

Racial discrimination and socioemotional and sleep problems in a cross-sectional survey of Australian school students

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ABSTRACT

Objective To determine the prevalence of direct and vicarious racial discrimination experiences from peer, school and societal sources, and examine associations between these experiences and socioemotional and sleep outcomes.

Methods Data were analysed from a population representative cross-sectional study of n=4664 school students in years 5–9 (10–15 years of age) in Australia. Students reported direct experiences of racial discrimination from peers, school and societal sources; vicarious discrimination was measured according to the frequency of witnessing other students experiences of racial discrimination. Students self-reported on the Strengths and Difficulties Questionnaire, with the total difficulties, conduct, emotional and prosocial behaviour subscales examined. Sleep problems included duration, latency, and disruption.

Results 41.56% (95% CI 36.18 to 47.15) of students reported experiences of direct racial discrimination; Indigenous and ethnic minority students reported the highest levels. 70.15% (95% CI 63.83 to 75.78) of students reported vicarious racial discrimination. Direct and vicarious experiences of racial discrimination were associated with socioemotional adjustment (eg, for total difficulties, total direct racism: beta=3.77, 95% CI 3.11 to 4.44; vicarious racism: beta=2.51, 95% CI 2.00 to 3.03). Strong evidence was also found for an effect of direct and vicarious discrimination on sleep (eg, for sleep duration, total direct: beta=-21.04, 95% CI -37.67 to -4.40; vicarious: beta=-9.82, 95% CI -13.78 to -5.86).

Conclusions Experiences of direct and vicarious racial discrimination are common for students from Indigenous and ethnic minority backgrounds, and are associated with socioemotional and sleep problems in adolescence. Racism and racial discrimination are critically important to tackle as social determinants of health for children and adolescents.

INTRODUCTION

Racism is a fundamental cause of health and health inequalities globally.¹ Racism is a system that stratifies, devalues and disempowers groups considered inferior and differentially allocates opportunities and resources within society.² Racial discrimination is the behavioural manifestation of racism, with well-documented health impacts in adults.^{1,3} A recent American Academy of Pediatrics statement highlights that children and adolescents

What is already known on this subject?

- Considerable evidence documents racism's harmful effects on a wide range of adult health outcomes across populations and contexts.
- Children and adolescents may be particularly vulnerable to the negative health impacts of racism.
- Effects of racial discrimination on child and adolescent mental health have been documented, with sleep identified as an important area of concern requiring investigation.

What this study adds?

- In a large cross-sectional survey of Australian adolescents, there are high levels of direct and vicarious racial discrimination.
- Direct and vicarious racial discrimination were associated with socioemotional adjustment and sleep problems.
- Health practitioners, policy makers and researchers must continue to name, examine and address racism as key determinants of child and adolescent health.

are vulnerable to racism's harms and the urgent need to address racism as a determinant of child and adolescent health.⁴

Effects on child and adolescent mental health have been most commonly examined, with associations observed between racial discrimination and negative and positive mental health.⁵ Racial discrimination can influence mental health via psychological and behavioural responses such as hypervigilance, rumination, heightened threat perception and situation avoidance and through dysregulation of biological stress responses.⁶ Links between racial discrimination and child and adolescent sleep are also emerging.⁷ However, evidence is limited to small community samples (n≤350) in the USA,^{8–15} and one larger sample of Indigenous Australian children using a single item carer-reported sleep measure.⁷ Accumulating evidence of links between child and adolescent sleep and cardiometabolic risk highlight its importance.¹⁶



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Increased attention to the complex ways racism can influence the lives of children and young people is recommended.⁴ As well as direct experiences of racial discrimination, experiences can occur vicariously, that is, witnessing discrimination directed at others.^{5 17} However, a recent systematic review found only three studies that examined effects of witnessing racial discrimination on child and adolescent health, all using small community samples.¹⁷ Racial discrimination can also arise in a range of developmental contexts and from a range of sources, including from peers, school and the wider society. As children and adolescents develop and increasingly operate outside of the family, these contexts become progressively more salient for self-esteem and identity.¹⁸ Greater attention to direct and vicarious discrimination across sources and settings is needed to avoid underestimating the burden of exposure, capture their potentially different health consequences and inform optimal targeting of interventions.³

This study aims to examine the prevalence of direct and vicarious racial discrimination experiences from peer, school and societal sources according to Indigenous status and ethnicity. We also aim to estimate the association between these experiences with two contrasting outcomes: 1) socioemotional outcomes, a well-established sequelae of discrimination and 2) sleep outcomes, an emerging area of concern for children experiencing discrimination. This study capitalises on data from a large-scale cross-sectional population representative survey of school students. The setting of this study was Australia, where racism has been deeply embedded in the foundations and systems of society since colonisation. Indigenous peoples make up 3.3% of the Australian population,¹⁹ and experience some of the most profound health inequities globally.²⁰ Australia's migrant population also faces considerable racism and is growing quickly, with over a quarter of the population overseas born.¹⁹ Europe and Asia are the most common source regions, though migration from the Middle East and Africa is increasing.¹⁹

METHODS

Data source

The Speak Out Against Racism (SOAR) student survey is a large-scale, population representative cross-sectional study of n=4664 school students in years 5–9 (10–15 years of age) in two Australian states: New South Wales and Victoria. Responses were collected across 23 schools in metropolitan and regional areas over a 10-week period in 2017. Full details are documented elsewhere²¹ but in brief, a list of government schools and their characteristics was obtained from state education departments and a balanced stratification sampling method used. Weights (applied herein) were created to adjust the sample to be representative of the government school student population in each state and to account for clustering at the school level.

Measures

Outcomes

Socioemotional outcomes

The Strengths and Difficulties Questionnaire (SDQ) is a brief questionnaire assessing child and youth psychological outcomes.²² The youth-reported (11–17 years) SDQ consists of 25 items across 5 subscales. We examined the total difficulties, conduct and emotional scales, the latter of which were taken as an indicator of externalising and internalising problems, respectively.²³ We also examined child strengths in relation to prosocial behaviour. While cut-points have been developed for the SDQ,

these have not been validated for ethnic minority youth; continuous scores are analysed herein.

Sleep problems

Sleep duration was calculated as the difference between student self-reported sleep time and wake-up time, separately for school and non-school days. Analysis was restricted to sleep durations between 2.5 and 20 hours,²⁴ which included 99.7% of observations. Sleep latency was measured using the item “During the last four weeks, how long did it usually take for you to fall asleep”, categorised as 0–30 min, 30–60 min or >60 min.²⁵ Sleep disruption was measured using the item “During the past four weeks, how often did you awaken during your sleep time and have trouble falling back to sleep again?”, rated as none/a little, some/a good bit, most/all. These items have previously been used with children and adolescents from diverse ethnic backgrounds.²⁵

Exposures

Direct experiences of racial discrimination

Student reports of racial discrimination experiences were measured using 10 items drawn from the Adolescent Discrimination Distress Index (ADDI)²⁶ together with two items used previously with diverse Australian school students²⁷; full details in online supplementary appendix 1. Items assessed discrimination by peers at school (four items), school personnel (three items) and others in society (five items). Each discrimination item was then followed by the attribution (“because of...”) with “your race/ethnicity/cultural background” being one of three non-mutually exclusive options. ‘Culture’ is commonly used to refer to race or ethnicity in Australian community vernacular so was included in the attribution following previous approaches.²⁷ Frequency was reported from 0=“this did not happen to me”, 1=“once or twice”, 2=“every few weeks”, 3=“about once a week”, to 4=“several times a week or more”. Following previous approaches,²⁶ subscales were created for each source of discrimination (peer, school, societal) by calculating the mean frequency rating for relevant items. A total score was calculated by taking the average of responses to all 12 items (Cronbach's $\alpha=0.92$).

Vicarious racial discrimination

Student report of vicarious discrimination was measured using five items drawn from previous studies (full details in online supplementary appendix 1).²⁷ Students were asked how often they had seen other students treated unfairly, for example, treated with less respect by other students because of their race/ethnicity/cultural background (four items), and how often they had seen “other students being picked on or treated with less respect by teachers at this school because of their race/ethnicity/cultural background?” (one item). Response options were 0=“never”, 1=“hardly ever”, 2=“sometimes”, 3=“most of the time” and 4=“always”. A vicarious discrimination scale was derived by taking the mean of responses across these five items ($\alpha=0.86$).

Covariates

Ethnicity was measured using a self-reported variable with categories developed for the study. Other than Indigenous background, self-reported race/ethnicity is not routinely collected in Australian schools so a standard classification is not available. Students were asked to select their racial/ethnic group/s from a list developed based on the most common categories in the Australian population, which included an open-ended ‘other’ free text field. Response options to ‘other’ were later back coded to the original

Table 1 Key study variables overall and by Indigenous status and ethnicity

| | Indigenous status and ethnicity M (SD) or % (95% CI) | | | | | | | | | |
|----------------------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Overall M (SD) or % (95% CI) | Indigenous | Pacific/ Maori | Middle Eastern | African | South Asian | East Asian | S East Asian | European | Anglo |
| Sociodemographic characteristics | | | | | | | | | | |
| Overall % (95% CI) | 4.67 (2.67 to 8.04) | 3.69 (2.11 to 6.36) | 5.52 (3.62 to 8.33) | 3.19 (2.13 to 4.75) | 5.48 (3.29 to 9.00) | 7.72 (4.73 to 12.36) | 8.69 (3.01 to 22.63) | 15.36 (12.39 to 18.88) | 39.54 (30.66 to 49.17) | |
| Born overseas | | | | | | | | | | |
| Female | 16.78 (13.26 to 21.00) | 5.20 (1.74 to 14.52) | 29.57 (11.09 to 58.56) | 34.80 (22.59 to 49.39) | 50.40 (36.66 to 64.07) | 53.98 (39.52 to 67.79) | 34.60 (18.66 to 54.96) | 28.90 (13.21 to 52.04) | 9.38 (7.16 to 12.19) | 3.86 (2.63 to 5.62) |
| School year | 51.03 (47.54 to 54.51) | 45.21 (37.80 to 52.83) | 55.17 (39.52 to 69.87) | 43.59 (39.50 to 47.77) | 49.23 (39.64 to 58.87) | 60.40 (47.31 to 72.15) | 50.18 (46.17 to 54.19) | 53.92 (47.35 to 60.35) | 51.71 (48.12 to 55.28) | 51.71 (48.12 to 55.28) |
| Racial Discrimination | 6.47 (1.39) | 6.05 (1.66) | 6.64 (1.61) | 6.87 (1.34) | 6.45 (1.43) | 6.71 (1.38) | 7.39 (1.22) | 6.41 (1.40) | 6.25 (1.23) | |
| Direct - Peer | | | | | | | | | | |
| Direct - School | 0.27 (0.60) | 0.49 (1.15) | 0.32 (0.65) | 0.40 (0.73) | 0.36 (0.55) | 0.42 (0.64) | 0.37 (0.68) | 0.21 (0.48) | 0.17 (0.49) | |
| Direct - Societal | 0.14 (0.49) | 0.27 (0.95) | 0.21 (0.70) | 0.26 (0.59) | 0.34 (0.71) | 0.16 (0.43) | 0.24 (0.64) | 0.09 (0.40) | 0.08 (0.37) | |
| Direct - Total | 0.2 (0.51) | 0.39 (1.05) | 0.24 (0.69) | 0.34 (0.55) | 0.40 (0.70) | 0.33 (0.47) | 0.34 (0.63) | 0.14 (0.42) | 0.11 (0.39) | |
| Direct - Any Peer | 0.21 (0.49) | 0.40 (1.00) | 0.28 (0.63) | 0.34 (0.53) | 0.37 (0.57) | 0.32 (0.46) | 0.33 (0.61) | 0.15 (0.36) | 0.12 (0.39) | |
| Direct - Any School | 32.40 (28.60 to 36.43) | 42.67 (38.94 to 46.49) | 45.77 (40.15 to 51.49) | 44.89 (36.38 to 53.71) | 49.29 (34.87 to 63.83) | 45.15 (37.76 to 52.77) | 47.82 (38.83 to 56.95) | 45.45 (34.29 to 57.09) | 31.28 (23.24 to 40.64) | 20.32 (17.38 to 23.63) |
| Direct - Any Societal | 12.94 (10.76 to 15.48) | 20.70 (17.11 to 24.81) | 16.83 (6.92 to 35.49) | 25.35 (18.00 to 34.43) | 31.74 (21.30 to 44.42) | 18.92 (13.62 to 25.67) | 20.02 (15.22 to 25.87) | 8.04 (4.95 to 12.80) | 6.36 (4.73 to 8.50) | |
| Direct - Any | 27.52 (23.79 to 31.59) | 36.97 (33.44 to 40.65) | 32.86 (21.34 to 46.90) | 46.3 (32.04 to 61.20) | 46.42 (32.01 to 61.46) | 45.66 (39.24 to 52.23) | 55.03 (42.63 to 66.84) | 43.60 (34.37 to 53.30) | 21.07 (14.29 to 29.92) | 13.59 (11.16 to 16.46) |
| Vicarious - Any | 41.56 (36.18 to 47.15) | 50.14 (43.55 to 56.71) | 60.97 (53.80 to 67.69) | 61.27 (51.59 to 70.13) | 58.03 (38.87 to 75.05) | 67.05 (54.18 to 77.79) | 58.74 (45.70 to 70.66) | 38.21 (27.78 to 49.86) | 25.13 (22.00 to 28.54) | |
| Vicarious - Any | 0.78 (0.77) | 0.94 (1.26) | 1.10 (0.95) | 0.82 (0.89) | 0.87 (0.66) | 0.82 (0.74) | 0.74 (0.74) | 0.70 (0.68) | 0.73 (0.72) | |
| Socioemotional outcomes | | | | | | | | | | |
| Total difficulties | 70.15 (63.83 to 75.78) | 71.68 (59.4 to 81.4) | 77.22 (68.31 to 84.21) | 66.43 (57.97 to 73.95) | 82.83 (72.32 to 89.91) | 69.39 (61.71 to 76.13) | 67.42 (53.4 to 78.89) | 70.52 (57.83 to 80.67) | 68.07 (61.4 to 74.08) | |
| Emotional symptoms | 11.86 (6.32) | 13.94 (9.38) | 12.95 (5.94) | 11.28 (5.33) | 10.81 (6.73) | 11.22 (5.19) | 11.99 (5.22) | 11.83 (6.52) | 11.80 (6.24) | |
| Conduct problems | 3.41 (2.36) | 3.61 (3.20) | 3.5 (2.54) | 3.27 (2.21) | 3.14 (2.25) | 3.58 (2.07) | 3.8 (2.08) | 3.46 (2.48) | 3.35 (2.30) | |
| Prosocial behavior | 2.04 (1.88) | 2.74 (2.99) | 2.51 (1.87) | 2.00 (1.52) | 1.74 (1.80) | 2.06 (1.94) | 2.10 (1.69) | 1.96 (1.81) | 1.89 (1.79) | |
| Sleep latency 0-30 min | 7.73 (1.84) | 7.45 (2.95) | 7.80 (2.11) | 7.82 (2.01) | 7.62 (2.00) | 7.50 (1.92) | 7.27 (1.93) | 7.86 (1.70) | 7.91 (1.63) | |
| >30-60 min | 63.28 (60.93 to 65.57) | 59.16 (52.84 to 65.2) | 61.34 (45.45 to 75.13) | 70.58 (64.71 to 75.83) | 62.53 (47.63 to 75.38) | 77.70 (64.62 to 86.92) | 68.16 (61.62 to 74.54) | 52.48 (46.72 to 58.18) | 63.36 (59.86 to 66.71) | |
| >60 min | 22.27 (19.88 to 24.86) | 20.67 (13.77 to 29.84) | 19.02 (12.89 to 27.17) | 18.35 (11.04 to 28.91) | 21.46 (13.25 to 32.82) | 15.90 (10.34, 23.68) | 21.83 (15.50 to 29.85) | 29.51 (25.05 to 34.41) | 22.39 (19.38 to 25.71) | |
| Sleep disruption | 14.45 (13.02 to 16) | 20.17 (16.75 to 24.08) | 19.64 (10.27 to 34.29) | 11.08 (6.76 to 17.64) | 16.01 (10.23 to 24.04) | 6.40 (2.77, 14.12) | 9.23 (5.25 to 15.7) | 18.01 (15.50 to 20.82) | 14.26 (10.99 to 18.3) | |
| None/A little | 54.29 (51.51 to 57.05) | 41.52 (31.19 to 52.65) | 35.26 (24.67 to 47.52) | 57.54 (43.66 to 70.32) | 59.03 (47.80 to 69.39) | 62.42 (48.45 to 74.60) | 64.01 (53.31 to 73.47) | 53.46 (47.98 to 58.86) | 55.19 (51.71 to 58.62) | |
| Some/A good bit of the time | 25.93 (24.88 to 27.00) | 23.76 (17.30 to 31.69) | 19.15 (8.50 to 37.63) | 27.16 (19.94 to 35.82) | 18.95 (10.34 to 32.17) | 26.24 (16.06 to 39.82) | 20.02 (16.72 to 23.78) | 27.04 (23.75 to 30.61) | 26.95 (22.85 to 31.48) | |
| Most/All of the time | 19.78 (17.29 to 22.54) | 34.73 (26.89 to 43.48) | 45.6 (24.09 to 68.88) | 15.31 (9.37 to 24.01) | 22.02 (14.56 to 31.87) | 11.34 (8.72 to 14.61) | 15.98 (8.86 to 27.11) | 18.31 (13.08 to 25.04) | 19.49 (14.64 to 25.48) | |
| Sleep duration school day (min) | 549.84 (85.38) | 595 | 552.90 (97.74) | 522.46 (94.21) | 556.23 (83.38) | 557.93 (73.16) | 528.88 (84.44) | 550.57 (80.66) | 560.57 (75.98) | |
| non-school day (min) | 583.15 (113.99) | 571.77 (203.67) | 583.28 (135.38) | 563.08 (115.30) | 583.58 (100.01) | 594.26 (102.60) | 581.34 (104.08) | 580.77 (105.56) | 586.70 (107.48) | |

Table 2 Estimates from linear regression models showing associations between self-reported racial discrimination and socioemotional outcomes (n=4480)

| | Total difficulties | | | | Emotional symptoms | | | | Conduct problems | | | | Prosocial behavior | | | |
|------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|---------------------|------------------------|
| | Unadjusted | | Adjusted# | | Unadjusted | | Adjusted# | | Unadjusted | | Adjusted# | | Unadjusted | | Adjusted# | |
| | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | Beta (95% CI) | |
| Racial Discrimination | | | | | | | | | | | | | | | | |
| Peer | 2.91 (2.50 to 3.33) | 2.93 (2.64 to 3.22) | 0.72 (0.48 to 0.95) | 0.77 (0.57 to 0.97) | 0.79 (0.59 to 1.00) | 0.71 (0.56 to 0.86) | -0.11 (-0.28 to -0.08) | -0.18 (-0.28 to -0.08) | 0.71 (0.56 to 0.86) | 0.77 (0.57 to 0.97) | 0.79 (0.59 to 1.00) | 0.71 (0.56 to 0.86) | -0.11 (-0.28 to -0.08) | -0.18 (-0.28 to -0.08) | 0.71 (0.56 to 0.86) | -0.11 (-0.20 to 0.01) |
| School | 2.78 (2.11 to 3.46) | 2.62 (1.70 to 3.55) | 0.64 (0.47 to 0.81) | 0.68 (0.45 to 0.91) | 1.00 (0.65 to 1.34) | 0.86 (0.51 to 1.20) | -0.37 (-0.64 to -0.11) | -0.37 (-0.64 to -0.11) | 0.86 (0.51 to 1.20) | 0.68 (0.45 to 0.91) | 1.00 (0.65 to 1.34) | 0.86 (0.51 to 1.20) | -0.37 (-0.64 to -0.11) | -0.37 (-0.64 to -0.11) | 0.86 (0.51 to 1.20) | -0.28 (-0.53 to 0.04) |
| Societal | 3.29 (2.67 to 3.91) | 3.37 (2.65 to 4.09) | 0.92 (0.73 to 1.11) | 0.98 (0.78 to 1.18) | 0.95 (0.60 to 1.31) | 0.87 (0.56 to 1.19) | -0.32 (-0.55 to -0.10) | -0.32 (-0.55 to -0.10) | 0.87 (0.56 to 1.19) | 0.98 (0.78 to 1.18) | 0.95 (0.60 to 1.31) | 0.87 (0.56 to 1.19) | -0.32 (-0.55 to -0.10) | -0.32 (-0.55 to -0.10) | 0.87 (0.56 to 1.19) | -0.22 (-0.44 to 0.02) |
| Total direct | 3.75 (3.18 to 4.31) | 3.77 (3.11 to 4.44) | 0.96 (0.76 to 1.16) | 1.03 (0.83 to 1.24) | 1.11 (0.76 to 1.47) | 1.00 (0.71 to 1.30) | -0.34 (-0.53 to -0.15) | -0.34 (-0.53 to -0.15) | 1.00 (0.71 to 1.30) | 1.03 (0.83 to 1.24) | 1.11 (0.76 to 1.47) | 1.00 (0.71 to 1.30) | -0.34 (-0.53 to -0.15) | -0.34 (-0.53 to -0.15) | 1.00 (0.71 to 1.30) | -0.24 (-0.41 to -0.06) |
| Vicarious | 2.52 (2.02 to 3.02) | 2.51 (2.00 to 3.03) | 0.69 (0.58 to 0.80) | 0.69 (0.58, 0.80) | 0.67 (0.49 to 0.84) | 0.66 (0.50 to 0.82) | 0.2 (-0.38 to 0.10) | 0.2 (-0.38 to 0.10) | 0.66 (0.50 to 0.82) | 0.69 (0.58, 0.80) | 0.67 (0.49 to 0.84) | 0.66 (0.50 to 0.82) | 0.2 (-0.38 to 0.10) | 0.2 (-0.38 to 0.10) | 0.66 (0.50 to 0.82) | 0.03 (-0.05 to 0.11) |

*Adjusted for ethnicity, gender, school year, country of birth, Index of Community Socio-Educational Advantage.

racial/ethnic categories (eg, Thai was coded as South-East Asian). Students could select more than one ethnicity. A prioritisation method was used to create mutually exclusive categories allocating children to the category with the highest level of stigmatisation, in the following order (Indigenous, Pacific Islander/Maori, Middle Eastern, African, Latinx (Latin American), South Asian, East Asian, South-East Asian, European and Anglo (white)).²¹ Five per cent of students had missing ethnicity data due to “do not know”, unintelligible or missing responses to this question. Rather than excluding these students from the analysis, a ‘Missing’ category was included within the ethnicity variable subsequently analysed. Estimates for students in this ‘Missing’ ethnicity group are not reported as meaningful interpretation was not possible. Due to very small numbers (n=35), estimates for Latinx students are not reported. Students self-reported their country of birth (coded as born overseas/born in Australia), gender (boy, girl, other) and school year level (years 5–9). Socioeconomic position at the school level was measured using the Index of Community Socio-Educational Advantage, a composite of average parent occupation and education across students, school geographic location and proportion of Indigenous students.²⁸

Statistical analysis

Regression models were fitted to estimate the prevalence of key study variables by ethnicity. To examine associations between racial discrimination and socioemotional and sleep outcomes, a series of regression models were run for each outcome. Linear regression models were fitted for socioemotional outcomes (continuous total difficulties, conduct, emotional and prosocial scores) and sleep duration (continuous duration of sleep in minutes), and multinomial regression models were fitted and parametrised in terms of relative risk ratios for sleep latency (0–30 min vs 30–60 min and 60 min) and sleep disruption (none/a little vs some/a good bit, and most/all trouble falling back to sleep). Unadjusted models examined the crude association between each racial discrimination exposure and each outcome. Next, models were further adjusted for gender, ethnicity, country of birth, year level and school socioeconomic background. As evidence suggests that sleep problems may be on the causal pathway between discrimination and mental health,²⁹ sleep was not included as a covariate in the socioemotional outcomes models.

There were small amounts of missing data on exposure measures (4% direct racial discrimination, 6% vicarious racial discrimination) and covariates (<1%), and for outcomes was minimal in the socioemotional domain (2%) and greater for sleep measures (10%–12%) (online supplementary table 1). The higher level of missingness for sleep data is likely related to question ordering whereby placement at the end of the survey impacted on participant’s fatigue. Indigenous and ethnic minority participants were more likely to have missing data for exposures and for outcomes. Analyses were run using both complete case and multiple imputation as alternative methods to address missing data. Multiple imputation by chained equations was implemented by generating 50 imputed data sets and combining results using Rubin’s rules.³⁰ These methods yielded very similar results indicating that the approach to missing data did not alter substantive conclusions. Results from complete case are presented throughout with multiple imputation findings presented in online supplementary tables 2–4. All analyses were conducted in Stata V.15³¹ using the ‘svy’ commands to accommodate sampling weights and account for clustering at the school level.

Table 3 Estimates from linear regression models showing associations between self-reported racial discrimination and sleep duration (n=3997)

| Racial Discrimination | Sleep duration (minutes) | | | |
|-----------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| | School day | | Non-school day | |
| | Unadjusted | Adjusted | Unadjusted | Adjusted |
| | Beta (95% CI) | Beta (95% CI)# | Beta (95% CI) | Beta (95% CI)# |
| Peer | -15.51 (-23.00 to -8.01) | -13.55 (-21.32 to -5.78) | -9.37 (-18.52 to -0.22) | -6.02 (-16.62 to 4.59) |
| School | -21.61 (-39.01 to -4.22) | -16.94 (-35.61 to 1.74) | -8.39 (-15.18 to -1.61) | -2.71 (-8.96 to 3.53) |
| Societal | -25.43 (-41.80 to -9.07) | -21.40 (-37.91 to -4.89) | -9.70 (-18.36 to -1.04) | -5.77 (-15.34 to 3.81) |
| Total direct | -25.13 (-40.81 to -9.46) | -21.04 (-37.67 to -4.40) | -11.39 (-20.73 to -2.05) | -6.19 (-16.84 to 4.47) |
| Vicarious | -9.55 (-14.20 to -4.90) | -9.82 (-13.78 to -5.86) | -9.26 (-14.95 to -3.58) | -9.15 (-15.05 to -3.25) |

*Adjusted for ethnicity, gender, school year, country of birth, Index of Community Socio-Educational Advantage.

RESULTS

The study sample (n=4664) was highly diverse across Indigenous background and ethnicity, reflective of the Australian population.

Overall, a substantial proportion (41.56%; 95% CI 36.18 to 47.15) of students reported experiences of direct racial discrimination, including direct experiences from peer (32.40%; 95% CI 28.60 to 36.43), school (12.94%; 95% CI 10.76 to 15.48) and societal 27.52% (95% CI 23.79 to 31.59) sources. Across all sources, far greater proportions of students from Indigenous and ethnic minority backgrounds reported direct racial discrimination than those from Anglo and European backgrounds (table 1); 70.15% (95% CI 63.83 to 75.78) of students reported vicarious racial discrimination.

There was strong evidence that direct experiences of racial discrimination across sources was related to socioemotional outcomes, after adjusting for sociodemographics (table 2). For example, each increase in frequency of total direct racial discrimination was associated with an increase of 3.77 (95% CI 3.11 to 4.44) in total difficulty scores. This effect was seen across both socioemotional difficulties and strengths. An effect was also seen for vicarious racial discrimination on all socioemotional outcomes examined except prosocial behaviours.

Strong evidence was also found for an effect of direct and vicarious racial discrimination across sources on sleep duration, sleep latency >60 min and sleep disruption, after adjusting for sociodemographics (tables 3 and 4).

DISCUSSION

Findings from the current study show that direct and vicarious forms of discrimination are common experiences for many Australian young people, with Indigenous and marginalised ethnic groups bearing the greatest burden. In a novel contribution to the literature, we have documented the harmful effects of direct racial discrimination experiences across multiple

sources and of vicarious racial discrimination on socioemotional outcomes and sleep problems for children and adolescents.

We found strong evidence that direct experiences of racial discrimination from peer, school and societal sources were associated with socioemotional outcomes. This was not restricted to socioemotional difficulties across the internalising and externalising spectrums, but also included child strengths. This reinforces a large body of existing evidence about the detrimental impact of racial discrimination on positive and negative mental health outcomes.⁵ Notably, the results were consistent regardless of the source (peer, school or societal), reinforcing the need to consider racial discrimination experiences across settings to fully capture its potential health consequences.

We also found strong and consistent evidence of a relationship between racial discrimination and sleep problems. Some studies have similarly reported associations between racial discrimination and sleep, including short sleep duration,^{13 14} lower sleep quality^{7 9 10 13-15} and objectively measured sleep latency and disturbance using wrist actigraphy.¹¹ Other studies have found racial discrimination and sleep duration unrelated,¹⁰ or only evident for adolescents with marginalised cultural orientations.⁸ The current findings add to this growing literature by providing evidence of an association using high-quality measures of both exposure and sleep problems.

A further contribution of this study are the findings that vicarious racial discrimination was associated with increased socioemotional difficulties and shorter sleep duration, longer sleep latency and increased sleep disturbance. This is counter to a previous study that found vicarious racism and depression and anxiety were unrelated, perhaps because this study only examined experiences arising online.¹⁷

Limitations and future directions

The analysis was limited to child and adolescent self-report of exposures and outcomes, and some measurement error is likely.

Table 4 Multinomial logistic regression showing associations between self-reported racial discrimination and sleep difficulties (n=4118)

| Racial Discrimination | Sleep latency | | | | Sleep disruption | | | |
|-----------------------|------------------------|---------------------|---------------------|---------------------|----------------------------------|---------------------|---------------------------------------|---------------------|
| | >30-60 min vs 0-30 min | | >60 min vs 0-30 min | | Some/A good bit vs None/A little | | Most/All of the time vs None/A little | |
| | Unadjusted | Adjusted* | Unadjusted | Adjusted* | Unadjusted | Adjusted* | Unadjusted | Adjusted* |
| | RR (95% CI) | RR (95% CI) | RR (95% CI) | RR (95% CI) | RR (95% CI) | RR (95% CI) | RR (95% CI) | RR (95% CI) |
| Peer | 1.20 (1.07 to 1.35) | 1.32 (1.17 to 1.50) | 1.48 (1.26 to 1.73) | 1.57 (1.34 to 1.85) | 1.62 (1.25 to 2.10) | 1.75 (1.27 to 2.40) | 1.73 (1.50 to 1.99) | 1.83 (1.54 to 2.18) |
| School | 1.02 (0.88 to 1.18) | 1.12 (0.95 to 1.31) | 1.34 (0.96 to 1.88) | 1.34 (1.00 to 1.79) | 1.59 (1.12 to 2.26) | 1.72 (1.12 to 2.65) | 1.86 (1.30 to 2.65) | 1.90 (1.17 to 3.11) |
| Society | 1.09 (0.95 to 1.26) | 1.21 (1.06 to 1.39) | 1.63 (1.33 to 2.00) | 1.71 (1.42 to 2.05) | 1.79 (1.29 to 2.50) | 1.95 (1.31 to 2.90) | 2.19 (1.57 to 3.04) | 2.30 (1.53 to 3.47) |
| Total direct | 1.14 (1.02 to 1.28) | 1.30 (1.14 to 1.47) | 1.62 (1.29 to 2.02) | 1.70 (1.39 to 2.08) | 1.95 (1.31 to 2.90) | 2.20 (1.34 to 3.62) | 2.31 (1.62 to 3.32) | 2.50 (1.55 to 4.04) |
| Vicarious | 1.11 (1.00 to 1.23) | 1.14 (1.04 to 1.26) | 1.31 (1.12 to 1.54) | 1.33 (1.14 to 1.55) | 1.35 (1.13 to 1.62) | 1.38 (1.13 to 1.68) | 1.75 (1.46 to 2.09) | 1.71 (1.46 to 2.02) |

*Adjusted for ethnicity, gender, school year, country of birth, Index of Community Socio-Educational Advantage. RR, risk ratio.

The vicarious discrimination measure only captures witnessing experiences of other students, and is likely to underestimate vicarious exposure. Future research would benefit from objective sleep measures and more comprehensive vicarious racism assessment, and replication in different countries and contexts. Examining the extent to which associations between Indigeneity, ethnicity and racial discrimination, and between racial discrimination and outcomes, are modified by factors such as gender and age is also important.

Given the cross-sectional data, it is also possible that poor mental health and sleep influenced children's reporting of discrimination experiences (eg, through hypervigilance and greater attention to negative events), contributing to the associations observed. Longitudinal analyses using population representative samples would provide stronger evidence of causal relations. It would also allow for examination of potential mediating effects of sleep on relationships between discrimination and mental health. This would provide additional insights into opportunities to attenuate the impact of racial discrimination. Even more important than opportunities to attenuate impact is fundamentally addressing racism.^{4,6}

CONCLUSION

Using data from a large cross-sectional population representative sample of diverse Australian school students, we show experiences of direct racial discrimination are common for Indigenous and ethnic minority students. Students from all backgrounds reported high levels of vicarious racial discrimination. Racial discrimination was associated with socioemotional outcomes and sleep problems in adolescence. Racism and racial discrimination are critically important to tackle as social determinants of health for children and adolescents.

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