Article

Perceived racism may partially explain the gap in health between Aboriginal and non-Aboriginal Victorians: A cross-sectional population based study

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A B S T R A C T

Background: There is a persistent gap in the health of Aboriginal Victorians compared with non-Aboriginal Victorians, where Aboriginal Victorians have poorer health. Currently, the most commonly touted explanation for this gap revolves around health behaviours known as 'lifestyle risk factors'. Yet the gap in health is similarly matched by persistent gaps in social and economic outcomes that reflect past and ongoing discrimination of Aboriginal peoples across Australia. Perceived racism has been implicated as a key determinant of the gap in health between Indigenous and non-Indigenous peoples across the world. We sought to determine the contribution of perceived racism to the gap in health and how this compared with the contribution of lifestyle risk factors and other determinants of health such as socioeconomic status.
Methods: We combined data from 2011, 2012 and 2014 Victorian Population Health Surveys (VPHS) to obtain a sample size of 33,833 Victorian adults, including 387 Aboriginal adults. The VPHS is a population-representative, cross-sectional, computer-assisted telephone interview survey conducted annually. Using logistic regression, poor self-reported health status was the dependent variable and Aboriginal status was the primary independent variable of interest. Secondary independent variables included age, sex, perceived racism, socioeconomic status, and lifestyle risk factors.
Results: Aboriginal Victorians were almost twice as likely as non-Aboriginal Victorians to report poor health; OR = 1.9 (95% confidence interval; 1.3–2.6). Perceived racism explained 34% of the gap in self-reported health status between Aboriginal and non-Aboriginal Victorians, followed by: smoking (32%), unhealthy bodyweight (20%), socioeconomic status (15%), excessive consumption of alcohol (13%), and abstinence from alcohol consumption (13%). In contrast, physical inactivity made no contribution. Together, perceived racism and smoking explained 58% of the gap, while all secondary independent variables explained 82% of the gap.
Conclusions: Perceived racism may be an independent health risk factor that explains more than a third of the health gap between Aboriginal and non-Aboriginal Victorians; equivalent in strength to smoking. The recognised failure of the Australian government's Closing the Gap strategy may be due in part to the failure to consider other determinants of the health gap beyond the lifestyle risk factors, namely racism, which may act to damage health through multiple pathways at multiple points along the causal chain.

Introduction

Aboriginal Australians experience a burden of disease that is more than twice the burden of disease experienced by non-Aboriginal Australians (AIHW, 2016). Attempts to reduce the gap in health between Aboriginal and non-Aboriginal Australians have mainly focussed on the biological determinants of ill-health, ignoring the psychological, social, cultural, economic and environmental causes of ill-health, consistent with the biomedical model of health (Johnson, 2013). These biological determinants largely consist of health behaviours such as smoking, misuse of alcohol, obesity, physical inactivity and low intake of fruit and vegetables; collectively known as the 'lifestyle risk factors'.

The assumption that it is the lifestyle risk factors that are largely responsible for the gap in health between Aboriginal and non-

Aboriginal Australians is primarily based on risk factor analyses conducted in the Australian Burden of Disease studies (Vos, Barker, Begg, Stanley, & Lopez, 2009). However, these risk factors analyses only took into consideration the lifestyle risk factors. For example, the 2003 Australian Burden of Disease Study estimated that 49% of the gap in burden of disease between Aboriginal and non-Aboriginal Australians was attributable to 11 lifestyle risk factors such as smoking (17%), high body mass (16%), and physical inactivity (12%) (Vos et al., 2009).

However, risk factor analysis is problematic, as the issue of what is or is not included in the analysis is not minor in terms of policy relevance (Watts & Cairncross, 2012). Omitting important risk factors can lead to overinflating the importance of the risk factors that are included, rendering the analysis flawed and subject to the biomedical fallacy; the error of inferring that disease in populations can be fully explained by risk factors for disease in individuals (Shy, 1997).

The gap in health between Aboriginal and non-Aboriginal Australians is similarly matched by gaps in social and economic outcomes that reflect past and ongoing discrimination towards Aboriginal peoples in Australia. For example, in 2012–13 almost 43% of Aboriginal Australians were in the bottom 20% of equivalised gross weekly household income level compared with 17% of non-Aboriginal Australians (AIHW, 2015). Low socioeconomic status is associated with poor health and socioeconomic gradients can be demonstrated for almost every known health outcome in every population of every country across the world (Marmot, 1999).

When a measure of socioeconomic status was included in a risk factor analysis that sought to explain the gap in life expectancy between Aboriginal and non-Aboriginal people living in the Northern territory, socioeconomic status explained 42–54% of the gap (Zhao, Wright, Begg, & Guthridge, 2013). A further 14–24% of the gap was explained by smoking, 9–17% by obesity, and 1–7% by alcohol consumption. Therefore, socioeconomic status explained more of the gap than the lifestyle risk factors, demonstrating the importance of how what is or is not included in a risk factor analysis has a significant influence on the conclusions drawn.

In the 10 years since the commencement of the Closing the Gap strategy, the Prime Minister reported to the nation in 2017 that almost no progress has been made in reducing the gap in health between Aboriginal and non-Aboriginal Australians, despite a 9% reduction in the prevalence of smoking (Commonwealth of Australia, 2017). Moreover, cancer rates are increasing, widening the gap in life expectancy, and there has been no narrowing of the gap in employment and education outcomes.

Therefore, the question needs to be asked "Is the almost exclusive focus on lifestyle risk factors an effective approach to improving the health of Aboriginal Australians?" Given the lack of progress over the past nine years, it is hard to answer this question in the affirmative and it is appropriate to consider other explanations of the persistent gap in health between Aboriginal and non-Aboriginal Australians.

There is an abundance of research that implicates racism as a key determinant of the mental and physical health of minority and Indigenous peoples around the world, including Australia (Pascoe & Smart Richman, 2009; Priest et al., 2013; Paradies et al., 2015). The pathways by which racism, directly and indirectly, damages health are complex, multiple, and located at multiple points across the causal pathway.

Racism has been variously defined; we define racism as "… organized systems within societies that cause avoidable and unfair inequalities in power, resources, capacities and opportunities across racial or ethnic groups" (Paradies et al., 2015). Racism can be internalised; whether it is an individual who believes that their ethnic group is superior while other ethnic groups are inferior or vice versa. It can be interpersonal; where the interactions between people serve to maintain or exacerbate the unequal distribution of opportunity and resources across racial or ethnic groups. It can also be structural, often known as systemic or institutional; where a society fosters racial

discrimination through its housing, employment, criminal justice, education, media, social welfare, and health care systems (Paradies, Harris, & Anderson, 2008; Bailey et al., 2017).

There are several indirect pathways by which racism damages health (Paradies et al., 2015). Racism reduces access to employment, housing and education which in turn ensures that those affected are relegated to the lower socioeconomic ranks of society (Dressler, Oths, & Gravlee, 2005). Racism increases exposure to hazardous physical and occupations environments (Clifford, Pearson, Franklin, Walker, & Zosky, 2015; Bailey et al., 2017). Racism increases the uptake of unhealthy behaviours such as smoking, excessive consumption of alcohol and overeating, as a means of coping (Pascoe & Smart Richman, 2009; Ziersch, Gallaher, Baum, & Bentley, 2011). Maternal exposure to racism elicits a physiological stress response that can impact on the uterine environment and epigenetic activity, causing subtle but harmful effects on a foetus that can be maintained into adulthood (Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman, 2008; Collins, David, Handler, Wall, & Andes, 2004).

There are also several direct pathways by which racism damages health (Paradies et al., 2015). Repeated and frequent experiences of racism constitute a chronic stressor that overstimulates the body's normal physiologic response to stress where adrenaline is released by the sympathetic nervous system and cortisol is released via the hypothalamic–pituitary–adrenal axis (Smith and Vale, 2006). Chronic stimulation of the hypothalamic–pituitary–adrenal axis causes long-term pathological changes and allostatic load, increasing premature morbidity and mortality from chronic diseases (Berger & Sarnyai, 2015; Chae et al., 2016). Racism causes adverse cognitive and emotional responses that are associated with psychopathology, such as depression and anxiety (Paradies & Cunningham, 2012). Racism can result in physical injury as a result of racially-motivated violence. Institutional racism within the health care system reduces access to and quality of health care and this has been well-documented in Australia where Aboriginal people often do not receive the same quality healthcare as their non-Aboriginal counterparts (Henry, Houston, & Mooney, 2004; Moore et al., 2014).

Since it is difficult to measure racism objectively, most of the evidence on racism and its impacts on health has relied on self-reported racism, also referred to as 'perceived racism'. We too relied on self-reported racism, also known as 'perceived racism'.

We sought to expand the investigation of the gap in health between Aboriginal and non-Aboriginal adults beyond the current focus on lifestyle risk factors. Our aim was (a) to determine and quantify the contribution of perceived racism to the gap in self-reported health between Aboriginal and non-Aboriginal adults living in the Australian state of Victoria, and (b) to compare the relative contributions of perceived racism, lifestyle risk factors and socioeconomic status to the health gap.

For ease of reading, but not to take away from the distinct ethnic identities, we use the term 'Aboriginal' to refer to both Aboriginal and Torres Strait Islander Victorians.

Methods

Data source

We combined data from three Victorian Population Health Surveys (VPHS) conducted in 2011, 2012 and 2014, in order to attain a large enough sample of Aboriginal participants.

Study design

The VPHS is a cross-sectional population-based survey conducted annually to provide information on the health and wellbeing of Victorians (Victorian State Government, 2017). Adults aged 18 years or older who live in private dwellings across the state of Victoria were

randomly selected using random digit dialling of landline telephones.

Sample size

We merged three datasets from the 2011 survey (33,673 participants), the 2012 survey (7533 participants), and the 2014 survey (33,654 participants). The sample size of the 2011 and 2014 surveys was based on recruiting approximately 426 participants per local government area, of which there are 79 in Victoria. The 2012 survey sample size was based on recruiting approximately 900 participants per departmental region, of which there are 8 in Victoria. The sample size assumed a prevalence of 7.5% for a variable of interest, with a confidence interval of 5,10% and an alpha of 5.0%.

We excluded all non-Aboriginal participants from the 2011 and 2012 surveys because they were not asked about experiences of racism. The combined dataset was stratified by departmental region of which there are eight in Victoria. The final sample size was 33,833, including 387 Aboriginal participants.

Response rate

The response rate, defined as the proportion of households where contact was made and an interview completed, was 67% for the 2011 survey, 69% for the 2012 survey, and 70% for the 2014 survey.

Weighting

In order to control for participation bias, we reweighted the survey data to reflect the age/sex/geographic distribution of the census Aboriginal and non-Aboriginal resident population of Victoria in 2011 and to account for the probability of selection of the household and participant within the household (Department of Health and Human Services, 2016). We then normalised the resulting weights to add up to the sample total in order to maximise the accuracy of the standard errors (ABS, 2008).

Ethics statement

The Victorian Department of Health Human Research Ethics Committee approved the survey in accordance with the guidelines of the Declaration of Helsinki.

Dependent and primary independent variables of interest

Our dependent variable was self-reported health status and all survey participants were asked to indicate whether they would describe their overall health status as excellent, very good, good, fair or poor. Our primary independent variable of interest was Aboriginal status and all survey participants were asked "Are you of Aboriginal or Torres Strait Islander origin?" Participants who stated that they were Aboriginal ($n = 328$), Torres Strait Islander ($n = 39$) or both ($n = 20$) were combined.

Secondary independent variables of interest

Perceived racism was assessed by asking all Aboriginal participants in the 2011 and 2012 surveys: "How often, if at all, have you received unfair treatment in the last 12 months because you are an Aboriginal or Torres Strait Islander?" Participants of the 2014 survey were asked: "In the last 12 months, have you experienced discrimination or been treated unfairly because of your racial, ethnic, cultural, or religious background?" Although the questions were not identical, we combined the three studies in order to attain a sufficient sample size of Aboriginal participants on the premise that both questions were reasonable measures of perceived racism.

Socioeconomic status was measured by determining the total annual household income of survey participants, which included pre-tax income from all sources such as wages, social security payments, child support, and investments over the previous 12 months.

The lifestyle risk factors that we examined included smoking, alcohol consumption, bodyweight, and physical activity. After inquiring about the frequency and typical number of standard alcoholic drinks consumed during a typical occasion of alcohol consumption, we derived a composite variable of alcohol consumption that reflected both frequency and volume of consumption (Table 2). We determined a participant's bodyweight status by calculating their body mass index (BMI) from their self-reported height and weight using the formula: BMI = bodyweight $/(\text{height}^2)$. A participant was judged to be underweight if their BMI was less than 18.5 kg/m^2, normal weight if BMI = 18.5–24.99 kg/m^2, overweight if BMI 25.0–29.99 kg/m^2, or obese if BMI $\geq$ 30 kg/m^2 (WHO, 2017). Participant were asked a series of questions about physical activity and their level of physical activity was determined according to the *1999 National Physical Activity Guidelines for Australians* (Department of Health and Human Services, 2016; DoHA, 1999).

Missing data

Less than 5% of participants refused to answer or were unable to answer the survey questions for all variables; with the exception of, total annual household income (17%), bodyweight status (10%), and physical activity level (7%).

Statistical analysis

We computed weighted prevalence estimates for all variables with 95% confidence intervals and calculated relative standard errors to determine the relative size of the sampling error. Where a relative standard error exceeded 25%, we deemed the estimate to be unreliable.

We used logistic regression to investigate the relationship between self-reported health and Aboriginal status. The dependent or outcome variable was poor self-reported health (0 = no and 1 = yes) and the primary independent or exposure variable of interest was Aboriginal status (1 = non-Aboriginal, 2 = Aboriginal and 9999 = did not know or refused to say). We determined statistical significance at the $p < 0.05$ level.

We analysed the survey data using the Stata statistical software package version 12 (StataCorp., 2011), using the following steps:

1. Univariable logistic regression to identify independent variables that were associated with self-reported health (Tables 1 and 2).
2. Bivariable logistic regression to investigate the impact of each secondary independent variable on the association between self-reported health and the primary independent variable of interest; Aboriginal status (Table 3). We estimated the extent to which a secondary independent variable explained the higher prevalence of poor self-reported health among Aboriginal adults in terms of the percentage reduction in the odds ratio (OR) for self-reported health comparing models with and without the proposed mediator (i.e., % reduction = $[(\text{OR}_{\text{wo/mediators}} - \text{OR}_{\text{w/mediator}})/(\text{OR}_{\text{wo/mediators}} - 1)] \times 100$) (Seeman et al., 2004).
3. Multivariable logistic regression to further investigate the impact of all secondary independent variables (Table 3).

Results

Table 1 shows that Aboriginal adults in Victoria were almost twice as likely as their non-Aboriginal counterparts to report being in poor health; an OR of 1.9 (95% confidence interval (CI); 1.3–2.6).

The proportion of adults who reported being in poor health did not differ between the sexes, however, adults aged 25 years or older were twice as likely as adults aged 18–24 years to report being in poor

Table 1

Poor self-reported health by socio-demographic characteristic and perceived racism: univariable analysis.

Independent variable	n^*	% weighted prevalence of poor self-reported health		Crude OR (95% CI)		*p*-value
Aboriginal status						
Non-Aboriginal	1718	5.0	(4.7–5.2)	1.0		
Aboriginal	41	8.9	(6.5–12.1)	1.9	(1.3–2.6)	< 0.001
Did not know or refused to say	10	9.6	(5.0–17.5)	2.0	(1.0–4.1)	0.045
Age (years)						
18–24	20	2.3	(1.5–3.6)	1.0		
25–34	61	5.0	(3.9–6.6)	2.2	(1.3–3.8)	0.004
35–44	167	4.5	(3.8–5.3)	2.0	(1.2–3.2)	0.006
45–54	286	4.6	(4.1–5.3)	2.0	(1.3–3.3)	0.003
55–64	432	5.3	(4.8–5.9)	2.3	(1.5–3.8)	< 0.001
65 +	803	5.3	(4.9–5.7)	2.3	(1.5–3.7)	< 0.001
Sex						
Male	700	5.0	(4.7–5.4)	1.0		
Female	1069	5.0	(4.7–5.3)	1.0	(0.9–1.1)	0.935
Perceived racism						
Never	1613	4.8	(4.6–5.1)	1.0		
At least yearly	93	7.1	(5.7–8.7)	1.5	(1.2–1.9)	0.001
At least monthly	46	11.2	(6.6–18.2)	3.0	(2.1–4.2)	< 0.001
Did not know or refused to say	17	11.5	(7.1–18.1)	2.6	(1.5–4.4)	0.001
Socioeconomic status[**]						
$100,000 or more	129	2.3	(1.9–2.8)	1.0		
$60,000-$99,999	155	2.9	(2.4–3.4)	1.3	(1.0–1.6)	0.075
$40,000-$59,999	186	4.2	(3.6–4.9)	1.9	(1.5–2.4)	< 0.001
$20,000-$39,999	525	6.6	(6.0–7.2)	3.0	(2.4–3.7)	< 0.001
Less than $20,000	441	10.5	(9.5–11.5)	5.0	(4.0–6.2)	< 0.001
Did not know or refused to say	335	5.7	(5.1–6.4)	2.6	(2.0–3.2)	< 0.001

95% CI = 95% confidence interval; OR = odds ratio.

* *n* = raw unweighted sample size; however. prevalence and OR are based on weighted data.

** Socioeconomic status was measured by total annual household income.

health.

The proportion of adults who reported being in poor health was significantly higher among those who reported experiencing racism and this increased with the frequency of experiences of racism. Adults who reported experiencing racism at least once a month were three times more likely to report being in poor health than those who did not report experiencing racism (OR = 3.0; 2.1–4.2) and almost 1.5 times more likely when they experienced racism less than once a month (OR = 1.5; 1.2–1.9).

The proportion of adults who reported being in poor health was inversely related to total annual household income; the lower the household income the higher the proportion of adults in poor health.

Table 2

Poor self-reported health by lifestyle risk factors: univariable analysis.

Independent variable	n^*	% weighted prevalence of poor self-reported health		Crude OR (95% CI)		*p*-value
Smoking status						
Non-smoker	726	3.8	(3.5–4.1)	1.0		
Ex-smoker	646	5.8	(5.3–6.3)	1.6	(1.4–1.8)	< 0.001
Current smoker	385	9.2	(8.3–10.2)	2.6	(2.2–3.0)	< 0.001
Did not know or refused to say	12	3.9	(2.1–7.2)	1.0	(0.5–2.0)	0.923
Consumption of alcohol						
1–2 drinks, 3–6 days a week or less	935	3.7	(3.5–4.0)	1.0		
3–4 standard drinks every day	58	5.2	(3.9–6.8)	1.4	(1.0–1.9)	0.026
5 + drinks, 3–6 days per week or every day	66	7.0	(5.4–9.1)	1.9	(1.5–2.6)	< 0.001
Abstainer	673	8.7	(8.0–9.4)	2.4	(2.2–2.7)	< 0.001
Did not know or refused to say	37	9.2	(6.6–12.7)	2.6	(1.8–3.8)	< 0.001
Bodyweight status						
Normal	371	3.0	(2.7–3.3)	1.0		
Underweight	59	10.7	(8.2–13.9)	3.9	(2.9–5.4)	< 0.001
Overweight	449	3.8	(3.5–4.2)	1.3	(1.1–1.5)	0.001
Obese	682	9.0	(8.3–9.7)	3.2	(2.8–3.7)	< 0.001
Did not know or refused to say	208	6.3	(5.4–7.2)	2.2	(1.8–2.6)	< 0.001
Physical activity						
Adequate physical activity	416	2.8	(2.5–3.1)	1.0		
Inadequate physical activity	849	5.4	(5.1–5.8)	2.0	(1.8–2.3)	< 0.001
Sedentary	258	14.1	(12.4–15.9)	5.7	(4.8–6.9)	< 0.001
Did not know or refused to say	246	9.5	(8.3–10.8)	3.7	(3.1–4.4)	< 0.001

95% CI = 95% confidence interval; OR = odds ratio.

* *n* = raw unweighted sample size; however. prevalence and odds ratio estimates are based on weighted data.

Table 3
Impact of socio-demographic characteristics, perceived racism and lifestyle risk factors on the association between poor self-reported health and Aboriginal status: bivariable and multivariable analyses.

Secondary independent variable	Adjusted Odds Ratio (OR)[a] (95% CI)			
	Non-Aboriginal	Aboriginal	*p*-value	% change from base model[b]
Age	1.0	2.0 (1.4–2.8)	< 0.001	-12%
Sex	1.0	1.9 (1.3–2.6)	< 0.001	0%
Perceived racism	1.0	1.6 (1.1–2.3)	0.013	34%
Socioeconomic status	1.0	1.7 (1.2–2.5)	0.002	15%
Smoking	1.0	1.6 (1.1–2.3)	0.009	32%
Excessive alcohol consumption	1.0	1.8 (1.1–2.8)	0.018	13%
Abstinence from alcohol consumption	1.0	1.8 (1.2–2.5)	0.002	13%
Unhealthy bodyweight status	1.0	1.7 (1.2–2.4)	0.003	20%
Physical inactivity	1.0	1.9 (1.3–2.7)	0.001	0%
All secondary independent variables	1.0	1.2 (0.7–1.9)	0.569	82%
Variables that changed the OR of the base model by 20% or more[c]	1.0	1.2 (0.9–1.8)	0.257	72%
Variables that changed the OR of the base model by 30% or more[d]	1.0	1.4 (0.9–2.0)	0.096	58%

[a] Crude odds ratio = 1.9 (95% confidence interval (CI): 1.3–2.6).
[b] % change from base model = (crude OR – adjusted OR) / (crude OR – 1) × 100.
[c] Includes perceived racism, smoking status, and bodyweight status.
[d] Includes perceived racism and smoking status.

Current and ex-smokers, adults of unhealthy weight (underweight, overweight or obese), and those who were physically inactive were also more likely to report being in poor health than non-smokers, adults of normal bodyweight, and the physically active, respectively (Table 2).

There appeared to be a u-shaped relationship between consumption of alcohol and poor self-reported health. Adults who abstained from alcohol consumption and those who typically consumed more alcohol than is currently recommended were both more likely to report being in poor health than adults who consumed alcohol within the recommended guidelines of no more than 2 standard drinks every day (NHMRC, 2009). From a policy perspective, one would not use such data to suggest that adults be encouraged to consume alcohol within the recommended guidelines if they did not drink any alcohol. Therefore, in order to separate out the two different associations, we derived two new variables; one for abstinence from alcohol and one for excessive consumption of alcohol to be used in the bivariable and multivariable analyses.

Table 3 shows that when secondary independent variables were included in the model, the variable that made the largest contribution to explaining the health gap between Aboriginal and non-Aboriginal adults in Victoria was perceived racism (Fig. 1). Perceived racism reduced the association between poor self-reported health and Aboriginal status by 34%, followed by smoking (32%), unhealthy bodyweight (20%), total annual household income (15%), excessive consumption of alcohol (13%), and abstinence from alcohol consumption (13%), while physical inactivity and sex made no impact. In contrast, age increased the odds ratio by 12%, suggesting that the association between poor self-reported health and Aboriginal status was masked or underestimated until differences in the relative age structures of Aboriginal and non-Aboriginal adults were taken into account.

When we included all secondary independent variables in the model, 82% of the gap in self-reported health between Aboriginal and non-Aboriginal adults was explained. Looking at the two variables that made the largest individual contributions, when put in the model together, perceived racism and smoking explained 58% of the health gap.

Discussion

We found that Aboriginal adults in Victoria were almost twice as likely as their non-Aboriginal counterparts to report being in poor
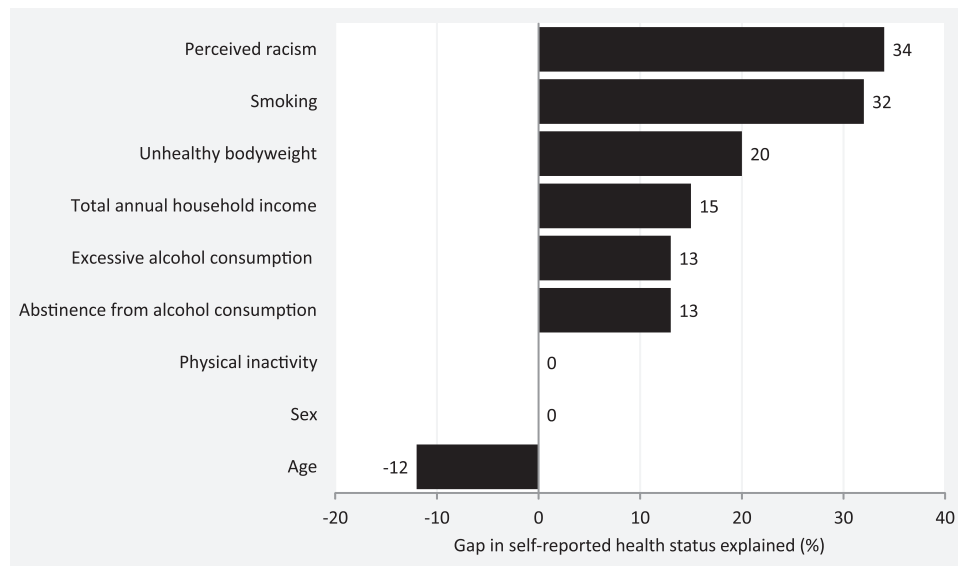

Fig. 1. The relative contribution of the individual secondary variables to the higher prevalence of poor self-reported among Aboriginal compared with non-Aboriginal adults in Victoria.

health. We refer to this in the rest of the discussion as 'the health gap'. Self-reported health status is a widely used reliable indicator of an individual's overall health status that has been validated in multiple studies across the world and shown to be an excellent predictor of both morbidity and mortality (Idler & Benyamini, 1997; Manor, Matthews, & Power, 2001; Schnittker & Bacak, 2014; Perez-Zepeda et al., 2016).

We sought to explain the health gap using multivariable logistic regression and hypothesised that each of the secondary independent variables of interest was a potential mediator of the association between Aboriginal status and self-reported health, with the exception of age and sex which we considered to be potential confounders. It is mathematically impossible to distinguish a potential mediator from a potential confounder and so the distinction is dependent upon extra-statistical reasoning (Babyak, 2009). It should be noted at this point that we use the term 'potential' deliberately because a key weakness of our study is that the data is cross-sectional. Cross-sectional data cannot be used to determine causality and its direction. However, there is consensus in the literature that smoking causes ill-health and a growing consensus that perceived racism also causes ill-health. Moreover, logic would dictate that if perceived racism and smoking potentially mediate the relationship between poor health and Aboriginal status, then it would be in the direction of causing ill-health rather than causing one's Aboriginal status.

The two independent variables that made the greatest contribution to explaining the health gap were perceived racism and smoking. Perceived racism explained 34% of the health gap, while smoking explained 32% of the health gap. When perceived racism and smoking were included in the same model, they explained 58% of the health gap. Therefore, the potential effect of perceived racism on health was largely independent of smoking, although we did observe (data not shown) that survey respondents who experienced racism at least once a year were almost twice as likely to smoke as those who never experienced racism (OR = 1.7; 1.4–1.9).

Given that perceived racism is likely to primarily reflect interpersonal experiences of racism, we hypothesise that perceived racism potentially acts as a proximate determinant of health through its action as a psychosocial stressor and therefore constitutes a health risk factor that is comparable to the health risk factor of smoking. However, this does not preclude the potential concomitant role of racism as a distal determinant of health and this is supported by a plethora of evidence in the literature that shows that racism may damage health via multiple pathways located at multiple points along the causal chain (Williams & Mohammed, 2013). We also hypothesise that the distal effects of racism are more likely to reflect structural racism that is not necessarily perceived by the individual and therefore unlikely to have been captured in our data.

Our findings regarding the consumption of alcohol are conflicting; both excessive and zero consumption of alcohol appear to partially explain the health gap. While there is consensus that excessive consumption of alcohol is harmful to health, there is also consensus that light to moderate consumption of alcohol confers a lower risk of cardiovascular disease and death (Gronbaek, 2009). Our findings may simply reflect the j-shaped relationship between alcohol consumption and health, and/or reflect that there may be a proportion of abstainers who abstained from alcohol consumption due to health reasons.

Negative stereotypes about Aboriginal Australians that fuel racism often centre around the misuse of alcohol. Yet the national data consistently show that Aboriginal people across Australia are less likely to consume alcohol than their non-Aboriginal counterparts (Wilson, Stearne, Gray, & Saggers, 2010). However, there is also evidence that Aboriginal people who do consume alcohol are more likely to do so to excess than non-Aboriginal Australians (Wilson et al., 2010). As with smoking, experiences of racism have been repeatedly shown to be associated with excessive consumption of alcohol as a coping mechanism (Shariff-Marco, Klassen, & Bowie, 2010).

Strengths of the study include that it was based on data from the Victorian Population Health Survey; a well-validated, population-based survey, with a relatively high response rate that was informed by a public health model of the social determinants of health (Ansari, Carson, Ackland, Vaughan, & Serraglio, 2003).

Weaknesses include that survey data is cross-sectional, which does not allow for assertions to be made about causality or its direction. Secondly, while combining datasets is a way of increasing precision, it is unclear if it creates bias, particularly since we had to exclude all non-Aboriginal participants from the 2011 and 2012 surveys because they were not asked about experiences of racism.

Thirdly, the data were self-reported which raises concern about accuracy. However, not all data readily lends itself to objective measurement such as experiences of racism (Paradies, 2006). Moreover, the literature suggests perceived racism is likely to be under-estimated due to cognitive biases such as social desirability bias, in addition to the well-known psychologically protective effect associated with minimising personal experiences of racism (Bailey et al., 2017; Hodson & Esses, 2002; Ruggiero & Taylor, 1997). Under-estimating exposure to racism is likely to lead to the under-estimation of the magnitude of association between racism and its impact on health. We previously reported that 17.0% (13.3–21.5%) of Aboriginal adults in Victoria, based on the same dataset, experienced at least one episode of racism in the 12 months prior to the survey (Markwick, Ansari, Clinch, & McNeil, Submitted for publication). This is in contrast to a national population-representative study that reported that 33% of Aboriginal Australians experienced racism during a similar time period as well as a survey of four localities in Victoria where 95% of Aboriginal participants experienced racism (ABS, 2016) (Ferdinand, Paradies, & Kelaher, 2012). Therefore, our findings are likely to be highly conservative and it is possible that perceived racism potentially explains more of the health gap than we have been able to demonstrate here.

We have shown that perceived racism explains more than one-third of the gap in health between Aboriginal and non-Aboriginal adults in Victoria; comparable to and independent of smoking. The literature shows that the health-harming effects of racism may be multiple and located at multiple points along the causal pathway; placing it in a pivotal position as a key determinant of the health gap between Indigenous and non-Indigenous peoples across the world. However, there is an ongoing reluctance to acknowledge the existence of racism and its harmful effects, both in Australia and across the world (Augoustinos and Every, 2007) (Bailey et al., 2017).

Past and current government policies that seek to close the gap in health between Aboriginal and non-Aboriginal Australians continue to favour initiatives that focus on addressing a narrow range of proximate health risk factors, namely the lifestyle risk factors of smoking, alcohol consumption, diet and physical activity (Commonwealth of Australia, 2013). This may be due, in part, to the dominance of the biomedical model of health which is underpinned by the dominant Western neo-liberal cultural philosophy that values individualism over collectivism and sees individual responsibility as the pathway to good health. This arguably could be described as another form of racism where the Western biomedical model of health reduces the Aboriginal identity to a series of health problems that need 'fixing', ignoring the Aboriginal concept of health. The Aboriginal concept of health is where health is not just the physical well-being of an individual, but includes the social, emotional and cultural well-being of the individual and the whole Community (NACCHO, 2017).

Policies that focus on reducing the prevalence of lifestyle risk factors have not only failed to reduce the health gap, but it has been argued that these policies are stigmatising, thus reinforcing negative stereotypes and perpetuating racism, which in turn may further damage health (Bond, 2005). Moreover a Cochrane systematic review of the effectiveness of interventions to reduce the prevalence of lifestyle risk factors in various populations across the world, concluded that health

promotion interventions have met with limited success, and often modest improvements are not sustained in the long-term (Ebrahim and Smith, 1997).

Therefore the failure of the Closing the Gap strategy may be due in part to the failure to consider other potentially more important determinants of the health gap, such as racism, as well as the relative lack of effectiveness of current approaches to promote behavioural change at the level of the individual. To that effect, it is time to reconsider the strategies for reducing the health gap between Aboriginal and non-Aboriginal Australians.

We conclude that our work provides evidence that racism may act as an important proximate determinant of the health gap between Aboriginal and non-Aboriginal people in Victoria, comparable to smoking. Moreover, the literature shows that institutional racism, which is pervasive across multiple organisations and sectors such as health care, criminal justice, education, housing, employment, and the media, is a distal and proximate determinant of health. Thus racism may play a pivotal role in damaging the health of Aboriginal people in Victoria.

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Declarations of interest

None.

Appendix A

https://www2.health.vic.gov.au/public-health/population-health-systems/health-status-of-victorians/guides-and-resources.

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