lisa M. Jamieson.

References

1. Berman G, Paradies Y. Racism, disadvantage and multiculturalism: towards effective anti-racist praxis. Ethn Racial Stud. 2010; 33(2): 214–232. https://doi.org/10.1080/01419870802302272
2. Paradies YC. Defining, conceptualizing and characterizing racism in health research. Crit Public Health. 2006; 16(2): 143–157. https://doi.org/10.1080/09581590600828881
3. Racism Paradies Y. and Health Indigenous. Oxford Research Encyclopedia of Global Public Health. 2018. Available from: http://oxfordre.com/publichealth/view/10.1093/acrefore/9780190632366.001.0001/acrefore-9780190632366-e-86
4. Elias A, Paradies Y. Estimating the mental health costs of racial discrimination. BMC Public Health. 2016; 16(1): 1205. https://doi.org/10.1186/s12889-016-3868-1 PMID: 27899096
5. Australia Institute of Health and Welfare. The health and welfare of Australia's Aboriginal and Torres Istrait Islander peoples 2015. Canberra: Australia Institute of Health and Welfare; 2015. 200 p. Report No. IHW 147.
6. Priest N, Thompson L, Mackean T, Baker A, Waters E. 'Yarning up with Koori kids'—hearing the voices of Australian urban Indigenous children about their health and well-being. Ethn Health. 2017; 22(6): 631–647. https://doi.org/10.1080/13557858.2016.1246418 PMID: 27764969
7. Temple JB, Kelaher M, Paradies Y. Prevalence and context of racism experienced by older Aboriginal and Torres Strait Islanders. Australas J Ageing. 2019; 38(1): 39–46. https://doi.org/10.1111/ajag.12604 PMID: 30632245
8. Umaña-Taylor AJ. A post-racial society in which ethnic-racial discrimination still exists and has significant consequences for youths' adjustment. Curr Dir Psychol Sci. 2016; 25(2): 111–118. https://doi.org/10.1177/0963721415627858
9. Priest N, Paradies Y, Trenerry B, Truong M, Karlsen S, Kelly Y. A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. Soc Sci Med. 2013; 95: 115–127. https://doi.org/10.1016/j.socscimed.2012.11.031 PMID: 23312306
10. Traub F, Boynton-jarrett R. Modifiable resilience factors to childhood adversity for clinical pediatric practice. Pediatrics. 2017; 139(5). https://doi.org/10.1542/peds.2016-2569 PMID: 28557726
11. Schwartz SJ, Syed M, Yip T, Knight GP, Umana-Taylor AJ, Rivas-Drake D, et al. Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. Child Dev. 2014; 85(1): 58–76. https://doi.org/10.1111/cdev.12201 PMID: 24490892
12. Umaña-Taylor AJ, Quintana SM, Lee RM, Cross WE, Rivas-Drake D, Schwartz SJ, et al; Ethnic-racial Identity in the 21st Century Study Group. Ethnic and racial identity during adolescence and into young adulthood: an integrated conceptualization. Child Dev. 2014; 85(1): 21–39. https://doi.org/10.1111/cdev.12196 PMID: 24490890
13. Cokley K. Critical issues in the measurement of ethnic and racial identity: A referendum on the state of the field. J Couns Psychol. 2007; 54(3):224–34. https://doi.org/10.1037/0022-0167.54.3.224
14. Helms JE. Some better practices for measuring racial and ethnic identity constructs. J Couns Psychol. 2007; 54(3):235–46. https://doi.org/10.1037/0022-0167.54.3.235
15. Phinney JS, Ong AD. Conceptualization and measurement of ethnic identity: current status and future directions. J Couns Psychol. 2007; 54(3), 271–281. https://doi.org/10.1037/0022-0167.54.3.271
16. Corenblum B. Development of racial-ethnic identity among First Nation children. J Youth Adolesc. 2014; 43(3): 356–374. https://doi.org/10.1007/s10964-013-0007-5 PMID: 23982921
17. Yip T. Ethnic/racial identity-a double-edged sword? Associations with discrimination and psychological outcomes. Curr Dir Psychol Sci. 2018; 27(3): 170–175. https://doi.org/10.1177/0963721417739348 PMID: 30581253
18. Phinney JS. Stages of ethnic identity development in minority group adolescents. Journal of Early Adolescence. 1989; 9(1–2):34–49. https://doi.org/10.1177/0272431689091004
19. Umaña-Taylor AJ, Yazedjian A, Bámaca-Gómez M. Developing the Ethnic Identity Scale using Eriksonian and Social Identity perspectives. Identity. 2004; 4(1):9–38. https://doi.org/10.1207/s1532706xid0401_2
20. Ashmore R, Deaux K, McLaughlin-Volpe T. An organizing framework for collective identity: articulation and significance of multidimensionality. Psychol Bull. 2004; 130(1): 80–114. https://doi.org/10.1037/0033-2909.130.1.80 PMID: 14717651
21. Corenblum B, Armstrong HD. Racial-ethnic identity development in children in a racial-ethnic minority group. Can J Behav Sci. 2012; 44(2): 124–137. https://doi.org/10.1037/a0027154

22. Tajfel H, Turner JC. The Social Identity Theory of intergroup behavior. In: Jost JT, Sidanius J, editors. Key readings in social psychology. Political Psychology: Key Readings. New York: Psychology Press; 1986. pp. 276–293.
23. Turner JC. Towards a cognitive redefinition of the social group. In Tajfel H, editors. Social identity and intergroup relations. Cambridge: Cambridge University Press; 1982. pp. 12–40.
24. Priest N, Mackean T, Davis E, Briggs L, Waters E. Aboriginal perspectives of child health and wellbeing in an urban setting: developing a conceptual framework. Health Sociol Rev. 2012; 21(2): 180–195. https://doi.org/10.5172/hesr.2012.21.2.180
25. Young C, Tong A, Nixon J, Fernando P, Kalucy D, Sherriff S, et al. Perspectives on childhood resilience among the Aboriginal community: an interview study. Aust N Z J Public Health. 2017; 41(4): 405–410. https://doi.org/10.1111/1753-6405.12681 PMID: 28712160
26. Kickett-Tucker C. Moorn (Black)? Djardak (White)? How come I don't fit in Mum? Exploring the racial identity of Australian Aboriginal children and youth. Health Sociol Rev. 2009; 18: 119–136. https://doi.org/10.5172/hesr.18.1.119
27. Kickett-Tucker CS, Christensen D, Lawrence D, Zubrick SR, Johnson DJ, Stanley F. Development and validation of the Australian Aboriginal racial identity and self-esteem survey for 8–12 year old children (IRISE_C). Int J Equity Health. 2015; 14(103). https://doi.org/10.1186/s12939-015-0234-3 PMID: 26499852
28. Usborne E, Taylor DM. The role of cultural identity clarity for self-concept clarity, self-esteem, and subjective well-being. Pers Soc Psychol Rev. 2010; 36(7): 883–897. https://doi.org/10.1177/0146167210372215 PMID: 20519575
29. Snowshoe A, Crooks CV, Tremblay PF, Hinson RE. Cultural connectedness and its relation to mental wellness for First Nations youth. J Prim Prev. 2017; 38(1–2): 67–86. https://doi.org/10.1007/s10935-016-0454-3 PMID: 27807659
30. Jones MD, Galliher RV. Ethnic identity and psychosocial functioning in Navajo adolescents. J Res Adolesc. 2007; 17(4), 683–696. https://doi.org/10.1111/j.1532-7795.2007.00541.x.
31. Smokowski PR, Evans CB, Cotter KL, Webber KC. Ethnic identity and mental health in American Indian youth: examining mediation pathways through self-esteem, and future optimism. J Youth Adolesc. 2014; 43(3): 343–355. https://doi.org/10.1007/s10964-013-9992-7 PMID: 23929530
32. Corenblum B. Relationships between racial-ethnic identity, self-esteem and in-group attitudes among First Nation children. J Youth Adolesc. 2014; 43(3): 387–404. https://doi.org/10.1007/s10964-013-0081-8 PMID: 24343260
33. Jaramillo J, Mello ZR, Worrell FC. Ethnic Identity, stereotype threat, and perceived discrimination among Native American adolescents. J Res Adolesc. 2016; 26(4): 769–775. https://doi.org/10.1111/jora.12228 PMID: 28453208
34. Chae DH, Powell WA, Nuru-Jeter AM, Smith-Bynum MA, Seaton EK, Forman TA. The role of racial identity and implicit racial bias in self-reported racial discrimination: implications for depression among African American men. J Black Psychol. 2017; 43(8): 789–812. https://doi.org/10.1177/0095798417690055 PMID: 29386696
35. Marcelo AK, Yates TM. Young children's ethnic-racial identity moderates the impact of early discrimination experiences on child behavior problems. Cultur Divers Ethnic Minor Psychol. 2019; 25(2): 253–265. https://doi.org/10.1037/cdp0000220 PMID: 30058832
36. Seaton EK. Perceived racial discrimination and racial identity profiles among African American adolescents. Cultur Divers Ethnic Minor Psychol. 2009; 15(2): 137–144. https://doi.org/10.1037/a0015506 PMID: 19364200
37. Lucas T, Wegner R, Pierce J, Lumley MA, Laurent HK, Granger DA. Perceived discrimination, racial identity, and multisystem stress response to social evaluative threat among African American men and women. Psychosom Med. 2017; 79(3): 293–305. https://doi.org/10.1097/PSY.0000000000000406 PMID: 27806018
38. Knol MJ, VanderWeele TJ. Recommendations for presenting analyses of effect modification and interaction. Int J Epidemiol. 2012; 41(2): 514–520. https://doi.org/10.1093/ije/dyr218 PMID: 22253321
39. VanderWeele TJ. Invited commentary: structural equation models and epidemiologic analysis. Am J Epidemiol. 2012; 176(7): 608–612. https://doi.org/10.1093/aje/kws213 PMID: 22956513
40. Department of Social Services. Footprints in time: The Longitudinal Study of Indigenous Children—Data User Guide, Release 8.1. Canberra (AU): Department of Social Services; 2017. 67p.
41. Department of Human Services [Internet]. Centrelink. [cited 2019 Mar 1st]. Available from: https://www.humanservices.gov.au/individuals/centrelink
42. Department of Human Services. [Internet]. Medicare services. [cited 2019 Mar 1st]. Available from: https://www.humanservices.gov.au/individuals/subjects/medicare-services#a1

43. Goodman R. The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry. 1997; 38(5): 581–586. https://doi.org/10.1111/j.1469-7610.1997.tb01545.x PMID: 9255702

44. Meltzer H, Gatward R, Goodman R, Ford T. The mental health of children and adolescents in Great Britain. London (UK): Office for National Statistics; 2000. 241p.

45. Greenland S, Morgenstern H. Confouding in health research. Annu Rev Public Health. 2001; 22: 189–212. https://doi.org/10.1146/annurev.publhealth.22.1.189 PMID: 11274518

46. Assari S, Gibbons FX, Simons RL. Perceived discrimination among Black Youth: an 18-year longitudinal study. Behav Sci (Basel). 2018; 8(5): 44. https://doi.org/10.3390/bs8050044 PMID: 29702587

47. Shepherd CC, Li J, Mitrou F, Zubrick SR. Socioeconomic disparities in the mental health of Indigenous children in Western Australia. BMC Public Health. 2012; 12: 756. https://doi.org/10.1186/1471-2458-12-756 PMID: 22958495

48. Biddle N. Ranking regions: Revisiting an Index of Relative Indigenous Socioeconomic Outcomes. Canberra (AU): The Australian National University Centre for Aboriginal Economic Policy Research; 2009. 38 p. Report No.: 50/2009.

49. Zubrick SR, Lawrence DM, Silburn SR, Blair E, Milroy H, Wilkes T, et al. The Western Australian Aboriginal Child Health Study: the health of Aboriginal children and young people. Perth (AU): Telethon Institute for Child Health Research; 2004. 22 p. Report No.:01.

50. Bhaskaran K, Smeeth L. What is the difference between missing completely at random and missing at random? Int J Epidemiol. 2014; 43(4): 1336–1339. https://doi.org/10.1093/ije/dyu080 PMID: 24706730

51. Ranganathan P, Aggarwal R, Pramesh CS. Common pitfalls in statistical analysis: odds versus risk. Perspect Clin Res. 2015; 6(4): 222–224. https://doi.org/10.4103/2229-3485.167092 PMID: 26623395

52. von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Med. 2007; 4(10): e296. https://doi.org/10.1371/journal.pmed.0040296 PMID: 17941714

53. VanderWeele TJ. On the distinction between interaction and effect modification. Epidemiology. 2009; 20(6): 863–871. https://doi.org/10.1097/EDE.0b013e3181ba333c PMID: 19806059

54. Ben J, Kelly D, Paradies Y. Contemporary anti-racism: a review of effective practice. In: Solomos J, editors. The Routledge International Handbook of Contemporary Racisms. London (UK): Ruthledge, Taylor & Francis group. 2019.

55. Wasserstein RL, Lazar NA. The ASA's Statement on p-Values: context, process, and purpose. Am Stat. 2016; 70(2): 129–133. https://doi.org/10.1080/00031305.2016.1154108

56. Wilkinson L. Statistical methods in psychology journals: guidelines and explanations. Am Psychol. 1999; 54(8): 594–604. https://doi.org/10.1037/0003-066X.54.8.594

57. Cummings P, Koepsell TD. P values vs estimates of association with confidence intervals. Arch Pediatr Adolesc Med. 2010; 164(2): 193–196. https://doi.org/10.1001/archpediatrics.2009.266 PMID: 20124150

58. Greenland S, Senn SJ, Rothman KJ, Carlin JB, Poole C, Goodman SN, Altman DG. Statistical tests, P values, confidence intervals, and power: a guide to misinterpretations. Eur J Epidemiol. 2016; 31(4): 337–350. https://doi.org/10.1007/s10654-016-0149-3 PMID: 27209009

59. Rothman KJ. Disengaging from statistical significance. Eur J Epidemiol. 2016; 31(5): 443–444. https://doi.org/10.1007/s10654-016-0158-2 PMID: 27272951

60. Morey RD, Hoekstra R, Rouder JN, Lee MD, Wagenmakers EJ. The fallacy of placing confidence in confidence intervals. Psychon Bull Rev. 2016; 23(1): 103–123. https://doi.org/10.3758/s13423-015-0947-8 PMID: 26450628

61. Paradies Y, Chandrakumar L, Klocker M, Frere M, Webster K, Burrel M,et al. Building on our strengths —A framework to reduce race-based discrimination and support diversity in Victoria. Melbourne (AU): Victorian Health Promotion Foundation; 2009. Full report.

62. Williamson A, Redman S, Dadds M, Daniels J, D'Este C, Raphael B, et al. Acceptability of an emotional and behavioural screening tool for children in Aboriginal Community Controlled Health Services in urban NSW. Aust N Z J Psychiatry. 2010; 44(10): 894–900. https://doi.org/10.3109/00048674.2010.489505 PMID: 20932203

63. Zubrick SR, Lawrence D, Maio JD, Biddle N. Testing the reliability of a measure of Aboriginal children's mental health—An analysis based on the Western Australian Aboriginal Child Health Survey. Canberra (AU): Australian Bureau of Statistics; 2006. Report No.: 1351.0.55.011.

64. Williamson A, McElduff P, Dadds M, D' Este C, Redman S, Raphael B, et al. The construct validity of the Strengths and Difficulties Questionnaire for Aboriginal Children living in urban New South Wales, Australia. Aust Psychol. 2014; 49(3): 163–170. https://doi.org/10.1111/ap.12045

65. Bourdon K, Goodman R, Rae DS, Simpson G, Koretz DS. The Strenghts and Difficulties Questionnaire: U.S. normative data and psychometric properties. J Am Acad Child Adolesc Psychiatry. 2005; 44(6): 557–564. https://doi.org/10.1097/01.chi.0000159157.57075.c8 PMID: 15908838

66. Kenney MK, Singh GK. Adverse Childhood Experiences among American Indian/Alaska Native children: The 2011–2012 National Survey of Children's Health. Scientifica (Cairo). 2016; 7424239. https://doi.org/10.1155/2016/7424239 PMID: 27529052

67. Salmon M, Skelton F, Thurber KA, Bennetts Kneebone L, Gosling J, Lovett R, et al. Intergenerational and early life influences on the well-being of Australian Aboriginal and Torres Strait Islander children: overview and selected findings from Footprints in Time, the Longitudinal Study of Indigenous Children. J Dev Orig Health Dis. 2018; 1–7. https://doi.org/10.1017/S204017441800017X PMID: 29717680

68. Nohr EA, Olsen J. Commentary: epidemiologists have debated representativeness for more than 40 years—has the time come to move on? Int J Epidemiol. 2013; 42(4): 1016–1017. https://doi.org/10.1093/ije/dyt102 PMID: 24062289

69. Farland LV, Correia KF, Wise LA, Williams PL, Ginsburg ES, Missmer SA. P-values and reproductive health: what can clinical researchers learn from the American Statistical Association? Hum Reprod. 2016; 31(11): 2406–2410. https://doi.org/10.1093/humrep/dew192 PMID: 27664212

70. Williams DR, Neighbors HW, Jackson JS. Racial/ethnic discrimination and health: findings from community studies. Am J Public Health. 2003; 93(2): 200–208. https://doi.org/10.2105/ajph.93.2.200 PMID: 12554570

71. Priest N, Paradies Y, Gunthorpe W, Cairney S, Sayers S. Racism as a determinant of social and emotional wellbeing for Aboriginal Australian youth. Med J Australia. 2011; 194(10):546–50. https://doi.org/10.5694/j.1326-5377.2011.tb03099 PMID: 21644910

72. Priest N, Paradies Y, Stewart P, Luke J. Racism and health among urban Aboriginal young people. BMC Public Health. 2011; 11(1):568. https://doi.org/10.1186/1471-2458-11-568 PMID: 21756369

73. Thurber KA, Banks E, Banwell C, Team L. Cohort profile: Footprints in Time, the Australian Longitudinal Study of Indigenous Children. Int J Epidemiol. 2015; 44(3): 789–800. https://doi.org/10.1093/ije/dyu122 PMID: 25011454

74. Brondolo E, Brady Ver Halen N, Pencille M, Beatty D, Contrada RJ. Coping with racism: a selective review of the literature and a theoretical and methodological critique. J Behav Med. 2009; 32(1): 64–88. https://doi.org/10.1007/s10865-008-9193-0 PMID: 19127420

7. Chapter 7: Final Considerations

The study findings herein demonstrate the pervasive effect of racism on Aboriginal children and their families. They highlight the importance of addressing racism as a key determinant of health and wellbeing. More specifically, the results of the first study demonstrate that experiences of racism reported by Aboriginal pregnant women are frequent and pervasive, manifesting in different settings in which the mothers in our sample lived. Racism was shown to be associated with increased levels of stress and decreased sense of personal control [1]. These findings suggest that racism impacts Aboriginal pregnant mother's mental health and wellbeing. Experience of psychosocial stressors during pregnancy have been shown to be associated with problems in child development and wellbeing in ethnic-racial minority groups [2, 3]. This suggests that mother's experiences of racism potentially affects Aboriginal children from the prenatal period. These results indicate a need for future studies that investigate the effects of racism during pregnancy on Aboriginal children's health and development [1].

The findings of the second study demonstrate the impact that racism can exert on different domains of Aboriginal children's social and emotional wellbeing (SEWB) [4]. Analyses suggest that racism can contribute to increased emotional difficulties, conduct problems, hyperactivity, and peer problems one to two years after exposure. Younger children (6-8 years) tended to demonstrate a less defined pattern of symptoms, presenting a range of emotional and behavioural difficulties as a consequence of racism. Older children (8-12 years) presented difficulties across all domains analysed, but a tendency towards hyperactivity problems was identified. The findings provided a closer examination of the effects of racism in Aboriginal Children SEWB, expanding from previous research previsouly conducted in the Aboriginal context [5]. These

findings have potential implications for caregivers and educators that, being aware of the effects of racism in Aboriginal children's SWEB, can avoid judgmental perspectives and invest in strategies to promote inclusion and acceptance of cultural diversity [4].

In the next stage, the research goals were to identify protective factors for the effect of racism on SEWB. The concept of Ethnic-Racial Identity (ERI) has been shown to be an important resilience factor in ethnic-racial minorities' youth [6, 7]. However it was not known whether ERI operated in the same manner among Aboriginal Australian children as this has never been studied in this context. The first step was to assess whether the measure used to collect information on Aboriginal children's ERI was psychometrically sound. Analyses were based on data from the Longitudinal Study of Indigenous children and found evidence that the ERI items included in the study fit a unidimensional model. This indicates that the measure assesses a single domain of ERI. The items were proposed as a measure of ERI attitudes – or ERI affirmation [8]. Evidence of validity and reliability was found, and also criterion-validity. The findings also indicated that the measure worked similarly for boys and girls. These results reinforced that the measure was appropriate to collect information on Aboriginal children's ERI. This further increased confidence the data was reliable to answer the next research question. It also suggests the items can be continually used in future studies focused on ERI development among Aboriginal Australian children [8].

Finally, I tested if ERI affirmation could modify the association between racism and different domains of SEWB. Findings demonstrated the protective effect of ERI in most of the SEWB domains analysed. Associations were modified in the expected directions for emotional problems, conduct problems, hyperactivity, and total emotional and behavioural difficulties [9]. The increased peer problems among children with high ERI

affirmation exposed to racism was discussed as a possible result of children standing up against racism or a possible limitation of the use of the Strengths and Difficulties Questionnaire's Peer Problems domain in this population. Overall, our results indicate promoting positive attitudes towards ERI can assist Aboriginal children navigate racism episodes whilst the necessary strategies to reduce racism at a society levels are designed and implemented [9]. These results corroborate the claims of Aboriginal community about the importance of the preservation of the Aboriginal culture and the transmission of its values to the future generations as for positive development and resilience promotion [10, 11].

A potential implication of the findings herein is that a call for action is still necessary to counteract the effects of racism on the Aboriginal population's health and SEWB. My studies contributed with evidence that racism impacts Aboriginal children from an early age, potentially from very early on – considering its effects on Aboriginal mother's mental health and the associations between racism during pregnancy and poor child developmental outcomes, as observed in other populations [2, 3]. As children are impacted from a very early age, the effects of racism might contribute to the intergenerational poor health and wellbeing experienced by Aboriginal people. Overall, these results suggests that taking action to extinguish racism against Aboriginal Australian must still be a central component of the Australian political agenda. Again, promotion of positive ERI affirmation might assist children, for example, to navigate racism, but macrossocial policies aiming to promote a more equal society for Aboriginal and non-Aboriginal Australians must be the long-term commitment of a society that is proposed to be truly plural.

7.1. Strengths

One of the main strengths of this body of work is its methodological rigour. The findings herein were based on two main sources of data: The South Australian Aboriginal Cohort Study (SAABCS) and the Longitudinal Study of Indigenous Children (LSIC). These two rich sources of data provided information on maternal experiences of racism, mother's mental health, and children's exposure to racism and SEWB. Both data sets contained information on a series of determinants that could confound the effect estimates generated to represent the associations of interest. The collection of information on confounding variables allowed for controlling the influence of systematic error in estimating measures of effect [12].

The use of the LSIC dataset is another main strength of this thesis. This is perhaps the largest survey currently conducted on determinants of Aboriginal children's health and development. It collects information on over a thousand Aboriginal children and their families living across the Australian territory, in areas in which this population live [13]. The study design and data collection procedures are selected in close consultancy with Aboriginal communities' stakeholders and researchers with expertise on Aboriginal health research. In addition, this is a study conducted annually, allowing for the test of associations in a longitudinal perspective [13]. Solutions to approach possible sources of systematic error were adopted in all studies conducted. For example, the possible bias generated by missing information was addressed by the use of multiple imputation with chained equations [14]. Besides, the findings were conservative as risk ratios were chosen as the effect-measures of interest. Risk ratios were considered more appropriate as they consider the proportion of the outcome among the entire population at risk and do not tend to be inflated when the outcome is not rare, as is the case for odds ratios [15]. Therefore, by prioritising a conservative

approach and addressing potential sources of bias, I believe that the effects observed are accurate representations of the effects of racism on this population SEWB.

I focused on selecting statistical analysis techniques that could maximize the potential of the data available. In study 2, for example, meta-analytical techniques were used to analyse age-differences at time of exposure and to address differences in relation to time of assessment of exposure and outcomes. In that manner, the meta-analysis permitted the examination of consistency of effects in the two different age-cohorts of LSIC and also generate a pooled-effect as a general measure of the effect under investigation [4]. In addition, the interpretation of results were based on recommendations from associations of reference in the field of Statistics and the Social Sciences (American Statistical Association; American Psychological Association) [16]. I deliberately avoided interpreting P-values and Confidence Intervals (CI) thresholds to decide the implication of the findings. I focused on interpreting the size of the effects found and considered CI as a measure of how precise the estimates were. A detailed discussion on the need to move beyond the dichotomous interpretation of statistical significance can be found in the studies herein included, more specifically in Chapters 2 and 4 [4, 9].

The main contribution of this body of work resides in expanding from the exploration of racism effects on SEWB to the investigation of protective factors. The first two studies focused on the effects of racism on mental health and wellbeing for Aboriginal mothers (Chapter 3) and Aboriginal children (Chapter 4). Beyond the specific contributions of each of these studies, I focused on investigating if ERI affirmation coud be protective against the effects of racism. The validation of the LSIC items used to verify this hypothesis were an essential step in guaranteeing the results would be methodologically sound. In addition, it would contribute to confidently

include these items in future studies aiming to assess ERI affirmation in Aboriginal children of the same age. From there, future research can explore nuances in ERI development and if previous findings can be replicated. This per se is considered a contribution to the field.

In addition, the findings presented in Chapter 4 are the first evidence on the protective role of ERI to the effects of racism on Aboriginal children SEWB. This is the first study to provide evidence of ERI affirmation as a resilience factor against racism in the Aboriginal Australian context. It expands findings observed among other ethnic-racial minorities. Although the importance of ERI for the self-esteem and wellbeing of Indigenous youth from other contexts (e.g., Canada, New Zealand) has been demonstrated [17, 18], these findings are the first to show the protective effect of ERI in youth from an Indigenous group. It is also one of the very few studies [19] analysing ERI's protective role against the effect of racism in children. The results therefore call for the continuous investigation of ERI development among Indigenous and other ethnic-racial minority children. A methodologically rigourous exploration of the concept in different studies can contribute to further verify if ERI is really protective and if the effects hold across different stages of development.

7.2. Limitations

A limitation of the first study (see Chapter 1) included in this thesis is that analysis were based on cross-sectional data. No information on mother's mental health was collected in the following waves of the SAABCS. In this manner, the effects of racism on mother's stress and sense of personal control was estimated but the data did not allow verification of whether this association holds longitudinally. Nevertheless, the findings are a contribution to the literature, as this is the first

study to characterize experiences of racism among Aboriginal Australian pregnant women and to document its effects on important determinants of mental health [1]. Future studies are necessary to verify the longitudinal effect of racism on Aboriginal caregiver's health and wellbeing. Its effects on parenting, and the relationship between racism, parenting, parent's mental health, and child development is also a fertile ground for future research. The results obtained from the SAABCS data is an initial step in addressing this important research questions.

The next studies were based on LSIC data. The main exposure of interest, racism, was collected in LSIC from child caregivers. I understand that caregiver-informed information on child experience of racism might underestimate levels of exposure. The inclusion of child self-report measures of racism could contribute to generate more accurate exposure levels and assist in understanding the effects of racism from the child perspective [20]. Nonetheless, it is necessary to consider the ethical and cultural issues inherent to investigating racism from the child perspective among Indigenous populations. LSIC is designed with close consultancy with representatives of Aboriginal Australian communities and research experts in the area. It is possible that racism might have been considered a sensitive topic to be addressed among children. Considering the historical oppression and dispossession faced by Aboriginal Australians, it is understandable that community representatives might have been reticent and believed caregiver-informed measures would be more appropriate.

Another limitation observed in this data set was the lack of consistency in the collection of specific variables during the different waves. In this manner, different windows of exposure and symptom onset for the two LSIC cohorts were observed. Although I had no control over the data collection, I aimed to apply analytical

strategies (e.g., meta-analysis) to overcome such limitations. Another limitation of the data was that the ERI items were only applied to one of the LSIC cohorts, limiting the sample size used in our analysis. For example, when stratifying the children with information on ERI per levels of exposure to racism, reduction of the sample size was further observed. Larger samples with information on ERI and racism could potentially yield more precise estimates [9].

Nonetheless, its is necessary to acknowledge the complexity in LSIC design and data collection procedures. As a longitudinal survey contemplating different domains of Aboriginal children development (e.g., oral health, physical health, SEWB) [13], it is natural that differences in the data collection between waves will be observed as to contemplate an holistic perspective of health and wellbeing. Besides these limitations, commonly observed when working with large datasets, it is still necessary to emphasize that LSIC is a pioneer study in collecting information on the most relevant constructs used in this thesis – racism and ERI. Access to LSIC was fundamental to explore research questions that could assist this field of research to move forward.

7.3. References

1. Macedo DM, Smithers LG, Roberts RM, Jamieson LM. Racism, stress, and sense of personal control among Aboriginal Australian pregnant women. Aust Psychol. 2019. doi: 10.1111/ap.12435.
2. Dominguez TP, Dunkel-Schetter C, Glynn LM, Hobel C, Sandman CA. Racial differences in birth outcomes: the role of general, pregnancy, and racism stress. Health Psychol. 2008;27(2):194-203. doi: 10.1037/0278-6133.27.2.194.
3. Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. Curr Opin Psychiatry. 2012;25(2):141-8. doi: 10.1097/YCO.0b013e3283503680.
4. Macedo DM, Smithers LG, Roberts RM, Paradies Y, Jamieson LM. Effects of racism on the socio-emotional wellbeing of Aboriginal Australian children. Int J Equity Health. 2019;18(1):132. doi: 10.1186/s12939-019-1036-9.
5. Shepherd C, Li J, Cooper MN, Hopkins KD, Farrant BM. The impact of racial discrimination on the health of Australian Indigenous children aged 5-10 years: analysis of national longitudinal data. Int J Equity Health. 2017;16(1):116. doi: 10.1186/s12939-017-0612-0.
6. Smokowski PR, Evans CB, Cotter KL, Webber KC. Ethnic identity and mental health in American Indian youth: examining mediation pathways through self-esteem, and future optimism. J Youth Adolesc. 2014;43(3):343-55. doi: 10.1007/s10964-013-9992-7.
7. Snowshoe A, Crooks C, F. Tremblay P, E. Hinson R. Cultural connectedness and its relation to mental wellness for First Nations youth. J Prim Prev. 2017;38:67-86. doi: 10.1007/s10935-016-0454-3.

8. Macedo DM, Santiago PR, Roberts RM, Smithers LG, Paradies Y, Jamieson LM. Ethnic-racial identity affirmation: Validation in Aboriginal Australian children. PLoS One. 2019;14(11):e0224736. doi: 10.1371/journal.pone.0224736.
9. Macedo DM, Smithers LG, Roberts RM, Haag DG, Paradies Y, Jamieson LM. Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? PLoS One. 2019;14(8):e0220744. doi: 10.1371/journal.pone.0220744.
10. Zubrick SR, Shepherd C, Dudgeon P, Gee G, Paradies Y, Scrine C, et al. Social determinants of social and emotional wellbeing for Aboriginal Australians. In: Dudgeon P, Milroy H, Walker R, editors. Working together: Aboriginal and Torres Strait Islander mental health and wellbeing principles and practice. Canberra: Australian Government, Department of The Prime Minister and Cabinet; 2014. pp. 93-112.
11. Priest N, Mackean T, Davis E, Briggs L, Waters E. Aboriginal perspectives of child health and wellbeing in an urban setting: developing a conceptual framework. Health Soc Rev. 2014;21(2):180-95. doi: 10.5172/hesr.2012.21.2.180.
12. Greenland S, Morgenstern H. Confounding in Health Research. Annu Rev Public Health. 2001;22(1):189-212. doi: 10.1146/annurev.publhealth.22.1.189.
13. Footprints in Time: The Longitudinal Study of Indigenous Children - Data user guide, Release 9.0. Department of Social Services, 2018.
14. Sterne JAC, White IR, Carlin JB, Spratt M, Royston P, Kenward MG, et al. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. BMJ. 2009;338:b2393. doi: 10.1136/bmj.b2393.

15. Ranganathan P, Aggarwal R, Pramesh C. Common pitfalls in statistical analysis: Odds versus risk. Perspect Clin Res. 2015;6(4):222-4. doi: 10.4103/2229-3485.167092.
16. Greenland S, Senn SJ, Rothman KJ, Carlin JB, Poole C, Goodman SN, et al. Statistical tests, P values, confidence intervals, and power: a guide to misinterpretations. Eur J Epidemiol. 2016;31(4):337-50. doi: 10.1007/s10654-016-0149-3.
17. Williams AD, Clark TC, Lewycka S. The associations between cultural identity and mental health outcomes for Indigenous Maori youth in New Zealand. Front Public Health. 2018;6:319. doi: 10.3389/fpubh.2018.00319.
18. Corenblum B. Relationships between racial-ethnic identity, self-esteem and in-group attitudes among First Nation children. J Youth Adolesc. 2014;43(3):387-404. doi: 10.1007/s10964-013-0081-8.
19. Marcelo AK, Yates TM. Young children's ethnic-racial identity moderates the impact of early discrimination experiences on child behavior problems. Cultur Divers Ethnic Minor Psychol. 2019;25(2):253-65. doi: 10.1037/cdp0000220.
20. Duran LG, Schernuk Schroh JC, Panizoni EP, Jouglard EF, Serralunga MG, Esandi ME. Bullying at school: Agreement between caregivers' and children's perception. Arch Argent Pediatr. 2017;115(1):35-42. doi: 10.5546/aap.2017.eng.35.

8. Appendix I: Ethics Approval for the South Australian Birth Cohort Study

Government of South Australia
SA Health

ETHICS OF HUMAN RESEARCH COMMITTEE

The Queen Elizabeth Hospital
28 Woodville Road
WOODVILLE SOUTH SA 5011

Lyell McEwin Hospital
Haydown Road
ELIZABETH VALE SA 5112

Ph: +61 08 8222 6841
Fax: +61 08 8222 6007
Email: qeh.ethics@health.sa.gov.au

05 March 2011

Dr L M Jamieson
Australian Research Centre for Population Oral Health
The University of Adelaide
122 Frome Street
Adelaide SA 5005

Dear Dr Jamieson

Application Number **2010160**

The Ethics of Human Research Committee has considered additional information to your protocol entitled:

"Reducing disease burden and health inequalities arising from chronic dental disease among indigenous children; an early childhood caries intervention."

The following documents have been reviewed and approved:

- HREC Application, version unknown,
- Patient Information Sheet and Consent, dated 04 February 2011
- Aboriginal Health Research Ethics Committee Approval Letter, dated 08 October 2010
- The University of Adelaide HREC Approval Letter, dated 03 June 2010
- Letter of support from Meredith Hobbs, dated 22 November 2010

Approval Status: **FINAL**

Period of Approval: **08 February 2011 – 08 February 2012**

***Please note the terms under which Ethical approval is granted:**

1. Researchers are required to immediately report to the Ethics of Human Research Committee anything which might warrant review of ethical approval of the protocol, including:

a) serious or unexpected adverse effects on participants;
b) proposed changes in the protocol; and
c) unforseen events that might affect continued ethical acceptability of the project

2. Protocols are approved for up to twelve months only and a report is required at the end of the study or 12 month period. Extensions will not be granted without a report to the Committee.
3. Confidentiality of the research subjects shall be maintained at all times as required by law
4. All research subjects shall be provided with a Patient Information Sheet and Consent Form, unless otherwise approved by the Committee
5. The Patient Information Sheet and Consent Form shall be printed on the relevant site letterhead stating the contact details for the researchers
6. The Patient Information Sheet must state that the Executive Officer can be contacted for information regarding conduct of the study, policies and procedures, or if the participant wishes to make a confidential complaint
7. A report and a copy of any published material should be forwarded to the Committee at the completion of the project.

Yours sincerely

A/Professor Timothy Mathew
Chairman
Ethics of Human Research Committee (TQEH & LMH)

9. Appendix II: South Australian Birth Cohort Study (originally Baby Teeth Talk Study) – Baseline participants questionnaire

Baby Teeth Talk Study

1. Participant ID Number_____
2. Date of birth (dd/mm/yy)_____
3. AMIC worker/Source_____
4. Interviewer name_____
5. Date of interview (dd/mm/yy)_____
6. Weeks Pregnant_____
7. Due date_____
8. Hospital_____

Why do we ask so many questions?

These questions are important so that we can find out how participants live their lives before taking part in our project aimed at reducing tooth decay, and then we would like to see if things change after our project to reduce tooth decay.

Everything you say is confidential, so no-one else will know what you have said. We take your name off the answers we collect so that we can see what has been said, but not who said it. We need to know who you are to match up your answers this time with the answers you will give us in the questionnaire at the end of this project to try to reduce tooth decay.

If you have any questions or would like me to tell you something in a different way please ask. We would like you to feel relaxed and we would like to be sure that you understand all of what we talk about today.

You may feel that some questions are very personal and that they do not relate to teeth. We ask about other things in your life because if you have bad teeth or toothache you might not enjoy other parts of your life, and sometimes it is hard to look after your teeth when other things need to be done.

We value your story and your time, so we will give you a $50 voucher when you complete each questionnaire. There will be three questionnaires. The questions are asked now, when your child is two years old, and again when your child is three years old.

9. Colour group Green [ ]$_1$
Red [ ]$_2$

A. These questions are about you and how you live

A1. Are you expecting your first child?	Yes (Go to A3) ☐1	No (Go to A2) ☐2		
A2. How many other children have you had?				*Write the number in this box.*
A3. How many children do you care for?				*Write the number in this box.*
A4. Are you?	Aboriginal ☐1	Torres Strait Islander ☐2	Both ☐3	Other ☐4
A5. Where do you live (suburb, town, city)?	_____			
A6. Level of education	No schooling ☐1	Primary school ☐2	High school ☐3	Trade or TAFE ☐4	University ☐5
A7. Income	Job ☐1	Centrelink payment ☐2	Other_____ ☐3	
A8. Health Care Card	Yes ☐1	No ☐2	Don't know ☐3	
A9. How many **people** stayed in the house last night?				*Write the number in this box*
A10. Do you own a car?	Yes ☐1	No ☐2		

B. The following questions ask about your general health. Many parts of general health impact on oral health

B1. Have you ever been told by a doctor that you have any of the following?	Rheumatic fever ☐1	Kidney disease ☐2	Heart condition ☐3	Diabetes ☐4	Other____ ☐5
B2. Smoking status	Currently smoke ☐1	Used to smoke ☐2	Never smoked ☐3		
B3. Alcohol drinking status	Currently drink alcohol ☐1	Used to drink alcohol ☐2	Have never drunk alcohol ☐3		

C. Dental health

C1. Do you have any of your own teeth left?	Yes (go to C3) ☐1	No (go to C2) ☐2
C2. Do you have false teeth?	Yes ☐1	No ☐2
C3. Have you ever had any teeth pulled out?	Yes ☐1	No (go to D1) ☐2
C4. How many teeth have you had pulled out?		*Write the number in this box*

D. Dental behaviours

D1. Have you seen a dentist before?	Yes ☐1	No (go to D5) ☐2		
D2. When did you last see a dentist?	Less than one year ago ☐1	More than one year ago ☐2		
D3. Where did you last see a dentist?	Aboriginal health service/Public dentist/School dental service ☐1	Private dentist ☐2		
D4. What is your usual reason for seeing a dentist?	Problem ☐1	Check up ☐2		
D5. Do you think you need to see a dentist?	Yes ☐1	No ☐2		
D6. Would you feel scared about going to a dentist?	No ☐1	Little bit ☐2	Fair bit ☐3	Heaps ☐4
D7. Do you have a toothbrush?	Yes ☐1	No (go to E1) ☐2		
D8. Did you brush your teeth yesterday?	Yes ☐1	No ☐2		
D9. Do you use toothpaste?	Yes ☐1	No ☐2		

E. Dental cost

E1. During the last year, have you not gone to a dentist because of cost?	Yes ☐1	No ☐2			
E2. How hard would it be for you to pay a $100 dental bill?	Not hard at all ☐1	Not very hard ☐2	A little bit hard ☐3	Very hard ☐4	Could not pay ☐5

F. Self-rated health

F1. How do you think your general health is?	Excellent ☐1	Very good ☐2	Good ☐3	Fair ☐4	Poor ☐5
F2. How do you think your dental health is?	Excellent ☐1	Very good ☐2	Good ☐3	Fair ☐4	Poor ☐5
F3. Compared with your general health, how do you think your dental health is?	Excellent ☐1	Very good ☐2	Good ☐3	Fair ☐4	Poor ☐5

G. Dental perceptions

G1. Do you think you need to have any fillings?	Yes ☐1	No ☐2
G2. Do you think you need to have any teeth pulled out?	Yes ☐1	No ☐2
G3. Do you think you have gum disease/bleeding gums?	Yes ☐1	No ☐2

How often during the last year...

G4. ...did you have toothache?	Very often ☐1	Fairly often ☐2	Sometimes ☐3	Hardly ever ☐4	Never ☐5
G5. ...did you feel uncomfortable about the way your teeth looked?	Very often ☐1	Fairly often ☐2	Sometimes ☐3	Hardly ever ☐4	Never ☐5
G6. ...could you not eat some foods or had to eat slowly because of problems with your teeth?	Very often ☐1	Fairly often ☐2	Sometimes ☐3	Hardly ever ☐4	Never ☐5

H. The items below refer to demands placed on you over the past year (*These questions show us how dental health can be affected by other things going on in our lives*)

How often during the LAST YEAR have you…

H1. … felt upset because of something that happened?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H2. … felt like you couldn't control the important things in your life?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H3. … felt nervous or stressed?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H4. … dealt well with life hassles?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5

H5. … coped well with important changes in your life?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H6. … felt able to handle your personal problems?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H7. … felt things were going your way?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H8. … felt unable to cope with all the things that you had to do?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H9. … felt able to control irritations in your life?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H10. … felt you were on top of things?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H11. … felt angered because of things that happened outside of your control?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H12. … found yourself thinking about all the things that you have to do?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H13. … felt able to control how you spend your time?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5
H14. … felt troubles were piling up so high that you could not deal with them?	Not at all ☐1	Rarely ☐2	Sometimes ☐3	Fairly often ☐4	Very often ☐5

I. The statements below ask about support from other people

I1. There are people in my life who pay attention to my feelings and problems	Strongly disagree ☐1	Disagree ☐2	Neutral ☐3	Agree ☐4	Strongly agree ☐5
I2. There are people in my life who appreciate what I do	Strongly disagree ☐1	Disagree ☐2	Neutral ☐3	Agree ☐4	Strongly agree ☐5
I3. There are people in my life who I can get help from if I need it	Strongly disagree ☐1	Disagree ☐2	Neutral ☐3	Agree ☐4	Strongly agree ☐5
I4. There are people in my life who I can talk to about how to handle things	Strongly disagree ☐1	Disagree ☐2	Neutral ☐3	Agree ☐4	Strongly agree ☐5
I5. How would you rate the support you get from people around you?	Excellent ☐1	Very Good ☐2	Good ☐3	Fair ☐4	Poor ☐5

J. The following statements ask about your sense of control over day-to-day matters

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
J1. I can do just about anything I really set my mind to	☐1	☐2	☐3	☐4	☐5
J2. Other people decide most of what I can and cannot do	☐1	☐2	☐3	☐4	☐5
J3. When I really want to do something I usually find a way to do it	☐1	☐2	☐3	☐4	☐5
J4. Whether or not I am able to get what I want is in my own hands	☐1	☐2	☐3	☐4	☐5
J5. There is little I can do to change many of the important things in my life	☐1	☐2	☐3	☐4	☐5
J6. I often feel helpless in dealing with life's problems	☐1	☐2	☐3	☐4	☐5
J7. There are many things that interfere with what I want to do	☐1	☐2	☐3	☐4	☐5
J8. I have little control over the things that happen to me	☐1	☐2	☐3	☐4	☐5
J9. There is really no way I can solve all the problems I have	☐1	☐2	☐3	☐4	☐5
J10. I sometimes feel I am being pushed around in my life	☐1	☐2	☐3	☐4	☐5
J11. What happens to me in the future mostly depends on me	☐1	☐2	☐3	☐4	☐5
J12. What happens in my life is often beyond my control	☐1	☐2	☐3	☐4	☐5

K1. Where would you put yourself on the ladder?

Think of this ladder as representing where people stand in our community.

At the top of the ladder are the people who are best off – those who have the best of everything. At the bottom are the people who are worst off – with the worst of everything.

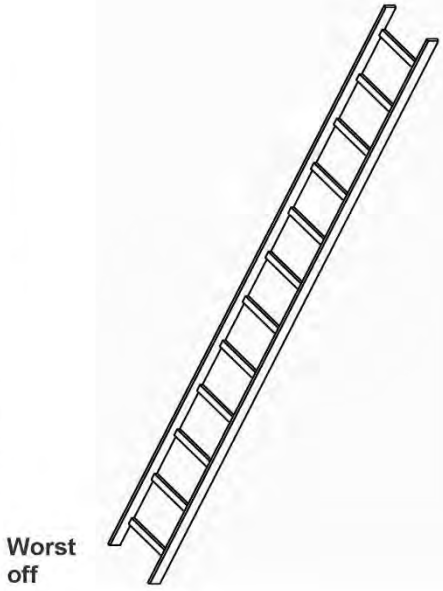
The higher up you are on this ladder, the closer you are to people at the very top of our community.
The lower down you are on the ladder, the closer you are to the bottom of our community.

Please place a large

X

on the rung where

you think you stand.



L. Oral health beliefs: How important do you rate the following in relation to teeth?

L1. Not having a lot of sweet foods	Extremely important ☐1	Fairly important ☐2	Doesn't matter much ☐3	Not very important ☐4	Not at all important ☐5
L2. Using (fluoride) toothpaste	Extremely important ☐1	Fairly important ☐2	Doesn't matter much ☐3	Not very important ☐4	Not at all important ☐5
L3. Visiting dentists	Extremely important ☐1	Fairly important ☐2	Doesn't matter much ☐3	Not very important ☐4	Not at all important ☐5
L4. Brushing teeth	Extremely important ☐1	Fairly important ☐2	Doesn't matter much ☐3	Not very important ☐4	Not at all important ☐5

L5. Drinking tap (fluoridated) water	Extremely important ☐1	Fairly important ☐2	Doesn't matter much ☐3	Not very important ☐4	Not at all important ☐5

M. Oral health self-efficacy: How confident do you feel about your ability to brush your teeth at night when you are…

M1. Under a lot of stress	Very confident ☐1	Somewhat confident ☐2	Not very confident ☐3	Not at all confident ☐4	I never feel like this ☐5
M2. Depressed	Very confident ☐1	Somewhat confident ☐2	Not very confident ☐3	Not at all confident ☐4	I never feel like this ☐5
M3. Anxious	Very confident ☐1	Somewhat confident ☐2	Not very confident ☐3	Not at all confident ☐4	I never feel like this ☐5
M4. Feeling like you do not have the time (too busy)	Very confident ☐1	Somewhat confident ☐2	Not very confident ☐3	Not at all confident ☐4	I never feel like this ☐5
M5. Tired	Very confident ☐1	Somewhat confident ☐2	Not very confident ☐3	Not at all confident ☐4	I never feel like this ☐5
M6. Worried about other things in your life	Very confident ☐1	Somewhat confident ☐2	Not very confident ☐3	Not at all confident ☐4	I never feel like this ☐5

N. Knowledge of Children's Oral Hygiene: How much do you agree with the following statement?

N1. Holes in baby teeth don't matter much since baby teeth fall out anyway	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
N2. Keeping baby teeth clean is not very important because they fall out anyway	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
N3. There is not much I can do to stop my child from getting holes in their teeth	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
N4. There is not much I can do to help my child have healthy teeth	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
N5. Children don't need to brush every day until they get their adult teeth	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
N6. Children don't really need their own toothbrush until all their teeth come	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5

O. Oral health-related fatalism: How much do you agree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
O1. Most people usually get problems with their teeth	☐1	☐2	☐3	☐4	☐5
O2. Most people will need to have their teeth pulled out sooner or later	☐1	☐2	☐3	☐4	☐5
O3. Most children eventually get holes in their teeth	☐1	☐2	☐3	☐4	☐5

P. Oral health systems navigation: What to do when you want to see the dentist

	Yes	No
P1. If you needed to visit to the dentist tomorrow, would you know what to do?	☐1	☐2
P2. Do you think there would be a dentist able to see you tomorrow?	☐1	☐2

Q. Dental care and dental information:

	Without any difficulty	Little difficulty	With some difficulty	Very difficult	Unable to do so
Q1. Are you able to find the energy to manage your dental health?	☐1	☐2	☐3	☐4	☐5
Q2. Are you able to make time for things that are good for your dental health?	☐1	☐2	☐3	☐4	☐5
Q3. Are you able to change your lifestyle to improve your dental health?	☐1	☐2	☐3	☐4	☐5
Q4. Are you able to find dental health information in a language you understand?	☐1	☐2	☐3	☐4	☐5
Q5. Are you able to discuss your dental with people other than a dentist?	☐1	☐2	☐3	☐4	☐5

	Without any difficulty	Little difficulty	With some difficulty	Very difficult	Unable to do so	I don't go to the dentist
Q6. Are you able to take family or a friend with you to a dental appointment?	☐1	☐2	☐3	☐4	☐5	☐6

	Without any difficulty	Little difficulty	With some difficulty	Very difficult	Unable to do so
Q7. Are you able to change your lifestyle to improve your dental health?	☐1	☐2	☐3	☐4	☐5

R. The next few questions ask about openness to pregnancy health information

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
R1. I would go to the dentist if my midwife, AMIC worker or someone close to me told me to do so	☐1	☐2	☐3	☐4	☐5
R2. I get advice on taking care of myself during pregnancy from my midwife, AMIC worker or someone close to me	☐1	☐2	☐3	☐4	☐5
R3. I feel comfortable asking my midwife, AMIC worker or someone close to me about ways to take care of myself during pregnancy	☐1	☐2	☐3	☐4	☐5
R4. It is easy for me to get answers about ways to take care of myself during pregnancy from my midwife, AMIC worker or someone close to me	☐1	☐2	☐3	☐4	☐5

S. The next few questions ask about how important dental health is to you

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
S1. Keeping my teeth healthy is important to me	☐1	☐2	☐3	☐4	☐5
S2. I benefit a lot when I clean my teeth	☐1	☐2	☐3	☐4	☐5
S3. I like the idea of a dentist working on my teeth to make them strong	☐1	☐2	☐3	☐4	☐5
S4. I believe going to the dentist would help my teeth	☐1	☐2	☐3	☐4	☐5

T. The next few questions ask about what is easy and what is difficult for you

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
T1. It is easy for me to snack on sweet foods and drinks throughout the day	☐1	☐2	☐3	☐4	☐5
T2. It is easy for me to forget to brush my teeth	☐1	☐2	☐3	☐4	☐5
T3. It would be hard for me to stop snacking on sweet foods and drinks	☐1	☐2	☐3	☐4	☐5
T4. I don't have time to brush every morning and every night	☐1	☐2	☐3	☐4	☐5

T5. I would have no problem going to the dentist	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
T6. It is not easy to make sure I have a toothbrush and toothpaste	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
T7. It is easier to drink sweet drinks like soft drinks rather than water	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
T8. It would be hard for me to change how often I brush my teeth	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
T9. It is easy for me to go to sleep at night without brushing my teeth	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5

U. The next few questions ask about general easy-goingness in relation to sweet food

U1. It makes me feel good when I eat or drink something sweet	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
U2. Everyone I care about eats or drinks a lot of sweet things	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
U3. I feel mean if I don't allow children to have sweet food	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5
U4. I don't like the taste of drinks that are not sweet	Strongly agree ☐1	Somewhat agree ☐2	Neither agree nor disagree ☐3	Somewhat disagree ☐4	Strongly disagree ☐5

V. The next few questions ask about racism and discrimination

In the last twelve months, have you felt that you have been treated unfairly in any of the following ways because you are Aboriginal?

V1. Applying for work or when at work	Yes ☐1	No ☐2
V2. At home, by neighbours or at somebody else's house	Yes ☐1	No ☐2
V3. At school, university, training course, or other educational setting	Yes ☐1	No ☐2
V4. While doing any sporting, recreational or leisure activities	Yes ☐1	No ☐2

V5. By the police, security people, lawyers or in a court of law	Yes ☐1	No ☐2
V6. By doctors, dentists, nurses or other staff at hospitals, dental clinics or doctor's surgeries	Yes ☐1	No ☐2
V7. By staff of government agencies	Yes ☐1	No ☐2
V8. When seeking any other services	Yes ☐1	No ☐2
V9. By members of the general public	Yes ☐1	No ☐2
V10. Any other situation	Yes (Specify_____) ☐1	No ☐2

W. The next few questions ask about culture

W1. Do you identify with a tribal group, a language group or clan?	Yes (Specify_____) ☐1	No ☐2	Don't know ☐3

W2. To you, is being Aboriginal...	The most important thing (central to who you are) ☐1	Important, but not the only thing ☐2	Something you don't know enough about and want to know more about ☐3	Something you don't think about ☐4

Is there anything else you would like to tell us:

Thank you for taking the time to answer our questions

Gift voucher receipt

I acknowledge that I have received a $50 voucher in recognition of the time spent completing the Baby Teeth Talk Study Questionnaire.

Signature_____

Voucher Number_____

Date _____

10. Appendix III: Individual Deed of License for accessing LSIC data set

Australian Government

Department of Social Services

Individual Deed of Licence for Australian Researchers

Davi Manzini Macedo

For LSIC Applicants only

Please refer to chapter 6 of the Fact Sheets for information on how to address your standpoint

Please provide a statement of your <u>standpoint</u> noting that this is **<u>NOT</u>** your project description**.** *This section is compulsory for LSIC applicants.*

Davi is an international student from Brazil with a background in Psychology and a master in developmental Psychology. In his masters work he analysed data from child maltreatment reported in Brazilian health services. He is currently a PhD student at the University of Adelaide (Lisa Jamieson primary supervisor). He wishes to use the LSIC data to form part of his PhD.

His trajectory of research has focused on child development in a context of vulnerability thus he aims to focus his PhD research in understanding the transgenerational impact of racism in the development of Australian Aboriginal children. His interest in the LSIC dataset is also motivated by the possibility of analysing protective factors such as racial socialization, racial identity and parental resilience. He is an early career researcher and thus has no publications in this area.

What additional data sources / sets (if any) do you plan to use in your analysis?

n/a

LSIC Data Integrity Statement

LSIC data applicants need to read this statement and show a willingness to adhere to it by signing below.

"In relation to using the LSIC data and reporting findings publicly I agree to uphold the following where relevant and practical. I will:

- show respect for: land, laws, elders, culture, community, families and support Indigenous people's visions for their futures when interpreting data outputs and reporting on them.
- declare my standpoint when reporting my work including my theoretical / methodological approach, institutional context and personal frame of reference such as my cultural background, work background, depth of experience liaising with Aboriginal and Torres Strait Islander people.
- represent Aboriginal and Torres Strait Islander people in a manner that honours the diversity of perspectives and experiences and avoids inappropriate or outdated perspectives and terminology.
- fully acknowledge Aboriginal and Torres Strait Islander contributions to the research including reviews and commentary and provide co-authorship where relevant.
- provide DSS with the results of the analysis so that the Department can honour its commitment to give Aboriginal and Torres Strait Islander peoples and communities (particularly those involved in the study) feedback on how the data are being used and a summary of the findings. This will also allow them to make my findings available so they can contribute in the policy, planning, management and delivery of services".

I have read the above and understand that these protocols are for the use of LSIC data as explained in the Fact Sheets.

I have downloaded a copy of the NHMRC's Values and Ethics - Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research and appreciate the importance of the values and ethics of Reciprocity, Respect, Equality, Responsibility, Survival and Protection, Spirit and Integrity even in secondary data analysis and reporting (see http://www.nhmrc.gov.au/publications/synopses/e52syn.htm)

(Please tick boxes above then sign below)

Signed:

Date: 28 /05 /2018

Name: Davi Manzini Macedo

Parties

The Commonwealth of Australia as represented by the Department of Social Services (**DSS**)

AND

(**Licensee**)

Note: If a student - *Supervisors must have independent access to the dataset for which the student is applying.

Family Name	Manzini Macedo
First Name	Davi
Title (Prof, Dr, Ms, Mr)	Mr
Name of Organisation	Indigenous Oral Health Unit - University of Adelaide
Position (if student, specify current level e.g. Masters, PhD)	PhD Student
If a student, Name of Supervisor*	Lisa M. Jamieson
Contact Details of Supervisor	Email: lisa.jamieson@adelaide.edu.au Business Telephone: +61 83134611
Postal Address (business)	Indigenous Oral Health Unit – AHMS Building, Level 9, University of Adelaide - 5005
Address (where data will be used)	Indigenous Oral Health Unit – AHMS Building, Level 9, University of Adelaide - 5005
Telephone (business)	+61 8 8313 4613
Email (business)	davi.manzinimacedo@adelaide.edu.au
Indicate how will data be accessed	CD ROM Secure Server (X) Secure Room
Have you ever used HILDA, LSAC, LSIC or BNLA before?	Yes No (X)

FOR USE OF THE FOLLOWING DATASET(S)

HILDA General Release	HILDA Unconfidentialised
LSAC General Release	LSAC Unconfidentialised
LSIC General Release (X)	
BNLA General Release	

You will be sent the latest version and release of the nominated datasets.

Please note: Users of the unconfidentialised datasets need to abide by additional security requirements as stated in this Deed and the Fact Sheets. Before DSS will give approval to use the unconfidentialised datasets, applicants must demonstrate that they can meet the security requirements and justify the research need for data at this detailed level.

Background

A. The Licensee wishes to use a DSS dataset/s for a specific research project that is to be conducted by the Licensee and is of interest to DSS in meeting its strategic priorities.

B. The Commonwealth of Australia through DSS offers to provide the Dataset to the Licensee on the terms set out in this Deed and the Licensee accepts the terms.

Operative provisions

1 Definitions and interpretation

In consideration of the mutual promises contained in this document, the parties to this Deed agree as follows:

Definitions

1.1 In the Deed the following definitions apply:

Approved Research means the research project(s) which DSS has approved the use of the Datasets specified in clause 6.1 of this Deed.

Authorised User means a person who has been given permission by DSS to have access to and use the Datasets for the Approved Research. For more information see the Fact Sheets.

BNLA means the Building a New Life in Australia Survey, also known as the Longitudinal Study of Humanitarian Migrants.

Business Day means any day on which all banks are open for business generally in Canberra, Australian Capital Territory.

Business Owner means the Branch Manager, Policy Evidence Branch, DSS or another officer of DSS formally notified as the person to whom notices to DSS are to be addressed under clause 24.2.

Commencement Date means the date of execution of this Deed by both parties.

Commercial purposes means the use of DSS longitudinal data for a fee, rate, charge or other consideration, or directly or indirectly in connection with any business, or other undertaking intended for profit.

Confidential Information means, in relation to DSS, information that:

(a) is by its nature confidential

(b) is designated in writing by DSS as confidential;

(c) is personal information under the *Privacy Act 1988*, protected information under section 23(1) of the *Social Security Act 1991*, or *protected information under Division 2 of Part 6 of A New Tax System (Family Assistance) (Administration) Act 1999*;

(d) the Licensee knows or ought to know is confidential and includes:

i. the Datasets, if in a form which discloses any of the information referred to in paragraphs (a)–(d) above;

ii. other information comprised in or relating to any Intellectual Property of DSS or third parties (where that information is provided by the third party on behalf of DSS) if in a form which discloses any of the information referred to in paragraphs (a)–(d) above; or

iii. information relating to the internal management and structure of DSS, but does not include information which:

1. is or becomes public knowledge other than by breach of this Deed, other confidentiality obligations or the *Privacy Act 1988*, the *Social Security Act 1991*, or *A New Tax System (Family Assistance) (Administration) Act 1999*; or

2. the Licensee can establish by written evidence has been independently developed or acquired by the Licensee without breach of any obligation of confidence.

Datasets means any or all of the DSS;

- General and Unconfidentialised Release household and person level Unit Record Data from the Household, Income and Labour Dynamics in Australia (HILDA) survey;
- General and Unconfidentialised Release household and person level Unit Record Data from the Longitudinal Study of Australian Children (LSAC), which may include administrative linked dataset/s;
- General Release household and person level Unit Record Data from the Longitudinal Study of Indigenous Children (LSIC);
- General Release household and person level Unit Record Data from the Building a New Life in Australia (BNLA) survey; and
- Any variations or updates of Releases that may be released from time to time;

Document includes:

(a) any paper or other material on which there is writing;

(b) any paper or other material on which there are marks, figures, symbols or perforations having a meaning to persons qualified to interpret them; and

(c) any article, material or media from which sounds, images or writings are capable of being reproduced with or without the aid of any other article or device.

DSS means the Commonwealth as represented by the Australian Government Department of Social Services.

Fact Sheets means the Fact Sheets for Access and Use of DSS Longitudinal Datasets, prepared and updated by DSS and published on the NCLD website.

FLoSse means the DSS Longitudinal Surveys Electronic Research repository into which users must directly deposit bibliographic details of research created using the datasets http://flosse.dss.gov.au.

General Release means a release of data from which personal information such as names, addresses (including postcodes) and date of birth have been removed and other information has been modified by various methods such as top coding and the application of classification codes at a more general level.

HILDA means the Household, Income and Labour Dynamics in Australia survey, also known as Living in Australia.

Intellectual Property means copyright (and all associated rights, including moral rights), and all rights in relation to inventions, registered and unregistered trade marks (including service marks), registered and unregistered designs, and circuit layouts, and any other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields.

Licensee means the signatory of this Deed.

LSAC means the Longitudinal Study of Australian Children, also known as Growing Up in Australia.

LSIC means the Longitudinal Study of Indigenous Children, also known as Footprints in Time.

Organisation means the entity listed in the parties section of this Deed.

Permitted Geographic Area means any of the following geographical area classifications: State and Territory; Major Statistical Region; Section of State; Greater Capital City Statistical Area; Remoteness Area; Region of Residence (LSAC only); and Level of Relative Isolation (LSIC only).

Personal Information means information or an opinion about an identified individual, or an individual who is reasonably identifiable whether the information or opinion is true or not, and whether the information or opinion is recorded in a material form or not.

Release means a dataset that differs from another dataset from the same survey in that it contains additional information based on new responses from survey respondents. For the purposes of this Deed, a Release does not include a new version of the data in which changes have been made based on the existing information from respondents.

Research Material means any final research findings based on the analysis of the Dataset created by the Licensee.

Survey Contract Manager means in the case of HILDA, the Melbourne Institute of Applied Economic and Social Research (MIAESR) at the University of Melbourne, Australia and in the case of LSAC, the Australian Institute of Family Studies. DSS manages the functions of the Survey Contract Manager for LSIC and BNLA.

Unauthorised Person means a person who is not authorised in writing by DSS to use the Dataset.

Unconfidentialised Release means a release of data from which the names and addresses have been removed but includes other potentially confidential information such as postcodes, date of birth and data at a more detailed level than the General Release datasets.

Unit Record Data means records about individual respondents from the Datasets, also known as unaggregated data.

Interpretation

1.2 In this Deed, unless the context otherwise requires:

1.2.1 a reference to any law or legislation or legislative provision includes any statutory modification, amendment or re-enactment, and any subordinate legislation or regulations issued under that legislation or legislative provision;

1.2.2 a reference to any agreement or Document is to that agreement or Document as amended, novated, supplemented or replaced from time to time;

1.2.3 words in the singular include the plural and words in the plural include the singular;

1.2.4 all references to clauses are reference to clauses in this Deed;

1.2.5 where any word or phrase has been given a defined meaning, any part of speech or other grammatical form about that word or phrase has a corresponding meaning;

1.2.6 if an example is given of any thing (including a right, obligation or concept), the example does not limit the scope of that thing; and

1.2.7 each party provision of this Deed will be interpreted without disadvantage to the party who (or whose representative) drafted that provision, that is, the *contra proferentum* rule does not apply to this Deed.

2 Term of the Deed

2.1 This Deed takes effect on and from the Commencement Date and will continue in effect until terminated by either party in accordance with the Deed.

3 Licence

3.1 DSS grants to the Licensee a non-exclusive, non-transferable licence to use, copy, adapt and modify the Datasets on the terms set out in this Deed for the purposes of undertaking Approved Research for the term of this Deed.

4 Roles, Responsibilities and Access Management

4.1 The Licensee agrees to comply with all procedures and requirements specified in this Deed and the Fact Sheets as at the Commencement Date which forms part of the documentation for the administration of this Deed.

4.2 The Licensee agrees to regularly check for updates to the Fact Sheets.

4.3 The Licensee must comply with the provisions set out in the latest version of the Fact Sheets. If the Licensee is unable or unwilling to comply with the provisions therein, the Licensee must immediately notify DSS and relinquish all DSS datasets in the Licensee's possession by returning them to DSS.

4.4 In the event of any inconsistency between the latest version of the Fact Sheets and this Deed, the Licensee must comply with the requirements which produce the highest level of protection of the Confidential Information.

5 Administration Fee

5.1 The Licensee must pay the administration fee of $77 to the Survey Contract Manager prior to the Dataset being provided.

5.2 The Survey Contract Manager will provide a tax invoice or payment link as soon as is reasonably practicable.

6 Restrictions on use of the Dataset

6.1 The Dataset must only be used for the purposes of undertaking the following research project until the expected date of completion:

What are the research aims/ questions or hypotheses for which you will be using the data?

The LSIC data will be used to test the associations between children, parents, and family experience of discrimination and child social emotional and behavioural development. The ways in each this concept interacts will be tested with the possible verification of mediators and moderators. Factors such as racial socialization, racial identity, parenting efficacy and social support will be tested for moderation and mediation effects.

What is your analytical plan or the key variables you will be examining?

Descriptive analysis will be performed for exploratory purposes. Bivariate analysis between racism experience (main exposure variable) and parenting and child social emotional and behavioural wellbeing (outcome variables) will follow. Multivariate statistical modelling will be performed to test associations and verify mediation and moderator effects in a longitudinal perspective (use of information from different waves). Other important variables are the ones related to Indigenous culture and identity and resilience factors.

What outputs do you intend will result from this research (e.g. journal article, thesis, book chapter, report, conference presentation etc)?

The intended output for this analysis are three empirical papers to be published in peer-reviewed journals and presentations at 2x national-level conferences. These same material will compose the PhD thesis of Davi Manzini Macedo.

If this project is being sponsored or commissioned by an agency other than the organisation listed in this application, please provide the full name of the sponsoring organisation (for administrative purposes only).

Please list who will be on this project with you.

Name:	Prof. Lisa Jamieson	Project Role: Main Supervisor
Name:	Prof. Lisa Smithers	Project Role: Supervisor
Name:	Prof. Rachel Roberts	Project Role: Supervisor
Name:	Prof. Yin Paradies	Project Role: Collaborator
Name:	Prof. João Bastos	Project Role: Collaborator

Who will own the Intellectual Property of the research material for which the data will be used?

The University of Adelaide

Is this project being undertaken for commercial purposes Yes No (X)

Expected Date of Completion of Research 10 /05 /2020 (dd/mm/yy) *up to a maximum of 3 years from the date of application*

6.2 If the Licensee requires the data beyond the three years he or she may apply to DSS in writing prior to the termination date requesting permission to retain the data for an additional specified length of time.

6.3 The Licensee must obtain approval from DSS before using the Dataset for any research project other than specified in this clause. To obtain approval for any additional research, the Licensee should email longitudinalsurveys@dss.gov.au.

6.4 This Deed is granted based on the Licensee's association with the Organisation listed under Parties of this Deed. If the Licensee ceases association with that Organisation, the Licensee must inform DSS and must obtain prior written approval from DSS before using the Dataset while undertaking research for or with another organisation.

6.5 The Licensee may modify the Dataset in order to undertake data analysis (e.g. create new derived data items, aggregate and manipulate the data).

6.6 The Licensee may copy/reproduce the Dataset for the permitted purpose, but may not copy/reproduce the Dataset for any other reason (e.g. give copies of the Dataset to Unauthorised Persons).

6.7 The Licensee must not:

6.7.1 use the Unconfidentilised dataset for the purpose of reporting on or showing data in relation to a geographic area other than a Permitted Geographic Area; or

6.7.2 perform any matching, sharing, merging or linkage of any of the HILDA dataset with any non-HILDA datasets or any of the LSAC datasets with any non-LSAC datasets or any of the LSIC datasets with any non-LSIC datasets or any of the BNLA datasets with any non-BNLA datasets without the prior written consent of DSS; or

6.7.3 attempt to identify any individuals in the Dataset; or

6.7.4 publish, in any form, any part of the Dataset; or

6.7.5 in relation to the LSAC datasets, use the ACARA MySchool institution level data to calculate or publish material which ranks schools.

7 DSS responsibility for the Dataset

7.1 The Dataset is provided to the Licensee on an 'as is' basis and DSS is not responsible for its accuracy, quality or fitness for purpose.

8 Provision of the Dataset

8.1 Subject to clause 5.1 DSS will use its best endeavours to arrange the provision of the Dataset to the Licensee as soon as possible after the Commencement Date.

8.2 DSS must notify the Licensee immediately in writing of any delay in the arrangement of the provision of the Dataset in accordance with clause 8.1 and in this event the parties will agree on a revised delivery date and appropriate changes to other timing obligations included in this Deed.

9 Security

9.1 The Licensee must comply at all times with the following security requirements in relation to the Datasets with a classification of unclassified – (DLM) for General Release and unclassified – (official use only) for Unconfidentialised datasets:

Only allow the Unit Record Data from the Datasets to be viewed by Authorised Users. Store all complete or partial dataset/s, in accordance with the baseline security controls detailed within the Australian Government Protective Security Policy Framework (PSPF) and the Australian Government Information Security Manual (ISM) applicable to Australian government information which requires some level of protection.

Further information relating to the PSPF and the ISM can be found on the following websites:

- Protective Security Policy Framework: http://www.protectivesecurity.gov.au
- Information Security Manual: http://www.asd.gov.au/infosec/ism/

The PSPF and ISM may be updated from time to time. The Licensee must regularly check for updates to these documents and comply with the provisions set out in the latest version.

9.2 The following ISM standards are the minimum requirements for users of DSS longitudinal Datasets. These include but are not limited to:

a. Agencies must register all ICT equipment and media with a unique identifier in an appropriate register

(**control 0336** of ISM (control last updated Sep 2011))

b. To destroy media, agencies must either:
   - Break up the media
   - Heat the media until it has either burnt to ash or melted
   - Degauss the media

(**control 0364** and see 0366 of ISM (control last updated Nov 2010))

c. Agencies using passphrases as the sole method of authentication must enforce the following passphrase policy:
   - a minimum length of 13 alphabetic characters with no complexity requirement; or
   - a minimum length of 10 characters, consisting of at least three of the following character sets:
     - lowercase alphabetic characters (a–z)
     - uppercase alphabetic characters (A–Z)
     - numeric characters (0–9)
     - special characters.

(**control 0421** of ISM (control last updated April 2015))

d. Securing ICT equipment and media during operational and non-operational hours. ICT equipment and media needs to be stored in accordance with the *Australian Government Physical Security Management Protocol*.

The physical security requirements of the Australian Government Physical Security Management Protocol can be achieved by:
   - ensuring ICT equipment and media always resides in an appropriate security zone
   - storing ICT equipment and media during non-operational hours in an appropriate security container or room
   - using ICT equipment with a removable hard drive which is stored during non-operational hours in an appropriate security container or room as well as sanitising the ICT equipment's Random Access Memory (RAM)
   - using ICT equipment without a hard drive as well as sanitising the ICT equipment's RAM

- using an encryption product to reduce the physical storage requirements of the hard drive in ICT equipment to an unclassified level as well as sanitising the ICT equipment's RAM

Agencies must ensure that ICT equipment and media with sensitive or classified information is secured in accordance with the requirements for storing sensitive or classified information in the *Australian Government Physical Security Management Protocol.*

(**control 0161** of ISM (control last updated Sep 2011))

10 Administrative Requirements

10.1 The Licensee agrees to comply at all times with the following Administrative minimum requirements.

a. only allow the Unit Record Data from the Datasets to be viewed by Authorised Users;

b. access to the password protected drive is only by Authorised Users and the password must only be known to Authorised Users of the Datasets;

c. where the Authorised User has access to the **General Release** dataset via CD ROM or DVD it is to be kept and used only on the Organisation's premises;

d. where the Authorised User does not have access to the **Unconfidentilised** dataset via a password protected server, Authorised Users may download the Dataset onto a password protected stand alone computer on the Organisation's premises;

e. there must be an effective means of limiting entry during both operational and non-operational hours to rooms or buildings in which the **General Release** datasets are used or stored. If possible and where practical, the room must be locked when an Authorised User is not there;

f. there must be an effective means of limiting entry during both operational and non-operational hours to the dedicated lockable room/s in which the **Unconfidentialised** datasets are used or stored. The room must be locked when an Authorised User is not there;

g. the keys or combinations to lockable containers in which Datasets are kept must be kept secure and not be given to any Unauthorised Person;

h. a record must be kept of all people who have been issued with keys and/or combinations to containers in which the Datasets are used or stored;

i. any unit record output from the Datasets must not be left unsecured for more than 10 minutes, and must be stored in a locked commercial grade container and disposed of using a crosscut shredder when no longer required;

j. when using the Datasets, users must lock their screen when they are away from their workstation;

k. the Business Owner or their nominated representative may with at least three Business Days' notice and during normal business hours make a physical inspection of the premises in which the Datasets are stored or used to ensure the security and administrative measures are in place, subject to the Business Owner complying with the security measures of the Organisation.

11 User support

11.1 DSS will provide Authorised Users, through the Survey Contract Manager, with technical assistance to the Licensee in use of the Dataset in accordance with this Deed.

12 Non-disclosure

12.1 In consideration of DSS disclosing certain Confidential Information to the Licensee, the Licensee acknowledges and agrees with DSS:

12.1.1 that all Confidential Information is confidential, is the property of DSS, and is of value to DSS, and that any Confidential Information disclosed to the Licensee is only disclosed pursuant to the terms of this Deed;

12.1.2 to keep Confidential Information confidential at all times;

12.1.3 that it must not, other than with the prior written approval of DSS (which may be granted or withheld in DSS's absolute discretion);

(a) use;

(b) disclose;

(c) divulge;

(d) make a digital or any other copy of;

(e) transmit electronically (including via email); or

(f) deal with,

any Confidential Information, nor allow any act, matter or thing to be done or occur whereby any Confidential Information may be ascertained or used by, or disclosed or communicated to, any other person, except in accordance with the terms of this Deed; and

12.1.4 that it must observe and be bound by the provisions of this Deed.

12.2 The Licensee must:

12.2.1 take all reasonable steps and do all reasonable things necessary, and do all things that may be reasonably required by DSS to keep the Confidential Information, including all Documents, and all other things recording, containing, setting out or referring to any Confidential Information, under effective control of the Licensee and protected from any unauthorised use or access;

12.2.2 immediately notify DSS if the Licensee becomes aware of any unauthorised access to, or use or disclosure of, any Confidential Information;

12.2.3 ensure that Confidential Information is not given to a person who is not an Authorised User;

12.2.4 if required at any time by DSS to do so, deliver up to DSS, or at the option of DSS destroy, without limitation, all Documents containing any Unit record Data in the possession, custody or control of the Licensee; and

12.2.5 if required by DSS:

(a) permit DSS or any nominees of DSS, upon at least three Business Days' notice and during normal business hours and subject to the security measures of the Licensee's Organisation, reasonable access to those premises where the Datasets are stored or being used, and records of the Licensee, (including without limitation, access to any of the Licensee's computer hard drives and computer disks containing Confidential Information belonging to DSS) to ensure or check compliance with this Deed; and/or

(b) provide to DSS a statutory declaration signed by the Licensee stating that they have complied with clause 12.2.4.

12.3 The Licensee may retain a copy of the Confidential Information if, and only to the extent to which and for the purpose for which, the Licensee is required by law to do so but subject to compliance with clause 12.1.

12.4 This clause 12 will survive the expiration or termination of this Deed.

13 Disclosure as required by law

13.1 The Licensee may disclose any Confidential Information which the Licensee is required by law to disclose, but only if the extent and the manner of the disclosure is strictly limited to what is required by law.

13.2 The Licensee undertakes to provide DSS with sufficient notice to enable DSS to seek a protective order or other relief from disclosure and to provide all assistance and co-operation which DSS reasonably considers necessary for that purpose.

14 Intellectual Property

14.1 The Licensee acknowledges and agrees that the Commonwealth owns all Intellectual Property rights in the Dataset.

14.2 Except where specified under a separate agreement, the Commonwealth will not own the Intellectual Property rights in any Research Material created using the Dataset to the extent the Research Material does not include the Unit Record Data.

14.3 The Licensee must enter into FLoSse, bibliographic details of any final Research Material produced by the Licensee using the Datasets within 30 days of completion.

14.4 The Licensee is exempt from the requirements in clause 14.3 if the Research Material is for internal administration of Australian Government agencies or for confidential business purposes for the Australian Government.

14.5 Where the Licensee has ownership of the Intellectual Property, the Licensee grants a perpetual licence to the Commonwealth to use, reproduce, adapt and modify the Research Material for any of the Commonwealth's Internal Purposes.

14.6 For the purposes of this clause 14, the Commonwealth's Internal Purposes means:

14.6.1 use of the Research Material by DSS to understand the extent to which the Datasets are being used; and

14.6.2 ready access by the Commonwealth to information and research to support internal policy development and evaluation.

14.7 Where the Licensee is not the owner of the Intellectual Property of the Research Material, the Licensee warrants that he or she will procure a sub-licence from a third party for the Research Material on the same terms as the Licensee grants to DSS under clause 14.5.

14.8 If the Commonwealth wishes to make any part of the Research Material publicly available, the Commonwealth will first obtain the written consent of the owner of the Intellectual Property.

14.9 This clause 14 will survive the expiration or termination of this Deed.

15 Acknowledgement and Disclaimer

15.1 The Licensee agrees to acknowledge DSS and the Survey Contract Manager for the use of the Dataset and assistance provided in using the Dataset in any reports and publications that use the Dataset.

15.2 The Licensee agrees that any of the material produced by the Licensee and made publicly available will include the acknowledgment in the latest version of the Fact Sheets or any variation of the acknowledgement which has been approved in writing by DSS in any reports and publications.

16 Privacy

16.1 The Licensee agrees with respect to all Confidential Information made available or provided by DSS or any other person at any time which comprises Personal Information as defined in the *Privacy Act 1988 (the Act)*:

16.1.1 to comply as if they were an agency bound by the Act with those provisions of the Act concerning the security, use and disclosure of information;

16.1.2 to co-operate with any reasonable demands or enquiries made by the Privacy Commissioner;

16.1.3 to ensure that any person who has an access level which would enable that person to obtain access to any information in respect of which DSS has obligations under the Act is made aware of, and undertakes in writing, to observe the provisions referred to in clause 16.1.1 above;

16.1.4 to take all reasonable measures to ensure that such information is protected against loss and against unauthorised access, use, modification, disclosure or other misuse and that only Approved Individuals have access to it;

16.1.5 not to transfer such information outside Australia, or allow parties outside Australia to have access to it, without the prior written approval of DSS;

16.1.6 to immediately notify DSS when the Licensee becomes aware of a breach of security by any Individual; and

16.1.7 to notify DSS of, and co-operate with DSS in the resolution of, any complaint alleging an interference with privacy.

16.2 The Licensee's obligations in this clause 16 are in addition to, and do not restrict, any obligations it may have under:

16.2.1 the Act; or

16.2.2 any privacy codes or privacy principles contained in, authorised by or registered under any law including any such privacy codes or principles that would apply to the Licensee but for the application of the other provisions of this clause 16.

16.3 This clause 16 will survive the expiration or termination of this Deed.

17 Conflict of interest

17.1 The Licensee warrants that no conflict of interest exists or is likely to arise while in receipt of Confidential Information.

17.2 The Licensee warrants that it will not permit any situation to arise or engage in any activity that may result in a conflict of interest with the Licensee's receipt of Confidential Information.

18 Legal requirements

18.1 Each party acknowledges and agrees to comply with the law in force in the Australian Capital Territory (Australia), including but not limited to:

18.1.1 *Social Security Act 1991*;

18.1.2 *Privacy Act 1988*; and

18.1.3 *Criminal Code Act 1995*.

18.2 The Licensee acknowledges that unauthorised disclosure of information held by the Commonwealth is subject to the sanction of criminal law under sections 70 and 79 of the *Crimes Act 1914* and section 91.1 of the *Criminal Code Act 1995*.

19 Indemnity

19.1 The Licensee agrees to indemnify DSS from and against any:

19.1.1 cost or liability incurred by DSS;

19.1.2 loss of or damage to property of DSS; or

19.1.3 loss or expense incurred by DSS in dealing with any claim against it including reasonable legal costs and expenses on a solicitor/own client basis;

arising from:

19.1.4 any negligent act or omission by the Licensee in connection with the use of the Dataset;

19.1.5 any breach by the Licensee of its obligations or warranties under this Deed;

19.1.6 any use or disclosure by the Licensee of Confidential or Personal Information held or controlled in connection with this Deed; or

19.1.7 the use by DSS of the Research Material as intended under this Deed but only to the extent that the Research Material has not been misquoted or taken out of context.

19.2 The Licensee's liability to indemnify DSS under clause 19.1 will be reduced proportionately to the extent that any negligent act or omission of DSS contributed to the relevant liability, loss or damage, or loss or expense.

19.3 The right of DSS to be indemnified under this clause 19 is in addition to, and not exclusive of, any other right, power or remedy provided by law, but DSS is not entitled to be compensated in excess of the amount of the relevant liability, loss or damage, or loss or expense.

19.4 This clause 19 will survive the expiration or termination of this Deed.

20 Applicable law

20.1 This Deed will be governed by and construed in accordance with the laws of the Australian Capital Territory (Australia) and the Licensee agrees to submit to the non-exclusive jurisdiction of the courts of the Australian Capital Territory in respect of all matters arising under, or in relation to, this Deed.

21 No exclusion

21.1 This Deed does not exclude the operation of any principle of law or equity intended to protect and preserve the confidentiality of the Confidential Information.

21.2 The rights and remedies provided under this Deed are cumulative and not exclusive of any rights or remedies provided by law.

22 Dispute resolution

22.1 DSS and the Licensee will attempt in good faith to resolve through negotiation any disputes, claim or controversy arising out of or relating to this agreement.

23 Termination of Deed

23.1 This Deed may be terminated by either party providing at least 14 days prior notice in writing.

23.2 DSS may terminate this Deed by notice in writing, with effect from the date in the notice, if the Licensee fails to remedy a breach of the Deed within 30 days of being given notice by DSS requiring the breach to be remedied.

23.3 On expiration or termination of this Deed in accordance with clause 23.1 or clause 23.2, the Licensee must immediately relinquish all DSS datasets in the Licensee's possession by returning them to DSS or take such other steps as agreed with DSS.

24 Notices

Giving notices

24.1 A notice, consent, information, application or request that must or may be given or made to a party under this Deed is only given or made if it is in writing and:

24.1.1 delivered or posted to that party at its address set out below;

24.1.2 emailed to that party at its email address set out below; or

24.1.3 faxed to that party at its fax number set out below.

24.2 If a party gives the other party 5 business days' notice of a change of its email or postal address, a notice, consent, information, application or request is only given or made by that other party if it is delivered, posted or emailed to the latest address.

DSS

Name: Department of Social Services
Business Owner Longitudinal Surveys
National Centre for Longitudinal Data
Policy Evidence Branch TOP DE4

Postal Address:	PO Box 9820 Canberra ACT 2610
Email:	longitudinalsurveys@dss.gov.au
Fax:	02 6206 9545

Licensees

Name: Davi Manzini Macedo

Position: PhD Candidate – University of Adelaide

Address: Indigenous Oral Health Unit – AHMS Building, Level 9, University of Adelaide – 5005

Email: davi.manzinimacedo@adelaide.edu.au

Fax Number:

I understand that I must provide DSS with any changes to the above information.

Signature of the Licensee:

Time notice is given

24.3 A notice, consent, information, application or request is to be treated as given or made at the following time:

24.3.1 if it is delivered, when it is left at the relevant address;

24.3.2 if it is sent by post, 5 Business Days after it is posted; or

24.3.3 if it is sent by email or fax, upon actual receipt by the addressee.

If a notice, consent, information, application or request is delivered after the normal business hours of the party to whom it is sent, it is to be treated as having been given or made at the beginning of the next Business Day.

25 Miscellaneous

Assignment

25.1 Except as expressly permitted by this Deed, the Licensee must not assign any of their rights under this Deed without the prior written consent of DSS. That consent may be given or withheld at DSS's absolute discretion.

Costs

25.2 Each party will bear its own costs in relation to this Deed, including the exercise of rights and performance of obligations specified in the Deed.

Entire agreement

25.3 This document contains everything the parties have agreed on in relation to the matters it deals with. No party can rely on an earlier document, or anything said or done by another party, or by a director, officer, agent or employee of that party, before this Deed was executed, save as permitted by law.

No agency or partnership

25.4 No party is an agent, representative, partner of any other party by virtue of this Deed.

No authority to act

25.5 No party has any power or authority to act for or to assume any obligation or responsibility on behalf of another party, to bind another party to any agreement, negotiate or enter into any binding relationship for or on behalf of another party or pledge the credit of another party except as specifically provided in this Deed or by express agreement between the parties.

Severability

25.6 If a clause or part of a clause of this Deed can be read in a way that makes it illegal, unenforceable or invalid, but can also be read in a way that makes it legal, enforceable and valid, it must be read in the latter way. If any clause or part of a clause is illegal, unenforceable or invalid, that clause or part is to be treated as removed from this Deed, but the rest of this Deed is not affected.

Time for action

25.7 If the day on or by which something is required to be done or may be done is not a Business Day, that thing must be done on or by the next Business Day.

Variation

25.8 No variation of this Deed will be of any force or effect unless it is in writing and signed by the parties to this Deed.

Waiver

25.9 The fact that a party fails to do, or delays in doing, something the party is entitled to do under this Deed, does not amount to a waiver of any obligation of, or breach of obligation by, another party. A waiver by a party is only effective if it is in writing. A written waiver by a party is only effective in relation to the particular obligation or breach in respect of which it is given. It is not to be taken as an implied waiver of any other obligation or breach or as an implied waiver of that obligation or breach in relation to any other occasion.

Execution

Executed as a DEED on Date: 21.06.18

Signed, sealed and delivered for and on behalf of **THE COMMONWEALTH OF AUSTRALIA as represented by the Department of Social Services** by

Name of authorised officer (print)

Delegate, Longitudinal Surveys

Signature of authorised officer

Name of HILDA authorised officer (print)

Signature of HILDA authorised officer

Name of LSAC authorised officer (print)

Signature of LSAC authorised officer

Anastasia SARIBAYEVA

Name of LSIC authorised officer (print)

Signature of LSIC authorised officer

Name of BLNA authorised officer (print)

Signature of BLNA authorised officer

In the presence of

Victoria Anthony

Name of witness (print)

Signature of witness

Signed, sealed and delivered by

Davi Manzini Macedo

In the presence of:

Lisa M. Jamieson

11. Appendix IV: Extra Paper - Development and initial psychometric assessment of the Race-related Attitudes and Multiculturalism Scale in Australia

Racism in Australia affects not only Aboriginal Australians, but the diverse ethnic-minority groups that comprises the Australian population. Investigating racism involves understanding ethnic-racially based intergroup attitudes, which are on the core of racist prejudice and discriminatory behaviour. Therefore, understanding race-related attitudes in the Australian context can assist in identifying attitudes patterns that daily affect the lives of ethnic-minorities. In other words, the topics of racism, multicultural and race-related attitudes are of special relevance for addressing inequalities in health and wellbeing in Australian multicultural society.

The present appendix is comprised of study developed in parallel with the present thesis project. The proposed study proposes to validate a measure of attitudes towards multiculturalism based on data from 2,714 Australian adults participating in the National Dental Telephone Interview Survey (NDTIS). This is an Australian population-based study conducted in all states and territories, using an overlapping dual sampling frame design. The scale was developed based on the 2015-16 Challenging Racism project and the 2013 survey of Victorians' attitudes to race and cultural diversity. Items were design to reflect theories and social ideologies considered to influence attitudes towards multiculturalism (e.g., Social dominance orientation; Right-wing authoritarianism). Exploratory and confirmatory factor analyses were used to evaluate the measure's factorial structure. Criterion validity was assessed through known-group comparisons and measuring invariance by sex, age, and educational attainment was tested.

Abstract

Aim: The present study aims to develop the Race-related Attitudes and Multiculturalism Scale (RRAMS) as a measure of multiculturalist attitudes, as well as to assess its psychometric properties in a national sample of Australian adults.

Methods: The sample comprised 2,714 Australian adults who took part in the 2013 National Dental Telephone Interview Survey (NDTIS), which includes a telephone-based interview and a follow-up postal questionnaire. We employed Exploratory Factor Analysis to evaluate the RRAMS' factorial structure (n=271) and then proceeded with Confirmatory Factor Analysis to confirm the proposed structure in an independent sample (n=2,443). Measurement invariance was evaluated according to sex, age and educational attainment. Criterion validity was assessed through known-groups comparisons. Internal consistency was assessed with McDonald's Ω_H and ordinal α. Multiple imputation by chained equations was adopted to handle missing data.

Results: EFA indicated a two-factor structure would best fit the data following the exclusion of 4 out of 12 items, which was then confirmed in an independent sample ($\chi^2(19) = 341.070$, $p<0.001$, CFI = 0.974, RMSEA = 0.083; 90% CI [0.076, 0.091]). Measurement invariance analyses indicated that the RRAMS items can be used to compare men/women, participants with/without tertiary education and young/older participants. The "Anglo-centric/Assimilationist attitudes" ($\Omega_H = 0.83$, $\alpha_{ORDINAL} = 0.85$) and "Inclusive/Pluralistic attitudes" subscales ($\Omega_H = 0.77$, $\alpha_{ORDINAL} = 0.79$) showed adequate reliability. Men and participants without tertiary education had higher Anglo-centric/assimilationist attitudes and lower inclusive/pluralistic attitudes, suggesting criterion-related validity.

Conclusions: The RRAMS appears to be a valid and reliable measure to evaluate multiculturalist attitudes in the Australian context. The instrument may be useful to

interventions aiming to promote multiculturalist inclusive attitudes and to increase social cohesion in Australia.

Introduction

Racism emerges whenever social and individual values, norms and practices of a given group are considered superior to others. Racism occurs with the particular aim of creating, maintaining or reinforcing power imbalances, as well as the corresponding inequalities in opportunities and resources along racial lines [1]. Similar to most contemporary societies, Australia is characterized by co-existing expressions of cultural diversity on the one hand, and negative impacts of racism on social cohesion, on the other [1]. In Australia, the mental health costs directly attributable to racism have been estimated at 235,452 disability-adjusted life years lost, which is equivalent to an average $37.9 billion in productivity loss per annum, equivalent to 3% of the Australian annual Gross Domestic Product (GDP) over 2001–2011 [2]. Such a strong relationship is an indication that racism may erode the very social fabric of the Australian society by producing mental disorders and suffering, which unevenly impacts upon racially marginalized groups.

Social conceptions that shape intergroup relations form the common ground upon which intergroup attitudes and discriminatory behaviour take place [3]. On an empirical level, findings suggest that racist attitudes are associated with racist behaviours and racial-ethnic minorities' experiences of discrimination [4]. Positive attitudes towards diversity, however, are negatively associated with discriminatory behaviour [5]. In this study, we propose to explore attitudes in relation to multiculturalism, a construct of special relevance to the social, economic and political fabric of contemporary Australia [6]. We focus on multiculturalism as an ideology of acknowledging and celebrating ethnic and cultural differences, in which the need for preserving cultural identities is recognized [7]. It reflects a "sensibility and disposition towards cultural differences among large sections of the population"[8]. Data from the 2016 Australian Census

revealed that one in three Australians were born overseas, and a similar proportion of individuals speak a language other than English at home. Nevertheless, assimilationist attitudes – expectations of conformation to the dominant culture – often prevail, as opposed to multiculturalist perspectives that accept and praise racial and ethnic-cultural diversity [9]. Understanding attitudes to multiculturalism can contribute to unveil the dynamics of racism and discrimination against minorities in the country, fostering public debate and policy formulation aimed to promote positive intergroup relations [10].

Research on ethnic-racial intergroup attitudes benefitted from the inputs of theories on ideological attitudes that explains group-based dominance and social cohesion [11-13]. Social Dominance Orientation (SDO), for example, reflects the degree to which respondents believe that hierarchy-based dominance between social groups is natural [14]. Discrimination against minorities, therefore, can be explained by the degree of endorsement of the notion that group-based hierarchies are natural and inevitable [14]. Endorsement of group-based dominance and out-group prejudice tends to increase among those with highly identify with the dominant group, as they represent a mechanism of maintaining the in-group *status quo* [12].

Research on ethnic-racial intergroup relations in contemporary society has also explored the Right-wing Authoritarianism (RWA) concept [15-17]. RWA is characterized by the endorsement of social conservative values, morality, collective security, group-based social cohesion, and strict obedience to social authorities [15, 17]. Those who endorse RWA values can be more sensitive to threats to social stability, being prone to conservative values as to increase their perception of control and collective security [18]. Perception of threat has been shown to mediate the association between group identification and attitudes towards multiculturalism [11]. Those that

consider immigrants or ethnic-racial minorities as a threat to the control of resources or maintenance of the dominant social values tends to endorse more conservative/assimilationist attitudes towards multiculturalism [11, 19].

Sustaining dominant group status quo can also be achieved by the avoidance of acknowledging and approaching ethnic-racial inequalities in the population. The so-called colour-blind racial ideology denies the existence of racism and justifies racial inequalities as a result of personal decisions, meritocratic achievements, and market forces [20, 21]. By denying racist practices and racial inequalities, it provides the discursive tools to downplay policy proposals to promote racial justice and therefore maintains the power imbalance between ethnic-racial groups [20]. Following this perspective, public denial of racism has been pointed as an obstacle to a deeper commitment to multiculturalism in Australia [13, 22]. Although the existence of racism is acknowledged, most Australians fail to recognise the existence of Anglo-privilege, a step necessary in reducing the imbalance in resource distribution and political representation among ethnic-racial groups [13].

Taken together, the results mentioned above point to the centrality of properly assessing the different facets of intergroup attitudes towards multiculturalism as to inform public debate and contribute to prevent and counteract discrimination. It is important to note that the majority of the available scales used to assess race-related attitudes have been developed and psychometrically examined among U.S. populations [7]. These tools may not be relevant or provide valid/reliable estimates of race-related attitudes in non-US contexts, though, given the considerable contextual dependency of racism. Historiographic and sociological accounts of racial dynamics usually emphasize specificities in terms of colonization, past and contemporary immigration policies, and patterns of cultural diversity as key aspects.

Australia is a settler society that started with a policy of Anglo-celtic migration only, later expanded to include migrants from other European-backgrounds (e.g., Greeks, Italians), having only in the 1980's opened its borders to migrants from Asian and Middle-Eastern descent. That and other differences in relation to other settler colonies (e.g., limited involvement on the Atlantic slavery trade) produce specific effects on social integration and justify the limitations of transposing tools validated in other populations to the Australian context. Just like other multiculturalist societies like Canada and New Zealand, multiculturalism was debated at a national level as a state-policy in the 1970's. Backlashes from conservative sectors, nonetheless, contributed to prioritise an assimilationist perspective on the implementation of multiculturalism values in society. Australia has also historically dispossessed and oppressed the native Aboriginal Australians since the beginning of colonization with ongoing effects until present [23]. Our study does not contemplate this agenda as to respect the pledge that the effects of colonisation and racism faced by Aboriginal Australians has unique features and can be diminished when contemplated under the umbrella of multiculturalism [24].

To the best of our knowledge, two measurement instruments that provide information on racial, ethnic, and cultural acceptance (i.e. race-related and multiculturalist attitudes) have been previously developed and assessed in Australia [7, 25]. While the first has focused on intercultural understanding among teachers and students in schools [25], psychometric evaluation of the second was carried out in relatively young and convenience samples of primary and secondary school students (all younger than 15 years-old residing in Victoria) and community members (mean age of 23 years-old with 70% residing mainly in Victoria), which limits their applicability at a national level and among older age groups. Therefore, neither an integrated picture

of attitudes towards multiculturalism across the country has yet been delineated, nor a range of strategies to advance racial equity based on this knowledge have been proposed.

The present study proposes the Race-related Attitudes and Multiculturalism Scale (RRAMS) as a measure of attitudes towards multiculturalism. The items were formulated to reflect social ideologies and collective believes identified to influence ethnic-racial intergroup attitudes. The aim of this study was to verify its applicability to the Australian context by assessing the extent to which the RRAMS provides valid and reliable measurement in a sample of Australian adults across all states and territories. In particular, the internal validity of the RRAMS was assessed in terms of its configural structure (i.e., the number of underlying factors), metric properties – the magnitude of item loadings and thresholds –, as well as measurement invariance (i.e., whether it allowed meaningful comparisons across sociodemographic characteristics). External validity of the RRAMS was then assessed in term of its criterion-related validity.

Methods

Study design and participants

This was an Australian population-based study, with data obtained from the 2013 National Dental Telephone Interview Survey (NDTIS), which includes a telephone-based interview and a follow-up postal questionnaire. The NDTIS has been carried out periodically by the University of Adelaide since 1994, and comprises a large national sample of Australian residents aged 5 years and over. The NDTIS is a random sample survey that collects information on the dental health and use of dental services of Australians in all states and territories. The survey also collects data on social determinants of oral health and wellbeing, which include detailed information on sociodemographic factors, such as household income, education, country of birth,

remoteness of location and main language spoken at home. For the 2013 survey, an overlapping dual sampling frame design was adopted. The first sampling frame was created from the electronic product 'Australia on Disc 2012 Residential; an annually updated electronic listing of people/households listed in the White Pages across Australia. Both landline and mobile telephone numbers were provided on records where applicable.

A stratified two-stage sampling design was used to select a sample of people from this sampling frame. Records listed on the frame were stratified by state/territory and region, where region was defined as Capital City/Rest of State. A systematic sample of records was selected from each stratum using specified sampling fractions [26]. To include households that were not listed in the White Pages, a second sampling frame comprising 20,000 randomly generated mobile telephone numbers was used. This sampling frame was supplied by *Sampleworx* and the mobile telephone numbers were created by appending randomly generated suffix numbers to all known Australian mobile prefix numbers. As the mobile numbers did not contain address information, the sampling frame could not be stratified by geographic region. A random sample of mobile numbers was selected from the frame and contacted to establish the main user of the mobile phone. This person was asked to participate in the telephone interview, provided that they were aged 18 years or over [26].

Following the completion of the telephone interview survey, participants were invited to respond to the postal questionnaire component. Those who agreed were sent a covering letter with the questionnaire and reply-paid envelope enclosed. A reminder postcard was sent two weeks later, with, if necessary, two additional follow-up letters/questionnaires sent subsequent to the postcard. A total of 6,340 Australian adults

aged 18+ years took part in the 2013 NDTIS, with 2,935 (46.3%) completing the follow-up postal questionnaire. Sample characteristics are displayed in Table 1. Two thirds of the sample were 45 to 98 years-old and had Technical and Further Education (TAFE) or went to university. Women corresponded to 60.3% of the sample. The majority of participants were born in Australia (76.7%), 12.8% were originally from Europe and 10.5% from the other continents (Asia, Africa and Americas).

Table 1. Characteristics of study participants (n=2,714).

	Total sample		**EFA sample**		**CFA sample**	
Sample characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Age						
18 to 45 years old	809	29.8	101	37.3	708	29.0
46 to 98 years old	1818	67.0	162	59.8	1656	67.8
Missing	87	3.2	8	3.0	79	3.2
Sex						
Female	1637	60.3	176	64.9	1461	59.8
Male	990	36.5	87	32.1	903	37.0
Missing	87	3.2	8	3.0	79	3.2
Education						
High school or less	548	20.2	60	22.1	1876	20.0
TAFE* or university	2079	76.6	203	74.9	488	76.8
Missing	87	3.2	8	3.0	79	3.2

Country of birth						
Australia	2079	76.7	209	77.1	1870	76.5
Rest of Oceania	72	2.7	6	2.2	66	2.7
Europe	347	12.8	36	13.3	311	12.7
Africa & Middle East	43	1.6	1	0.4	42	1.7
Asia	56	2.1	5	1.8	51	2.1
Americas	30	1.1	6	2.2	24	1.0
Missing	87	3.2	8	3.0	79	3.2

*TAFE, Technical and Further Education (trade school/college).

Ethical approval and consent

Ethical approval for the study was granted by the University of Adelaide's Human Research Ethics Committee (approval number HS-2013-036). All

Statistical Analysis

Statistical analyses were conducted with R software [27] and R packages lavaan [28], and semTools [29].

Phase 1: Item development

The RRAMS was developed by a group of researchers with expertise on the topics of racism, multiculturalism, and race-related attitudes in Australia. To ensure content validity [30] in the Australian context, the scale was based on large surveys carried out in the country that were co-designed by the abovementioned group of researchers. These include the 2015-16 Challenging Racism Project [31] and the 2013 survey of Victorians' attitudes to race and cultural diversity [32]. The RRAMS was proposed as comprised by two subscales. The first subscale included six items reflecting theories and social ideologies in agreement with "Anglo-centric/Assimilationist attitudes" It

included items measuring compliance to RWA (e.g, 'We need to stop spreading dangerous ideas and stick to the way things have always been done in Australia'), agreement with SDO ('It is okay if some racial or ethnic groups have better opportunities in life than others'), endorsement of colour-blind racial ideology (e.g., 'We shouldn't talk about racial or ethnic differences'), zero-sum racist thinking (e.g., 'Racial or ethnic minority groups take away jobs from other Australians'), and endorsement of assimilationist ideology (e.g., 'People from racial or ethnic minority groups should behave more like mainstream Australians').

The second subscale comprised six items assessing agreement with "Inclusive/Pluralistic attitudes". It included low compliance to RWA (e.g., 'Some of the best people in our country are those who are challenging our government and ignoring the 'normal' way things are supposed to be done'), low SDO (e.g., 'We should do what we can to create equal conditions for different racial or ethnic groups'), acknowledgment of racism (e.g., People from racial or ethnic minority groups experience discrimination in Australia), acknowledgment of white privilege (e.g., 'Australians from an Anglo background (that is, of British descent) enjoy an advantaged position in our society'), and embracement of multiculturalism (e.g. "People from racial or ethnic minority groups benefit Australian society"). Besides their theoretical relevance, these constructs have been found in previous national studies in Australia to be acceptable and appropriate for assessing population race-related attitudes [31] [32]. Response options for each item ranged from 'strongly disagree' (0), 'disagree' (1), 'neither agree nor disagree' (2), and 'agree' (3) to 'strongly agree' (4).

Phase 2: Identification of a potential factorial structure

Since the RRAMS was conceptualized to measure agreement with both issues of conformity to the dominant ethnoculture ("Anglo-centric/Assimilationist attitudes") and agreement with promotion of ethnic diversity ("Inclusive/Pluralistic attitudes"), an Exploratory Factor Analysis (EFA) was initially run to *empirically* test this assumption (i.e., that a two-factor solution would underlie the set of items). The factorial solution suggested by the EFA was then confirmed by means of a Confirmatory Factor Analysis [33] in an *independent sample* to avoid capitalization on chance [34, 35]. We randomly divided the NDTIS sample into one group for the EFA and another group for the CFA. Considering that a sample size with at least 200 participants is sufficient for EFA under normal conditions (medium communalities and at least three measured variables loading on each factor) [36] and CFA has higher sample requirements, 271 participants from the original survey were randomly selected for the EFA.

Factor retention relied on the Scree Plot [37] criteria and Parallel Analysis (PA) [38]. In the PA, 1,000 random and resampled datasets with the same number of RRAMS items and respondents were generated. The rationale of the PA is that meaningful factors extracted in the current study should account for more variance than factors extracted from random data [36]. Factor extraction was conducted with maximum likelihood [39] and oblique rotation ("direct oblimin") [40]. Items with non-salient factor loadings (.<40) were deleted. Additionally, 100 bootstrapped samples were used to generate factor loadings' 95% confidence intervals [41].

Phase 3: Confirmation of the factorial structure in an independent sample

After a factorial structure was derived from the EFA, this was assessed using CFA in an independent sample (n = 2,443). The estimation method was weighted least squares [42], with a mean- and variance-adjusted (WLSMV) test statistic [43]. Missingness of individual item responses ranged from 0.9% to 2.2%, and this was

handled with multiple imputation of 20 datasets using the fully conditional specification method [44]. We imputed information for individuals who responded at least one item of the RRAMSs (n = 2,714). Rubin's rules [45] were used to pool point estimates and standard errors (SE). To evaluate model fit, the scaled χ^2 was used to test the hypothesis of *exact-fit.* Additionally, we evaluated *approximate fit* indices, such as the scaled Comparative Fit Index (CFI) and scaled[1] Root Mean Squared Error of Approximation (RMSEA). Values of CFI $\geq$ 0.96 and RMSEA $\leq$ 0.5 indicate good model fit [46], while 0.5 < RMSEA $\leq$ 1.0 indicates acceptable fit [35].

Since factorial structures derived from EFA do not necessarily imply good fitting CFA models (e.g. due to cross-loadings or error correlations) [47], in case the factorial structure had a poor fit, model re-specifications were informed by standardized residuals, modification indices (MI) and the standardized expected parameter change (SEPC) [48]. Completely standardized solutions were reported in the present paper.

Phase 4: Analysis of measurement invariance

An initial Multigroup CFA [49] was conducted to check if the same factorial structure would hold for all sex, age, and education-based groups – i.e., to whether *configural invariance* could be confirmed with the data at hand. The χ^2, CFI and RMSEA and their previously described cut-off points were used to evaluate configural invariance. The second level of measurement invariance, *metric invariance*, was assessed to ascertain whether factor loadings were similar across the same groups. The final test, *scalar invariance*, was used to determine whether item thresholds were equal across sex, age and education. Since scalar models are nested within metric models, and metric models are nested within configural models, metric and scalar invariance were evaluated through a Likelihood Ratio Test (LRT), namely the $\Delta \chi^2$ [50]. The $\Delta \chi^2$

[1] For simplicity, the term 'scaled' will be omitted from now on.

statistic was computed in each imputed dataset and pooled according to Li, Meng (51) recommendations (i.e. D2 statistic). When the $\Delta \chi^2$ was *statistically* significant, the ΔCFI [52] was employed to evaluated the *magnitude* of the difference. Models with $\Delta CFI \leq -.002$ indicated lack of invariance [53]. In instances when measurement invariance was not achieved, tests of partial invariance were conducted [54].

Phase 5: Reliability

Internal consistency was calculated with McDonald's Ω_H [55] and ordinal α [56]. The McDonald's Ω_H has two advantages over the traditional and widely used Cronbach's α. It does not assume (1) tau-equivalence and a (2) congeneric model without correlated errors (i.e. locally independent items) [57]. Furthermore, the ordinal α is reported given that Cronbach's α underestimates reliability in ordinal Likert scales. Adequate methods for calculating ordinal α confidence intervals are not available [58].

Phase 6: Item reduction analysis

In the item reduction analysis, we evaluated inter-item correlations, corrected item-total correlations (CITC) and item difficulties. Inter-item correlations indicate the extent which all items on a scale are examining the same construct without redundancy. Thus, inter-item correlations should be moderate (i.e. items measure the same construct but also have unique variances) and items with correlations lower than .20 were considered for deletion [59].

The next step was the evaluation of CITC. One important aspect in instrument development is achieving a good balance between a small number of items (lengthy questionnaires can induce lower response rates [60]) and adequate reliability. A recent study by Zijlmans, Tijmstra (61) showed that the CITC [62] performed better than other methods at identifying which items can be removed while maximizing reliability. Therefore, items with the lowest CITC should be the first to be considered for removal.

The corrected item-*total* correlation needs to be calculated *within subscale* since items can only be summed into a *total* score when they measure the same construct [63]. For this reason, CITCs were calculated *after* the factorial structure was established (i.e. we had no prior information about which item belonged to which subscale to calculate corrected total scores). Given the ordinal nature of the data, the inter-item correlations and CITCs were investigated with non-parametric Kendall's τ [64].

Finally, due to the limitations of classical difficulty indices such as the p-value (i.e. proportion of correct responses given the total score) [65], we evaluated item difficulty with the $LI_{IRF,}$ the location index based on the item-response function [66]. The LI_{IRF} is calculated based on the *item locations* (β_i), which are a well-known reparameterization of *item thresholds* (τ_i) of adjacent *i* and *i* +1 response categories [67]. The LI_{IRF} indicates the value of the latent trait in which respondents have an *average* score of half the maximum item score. For example, in a 5-point rating scale (items ranging from 0 = Strongly Disagree to 4 = Strongly Agree), the LI_{IRF} indicates the level of inclusive/pluralistic attitudes required for participants to score *on average* 2 (2 = Neutral). In our study, the LI_{IRF} was chosen over item thresholds (τ_i) to convey item difficulty due to two advantages: the interpretation of the LI_{IRF} is (a) easier, since it is a single index compared to four thresholds per item; and (b) more substantive, since it is based on the *latent trait* ("Anglo-centric/Assimilationist attitudes" or "Inclusive/Pluralistic attitudes") rather than on the *latent response variables* [68]. Nonetheless, for the sake of completeness, we also reported the item thresholds (τ_i).

Phase 7: Criterion-related validity

To evaluate the RRAMS' criterion-related validity, we investigated known-groups validity according to sex, education and age. Known-groups validity compares the levels of the constructs in different groups (e.g. men compared to women) and

should be applied when it is known, theoretically or due to previous empirical research, that these groups differ on the variable of interest. Therefore, known-groups validity can inform whether the instrument is able to *discriminate* between two groups that are *known* to be different regarding the construct (e.g. individuals with more education have more inclusive attitudes). The investigation of known-groups validity is important in many instances, such as when there is no "gold standard" method of measurement to which the instrument can be compared [69]. That is, since there is no "gold standard" or established (based on robust psychometric evidence) instrument to measure racial related attitudes and multiculturalism in Australia, it is hard to define what would constitute a good measure for the RRAMS to display convergent validity with. Furthermore, in our case, there is previous evidence of groups that are known to differ according to multiculturalism and race-related attitudes. For example, as multiculturalism can be perceived as identity-threatening by dominant group members [11, 19], we expected men to have more conservative attitudes towards multiculturalism when compared to women [22, 70]. The same pattern was expected for older participants (>45 years old) when compared to younger respondents [22, 70, 71]. Participants with a university degree, in turn, were expected to be more supportive of multiculturalism than those with lower educational attainment. This hypothesis is in accordance with previous findings showing that sense of economic security (economic, personal, and cultural), higher education and younger age were associated with more positive attitudes towards multiculturalism and lesser exclusionary attitudes [22, 70, 71]. Therefore, sex, age and education were chosen as the exogenous variables for the evaluation of known-groups validity. To assess known-groups validity, latent mean differences were calculated by constraining the latent means in one of the groups (i.e. women and participants with higher education) to zero, so this group would function as

a reference group. Considering that latent variances were constrained to one in the completely standardized solution, latent mean differences are interpreted as effect sizes analogous to Cohen's [72] *d* [73]. Finally, we employed the Empirical Bayes model [74] to estimate factor scores, which were plotted using Kernel density [75] to inform not only the *average* but also the distribution of the latent trait according to groups.

Results

Identification of a potential factorial structure

Investigation of the Scree Plot and PA indicated that 2 factors substantially explained more variance than factors extracted from randomly generated data (Figure 1).

Note. The triangles indicate the factors' eigenvalues extracted from the study data. The dashed lines and 95% CI indicate the factors' eigenvalues extracted from the 1,000 simulated and resampled datasets. FA stands for factor analysis.

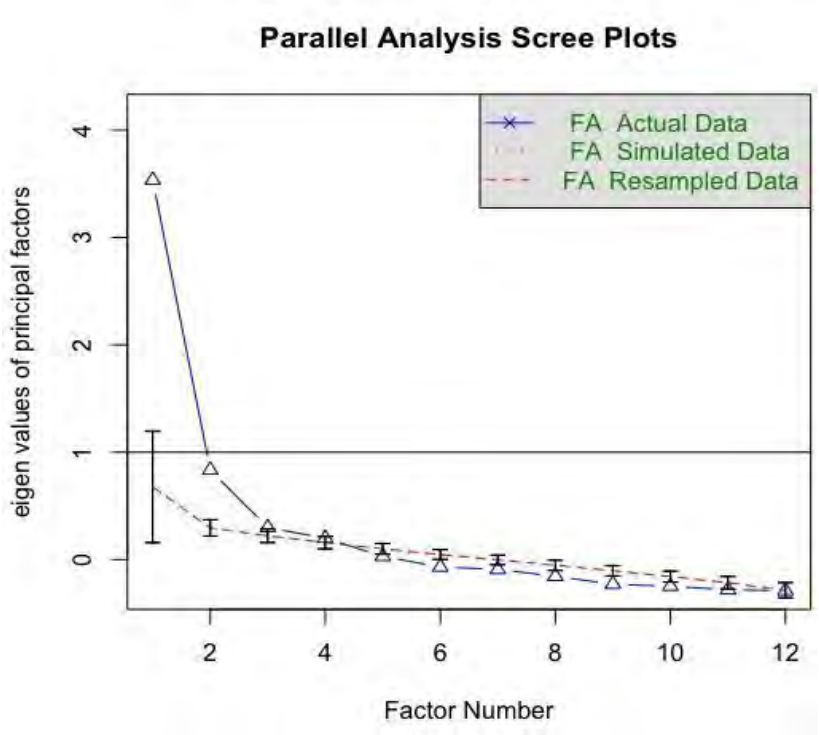


Figure 1. Parallel Analysis and Scree Plots of the Race-related Attitudes and Multiculturalism Scale.

It should be noted that, although the third factor accounted for more variance than the third factor extracted from the random datasets, the difference was trivial. For this reason, only two factors were retained. The next step was the evaluation of the factor loadings (Table 2). Results showed that Item 2 ("Some of the best people in our country are those who are challenging our government and ignoring the 'normal' way things are supposed to be done"), Item 3 ("It is okay if some racial or ethnic groups have better opportunities in life than others") and Item 6 ("We shouldn't talk about racial or ethnic differences") did not have substantial factor loadings (>.40) and were therefore excluded. Item 5 had the smallest factor loadings ($\lambda_2 = 0.440$ 95% CI [0.220, 0.610]).

Table 2. Exploratory Factor Analysis: Factor Loadings (λs) and Bootstrapped 95% CI (n = 271).

Item	Factor 1		Factor 2	
	Estimate	**95% CI**	**Estimate**	**95% CI**
1. We need to stop people spreading dangerous ideas and stick to the way things have always been done in Australia.	0.59	[0.40, 0.77]	-0.10	[-0.26, 0.03]
2. Some of the best people in our country are those who are challenging our government and ignoring the 'normal' way things are supposed to be done.	**0.08**	**[-0.16, 0.26]**	**0.38**	**[0.15, 0.57]**
3. It is okay if some racial or ethnic groups have better opportunities in life than others.	**0.27**	**[0.00, 0.47]**	**0.10**	**[-0.16, 0.30]**
4. We should do what we can to create equal conditions for different racial or ethnic groups.	-0.12	[-0.28, 0.02]	0.57	[0.39, 0.74]
5. Australians from an Anglo background (that is, of British descent) enjoy an advantaged position in our society.	-0.03	[-0.25, 0.15]	0.44	[0.22, 0.61]

6. We shouldn't talk about racial or ethnic differences.	**0.23**	**[-0.02, 0.44]**	**-0.06**	**[-0.28, 0.13]**
7. People from racial or ethnic minority groups benefit Australian society.	-0.06	[-0.27, 0.11]	0.47	[0.24, 0.64]
8. People from racial and ethnic minority groups experience discrimination in Australia.	0.01	[-0.16, 0.11]	0.74	[0.57, 0.88]
9. Something more should be done to reduce discrimination experienced by people from racial or ethnic minority groups in Australia.	0.02	[-0.14, 0.14]	0.88	[0.73, 1.00]
10.Racial or ethnic minority groups take away jobs from other Australians.	0.65	[0.44, 0.81]	-0.07	[-0.27, 0.07]
11.The Australian way of life is weakened by people from minority racial or ethnic backgrounds maintaining their cultural beliefs and values.	0.65	[0.46, 0.83]	0.04	[-0.11, 0.13]
12.People from racial and ethnic minority groups should behave more like mainstream Australians.	0.81	[0.63, 0.95]	0.01	[-0.18, 0.13]

Note. Deleted items highlighted in bold.

After deletion of these four items and EFA re-analysis, the two-factor solution achieved simple structure. This time, however, Item 5 did not achieve a substantial factor loading ($\lambda_2 = 0.390$; 95% CI [0.180, 0.590]) (Supplementary Table 1); that is, the factors explained only 19% of the variance of item responses ("communality"), while 81% of the variance was explained by other sources ("uniqueness"), such as measurement error. For this reason, Item 5 was also excluded from the analysis.

Confirmation of the factorial structure in an independent sample

The 2-factor model was then selected and its fit, examined ($\chi^2(19) = 341.070$, $p<0.001$, CFI = 0.974, RMSEA = 0.083; 90% CI [0.076, 0.091]). Since the null hypothesis of *exact-fit* was rejected ($\chi^2(19) = 341.070$, $p<0.001$), we proceeded to evaluate the indices of *approximate-fit*. The CFI indicated a good fit to the data (>.960), while the RMSEA was adequate ($0.5 < \text{RMSEA} \leq 1.0$). Residual correlations are displayed in Supplementary Table 2. Considering the overall good fit of the model and

that all items exhibited substantial factor loadings (Table 3), the two-factor model with 8 items was accepted.

"Anglo-centric/Assimilationist attitudes" (e.g. "Racial or ethnic minority groups take away jobs from other Australians"), whereas the second subscale comprised six items assessing agreement with "Inclusive/Pluralistic attitudes"

Table 3. Confirmatory Factor Analysis: Factor Loadings (λs) and Factor correlations (n = 2,443).

Item	Estimate (SE)	*p*-value	95% C.I.	CITC	LI_{IRF}
Subscale 1: Anglo-centric/Assimilationist attitudes					
1. We need to stop people spreading dangerous ideas and stick to the way things have always been done in Australia.	0.629 (0.014)	<0.001	[0.601, 0.656]	0.43	0.00
10. Racial or ethnic minority groups take away jobs from other Australians.	0.784 (0.010)	<0.001	[0.764, 0.804]	0.50	0.72
11.The Australian way of life is weakened by people from minority racial or ethnic backgrounds maintaining their cultural beliefs and values.	0.856 (0.009)	<0.001	[0.838, 0.874]	0.58	0.44
12.People from racial and ethnic minority groups should behave more like mainstream Australians.	0.814 (0.010)	<0.001	[0.794, 0.834]	0.57	0.01
Subscale 2: Inclusive/Pluralistic attitudes					
4. We should do what we can to create equal conditions for different racial or ethnic groups.	0.652 (0.016)	<0.001	[0.620, 0.684]	0.41	-1.58
7. People from racial or ethnic minority groups benefit Australian society.	0.627 (0.016)	<0.001	[0.595, 0.658]	0.39	-1.16
8. People from racial and ethnic minority groups experience discrimination in Australia.	0.680 (0.013)	<0.001	[0.655, 0.706]	0.43	-0.80

9. Something more should be done to reduce discrimination experienced by people from racial or ethnic minority groups in Australia.	0.835 (0.012)	<0.001	[0.813, 0.858]	0.54	-0.86
Factor correlation (anglo-centric/assimilationist attitudes x inclusive/pluralistic attitudes)	-0.638 (0.016)	<0.001	[-0.669, -0.608]	-	-

Note. CITC = Corrected Item-Total Correlations. LI_{IRF} = Location Index based on the Item Response Function. Standardized factor loadings are displayed. Point estimates and SE were pooled across 20 imputed datasets according to Rubin's rules. LI_{IRF} was calculated based on pooled item thresholds and factor loadings.

Analysis of measurement invariance

Next, measurement invariance by sex, education and age was evaluated. Regarding sex, the LRT indicated that the metric model was not statistically different from the configural model ($\Delta \chi 2$ (6) = 11.86; p = 0.065), and that the scalar model was not statistically different from the metric model ($\Delta \chi 2$ (16) = 24.26; p = 0.083). In other words, factor loadings and thresholds were invariant across men and women. Regarding education, although the configural model and scalar model were statistically different ($\Delta \chi 2$ (6) = 19.14; p = 0.004), the fit of the (constrained) metric model improved (ΔCFI =0.002) providing evidence of metric invariance between those with and without higher education. The same happened when metric invariance was evaluated by age; although the configural model and scalar model were statistically different ($\Delta \chi 2$ (6) = 15.15; p = 0.019), the fit of the metric model (ΔCFI = 0.005) was better. When scalar invariance was evaluated, the pooled $\Delta \chi 2$ was negative for both education and age-based groups. Although a negative $\Delta \chi 2$ is not interpretable (and, therefore, values were set to zero), these negative values can occur when the difference between models are small [76]. For this reason, the threshold constraints were regarded as tenable [77] and provided indirect support for scalar invariance.

Table 4. Measurement invariance according to sex and education.

Model	χ^2	*df*	*p*-value	RMSEA	90% CI	CFI	Δ χ2 (df)	*p*-value	Δ CFI
Sex									
Configural	381.703	38	<0.001	0.086	[0.078, 0.094]	0.973	-	-	-
Metric	340.310	44	<0.001	0.074	[0.067, 0.082]	0.976	11.86 (6)	0.065	0.003
Scalar	428.058	60	<0.001	0.074	[0.065, 0.077]	0.971	24.26 (16)	0.083	0.005
Education									
Configural	363.867	38	<0.001	0.084	[0.076, 0.092]	0.974	-	-	-
Metric	339.008	44	<0.001	0.074	[0.067, 0.082]	0.976	19.14 (6)	0.004	0.002
Scalar	422.999	60	<0.001	0.070	[0.064, 0.077]	0.971	0 (6)*	1.000	-0.005
Age									
Configural	385.254	38	<0.001	0.087	[0.079, 0.094]	0.973	-	-	-
Metric	332.751	44	<0.001	0.073	[0.066, 0.081]	0.978	15.15 (6)	0.019	0.005
Scalar	386.834	60	<0.001	0.067	[0.061, 0.073]	0.975	0 (6)*	1.000	-0.003

Note. χ2 = chi-square; df = degrees of freedom; RMSEA = root mean square error of approximation; CFI = comparative fit index; Δχ2 (df) = chi-square difference and degrees of freedom; ΔCFI = CFI difference. * Negative pooled test statistic was set to zero.

Reliability

The first subscale "Anglo-centric/Assimilationist attitudes" ($\Omega_H = 0.83$, $\alpha_{ORDINAL} = 0.85$, $\alpha = 0.85$; 95% CI [0.84, 0.86]) showed good reliability, while the "Inclusive/Pluralistic attitudes" subscale ($\Omega_H = 0.77$, $\alpha_{ORDINAL} = 0.79$, $\alpha = 0.72$; 95% CI [0.70, 0.73]) exhibited adequate reliability.

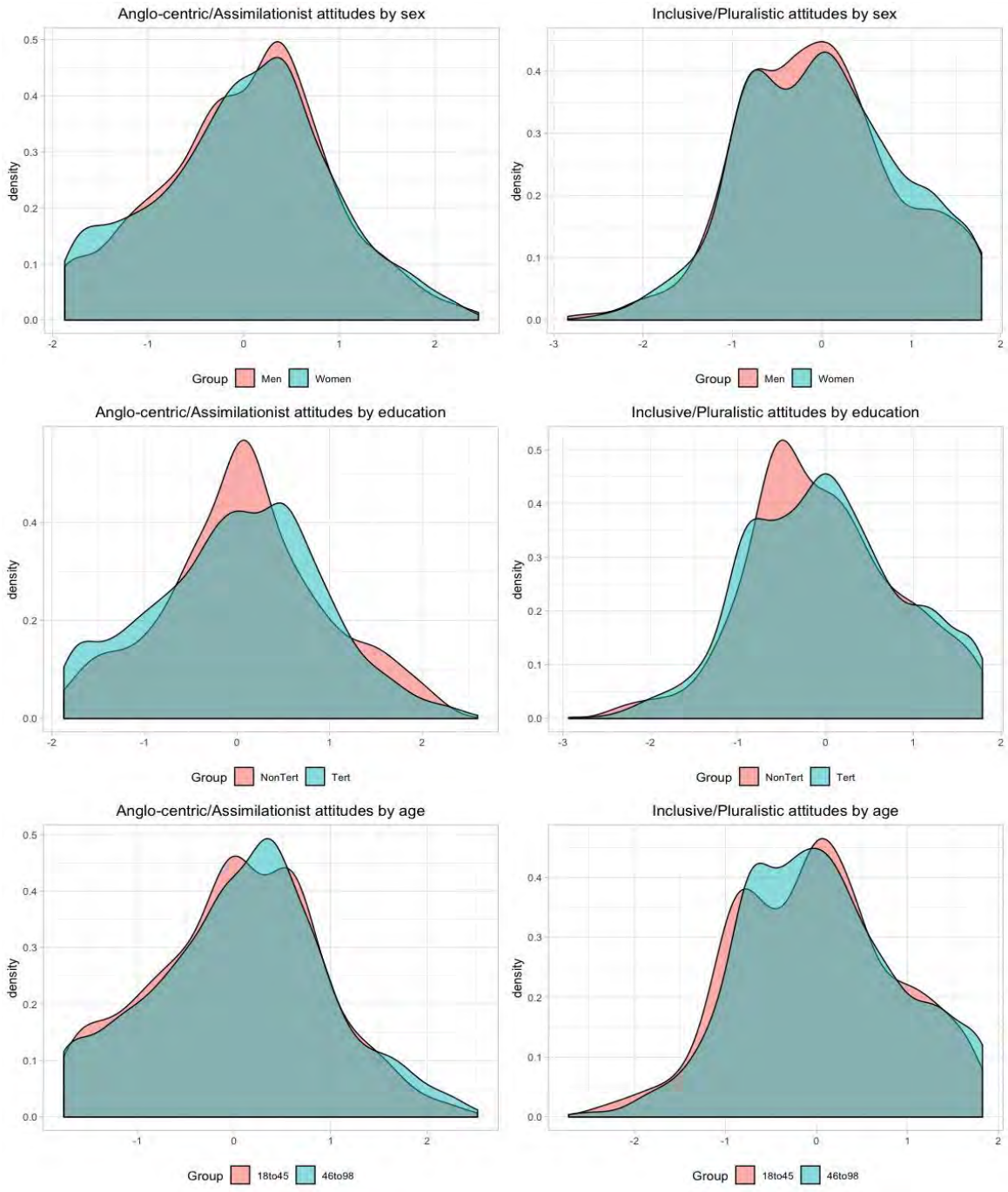
Item Reduction Analysis

Inter-item correlations ranged from 0.29 to 0.56 (Supplementary 3) and no correlations were lower than 0.20. The CITCs ranged from 0.39 to 0.58. Within the "Anglo-centric/Assimilationist attitudes" dimension, the easiest item was "We need to stop people spreading dangerous ideas and stick to the way things have always been done in Australia" ($LI_{IRF} = 0.00$), while the hardest item was "Racial or ethnic minority groups

take away jobs from other Australians" (LI_{IRF} = 0.72) (Table 3). That is, with respect to Item 10, respondents needed to have 0.72 standard deviations more anglo-centric/assimilationist attitudes than the average Australian to produce an expected score of 2 out of 4. Item 10 was the *hardest* item in the "Anglo-centric/Assimilationist attitudes" subscale since its endorsement required more anglo-centric/assimilationist attitudes than the other items. Within the "Inclusive/Pluralistic attitudes" subscale, the easiest item was "We should do what we can to create equal conditions for different racial or ethnic groups" (LI_{IRF} = -1.58), while the hardest item was "People from racial and ethnic minority groups experience discrimination in Australia." (LI_{IRF} = -0.80). The hierarchy of item difficulties was identical when average item thresholds ($\bar{\tau}$) were inspected (Supplementary Table 4).

Criterion-related validity

Examination of criterion-related validity indicated that men (M = 0.105; 95% CI [0.014, 0.197]), participants without tertiary education (M = 0.585; 95% CI [0.474, 0.696]) and those aged 45 years and over (M = 0.373; 95% CI [0.275, 0.470]) had higher Anglo-centric/assimilationist attitudes. Furthermore, men (M = -0.116; 95% CI [-0.213, -0.020]) and participants without tertiary education (M = -0.304; 95% CI [-0.420, -0.188]) also presented lower inclusive/pluralistic attitudes. The difference in inclusive/pluralistic attitudes between participants aged 45 years and over (M = -0.045; 95% CI [-0.148, 0.057]) and their peers was close to zero. The distribution of factor scores is displayed in Figure 2.



Note. The Kernel density plots indicate the distribution of factor scores.

Figure 2. Factor scores Kernel density plots of assimilationist and pluralistic attitudes.

Discussion

The current study aimed to present the RRAMS as a measure of attitudes towards multiculturalism in Australia and to examine its psychometric properties using data from a nationwide sample. The two-factor solution proposed in exploratory stages

of the analysis was thereafter confirmed by means of a CFA in an independent sample. Results showed that the two subscales of "Anglocentric/Assimilationist attitudes" and "Inclusive/Pluralistic attitudes" are initially valid and reliable for the Australian population.

In the initial stage of psychometric assessment, we identified poorly performing items, and these were excluded. One of these was Item 2 ("Some of the best people in our country are those who are challenging our government and ignoring the 'normal' way things are supposed to be done"), an item originally designed to reflect RWA in relation to multiculturalism. Despite its original purpose, Item 2 might not reflect the cultural and race-related topic in question. This is one possible explanation why the responses to this item were not strongly influenced by respondent's Inclusive/Pluralistic attitudes towards multiculturalism (only 12% of the variance was explained by the factor). For instance, the wording "challenging our government" can be interpreted as referring to a general debate not reflecting ethnic-racial differences on political representation and resources distribution, for example. Future studies might test the item fit by emphasizing 'challenging our government' as pressuring for a political agenda that prioritize reducing social inequalities among ethnic-racial groups and promotion of a pluralistic society.

Items 3 ("It is okay if some racial or ethnic groups have better opportunities in life than others") and 6 ("We shouldn't talk about racial or ethnic differences") also performed poorly and failed to capture assimilationist views. Item 3 was designed to reflect respondent's SDO. It was hypothesized that participants with high SDO, and thus assimilationist views of multiculturalism, would endorse the item. Contrarily to expected, these respondents might have interpreted the phrasing 'some racial or ethnic groups' as a reference to ethnic-racial minorities. Conservatives might perceive

affirmative action and social assistance policies as privileges and can endorse the notion that minorities 'have it easy'. Conservative attitudes such as that of RWA and SDO have been linked to social and economic conservatism, reflecting ideologies of competition and meritocracy [78]. The ambiguity left by the item wording can thus explain its failure in discriminating assimilationist attitudes. Item 6, in turn, might have not worked in its subdomain because, again contrarily to our hypothesis, respondents with high assimilationist views might be *willing* to discuss racial and ethnic differences with the intent of promoting assimilationist and racist views [79]. Therefore, the item performed poorly as respondents in the different strata of assimilationist attitudes could be prone do endorse the item for different reasons.

The last deleted item was Item 5 ("Australians from an Anglo background [that is, of British descent] enjoy an advantaged position in our society"). One possible explanation for the item's poor performance is that the recognition of privilege *does not necessarily* informs on inclusive/pluralistic attitudes. For example, a previous study in the Australian states of Queensland and New South Wales showed these as two independent dimensions [9]. The item poor loading in the inclusive attitudes domain suggests respondents might not link acknowledgment of white privilege to their notion of a pluralistic society. Taken together, these results potentially indicate that debates over multiculturalism in Australia need to promote awareness of the connection between Anglo-privilege and racism. Scholars advocate that challenging racism and privilege is as a necessary step to promote the abandonment of assimilationist views in favour of more inclusive perspectives [9, 13].

The subscales "Anglo-centric/Assimilationist attitudes" and "Inclusive/Pluralistic attitudes" achieved *metric invariance* and *scalar invariance* according to sex. Furthermore, the two subscales achieved *metric invariance* according

education and the results also (indirectly) supported *scalar invariance*. That is, "Anglo-centric/Assimilationist attitudes" and "Inclusive/Pluralistic attitudes" influenced the item responses the same way in each group (*metric invariance*) and the items were not more difficult for one group compared to another (*scalar invariance*). The RRAMS items can thus be used to compare men/women, participants with/without tertiary education and young/older participants, and the scores will reflect *true differences* regarding "Anglo-centric/Assimilationist attitudes" and "Inclusive/Pluralistic attitudes" rather than measurement bias [35].

After ensuring measurement invariance between subgroups, we compared the factor scores between men and women, participants with and without tertiary education, and participants up to and over 45 years of age. The stronger predictor of assimilationist *and* inclusive attitudes was education status, while sex also influenced both constructs. Furthermore, older individuals were more likely to have higher assimilationist attitudes. The role of education in promoting inclusive/pluralistic has been previously established [22, 70] and suggests education as an important target for future interventions aimed at promoting multiculturalism in Australia. The results also indicated that men and older individuals had stronger assimilationist attitudes in comparison with women and younger counterparts [71]. In general, the associations of the two subscales with sex, education, and age conformed to the theoretical expectations and provide further evidence of the RRAMS' construct validity.

With regards to reliability, the "Anglo-centric/Assimilationist attitudes" and "Inclusive/Pluralistic attitudes" subscales showed adequate reliability (>.70) [80], since values between .70 and .80 are considered appropriate for research purposes [81]. In case the RRAMS is used in the future in high-stakes scenarios (i.e. where decisions

need to be made based on scale scores) [82], new items should be developed to increase reliability.

In the item reduction analysis, all items displayed moderate inter-item correlations and CITC, so no items were required to be removed. The item with the smallest CITC was Item 7 ("People from racial or ethnic minority groups benefit Australian society"), followed by Item 4 ("We should do what we can to create equal conditions for different racial or ethnic groups."). Since reliability was only modest, we considered that further shortening the questionnaire would be more detrimental in terms of reliability and content validity than beneficial as a means of creating a briefer measure. In addition, with the exception of Item 1 ("We need to stop people spreading dangerous ideas and stick to the way things have always been done in Australia.") and Item 12 ("People from racial and ethnic minority groups should behave more like mainstream Australians."), the items difficulties were spread across the latent trait. Once again, although Item 1 or Item 2 could potentially be removed due to similar difficulties, we believe removing additional items would be detrimental to content validity and the psychometric properties of the scale.

One limitation of the current study was that we were not able to evaluate convergent and discriminant validity. The RRAMS was originally applied at the 2013 NDTIS, a study that focused on collecting information on the use of dental services in Australia and did not include other psychosocial measures. For this reason, we considered known-groups validity to be the best strategy to investigate the RRAMS' criterion-related validity. While the results from known-groups validity were in accordance with theoretical expectations (e.g. inclusive attitudes were more present in individuals with more education), future studies need also to investigate other forms of validity, such as convergent/discriminant and predictive validity. For example, future

studies should evaluate whether the scores from the "Inclusive/Pluralistic attitudes" subscale are positively correlated (i.e. convergent validity) with scores from other instruments evaluating multiculturalist and inclusive attitudes. Our analyses did not account for sampling weights, meaning that our sample is not representative of the Australian population. It is important to highlight, however, that our study included Australians from all age groups and socioeconomic backgrounds across all states and territories of the country. Furthermore, to the best of our knowledge, this is the largest sample in which a measure of attitudes towards multiculturalism has been employed in Australia. Lack of representativeness and its implications to the validity of scientific findings are central to longstanding discussions in the literature (ref.). Because the purpose of the current analysis was to assess the psychometric properties of the RRAMS, as opposed to purely describe prevalence estimates, we do not believe that the lack of representativeness of our sample limits the validity of inferences made here in. The fact that a study sample is representative of some larger population does not mean that the associations or correlations between variables in the sample will apply to every subgroup of the population (ref.). The overall association or correlation is simply an average value that has been balanced according to the distribution of people in these subgroups. If a sample that is representative of the sex distribution in the target population, the results will not necessarily be apply to both males and females, but only to a hypothetical participant that is "weighted" on sex. Subgroups analyses are necessary if one wishes to investigate relationships between variables by subgroups, which we have performed during the criterion validity assessment stage.

In conclusion, we successfully developed a comprehensive race-related attitudes and multiculturalism scale to the Australian context. We used robust, cutting edge psychometric techniques and a large, nation-wide survey. The small number of items

(eight) means the instrument will likely be readily used by policy makers and in future research. Future studies should assess the scaling properties of the instrument by using parametric and non-parametric Item Response Theory techniques. The instrument may, nevertheless, be useful to inform on multiculturalism attitudes across the country and hopefully contribute to a public debate aimed to promote multiculturalist inclusive attitudes with the potential to increase social cohesion in Australia.

References

1. Berman G, Paradies Y. Racism, disadvantage and multiculturalism: towards effective anti-racist praxis. Ethnic and Racial Studies. 2010;33(2):214-32. doi: 10.1080/01419870802302272.
2. Elias A, Paradies Y. Estimating the mental health costs of racial discrimination. BMC public health. 2016;16(1):1205-. doi: 10.1186/s12889-016-3868-1.
3. Hage G. Analysing multiculturalism today. In: Bennett T, Frow J, editors. The SAGE handbook of cultural analysis: SAGE Publishing; 2007. pp. 488-509.
4. Habtegiorgis AE, Paradies YC, Dunn KM. Are racist attitudes related to experiences of racial discrimination? Within sample testing utilising nationally representative survey data. Soc Sci Res. 2014;47:178-91. doi: 10.1016/j.ssresearch.2014.05.002.
5. Kauff M, Wagner U. Valuable Therefore Not Threatening The Influence of Diversity Beliefs on Discrimination Against Immigrants2012. 714-21 p.
6. Modood T. Multiculturalism. In: Ritzer G, editor. The Blackwell Encyclopedia of Sociology: John Wiley & Sons; 2016.
7. Grigg K, Manderson L. The Australian Racism, Acceptance, and Cultural-Ethnocentrism Scale (RACES): item response theory findings. International Journal for Equity in Health. 2016;15(1):49. doi: 10.1186/s12939-016-0338-4.

8. Hage GaB. Analysing Multiculturalism Today. The SAGE Handbook of Cultural Analysis2008. pp. 488-509.

9. Forrest J, Dunn K. 'Core'Culture Hegemony and Multiculturalism. Ethnicities. 2016;6(2):203-30. doi: 10.1177/1468796806063753.

10. Vala J, Costa-Lopes R. Intergroup relations. In: Smelser NJ, Baltes PB, editors. International Encyclopedia of the Behavioral Sciences. 2nd edition ed: Elsevier; 2015.

11. Verkuyten M. Support for Multiculturalism and Minority Rights: The Role of National Identification and Out-group Threat. Social Justice Research. 2009;22(1):31-52. doi: 10.1007/s11211-008-0087-7.

12. Morrison KR, Ybarra O. The effects of realistic threat and group identification on social dominance orientation. J Exp Soc Psychol. 2008;44(1):156-63. doi: 10.1016/j.jesp.2006.12.006.

13. Dunn K, Nelson JK. Challenging the Public Denial of Racism for a Deeper Multiculturalism. Journal of Intercultural Studies. 2011;32(6):587-602. doi: 10.1080/07256868.2011.618105.

14. Pratto F, Sidanius J, Levin S. Social dominance theory and the dynamics of intergroup relations: Taking stock and looking forward. European Review of Social Psychology. 2006;17(1):271-320. doi: 10.1080/10463280601055772.

15. Adorno TW, Frenkel-Brunswik E, Levinson D, Sandford RN. The Authoritarian personality. New York: Harper; 1950.

16. Bizumic B, Duckitt J. Investigating right wing authoritarianism with a very short authoritarianism scale. Journal of Social and Political Psychology. 2018;6(1):129-50. doi: 10.5964/jspp.v6i1.835.

17. Duckitt J. Authoritarianism and dogmatism. In: Leary M, Hoyle R, editors. Handbook of individual differences in social behavior. New York: Guilford Press; 2009. pp. 298-317.

18. Perry R, Sibley CG. Big-Five personality prospectively predicts Social Dominance Orientation and Right-Wing Authoritarianism. Pers Individ Dif. 2012;52(1):3-8. doi: 10.1016/j.paid.2011.08.009.

19. Sumino T. National identity and public attitudes toward multiculturalism in Canada: Testing the indirect effect via perceived collective threat. Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement. 2017;49(3):183-94. doi: 10.1037/cbs0000076.

20. Doane A. Beyond Color-blindness: (Re) Theorizing Racial Ideology. Sociological Perspectives. 2017;60(5):975-91. doi: 10.1177/0731121417719697.

21. Bonilla-Silva E. Racism without racists: Color-Blind Racism and the persistence of racial inequality in the United States. New York: Rowman & Littlefield; 2003.

22. Dunn K, Blair K, Alam O, Kamp A. Australians' Views on Cultural Diversity, Nation and Migration, 2015-16. Cosmopolitan Civil Societies: An Interdisciplinary Journal. 2017;9(3):61-84. doi: 10.5130/ccs.v9i3.5635.

23. Marwick A, Ansari Z, Sullivan M, Parsons L, McNeil J. Inequalities in the social determinants of health of Aboriginal and Torres Strait Islander People - A cross-sectional population-based study in the Australian state of Victoria. International Journal for Equity in Health. 2014;13(91):1-12. doi: 10.1186/s12939-014-0091-5.

24. Curthoys A. An uneasy conversation: the multicultural and the Indigenous. In: Docker J, Fischer G, editors. Race, colour and identity in Australia and New Zealand. Sydney: UNSW Press; 2000. pp. 21-36.

25. Denson N, Ovenden G, Wright L, Paradies Y, Priest N. The development and validation of intercultural understanding (ICU) instruments for teachers and students in primary and secondary schools. Intercultural Education. 2017;28(3):231-49. doi: 10.1080/14675986.2017.1333346.

26. Australian Institute of Health and Welfare. Australia's welfare 2017. Canberra: Australian Institute of Health and Welfare, 2017.

27. R Core Team. R: A language and environment for statistical computing. 2013.

28. Rosseel Y. Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). Journal of statistical software. 2012;48(2):1-36.

29. Jorgensen T, Pornprasertmanit S, Schoemann A, Rosseel Y. semTools: Useful tools for structural equation modeling. R Package Version 0.5-1. 2018.

30. Haynes SN, Richard DCS, Kubany ES. Content validity in psychological assessment: A functional approach to concepts and methods. Psychol Assess. 1995;7(3):238-47. doi: 10.1037//1040-3590.7.3.238.

31. Blair K, Dunn, K., Kamp, A., & Alam, O. Challenging Racism Project 2015-16 National Survey Report. In: University. SWS, editor. 2017.

32. VicHealth. Findings from the 2013 survey of Victorians' attitudes to race and cultural diversity. In: Foundation VHP, editor. Melbourne, Australia2014.

33. Rees S, Silove D, Chey T, Ivancic L, Steel Z, Creamer M, et al. Lifetime prevalence of gender-based violence in women and the relationship with mental disorders and psychosocial function. Journal of the American Medical Association. 2011;306(5):513-21. doi: 10.1001/jama.2011.1098.

34. Fokkema M, Greiff S. How Performing PCA and CFA on the Same Data Equals Trouble. Hogrefe Publishing; 2017.

35. Kline RB. Principles and practice of structural equation modeling. New York, NY: Guilford publications; 2015.

36. Fabrigar LR, Wegener DT. Exploratory factor analysis: Oxford University Press; 2011.

37. Cattell RB. The scree test for the number of factors. Multivariate behavioral research. 1966;1(2):245-76.

38. Horn JL. A rationale and test for the number of factors in factor analysis. Psychometrika. 1965;30(2):179-85.

39. Lawley DN. Vi.—the estimation of factor loadings by the method of maximum likelihood. Proceedings of the Royal Society of Edinburgh. 1940;60(1):64-82.

40. Harman HH. Modern factor analysis: University of Chicago press; 1976.

41. Efron B, Tibshirani RJ. An introduction to the bootstrap: CRC press; 1994.

42. Muthén B. A general structural equation model with dichotomous, ordered categorical, and continuous latent variable indicators. Psychometrika. 1984;49(1):115-32.

43. Asparouhov T, Muthén B. Simple second order chi-square correction. Mplus technical appendix. 2010.

44. Van Buuren S. Multiple imputation of discrete and continuous data by fully conditional specification. Stat Methods Med Res. 2007;16(3):219-42.

45. Rubin DB. Multiple imputation for nonresponse in surveys: John Wiley & Sons; 2004.

46. Yu C-Y. Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes: University of California, Los Angeles Los Angeles; 2002.

47. Van Prooijen J-W, Van Der Kloot WA. Confirmatory analysis of exploratively obtained factor structures. Educ Psychol Meas. 2001;61(5):777-92.

48. Saris WE, Satorra A, Van der Veld WM. Testing structural equation models or detection of misspecifications? Structural Equation Modeling. 2009;16(4):561-82.

49. Wu H, Estabrook R. Identification of confirmatory factor analysis models of different levels of invariance for ordered categorical outcomes. Psychometrika. 2016;81(4):1014-45.

50. Satorra A. Scaled and adjusted restricted tests in multi-sample analysis of moment structures. Innovations in multivariate statistical analysis: Springer; 2000. pp. 233-47.

51. Li K-H, Meng X-L, Raghunathan TE, Rubin DB. Significance levels from repeated p-values with multiply-imputed data. Statistica Sinica. 1991:65-92.

52. Cheung GW, Rensvold RB. Evaluating goodness-of-fit indexes for testing measurement invariance. Structural equation modeling. 2002;9(2):233-55.

53. Meade AW, Johnson EC, Braddy PW. Power and sensitivity of alternative fit indices in tests of measurement invariance. J Appl Psychol. 2008;93(3):568.

54. Byrne BM, Shavelson RJ, Muthén B. Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. Psychol Bull. 1989;105(3):456.

55. McDonald RP. Test theory: A unified treatment: Psychology Press; 2013.

56. Zumbo BD, Gadermann AM, Zeisser C. Ordinal versions of coefficients alpha and theta for Likert rating scales. Journal of modern applied statistical methods. 2007;6(1):4.

57. Dunn TJ, Baguley T, Brunsden V. From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. Br J Psychol. 2014;105(3):399-412.

58. Turner HJ, Natesan P, Henson RK. Performance Evaluation of Confidence Intervals for Ordinal Coefficient Alpha. Journal of Modern Applied Statistical Methods. 2017;16(2):9.

59. Piedmont RL. Inter-item correlations. Encyclopedia of quality of life and well-being research. 2014:3303-4.

60. Rolstad S, Adler J, Rydén A. Response burden and questionnaire length: is shorter better? A review and meta-analysis. Value Health. 2011;14(8):1101-8.

61. Zijlmans EAO, Tijmstra J, der Ark V, Andries L, Sijtsma K. Item-score reliability as a selection tool in test construction. Front Psychol. 2018;9:2298.

62. Guilford JP. The correlation of an item with a composite of the remaining items in a test. Educ Psychol Meas. 1953;13(1):87-93.

63. Gardner PL. Measuring attitudes to science: Unidimensionality and internal consistency revisited. Research in science education. 1995;25(3):283-9.

64. Kendall SM. Rank correlation. Van Nostrand's Scientific Encyclopedia. 1948.

65. Embretson SE. The new rules of measurement. Psychol Assess. 1996;8(4):341.

66. Ali US, Chang HH, Anderson CJ. Location Indices for Ordinal Polytomous Items Based on Item Response Theory. ETS Research Report Series. 2015;2015(2):1-13.

67. Muthen BO. Instructional Sensitivity in Mathematics Achievement Test Items: Application of a New IRT-Based Detection Technique. 1988.

68. Ferrando PJ. Difficulty, discrimination, and information indices in the linear factor analysis model for continuous item responses. Appl Psychol Meas. 2009;33(1):9-24.

69. Davidson M. Known-groups validity. Encyclopedia of quality of life and well-being research: Springer; 2014. pp. 3481-2.

70. Dandy J, Pe-Pua R. Attitudes to multiculturalism, immigration and cultural diversity: Comparison of dominant and non-dominant groups in three Australian states. International Journal of Intercultural Relations. 2010;34(1):34-46. doi: 10.1016/j.ijintrel.2009.10.003.

71. Dunn KM, Forrest J, Burnley I, McDonald A. Constructing Racism in Australia. Australian Journal of Social Issues. 2004;39(4):409-30. doi: 10.1002/j.1839-4655.2004.tb01191.x.

72. Cohen J. Statistical power analysis for the behavioral sciences. 2nd. Hillsdale, NJ: erlbaum; 1988.

73. Hancock GR. Effect size, power, and sample size determination for structured means modeling and MIMIC approaches to between-groups hypothesis testing of means on a single latent construct. Psychometrika. 2001;66(3):373-88.

74. Rabe-Hesketh S, Skrondal A. Assigning values to latent variables. Generalized latent variable modeling: Multilevel, longitudinal, and structural equation models: Chapman and Hall/CRC; 2004.

75. Sheather SJ, Jones MC. A reliable data-based bandwidth selection method for kernel density estimation. Journal of the Royal Statistical Society Series B (Methodological). 1991:683-90.

76. Satorra A, Bentler PM. Ensuring positiveness of the scaled difference chi-square test statistic. Psychometrika. 2010;75(2):243-8.

77. Marshall GN, Miles JN, Stewart SH. Anxiety sensitivity and PTSD symptom severity are reciprocally related: Evidence from a longitudinal study of physical trauma survivors. J Abnorm Psychol. 2010;119(1):143.

78. Harnish RJ, Bridges KR, Gump JT. Predicting Economic, Social, and Foreign Policy Conservatism: the Role of Right-Wing Authoritarianism, Social Dominance Orientation, Moral Foundations Orientation, and Religious Fundamentalism. Current Psychology. 2017;37(3):668-79. doi: 10.1007/s12144-016-9552-x.

79. Faulkner N, Bliuc A-M. 'It's okay to be racist': moral disengagement in online discussions of racist incidents in Australia. Ethnic Racial Stud. 2016;39(14):2545-63.

80. Nunnally JC, Bernstein IH. Psychometric theory: McGraw-Hill New York; 1967.

81. Furr RM, Bacharach VR. Psychometrics: an introduction. Thousand Oaks, CA: Sage; 2013.

82. Wells CS, Wollack JA. An instructor's guide to understanding test reliability. Testing & Evaluation Services University of Wisconsin. 2003.