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Exploring relationships between racism, housing and child illness in remote indigenous communities

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ABSTRACT

Background Although racism is increasingly acknowledged as a determinant of health, few studies have examined the relationship between racism, housing and child health outcomes.

Methods Cross-sectional data from the Housing Improvement and Child Health study collected in ten remote indigenous communities in the Northern Territory, Australia were analysed using hierarchical logistic regression. Carer and householder self-reported racism was measured using a single item and child illness was measured using a carer report of common childhood illnesses. A range of confounders, moderators and mediators were considered, including socio-demographic and household composition, psychosocial measures for carers and householders, community environment, and health-related behaviour and hygienic state of environment.

Results Carer self-reported racism was significantly associated with child illness in this sample after adjusting for confounders (OR 1.65; 95% CI 1.09 to 2.48). Carer negative affect balance was identified as a significant mediator of this relationship. Householder self-reported racism was marginally significantly associated with child illness in this sample after adjusting for confounders (OR 1.43; 95% CI 0.94 to 2.18, $p=0.09$). Householder self-reported drug use was identified as a significant mediator of this relationship.

Conclusions Consistent with evidence from adult populations and children from other ethnic minorities, this study found that vicarious racism is associated with poor health outcomes among an indigenous child population.

INTRODUCTION

Racism is recognised as a key determinant of health for indigenous Australians¹ and for minority groups internationally.² A phenomenon resulting in avoidable and unfair inequalities in power, resources and opportunities across racial or ethnic groups, racism can be expressed through beliefs and stereotypes, prejudices or discrimination.³ Racism can occur across a range of levels, from open threats and racial slurs to being entrenched in societal systems and institutions.⁵ Although the study of racism and health is a growing field of investigation, to date little work has focused on children and young people.^{2 4 5} Those studies that do exist have focused on African Americans in the United States, and on adolescents and older children.⁵

Strong associations between self-reported racism and poor health outcomes have been identified for adults from a range of minority groups within developed countries after adjusting for a range of

confounders and in longitudinal and cross-sectional studies.^{2 4 6} For children and young people, associations are reported between racism and poor mental health as well as behavioural difficulties and indicators of metabolic and cardiovascular disease.^{5 7}

Vicarious experiences of racism, such as caregiver racism are considered highly likely to impact negatively on child health, although casual pathways and mechanisms are currently poorly understood. The few studies that have explicitly explored the impact of racism on parenting have identified links between racism and reduced maternal support available to children, limited parental ability to provide a warm and caring environment, reduced quality of maternal-child relationship, and high levels of uninvolved parenting.^{5 7} Parenthood is considered a time of particular vulnerability to racism due to heightened awareness of racism as an impediment to achieving life goals and of the desire to protect children from negative life experiences.⁷

Indigenous people are among the most disadvantaged in Australia and this disadvantage is associated with both historical and contemporary racism, colonisation and oppression.⁸ However, research on racism and its health effects for indigenous children and young people is limited. The most comprehensive epidemiological data available are provided by the Western Australian Aboriginal Child Health Survey, which found that 21.8% of 1073 indigenous young people aged 12–17 years reported racism (treated badly or refused service due to being aboriginal in the past 6 months).⁹ After adjusting for relevant confounders, reported racism was significantly associated with drinking to excess and frequent marijuana use, high risk of clinically significant emotional or behavioural difficulties, and attempted suicide.⁹

Children living in remote indigenous communities experience high rates of common childhood illnesses compared to other Australian children,¹⁰ which substantially impacts on their later health, social and educational outcomes.¹¹ Poor housing conditions are a critical factor influencing these poor health outcomes,¹² leading to increased transmission of infection due to poor infrastructure (such as inadequate sanitation), inadequate food preparation and storage technology, increased interpersonal contact due to overcrowding, and increased stress and poor mental health.¹³

Both racism and housing conditions are identified as critical determinants of indigenous health.¹ However, associations between racism, housing conditions and childhood illnesses for children living in remote indigenous communities have yet to be examined. Independently, racism and housing conditions are both associated with child health,

and with adult physical and mental health. It is plausible that poor adult health resulting from poor housing conditions increases vulnerability to racism and its negative effects on both adults and children, and also that poor adult health resulting from racism increases vulnerability to the negative effects of poor housing. Poor housing may also be a marker for institutionalised racism. In this study we examined associations between racism, housing conditions and child illnesses among children in remote indigenous communities and examined potential mediators, including carer psychosocial wellbeing.

METHODS

Study setting and design

The Housing Improvement and Child Health (HICH) study was conducted in ten remote indigenous communities across the Northern Territory (NT) of Australia in 2003–04. These communities were selected due to plans for extensive housing construction and to reflect the diversity of geography and architecture across NT communities. Detailed information on HICH is described elsewhere, including involvement of an anthropologist in developing methodology and identifying measures used.^{12 14–16} All houses with at least one child aged 7 years or less were included in HICH. Data were collected via: (i) interviewer-administered surveys of person self-identified as the child's primary carer and the person identified as the head of the household (main householder); (ii) audit of health clinic records; (iii) a detailed survey of the functional state of the household infrastructure; (iv) a survey of the general community environment; and (v) interviews with senior members of the community council or housing office. Appropriate interpretation of survey responses was supported by employment of local community residents.¹⁴ Both carer and householder data were collected in recognition of the complex nature of indigenous households in remote communities that tend to be large, non-nuclear and fluid in composition.¹¹ Ethics approval was obtained from the Health Research Ethics Committees in the Top End and Central regions of the NT and formal agreements to participate were signed by peak organisations in each of the ten indigenous communities.

Measures

Outcomes: childhood illness

Data on five childhood illnesses common in remote communities were collected by asking the primary carer if the child had had such an illness in the last 2 weeks (respiratory infection; diarrhoea and/or vomiting; ear infection; scabies with or without skin infection, including boils; and skin infection, including boils with no scabies). Colloquial terms used by local community residents were used when asking about these illnesses. The overall number of childhood illnesses was coded as a composite binary variable (less than two illnesses compared to two or more). Given a relatively small sample size, sensitivity analysis assessed different cut-points to maximise the number of participants in each category and hence study power.

Primary explanatory variables: carer and householder self-reported racism

Carer and householder self-reported racism were measured using the Negative Life Events Scale (NLES). The NLES has been validated in remote indigenous communities and in recent national social and health surveys.¹⁷ (Young M and Stevens M, submitted 2010). As well as measuring poor health, job loss, death of a family member, experience of actual or threatened

violence, and trouble with the police, racism is assessed by asking respondents if they have been 'treated badly because (they) are aboriginal or Torres Strait islander'. Respondents were asked 'have you or any other people in this house had to worry for/about any of these things (shown list of stressors) in the last year?' Yes or no responses were elicited after each item was read out by the interviewer. Thus, the term 'self-reported racism' as used below refers to reported worry about racism in the last year for the respondent and/or another member of their household.

Other explanatory variables

A range of socio-demographic and household characteristics were collected for children, carers and householders. Carers and householders reported sex, age, highest year of schooling and financial stress ('In the last two weeks, were there any days when you ran out of money for food, clothing and bills?'). Carers rated their health in a single item ('In general would you say that your health is excellent, very good, good, ok or bad?'). This was categorised into three groups (excellent/very good, good, ok/bad) for analysis. Carers and householders reported whether they smoked cigarettes (yes/no) and householders reported number of other inside smokers, categorised into two groups (none, 1 or more) for analysis.

Carers also reported child age, sex, mobility ('Does this child always live/sleep at this house?'; yes/no), child relationship to householder (son/daughter, grandson/daughter, nephew/niece, other), carer relationship to child (mother, father, aunt, grandma, other), child attendance at a childcare centre (yes/no), and breastfeeding ('Did you breastfeed your child when he/she was a baby?'; yes/no). For analysis, data were categorised into three groups for child age (<1 year, 1–2 years, 3–7 years), carer age (<20, 20–34, 35+ years), householder age (20–34, 35–49, 50+ years) and carer/householder highest year of schooling (<8, 9–10, 11–12 years or more).

Carers responded to two psychosocial measures. The Brief Screen for Depression (BSD) produces a score out of 50, with respondents scoring ≥ 25 classified as depressed¹⁸ ($\alpha=0.57$ in this study). The BSD has established concurrent and discriminant validity.¹⁹ Positive and negative affect were measured using the two 5-item scales of the Affect Balance Scale²⁰ which have been used with other indigenous populations.²¹ Recent analysis of this measure confirmed its psychometric validity²² (in this study, negative affect balance scale $\alpha=0.54$ and positive affect balance scale $\alpha=0.67$). Householders responded to two different psychosocial measures. Mastery was measured using Pearlin's 7-item instrument (with 5-point Likert response scale).²³ This instrument has been widely used,²⁴ including with other indigenous populations²⁵ ($\alpha=0.60$ in this study). Self-efficacy was measured using the Generalised Self Efficacy Scale,²⁶ widely used internationally²⁷ ($\alpha=0.83$ in this study).

Community survey items measured the community's distance from a major service centre; housing quantity and quality; council and housing management; quality of infrastructure (ie, roads, trash/rubbish/waste dump, public toilets, water and electricity supply); availability of community facilities, including community development employment projects (CDEPs), women's centre, canteen/alcohol outlet and aged care facility (yes/no); and access to healthcare services, including doctor (resident/visits community twice a week/once a week/fortnightly), aboriginal health workers (two or more/none), resident nurses in community (less than three/three or more), and number of staff at the health centre for less than 3 months (three or more/less than two). Health-related behaviour and hygienic state of environment variables included pest and dust control; washing

facilities for people, clothes and bedding; and storage/preparation of food. Detail on these items are reported elsewhere.¹⁴ These community survey and health-related behaviour and hygienic state of environment variables were included in analysis as they were hypothesised to be associated with carer experience of racism, carer psychosocial wellbeing and childhood illnesses.

Statistical analysis

Interview and survey data were available from 279 houses with children in the eligible age range. Data were obtained on 618 individual children aged 7 years or less, comprising 85% of the estimated total 727 children in the eligible age range in the 10 communities.¹² A total of 26.6% of children lived in houses where the carer and the householder were the same in the sample of children, which equated to 23.8% of carers being the householder in the carer sample. Carer and householder data were each analysed separately to avoid potential for double counting. Data were obtained from 352 carers and from 275 householders. All analysis was conducted using Stata 10 Intercooled for Windows.

The following bivariate associations were examined separately for carer and householder self-reported racism using the χ^2 test and simple logistic regression: report of racism and each individual child illness as well as the composite child illness measure; report of racism and all other explanatory variables (socio-demographic and household composition; psychosocial; NLES stressors excluding racism; community; health-related behaviour; and hygienic state of environment). Bivariate associations between child socio-demographic explanatory variables and the composite child illness measure were also examined to identify potential confounders.

All variables with a marginal statistical significance ($p < 0.10$) were considered for inclusion in hierarchical multiple logistic regression analyses, with carer reported racism as the independent variable and the composite child illness measure as the dependent variable. Variables were entered in blocks at separate steps. Child sex, age, mobility, relationship to householder, relationship to carer, childcare attendance and breastfeeding were added in the first step. Carer socio-demographic, household composition and psychosocial variables were added in the second step, followed by NLES stressors in the third step, then finally community variables in the fourth step. At each step of the analysis, only variables significant at the $p \leq 0.05$ level were retained. These analyses were repeated with householder reported racism as an independent variable. The Wald test was used to assess model fit at each step of the analysis. Variance inflation factors of less than three for variables across all models indicated that multicollinearity was not present.

Interaction (ie, effect modification) between racism and other independent variables in the final model was also explored (with removal set at $p > 0.10$). All confidence intervals were adjusted for clustering of children by community and dwelling using the Huber–White sandwich variance estimator.²⁸

Relevant variables in the final model were explored as potential mediators between carer and householder reported racism and child health using the method outlined by Baron and Kenny.²⁹ More sophisticated bootstrapping approaches to assessing mediation are not appropriate under the adjustment for clustering required by the survey design. Use of the Sobel test to examine mediation significance is not possible for logistic regression.³⁰

RESULTS

Racism was reported by 34.4% of carers and 38.2% of householders in the 12 months prior to the survey. Bivariate analysis

found a statistically significant association between number of child illnesses (0–1 compared to 2–4) and carer reported racism (OR 1.54; 95% CI 1.04 to 2.29, $p = 0.03$) as well as householder reported racism (OR 1.53; 95% CI 1.02 to 2.3, $p = 0.04$). When childhood illnesses were considered individually, ear infection in the last 2 weeks was marginally significantly associated with carer reported racism (OR 1.50; 95% CI 0.99 to 2.28, $p = 0.06$) and significantly associated with householder reported racism (OR 1.56; 95% CI 1.04 to 2.33, $p = 0.03$). No significant associations were found for skin infection without scabies, scabies, chest infection or diarrhoea and/or vomiting with either carer or householder reported racism (see table 1).

For carers, there were no statistically significant associations between racism and socio-demographic characteristics. Carer reported racism was, however, associated with carer negative affect balance (OR 2.54; 95% CI 1.51 to 4.28) (see table 2). For householders, associations were found between reported racism and householder level of education as well as between reported racism and financial stress (see table 3).

Of the community level variables, carer reported racism was statistically significantly associated with access to a doctor, with higher reported racism for carers associated with a doctor visiting once per week (OR 1.84; 95% CI 1.06 to 3.17, $p = 0.03$) and visiting once per fortnight (OR 4.55; 95% CI 2.22 to 9.34, $p < 0.001$) compared to carers with a resident doctor. Significant bivariate associations were also found between carer reported racism and no aboriginal health worker in the health centre (OR 3.73; 95% CI 1.97 to 7.32, $p < 0.001$) and less than two staff at the health centre for more than six months (OR 3.73; 95% CI 1.90 to 7.32, $p < 0.001$). Presence of individual community facilities was also significantly associated with carer reported racism in bivariate analysis. Carer reported racism was positively associated with CDEPs (OR 3.13; 95% CI 1.06 to 9.21, $p = 0.04$) and with a canteen/alcohol outlet (OR 2.05; 95% CI 1.14 to 3.71, $p = 0.02$); and negatively associated with a women's centre (OR 0.55; 95% CI 0.33 to 0.91, $p = 0.02$) and an aged care facility (OR 0.63; 95% CI 0.40 to 0.98, $p = 0.04$). Similar associations were found for householders, although CDEP and presence of a canteen/alcohol facility were not significant (see table 4).

There were no statistically significant bivariate associations between health-related behaviour and hygienic state of environment variables and either carer or householder reported racism. Consequently these variables were not examined in hierarchical regression models.

In the multivariable model, the association between carer reported racism and carer reported child illness remained after adjusting for the child's sex, age, time in day care and breastfeeding (adjusted OR 1.65; 95% CI 1.09 to 2.48, $p = 0.02$). No significant interactions were observed in the adjusted model (see table 5). Carer negative affect balance met Baron and Kenny's conditions for a partial mediator²⁹: strong evidence of an association between carer-reported racism and carer negative affect balance (OR 2.40; 95% CI 1.51 to 3.81, $p < 0.001$), strong association between carer-reported racism and child illness (OR 1.63; 95% CI 1.15 to 2.32, $p = 0.006$), and a decreased association between carer-reported racism and child illness after controlling for carer negative affect balance (OR 1.52; 95% CI 1.05 to 2.22, $p = 0.03$). Carer reported drug problems also met the conditions for a mediator with a strong association between carer reported racism and carer reported drug problems (OR 3.62; 95% CI 2.09 to 6.28, $p < 0.001$), and no significant association between carer racism and child illness after controlling for carer reported drug problems (OR 1.33; 95% CI 0.88 to 2.02, $p = 0.17$).

Table 1 Sample characteristics of children (n=618) and carer/householder reported racism

	% (n)	Carer		Householder	
		% reporting racism (n)	Unadjusted OR (95% CI)	% reporting racism (n)	Unadjusted OR (95% CI)
Sex					
Male	52.3 (317)	32.1 (100)	1.00	40.3 (123)	1.00
Female	47.7 (289)	33.5 (95)	1.11 (0.79 to 1.56)	37.8 (105)	1.11 (0.79 to 1.56)
Age group (years)					
<1	15.4 (95)	28.0 (26)	0.78 (0.4 to 1.52)	30.8 (28)	1.75 (1.05 to 2.92)
1–2	30.7 (190)	36.5 (69)	1.10 (0.68 to 1.81)	43.8 (81)	1.39 (0.87 to 2.22)
3–7	53.9 (333)	31.6 (103)	1.00	38.2 (122)	1.00
Child always sleeps here					
No	10.0 (62)	33.9 (21)	1.00	36.1 (22)	1.00
Yes	90.0 (556)	32.4 (177)	1.41 (0.64 to 3.11)	39.1 (209)	1.14 (0.60 to 2.16)
Relationship to householder					
Son/daughter	29.6 (183)	38.7 (70)	1.00	40.1 (71)	1.00
Grandson/daughter	49.8 (308)	29 (88)	0.67 (0.41 to 1.11)	39.3 (117)	0.97 (0.55 to 1.69)
Nephew/niece	15.7 (97)	32.6 (31)	0.83 (0.42 to 1.67)	40.2 (37)	1.00 (0.51 to 1.97)
Other	4.9 (30)	31.0 (9)	1.02 (0.40 to 2.63)	21.4 (6)	0.41 (0.14 to 1.15)
Carer relationship to child					
Mother	72.6 (442)	33.6 (146)	1.00	40.2 (171)	1.00
Father	3.8 (23)	47.8 (11)	1.64 (0.62 to 4.31)	47.8 (11)	1.36 (0.41 to 4.49)
Aunt	7.9 (48)	31.9 (15)	1.15 (0.48 to 2.76)	33.3 (15)	0.74 (0.31 to 1.79)
Grandma	13.8 (84)	31.3 (26)	0.83 (0.40 to 1.72)	37.8 (31)	0.90 (0.44 to 1.86)
Other	2.0 (12)	0 (0)	-	0 (0)	-
Attending day care					
No	89.6 (549)	34.4 (186)	1.00	39.9 (210)	1.00
Yes	10.4 (64)	19.4 (12)	0.59 (0.27 to 1.28)	31.8 (20)	0.70 (0.38 to 1.31)
Breastfed as a child					
No	10.6 (65)	29.7 (19)	1.00	44.4 (28)	1.00
Yes	89.4 (549)	33.2 (179)	1.22 (0.61 to 2.41)	38.3 (202)	0.77 (0.41 to 1.46)
Skin infection no scabies					
No	80.3 (496)	31.3 (153)	1.00	37.2 (178)	1.00
Yes	19.7 (122)	37.8 (45)	1.31 (0.89 to 1.92)	45.3 (53)	1.4 (0.86 to 2.25)
Scabies					
No	82.9 (512)	32.2 (162)	1.00	38.4 (190)	1.00
Yes	17.2 (106)	34.3 (36)	1.33 (0.89 to 1.98)	41 (41)	1.12 (0.67 to 1.85)
Respiratory infection					
No	71.2 (440)	31.0 (134)	1.00	36.7 (156)	1.00
Yes	28.8 (178)	36.6 (64)	1.67 (1.19 to 2.33)	44.1 (75)	1.36 (0.90 to 2.07)
Gastrointestinal infection					
No	69.4 (429)	30.5 (128)	1.00	37.9 (156)	1.00
Yes	30.6 (189)	37.2 (70)	1.65 (1.18 to 2.31)	41 (75)	1.14 (0.76 to 1.71)
Ear infection					
No	72.0 (445)	30.0 (131)	1.00	35.8 (152)	1.00
Yes	28.0 (173)	39.2 (67)	1.65 (1.20 to 2.28)	46.5 (79)	1.56 (1.04 to 2.33)
Number of childhood illnesses					
0–1	62.8 (388)	29.0 (110)	1.00	35 (131)	1.00
2–4	37.2 (230)	38.6 (88)	1.63 (1.15 to 2.32)	45.3 (100)	1.53 (1.02 to 2.30)

A marginally significant association between child illness and householder reported racism was found in the multivariate model adjusted for the child's sex, age, time in day care, breastfeeding, and householder financial stress (adjusted OR 1.43; 95% CI 0.94 to 2.18, $p=0.09$) (see table 5). The potential for interaction was tested. However, the model became unstable due to over-parameterisation. As there was no evidence of a relationship between householder reported racism and psychosocial measures, these variables were not considered as potential mediators.

Householder reported drug problems met the conditions for a mediator with significant associations between householder reported racism and householder reported drug problems (OR 2.78; 95% CI 1.55 to 4.98, $p=0.001$), householder reported racism and childhood illness (OR 1.53; 95% CI 1.02 to 2.30,

$p=0.04$), and no significant association between householder reported racism and child illness after controlling for householder reported drug problems (OR 1.31; 95% CI 0.87 to 2.00, $p=0.20$).

DISCUSSION

To our knowledge, this is the first study to show an association between carer or householder reported racism and child health in an indigenous population. The study also identifies novel mediating factors (carer negative affect balance, drug problems) on the pathway from vicarious racism to poor child health outcomes.

After adjusting for confounders we found a significant association between carer reported racism and a composite child

Table 2 Sample characteristics of carers and carer reported racism (n=352)

	Total % (n)	% reporting racism (n)	Unadjusted OR (95% CI)
Total		34.4 (119)	
Socio-demographics			
Sex			
Male	5.1 (18)	41.2 (7)	1.00
Female	94.9 (334)	34.0 (112)	0.74 (0.29 to 1.86)
Age group (years)			
20–34	64.8 (210)	33.8 (70)	1.00
<20	8.6 (28)	39.3 (11)	1.27 (0.55 to 2.89)
35+	26.5 (86)	33.3 (28)	0.98 (0.57 to 1.69)
Highest year of schooling			
Years 11 and 12	35.5 (125)	37.7 (46)	1.00
Years 9 and 10	51.7 (182)	33.0 (60)	0.81 (0.50 to 1.33)
Less than year 8	12.8 (45)	31.0 (13)	0.74 (0.34 to 1.60)
Ran out of money for food, clothes or bills in last 2 weeks			
No	54.0 (189)	31.0 (58)	1.00
Yes	46.0 (161)	38.4 (61)	1.38 (0.89 to 2.15)
Self-rated health			
Excellent/very good	37.9 (131)	28.1 (36)	1.00
Good	45.1 (156)	38.1 (59)	1.57 (0.95 to 2.61)
OK/bad	17.1 (59)	39.7 (23)	1.68 (0.89 to 3.19)
Smokes			
No	49.4 (173)	34.5 (59)	1.00
Yes	50.6 (177)	34.3 (60)	0.99 (0.64 to 1.54)
Psychosocial			
Depression (BSD 25 or more)			
No	83.3 (284)	33.9 (95)	1.00
Yes	16.7 (57)	40.4 (23)	1.32 (0.75 to 2.32)
Negative affect			
Less negative	77.6 (263)	29.3 (76)	1.0
Most negative	22.4 (76)	51.3 (39)	2.54 (1.51 to 4.28)

illness measure as well as a marginally significant association between householder reported racism and the child illness measure. One explanation for this difference in significance is that carer influence on child health is more proximal than householders. Internationally, research on vicarious and worry about racism is limited.^{2 4 31} We relate our findings to other studies that assess more direct measures of racism. Several studies have identified associations between parental experience of racism and poor child mental health outcomes.^{32–54} Child exposure to racism has been associated with poor physiological functioning,⁷ and indicators of cardiovascular and metabolic disease.⁵ Links between racism and physical ill-health have consistently been established in adults.^{2 4 6}

Associations between self-reported racism and poor mental health outcomes and between self-reported racism and substance use are well established in cross-sectional and longitudinal studies with adults across a range of populations and settings.^{2 4 6} Considerable evidence also exists that children whose caregivers experience mental health difficulties are at greater risk of adverse outcomes.³⁵ Links have also been demonstrated between poor child outcomes and living in an environment where drugs are abused.³⁶ Parental mental ill-health and drug use are also correlated, and both are related to other risk factors for poor child health outcomes including poverty, inconsistent caregiving, and family and community violence.³⁶ Further exploration of relationships between these risk factors and racism is outside the focus of this present study, though remains an important area for future work.

The established links between racism and poor adult mental health/substance use, and between these factors and poor child

Table 3 Sample characteristics of householders and householder reported racism (n=275)

	Total % (n)	% reporting racism	Unadjusted OR (95% CI)
Total		38.2 (105)	
Socio-demographics			
Sex			
Male	49.1 (139)	35.8 (49)	1.00
Female	50.9 (144)	40.6 (56)	1.23 (0.75 to 2.00)
Age group (years)			
20–34	27.5 (41)	35.9 (14)	1.00
35–49	49.7 (74)	37.5 (27)	1.07 (0.48 to 2.41)
50+	22.8 (34)	30.3 (10)	0.78 (0.29 to 2.10)
Highest year of schooling			
Years 11 and 12	27.3 (77)	52.1 (37)	1.00
Years 9 and 10	43.6 (123)	31.2 (38)	0.42 (0.23 to 0.76)
Less than year 8	29.1 (82)	35.8 (29)	0.51 (0.27 to 0.98)
Ran out of money for food, clothes or bills in last 2 weeks			
No	46.8 (130)	32.8 (42)	1.00
Yes	53.2 (148)	42.9 (63)	1.54 (0.94 to 2.52)
Smokes			
No	44.5 (125)	41 (50)	1.00
Yes	55.5 (156)	36 (55)	0.81 (0.5 to 1.32)
Number of inside smokers			
None	12.7 (35)	25.7 (9)	1.00
1 or more	87.3 (240)	40 (96)	1.93 (0.86 to 4.30)
Psychosocial			
Self-efficacy scale			
10–22	25.0 (60)	35.0 (21)	1.00
23–26	27.9 (67)	34.9 (23)	0.99 (0.48 to 2.07)
27–30	23.8 (57)	49.1 (28)	1.79 (0.85 to 3.77)
31–40	23.3 (56)	37.5 (21)	1.11 (0.52 to 2.38)
Mastery score			
5–12	31.0 (79)	43.0 (34)	1.00
13–14	23.5 (60)	45.0 (27)	1.08 (0.55 to 2.13)
15–17	23.5 (60)	32.2 (19)	0.63 (0.31 to 1.27)
18–25	22 (56)	30.9 (17)	0.59 (0.29 to 1.22)

outcomes, support a causal interpretation of the association between carer experiences of racism and increased reporting of childhood illness found in this study. It is likely that carer experiences of racism lead to poor carer mental health, thus reducing carer capacity to provide an environment supportive of child health. Specifically this might include reduced parental warmth and support, high levels of uninvolved parenting, and fewer healthcare seeking behaviours.⁷ Poor carer mental health resulting from racism may also lead to drug use as a coping mechanism, which similarly reduces carer capacity to support child health.^{34 35} Although this study did not find significant associations between racism and housing conditions, further examination of potential links between these two determinants in the context of child health outcomes is warranted given their importance as influences on indigenous health.¹

The findings of this study must be interpreted in the context of several limitations. The study population is not a representative sample of the Australian indigenous population or of all remote indigenous communities. It is also limited by a relatively small sample size and restricted analytical methods due to the clustered study design. The cross-sectional design also limits definitive conclusions about causal directions. Although 32 longitudinal studies suggest that racism precedes ill-health, the converse cannot be ruled out in this study.^{2 4 6} Despite using well established and validated measures, the internal consistency of the depression, affect balance and mastery scales used in this

Table 4 Community facilities and carer/householder reported racism

	Community n	Child Total % (n)	Carer			Householder		
			Total % (n)	Reported racism % (n)	Unadjusted OR (95% CI)	Total % (n)	Reported racism % (n)	Unadjusted OR (95% CI)
Total				34.4 (119)			38.2 (105)	
Healthcare services								
Access to doctor								
Resident	5	45.3 (280)	45.5 (160)	27.1 (42)	1.00	48.4 (138)	30.3 (40)	1.00
Visits 2× week	1	13.3 (82)	14.2 (50)	24.0 (12)	0.85 (0.43 to 1.66)	12.3 (35)	25.7 (9)	0.80 (0.34 to 1.85)
Visits 1× week	3	31.1 (192)	30.4 (107)	40.6 (43)	1.84 (1.06 to 3.17)	30.9 (88)	45.2 (38)	1.90 (1.08 to 3.36)
Visits 1× fortnight	1	10.4 (64)	9.9 (35)	62.9 (22)	4.55 (2.22 to 9.34)	8.4 (24)	75.0 (18)	6.90 (2.54 to 18.7)
Aboriginal health workers								
Two or more	1	89.6 (554)	90.1 (317)	31.2 (97)	1.00	91.6 (261)	34.7 (87)	1.00
None	9	10.4 (64)	9.9 (35)	62.9 (22)	3.73 (1.90 to 7.32)	8.4 (24)	75.0 (18)	5.66 (2.16 to 14.8)
Resident nurses								
Less than three	7	71.4 (441)	72.2 (254)	35.7(90)	1.00	71.9 (205)	38.2 (76)	1.00
Three or more	3	28.6 (177)	27.8 (98)	30.9 (29)	0.8 (0.49 to 1.31)	28.1 (80)	38.2 (29)	1.00 (0.58 to 1.72)
Number staff at health centre >6 months								
Three or more	9	89.6 (554)	90.1 (317)	62.9 (22)	1.00	8.4 (24)	75.0 (18)	1.00
Less than two	1	10.4 (64)	9.9 (35)	31.2 (97)	3.73 (1.9 to 7.32)	91.6 (261)	34.7 (87)	5.66 (2.16 to 14.79)
Community facilities								
Community development employment project	9	94.5 (584)	94.3 (332)	35.6 (116)	3.13 (1.06 to 9.21)	94.4 (269)	38.6 (100)	1.38 (0.47 to 4.11)
Women's centre	7	76.1(470)	76.7 (270)	31.1 (82)	0.55 (0.33 to 0.91)	78.3 (223)	33.5 (72)	0.41 (0.23 to 0.74)
Canteen/alcohol	2	18.3(113)	17.6 (62)	48.4 (30)	2.05 (1.14 to 3.71)	19.7 (56)	48.2 (26)	1.67 (0.91 to 3.05)
Aged care	6	57.8 (357)	59.7 (210)	30.1 (62)	0.63 (0.4 to 0.98)	61.4 (175)	31.6 (54)	0.48 (0.29 to 0.79)

study were low to moderate. As such, these scales³¹ may have tapped into their respective underlying constructs less accurately than expected within this study.

It is also important to consider implications of the item used to measure racism in this study. Firstly, this item can be regarded as a measure of concern about victimisation, that is being worried about racism but not necessarily a direct experience of racism. Associations between feeling vulnerable to experiences of racism and poor health have been reported elsewhere among adults, and fear of racism is advocated as an important issue for

anti-racism research and policy.³¹ This paper is the first to report associations between caregiver fear of racism and child health outcomes. Moreover, while the item asks about experiences of racism for both the participant and anyone in the household, it cannot be assumed that any particular respondent has accurate knowledge of what others in their household experience.

This work must also include caregiver fear of racism, given findings of this present study. Secondly, a single item rather than a multi-item measure is unlikely to capture all experiences of racism and thus may underestimate worry about racism within

Table 5 Multivariable adjusted associations between child health (2–4 childhood illnesses)* and carer and householder reported racism

	Carer		Householder	
	OR (95% CI)	Adjusted OR (95% CI) (n = 590)	OR (95% CI)	Adjusted OR (95% CI)* (n = 577)
Reported racism				
No	1.0	1.0	1.0	1.0
Yes	1.54 (1.04 to 2.29)	1.65 (1.09 to 2.48)	1.53 (1.02 to 2.30)	1.43 (0.94 to 2.18)
Child sex				
Female	—	1.0	—	1.0
Male	—	1.78 (1.28 to 2.48)	—	1.70 (1.22 to 2.39)
Age (years)				
<1	—	1.0	—	1.0
1–2	—	1.19 (0.72 to 1.95)	—	1.22 (0.74 to 2.04)
3–7	—	2.08 (1.46 to 2.96)	—	2.19 (1.5 to 3.18)
Day care attendance				
None	—	1.0	—	1.0
One or more days	—	2.07 (1.15 to 3.73)	—	2.05 (1.17 to 3.6)
Breastfed when child				
No	—	1.0	—	1.0
Yes	—	0.47 (0.26 to 0.85)	—	0.5 (0.27 to 0.91)
Ran out of money in last 2 weeks				
No	—	—	—	1.0
Yes	—	—	—	1.69 (1.09 to 2.63)
R ² ¶	0.01	0.10	0.01	0.11

*Base category: 0-1 childhood illnesses.

¶McKelvey-Zavoina pseudo R² (DeMaris A. Explained variance in logistic regression: a Monte Carlo study of proposed measures. *Sociological Methods & Research* 2002;31:27–74).

What is already known on this subject

- ▶ Racism is identified as a critical determinant of health for indigenous peoples and minority groups across the world.
- ▶ While links between racism and poor health outcomes are well established within adult populations, few studies have explored associations between racism and health outcomes for young children.
- ▶ Also, little is currently known about the health effects of vicarious racism, including the impact of caregiver experiences of racism on child outcomes.

What this study adds

- ▶ This study shows that carer self-reported racism is a significant factor contributing to high rates of common childhood illnesses experienced by children in remote indigenous communities.
- ▶ Results also suggest that carer mental health and drug use are key issues on the causal pathway between carer experience of racism and poor child health outcomes.
- ▶ Links between housing conditions, reported racism and child health were not significant in this study.
- ▶ This study suggests that interventions to prevent racism and to counter its negative effects within remote indigenous communities have a role to play in addressing indigenous child health inequalities.

this study.^{4 37} Thus non-significant findings do not necessarily indicate a lack of association between racism, housing and child health, but rather that none could be found using this particular measure.

This study is the first of its kind to show associations between carer reported worries about racism and common childhood illnesses either in remote indigenous communities or in other population groups in different geographical contexts. Strong associations between worry about racism and poor physical health have been found among indigenous adults in remote and non-remote areas of Australia and internationally,^{2 4 6} and between racism and indicators of metabolic disease among African adolescents in Barbados.^{5 7} More work is needed to examine associations between racism and childhood illnesses in other settings and among other population groups, including indigenous people living in regional and urban areas of Australia, where data on the health effects of racism for indigenous children are lacking.

The critical importance of the early years of life as a foundation for later outcomes is internationally acknowledged.³⁸ Early years interventions are widely recommended as a key means of reducing health inequalities throughout the lifespan.³⁹ Further research is needed both to improve our understanding of racism as a determinant of child health and wellbeing and to inform action to prevent racism and reduce its detrimental effects.⁴⁰

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Competing interests None declared.

Ethics approval This study was conducted with the approval of the Health Research Ethics Committees in the Top End and Central regions of the NT; formal agreements to participate were signed by peak organisations in each of the ten indigenous communities.

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