J Gambl Stud (2013) 29:393–415
DOI 10.1007/s10899-012-9323-z

ORIGINAL PAPER

Racial Discrimination, Post Traumatic Stress, and Gambling Problems among Urban Aboriginal Adults in Canada

Cheryl L. Currie · T. Cameron Wild · Donald P. Schopflocher · Lory Laing · Paul Veugelers · Brenda Parlee

Published online: 24 June 2012
© Springer Science+Business Media, LLC 2012

Abstract Little is known about risk factors for problem gambling (PG) within the rapidly growing urban Aboriginal population in North America. Racial discrimination may be an important risk factor for PG given documented associations between racism and other forms of addictive behaviour. This study examined associations between racial discrimination and problem gambling among urban Aboriginal adults, and the extent to which this link was mediated by post traumatic stress. Data were collected via in-person surveys with a community-based sample of Aboriginal adults living in a mid-sized city in western Canada ($N = 381$) in 2010. Results indicate more than 80 % of respondents experienced discrimination due to Aboriginal race in the past year, with the majority reporting high levels of racism in that time period. Past year racial discrimination was a risk factor for 12-month problem gambling, gambling to escape, and post traumatic stress disorder (PTSD) symptoms in bootstrapped regression models adjusted for confounders and other forms of social trauma. Elevated PTSD symptoms among those experiencing high levels of racism partially explained the association between racism and the use of gambling to

C. L. Currie (✉)
Faculty of Health Sciences, University of Lethbridge, M3083 Markin Hall, Lethbridge, AB T1K 3M4, Canada
e-mail: cheryl.currie@uleth.ca

T. C. Wild · D. P. Schopflocher · L. Laing · P. Veugelers
School of Public Health, 3-300 Edmonton Clinic Health Academy, University of Alberta, 11405-87 Ave, Edmonton, AB T6G 1C9, Canada
e-mail: cam.wild@ualberta.ca

D. P. Schopflocher
e-mail: donald.schopflocher@ualberta.ca

L. Laing
e-mail: lory.laing@ualberta.ca

P. Veugelers
e-mail: paulus.veugelers@ualberta.ca

B. Parlee
Faculty of Native Studies, University of Alberta, 2-31 Pembina Hall, Edmonton, AB T6G 2H8, Canada
e-mail: brenda.parlee@ualberta.ca

escape in statistical models. These findings are the first to suggest racial discrimination may be an important social determinant of problem gambling for Aboriginal peoples. Gambling may be a coping response that some Aboriginal adults use to escape the negative emotions associated with racist experiences. Results support the development of policies to reduce racism directed at Aboriginal peoples in urban areas, and enhanced services to help Aboriginal peoples cope with racist events.

Keywords Problem gambling · Aboriginal peoples · Racial discrimination · Post traumatic stress · Coping

Background

Problem gambling is more prevalent among Aboriginal peoples in North America than the general population (Williams et al. 2011). While games of chance were part of Aboriginal cultures before European contact, gambling for monetary gain was discouraged (Peacock et al. 1999; Salter 1979). Gambling now occurs in a markedly different socio-political and economic context with different meanings and consequences for this population (Smith et al. 2011). While participating in gambling activities continues to be part of the social fabric in many Aboriginal communities (Oakes and Currie 2005), sanctions against gambling for personal gain have been weakened by the process of colonization and are no longer consistently understood. These changes coupled with high rates of Aboriginal poverty and unemployment have created a pull toward gambling for the chance it may offer to escape life problems and make ends meet.

After adjustment for income, minority status itself is also an independent predictor of problem gambling for Aboriginal peoples, African Americans, and Asians (Barry et al. 2011; Kessler et al. 2008; Loo et al. 2008; Williams et al. 2011). While this association is often attributed to residual confounding or culturally-based beliefs in luck and superstition (Oei et al. 2008), racial discrimination may also be an important, albeit overlooked, factor that may help to explain disproportionate problem gambling rates among minority populations.

Race as a concept refers to a form of social categorization based on phenotypic characteristics, the salience of which shifts across place and time (Williams 1997; Wu et al. 2003). Although there is little biologic criteria to formulate or support a valid and reliable taxonomy of race, as a social construct, race continues to be used not only to classify human variation, but to justify the exploitation of groups defined as inferior (Williams 1997; Root 2001). The term *racism* refers to an ideology that ranks some groups as inherently inferior to others and supports the social norms and institutions that implement this ideology (Jones 1997). Racism leads to the development and maintenance of negative attitudes and beliefs about certain groups (racial prejudice), as well as unfair treatment directed at those perceived to be part of a stigmatized racial group (racial discrimination). Targets are aware of some of the discriminatory behavior directed at them, with these perceptions generating significant levels of stress (Clark et al. 1999). A growing number of US researchers now attribute the health disparities experienced by African Americans to social stressors, most prominently the experience of racial discrimination (Clark et al. 1999; Hunter and Schmidt 2010; Sellers et al. 2003; Williams et al. 2010; Williams and Mohammed 2009) Prospective studies have temporally linked perceived racial discrimination to an array of adverse outcomes including the incidence of substance use disorders, mental illness, breast cancer, uterine myomas, obesity and coronary artery calcification

(Borrell et al. 2007; Lewis et al. 2006; Taylor et al. 2007; Wise et al. 2007). Research also suggests urban Aboriginal youth and adults in Australia experience high levels of racial discrimination, with significant impacts on their physical health and mental well-being (Paradies et al. 2008; Paradies and Cunningham 2009; Priest et al. 2011).

In Canada, the degree to which racial discrimination may similarly account for the disproportionate burden of health disparities observed among Aboriginal peoples has received little attention in the scientific literature. The Canadian Aboriginal population has surpassed 1 million and is rapidly urbanizing (Cloutier et al. 2008). More than half now live in urban areas resulting in increased contact between Aboriginal and non-Aboriginal populations (Cloutier et al. 2008). Historical efforts to keep Aboriginal peoples away from urban areas including the creation of reserves and efforts unique to the Canadian prairies, such as the 'pass system' which confined First Nations persons to reserves and required a pass from an Indian agent to leave, have helped reinforce the view that cities are 'modern' spaces reserved for settler societies and the immigrant groups they select to live there (Barron 1988; Wilson and Peters 2005). As a result, Aboriginal peoples are often considered 'out of place' in urban Canada (Peters 1996). While these assumptions are being challenged by the growing demographic and cultural presence of Aboriginal peoples in urban areas, emerging research suggests that if there is a single urban Aboriginal experience it is the shared perception that they are stereotyped negatively (Environics Institute 2010). A 2009 study of 11 Canadian cities found seven in ten Aboriginal adults had been teased or insulted because of their ethnic background, and more than a third did not feel accepted by non Aboriginal people (Environics Institute 2010). The study also polled urban non Aboriginal residents and found many viewed relations with the Aboriginal population in their city as both negative and not improving. Non Aboriginal residents in Edmonton were the most pessimistic about this relationship, with 62 % viewing it as negative and 79 % not improving (Environics Institute 2010).

Edmonton is home to the second largest Aboriginal population in Canada making relations between Aboriginal and non Aboriginal peoples in this city important at both a local and national level. A 2009 pilot study conducted as a precursor to the present work found that the frequency of racism experienced by urban Aboriginal university students in Edmonton was two to three times higher than a reference sample of African and Latino Americans in the US (Currie et al. forthcoming; Krieger et al. 2005). Building on this pilot, the present study examined the extent to which racial discrimination was associated with problem gambling across a broader sample of urban Aboriginal peoples. Surprisingly, potential links between racial discrimination and problem gambling have not yet been examined in the scientific literature, despite the plausibility of this association. Studies have shown that similar to alcohol individuals will use gambling to cope with negative affect (Stewart and Zack 2008); which discriminatory experiences have been shown to elicit in both observational and experimental studies (Carter 2007; Clark et al. 1999; Hunter and Schmidt 2010; Paradies 2006; Priest et al. 2011; Soto et al. 2011; Williams et al. 2010).

In the social determinants of health literature, experts often link social experiences to adverse outcomes via such *psychosocial stress pathways*. Stress is an ambiguous term that has been characterized in several ways since it was first introduced in the 1950s (Fink 2009). At that time, stress and coping theorists advocated that the stress response was a property of individuals and differed widely between them independent of the social stressors they were exposed to. From the perspective of differential vulnerability, which it is often termed, what is stress for one is stimulation to another, depending on how a situation is appraised by an individual (Lazarus and Folkman 1984).

However, what appears to be differential vulnerability to stress at an individual level may actually be, on closer inspection, differential exposure to social stressors at a population level (Kessler et al. 1999). More detailed examinations of the physiology of the human stress response since the 1950s have documented sufficient stress-reactive physiologic regularity to suggest a more appropriate focus is the social environment and the reliable effects it has on visceral stress reactions across individuals (Brunner and Marmot 2006; Fink 2011; Joëls 2011; McEwen 2007). It is now well documented that the wear and tear of high unremitting stress on physiological systems can dysregulate normal biologic reactions, causing hyper or hypoactive responses to environmental triggers and an inability to turn off the stress response when it is no longer needed, among other problems (Brunner and Marmot 2006; McEwen 2008a, b). Stress-induced dysregulation of allostatic systems, particularly the autonomic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis, have been implicated in the development of psychiatric and physical illness in prospective studies (McEwen 2008a, b). Chronic uncontrollable and unpredictable stress also exerts profound effects on the structure and function of limbic neurons that can, in combination with allostatic dysregulation, result in physiological damage to key brain regions (the prefrontal cortex and the amygdala) associated with risk-taking and addictive behaviours (Bickel and Yi 2010; Joëls 2011; Redish 2010). McEwen fashioned the term *allostatic overload* to describe the damage that chronic activation of allostatic systems has on the body (i.e., dysregulation of the sympathetic nervous system and the HPA axis, neural damage) as well as the behavioural changes that accompany this damage (e.g., difficulty sleeping, social withdrawal, smoking, substance abuse and other risk-taking behaviour; McEwen 2000).

Links can be made between McEwen's allostatic overload model and Cooper's theoretical model of alcohol use. In her seminal work, Cooper (1994) argued individuals are motivated to use alcohol to reduce negative affect (i.e., to cope or escape), and that this motive represents a pathway linking distal variables to alcohol problems. The use of gambling and illicit drugs to cope with negative affect have been supported in subsequent studies (Simons et al. 1998; Stewart and Zack 2008). The concept of allostatic overload complements this theory by suggesting that individuals who experience extreme forms of social adversity can become highly motivated to engage in addictive behaviours to cope with the resulting biological and emotional sequelae. Thus, McEwen's allostatic overload model provides a social and biological grounding for a key motive for addictive behaviour implicated in Cooper's theory.

Racial Discrimination and PTSD

A particularly potent stress response that can occur in reaction to social trauma is post traumatic stress disorder (PTSD). PTSD results in the intrusive recollection of events associated with trauma, efforts to avoid stimuli and feelings associated with traumatic events, detachment, and ongoing symptoms of physiologic hyperarousal such as hypervigilance, difficulty sleeping, and an exaggerated startle response (Fink 2011). It is well documented that individuals will engage in addictive behaviours, including gambling, to escape PTSD symptoms (for example, see Biddle et al. 2005; Kausch et al. 2006; Ledgerwood and Petry 2006). However, the idea that racism could result in PTSD symptomology is more controversial. Although racial discrimination is ubiquitous in North American society, the Diagnostic and Statistical Manual of Mental Disorders (DSM) has remained silent on the correct classification of race-based psychological trauma (Carter and Forsyth 2009). The result has been a lack of clarity on the clinical and forensic assessment

of race-based traumatic stress disorders and on what exactly is being measured in scientific research when visible minorities demonstrate symptoms of traumatic stress in response to discriminatory experiences (Carter and Forsyth 2009).

There has been long-standing and heated debate between experts on the types of qualifying events that precipitate PTSD (Brewin et al. 2009; Kilpatrick et al. 2009; Robinson and Larson 2010; Van Hooff et al. 2009). In its most current form, the definition for PTSD qualifying events (Criterion A1) in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) is more restrictive than previous versions of the Manual, requiring a person experience, witness or have been confronted with an event or events that involves actual injury or a threat to the physical integrity of oneself or others (American Psychiatric Association 2000). The DSM also includes a list of 52 environmental stressors that may precipitate a diagnoses of PTSD; however, this list does not include racial events. This omission may result in an underestimate of the true psychological impact of racial discrimination by those relying on diagnosable psychological disorders as evidence of emotional distress (Carter 2007), and has resulted in a call for experts to expand their perspectives beyond the DSM when considering race-based traumatic stress (Greenberg et al. 2004).

The International Statistical Classification of Diseases and Related Health Problems, 10th edition (ICD-10), for example, classifies PTSD not as an anxiety disorder, but in a category of reactions to severe stress. ICD-10 requires that qualifying events be of an exceptionally threatening or catastrophic nature, which are likely to cause pervasive stress in almost anyone (World Health Organization 1992). It may be argued that racial discrimination meets the definition of an ICD-10 qualifying event as race-based discriminatory experiences are inherently and exceptionally threatening for most individuals given they are based on fixed features of an individual's physical appearance. Racial discrimination is also typically uncontrollable, unpredictable and ongoing, offering little opportunity for individuals to place distance between themselves and the stressor and recover from its effects. Research suggests minorities rank the distress caused by discrimination as extreme, similar to the effects of major life events like the death of a loved one, divorce, and job loss (Kessler et al. 1999).

As a clinician, Butts (2002) notes there are intriguing psychodynamics implicit in the refusal by European-Americans to acknowledge and accept that the responses of minorities to racial discrimination should be viewed as clinically symptomatic. He reports on the devastating emotional responses to racist acts he has seen in his clinical work. He argues that with a fair degree to frequency, African Americans who experience racial discrimination report symptoms consistent with a PTSD diagnosis. The overall objective of the present research was to expand on these observations by testing whether exposure to racial discrimination was positively associated with PTSD symptomology and problem gambling in a community-based sample of urban Aboriginal Canadians.

Summary of Hypotheses

In summary, it was hypothesized that: (1) racial discrimination would be positively associated with problem gambling; (2) racial discrimination would also be positively associated with PTSD symptoms; and (3) on the view that gambling provides a way to minimize negative affect associated with racial discrimination, PTSD symptomology would partially mediate the association between racial discrimination and problem gambling.

Methods

Sample and Procedure

This study organized an Aboriginal Advisory Committee made up of key members of the Edmonton Aboriginal community to work collaboratively with university researchers to set study priorities, determine measures that would be used, and decide how data would be collected. Among other useful suggestions the Committee recommended participants be given the option to self-identify as Inuit, Métis, First Nation, *or* Aboriginal as some individuals living in cities who are First Nations but are not affiliated with a specific First Nations community or do not have Registered Indian Status may prefer to self-identify as Aboriginal. As a group we determined that after completing a pilot study with Aboriginal university students, an in-person survey would be administered to a community-based convenience sample of adults in Edmonton who self-identified as Aboriginal, Métis or Inuit.

Data were collected from May to December of 2010. Participants were recruited using posters placed in the offices of Aboriginal organizations and organizations offering various services such as child care; educational, employment, and housing opportunities; and general publicly used spaces such as grocery stores and shopping malls. Ads were also placed in community newspapers and e-newsletters distributed by Aboriginal organizations. The range and breadth of organizations and public spaces in which the study was advertised was carefully considered before and during data collection, taking into consideration the sociodemographic profile and geographic distribution of Aboriginal peoples in Edmonton. To increase the generalizability of findings snowball sampling techniques were avoided. No advertising took place in gaming establishments or addiction treatment centres.

Written consent was obtained from all participants. Study procedures and survey instruments were reviewed and approved by the Human Research Ethics Board at the University of Alberta and the Aboriginal Advisory Committee commissioned for the project. All participants completed a questionnaire package by hand (mean completion time = 70 min). Each participant was given an honorarium of $25 for his or her time.

Outcome Variable

Problem gambling was assessed using the Problem Gambling Severity Index (PGSI); a nine-item subset of the Canadian Problem Gambling Index that measures problem gambling in population-based samples (Ferris and Wynne 2001). PGSI scores of 8 or more define severe risk gambling, scores of 3–7 define moderate risk, and scores of 1–2 define low risk gambling (Ferris and Wynne 2001). Participants who score zero have not experienced problems with gambling in the past year. Respondents who fall into the moderate to severe risk categories are typically classified as problem gamblers in Canada and other jurisdictions (see Williams et al. 2012 for review). While this may be a conservative cut-off it has been used here to allow comparison with the majority of academic and government studies that have been published using this measure.

In the present study, PGSI scores ranged from 0 to 27 ($M = 3.0$, SD = 4.9) and internal consistency was excellent ($\alpha = 0.92$). Given that the use of gambling to reduce or avoid negative emotions is an important predictor of problem gambling risk, participants were also asked if they gambled to escape (yes or no) as a second adverse gambling outcome in this study. A validated measure of gambling motivations has since been published in the

literature (Stewart and Zack 2008). However, this index was not yet available when the measures included in the present study were piloted tested and reviewed by the Aboriginal Advisory Committee organized for this study.

Exposure Variable

The Experiences of Discrimination (EOD) Scale measured self-reported discrimination due to Aboriginal race across nine situations (Krieger et al. 2005). The situation subscale counts the number of situations in which racism is experienced, while the frequency subscale asks participants to report how many times racism was experienced in each situation. The situation subscale is scored by counting the number of situations (1–9) that racial discrimination is experienced. The frequency subscale, assigns values of 0, 1, 2.5 and 5 to responses of never, once, 2–3 times and 4 or more times for each situation (Krieger et al. 2005). Although the original measure examines *lifetime discrimination*, a preliminary in-person survey conducted in 2008–2009 as a precursor to the present work suggested Canadian Aboriginal university students may experience very high levels of racial discrimination over their lifetime (Currie et al., in press). Findings indicate the frequency of racism experienced by Canadian Aboriginal university students was two to three times higher than a reference sample of African and Latino Americans in the US (Currie et al., in press). Urban Aboriginal adults from the general population may similarly experience high levels of racial discrimination. Thus a 12-month measure may be more appropriate to ensure sufficient data variability. To accommodate this change, each question on the situation subscale was worded as follows, with information in brackets reflecting the information added that was not included in the original measure, and X reflecting each of the 9 situations tested: *(In the past 12 months) have you experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior at/on/getting because of your race, ethnicity or colour?* Wording on the frequency subscale was as follows, with information in brackets reflecting the modification made to each question: *If yes, how many times did this happen (in the past year)?*

Krieger et al. 2010 define high discrimination by situation scores of 3–9, and moderate discrimination by scores of 1–2. In the present study, the situation subscale ranged from 0 to 9 situations in the past year ($M = 3.3$, SD $= 2.7$). Frequency subscale scores ranged from 0 to 45 ($M = 10.0$, SD $= 10.5$). The internal consistency of each subscale was good ($\alpha = 0.82$ and 0.86 for the situation and frequency subscale, respectively). The EOD also includes questions about the extent to which individuals worry about discrimination targeted at themselves and their racial group, and how frequently they experienced and worried about discrimination in childhood. These items were also included in the present study.

Mediating Variable

The PTSD Checklist-Civilian Version (PCL) was used to assess current PTSD symptoms (Weathers et al. 1991). Participants were asked how often they were bothered by each of 17 symptoms in the last month using a five-point Likert scale ranging from 1 (not at all) to 5 (extremely). A total symptom severity score (range = 17–85) can be obtained by summing the 17 items. The PCL can also be used to assess symptom clusters for PTSD including intrusive recollection, avoidance/numbing, and hyper-arousal. Psychometric reviews of studies that have used the PCL indicate it is a well-validated measure, showing good temporal stability, internal consistency, test–retest reliability, and convergent validity

across populations (McDonald and Calhoun 2010; Wilkins et al. 2011). In the present study, full scale scores ranged from 17 to 85 ($M = 40.0$, SD = 15.9) and internal consistency was excellent ($\alpha = 0.95$).

Covariates

Gender and exact age were was assessed as well as marital status across three categories, education across four categories and employment across five categories. Current household income was also examined; however, consistent with previous studies conducted with Aboriginal populations, a large percentage left this question blank (Oakes and Currie 2005; Smith et al. 2011). As this was anticipated, participants were also asked if they had experienced poverty in their lifetime. Response options included 'never', 'as a child only', 'as an adult only' and 'all my life'. Few participants left this question blank (2.0 %), and this variable was used to adjust for poverty across the life course in multivariate models. To allow for the control of other forms of trauma that may influence PTSD and PG symptomology, participants were asked if they had been separated from their parents in childhood (yes or no) and if they had experienced physical or sexual abuse in childhood (yes or no).

Analysis Strategy

Descriptive analyses were used to examine demographic characteristics and the extent to which participants experienced problem gambling and racial discrimination in the past year. Racial discrimination was operationalized as the number of situations racism was experienced in the past year. The situation subscale was used for hypothesis testing because it is the subscale most frequently employed to examine associations between discrimination and adverse outcomes in the literature (Krieger et al. 2008). The degree to which racial discrimination was associated with 12-month problem gambling was examined using bootstrapped linear regression models and 95 % confidence intervals ($k = 5{,}000$; Preacher and Hayes 2008). All variables were examined in the continuous form.

These analyses were adjusted for the potential confounding effects of covariates selected a priori based on existing literature. These included age, gender, education, marital status, unemployment status, and life course poverty. Models were also adjusted for childhood trauma given documented associations between these experiences and both PTSD and PG in the literature (Hodgins et al. 2010; De Bellis 2002; Molnar et al. 2001). Potential statistical interactions were examined using loess curves and hierarchical F tests (Cohen et al. 2003; Jaccard and Turrisi 2003); none were indicated.

Mediational Analysis

A mediator is a mechanism that explains how one variable affects another (MacKinnon 2008). It in the present study, PTSD symptomology was hypothesized to be a mechanism through which racial discrimination affects problem gambling score (Fig. 1). Mediation was examined using a non-parametric bootstrapped multivariate approach to the cross-products of coefficients method developed by Preacher and Hayes (Preacher and Hayes 2004, 2008). A key advantage of examining mediation using the Preacher and Hayes approach is a single test of the mediation ($a \times b$) pathway. This method avoids a key

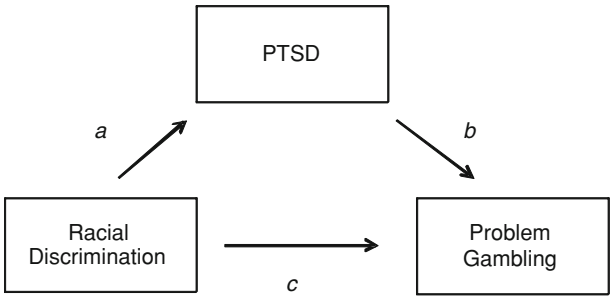

Fig. 1 Hypothesized mediational pathway

problem with the standard approach to mediation testing originally developed by Baron and Kenny in 1986. The Baron and Kenny method examines the reduction in size of the *c* path estimate when the variance provided by the *a* and *b* path are removed (termed the c' path; Baron and Kenny 1986). Using this method, if an exposure variable has a strong affect on a mediator (the *a* pathway), there may be limited opportunity for the mediator to be significantly associated with the outcome (the *b* pathway) due to the mutuality of the *a* and *b* paths (Lundgren et al. 2008). However, the best known cross product of the coefficients test is the Sobel (1982) which is sensitive to violations of normality making it overly conservative with small to moderately sized samples (Sobel 1982). Thus, rather than use a Sobel test, the Preacher and Hayes approach was used which requires no assumption regarding underlying sample distributions as statistical significance is determined non-parametrically (Preacher and Hayes 2008). A total of 5,000 random samples of the original size were taken from the data with replacement, and the indirect effect ($a \times b$) was computed for each sample (Preacher and Hayes 2004; Preacher and Hayes 2008). The point estimate of the indirect effect was the mean $a \times b$ value computed over the samples, with 95 % confidence intervals derived from the obtained distribution of $a \times b$ scores (Preacher and Hayes 2004; Preacher and Hayes 2008). If the upper and lower bounds of these bias corrected confidence intervals did not contain zero, the indirect effect was considered significant. Only a value that reached conventional levels of significance ($p \leq 0.05$) were interpreted, unless otherwise specified.

Results

Sample Characteristics

Participants had a mean age of 35.2 years (SD = 11.5, *range* = 18–79 years). Most identified as First Nations or Aboriginal and more than three in four had Registered Indian Status. The sample included approximately 20 % more women than men, which is consistent with the gender distribution of Aboriginal peoples in Edmonton (Table 1; Edmonton Urban Aboriginal Accord Initiative 2005). The reported household income and educational attainment of participants also matched population-based estimates, however a large proportion of the sample did not disclose their income and there were more unmarried and unemployed participants than would be expected if random sampling had been used (Indian and Northern Affairs Canada 2009). On average participants had been living in Edmonton for 15 years (SD = 12.3, *range* = 0.8–60 years). About 70 % lived in the 11 traffic zones designated as inner city by the City of Edmonton, which is somewhat

Table 1 Description of the sample and prevalence of 12-month problem gambling (PG) by sociodemographic variables

Characteristic	Total sample *N* (%)	PGs *N* (%)
Total sample	371 (100)	117 (33.3)
Aboriginal group		
First Nation/Aboriginal	275 (76.6)	91 (33.5)
Métis/mixed ancestry	81 (22.6)	25 (31.3)
Inuit	3 (0.3)	0 (0.0)
Gender		
Male	150 (41.4)	53 (35.6)
Female	212 (58.6)	62 (29.7)
Age quartiles		
18–24	83 (23.3)	13 (15.7)
25–34	92 (25.8)	21 (23.3)
35–44	97 (27.2)	40 (41.7)
≥45	84 (23.6)	38 (45.8)
Marital status		
Never married	156 (43.2)	45 (28.8)
Married/cohabiting	139 (41.3)	51 (34.7)
Not currently married	56 (15.5)	19 (35.2)
Where do you live in Edmonton		
Inner city neighbourhood	225 (70.1)	77 (34.5)
Non inner city neighbourhood	96 (29.9)	29 (30.5)
Education		
<High school diploma	159 (45.2)	60 (37.7)
High school diploma	39 (11.1)	9 (23.1)
Some university/college	85 (24.1)	25 (29.8)
University/college degree	69 (19.6)	19 (28.4)
Employment		
Employed full/part-time	96 (26.7)	32 (33.3)
Unemployed	159 (44.2)	59 (37.3)
Student	86 (23.9)	15 (18.1)
Retired or homemaker	19 (5.3)	8 (42.1)
Household income		
<$10,000	54 (24.4)	23 (42.6)
$10,000–19,999	48 (21.7)	18 (38.3)
$20,000–39,999	57 (25.3)	17 (30.4)
$40,000–59,999	24 (10.9)	9 (37.5)
≥$60,000	39 (10.5)	12 (31.6)
Question not answered	150 (40.4)	79 (36.1)
Lived in poverty		
Never	92 (26.0)	24 (26.4)
As a child	97 (27.4)	31 (32.0)
As adult	60 (16.9)	21 (35.6)
All my life	105 (29.7)	36 (35.0)

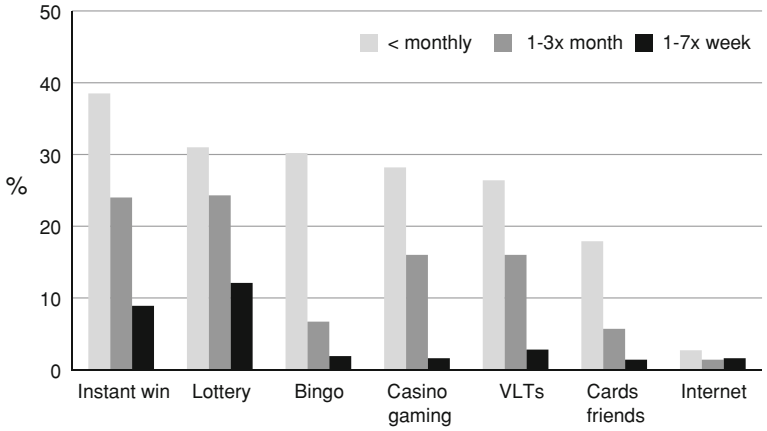

Fig. 2 Gambling involvement by Aboriginal participants in study (full sample)

higher than the actual percentage of the Aboriginal population who live in this area (62.5 %; Edmonton Urban Aboriginal Accord Initiative 2005). About a quarter of the sample had never lived in poverty, while about 30 % had lived in poverty all their lives.

Gambling Involvement and Problems

Overall, 93 % of the sample gambled in the past year. Participants engaged in an average of four types of gambling activities in that time period, most typically purchasing lottery and instant win tickets, gambling in casinos, and participating in raffles (Fig. 2). Males and older participants gambled more frequently than females ($t(303) = 4.54$, $p = .001$) and younger participants (*Pearson's* $r = .20$, $p = .001$). As shown in Table 2, participants who gambled to escape evidenced significantly higher problem gambling scores than participants who did not.

A third of the sample met criteria for problem gambling (17 % moderate risk, 16 % severe risk), and 17.2 % were at-risk gamblers. Respondents who gambled to escape were approximately 9.5 times more likely to meet criteria for problem gambling than participants who did not (70.6 % versus 29.4 %, $OR = 9.53$, 95 % CI [4.33, 20.96] in a model adjusted for sociodemographics and childhood trauma). Problem gamblers were more likely than non problem gamblers to participate in all forms of gambling measured, particularly VLTs, bingo and gambling on the internet (Fig. 3). The mean number of games

Table 2 Differences between participants who gamble and do not gamble to escape

	Gamble to escape	*N*	Mean score	SD	SE mean	*t* test	*p*
Racism situation score (range 0–9)	no	308	3.08	2.67	.15	−1.93	0.05
	Yes	48	3.87	2.50	.36		
PTSD score (range 18–85)	No	302	38.42	15.46	.89	−2.05	0.05
	Yes	49	43.37	16.71	2.39		
PG score (range 0–27)	No	314	2.25	4.14	.23	−7.57	0.001
	Yes	52	7.40	6.49	.90		

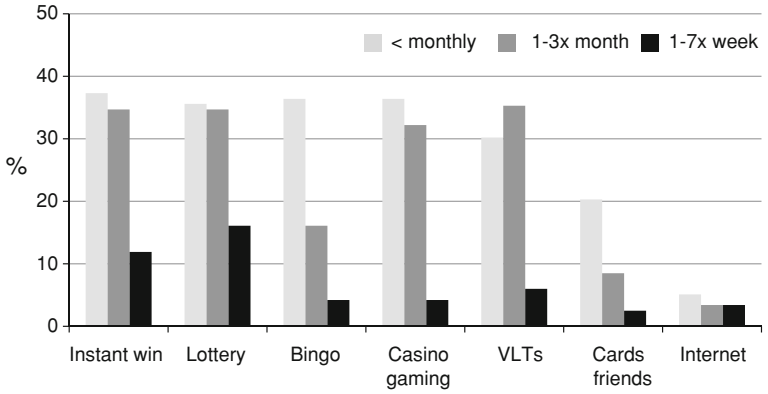

Fig. 3 Gambling involvement among Aboriginal participants who met criteria for problem gambling ($N = 117$)

played monthly or more by problem gamblers was 2.5 (SD = 2.2) compared to 0.9 (SD = 1.3) among non PGs.

Overall, 17.4 % of PGs and 1 % of non PGs had sought help for gambling in their lifetime, most frequently through Gamblers Anonymous (45.5 %), treatment centres (36.4 %), counsellors (36.4 %), and by talking to family members (31.8 %). While the same percentage of problem and non problem gamblers had made a suicide attempt in their lifetime (33.3 % of PGs compared to 33.8 % of non PGs); a higher percentage of current problem gamblers had made a suicide attempt in the past year compared to participants without gambling problems (10.4 % versus 6.6 %, $OR = 2.97$, 95 % CI [1.03, 8.56] in a model adjusted for sociodemographics, childhood trauma, and lifetime suicide attempts).

Racial Discrimination

Overall, 81.8 % of participants had experienced discrimination due to Aboriginal race in the past year. More than half (51.3 %) had experienced high levels of racism ($\geq$ 3 situations) in that time period ($M = 3.3$ situations, SD = 2.70, *range* = 0–9). Participants experienced discrimination most frequently in public spaces, stores and restaurants, and in seeking employment. About 60 % of those who identified as First Nation or Aboriginal and 50 % of those who identified as Métis or mixed heritage worried some or most of the time about experiencing racism in their day-to-day lives (Table 3). About 70 % of the full sample also worried some or most of the time about other people in their Aboriginal group experiencing racism. On the whole, participants believed that Aboriginal peoples in Canada experienced racial discrimination more frequently then they had experienced themselves in the past year.

In childhood, about 75 % of Aboriginal or First Nations participants, and 65 % of Métis or mixed heritage participants had experienced racial discrimination some or most of the time. The majority of participants had worried frequently about racism in childhood. Levels of racial discrimination experienced in the past year were positively correlated with levels experienced in childhood ($r = .49$, $p < .001$) highlighting the importance of viewing discrimination as a life course variable.

Table 3 Experiences of discrimination (EOD) among urban Aboriginal participants

EOD	Identify as Aboriginal or First Nation (%) $N = 275$	Identify as Métis or mixed ancestry (%) $N = 81$
Number of situations, past yr		
0: No discrimination	15.7	29.1
1–2: Moderate	30.3	25.3
3+: High	53.9	45.6
Mean situation score (SD)	3.35 (2.60)	2.76 (2.78)
Mean frequency score (SD)	10.61 (10.46)	8.47 (10.82)
At school, past yr		
Once	6.7	7.4
2–3 times	24.4	16.0
4 or more times	22.6	21.0
In a public setting, past yr		
Once	5.9	12.5
2–3 times	25.4	16.3
4 or more times	22.4	16.3
In a store or restaurant, past yr		
Once	12.1	10.0
2–3 times	21.2	12.5
4 or more times	14.3	5.0
At work, past yr		
Once	10.3	9.9
2–3 times	11.7	9.9
4 or more times	11.4	17.3
Finding work, past yr		
Once	12.9	13.6
2–3 times	18.4	11.1
4 or more times	12.1	8.6
From the police/courts, past yr		
Once	11.0	6.3
2–3 times	12.9	12.5
4 or more times	13.2	8.8
Finding housing, past yr		
Once	13.6	11.3
2–3 times	13.9	10.0
4 or more times	12.1	10.0
Seeking medical care, past yr		
Once	8.5	11.3
2–3 times	11.0	7.5
4 or more times	10.3	7.5
Getting bank loans/mortgage/credit, past yr		
Once	4.8	1.3
2–3 times	7.3	7.5
4 or more times	3.3	6.3

Table 3 continued

EOD	Identify as Aboriginal or First Nation (%) $N = 275$	Identify as Métis or mixed ancestry (%) $N = 81$
How often are Aboriginal groups discriminated against in Canada		
Rarely or never	9.6	9.9
Sometimes	41.5	35.8
Often	48.9	54.3
How often do you feel discriminated against because of your Aboriginal ethnicity?		
Rarely or never	28.8	39.2
Sometimes	50.4	49.4
Often	20.8	11.4
Worry about experiencing racism, past yr		
Rarely or never	39.9	50.0
Some of the time	42.8	38.8
Most of the time	17.3	11.3
Worry about your Aboriginal group experiencing racism, past yr		
Rarely or never	28.5	30.0
Some of the time	46.7	47.5
Most of the time	24.8	22.5
Frequency of racism, in childhood		
Rarely or never	22.3	35.0
Some of the time	48.7	43.8
Most of the time	28.9	21.3
Worry about experiencing racism, as child		
Rarely or never	23.6	40.0
Some of the time	45.8	42.5
Most of the time	30.6	17.5
Worry about your Aboriginal group experiencing racism, as child		
Rarely or never	23.4	27.5
Some of the time	50.9	43.8
Most of the time	25.6	28.7

Mediation Analysis

As hypothesized, 12-month racial discrimination was significantly and positively associated with PTSD symptomology and continuous problem gambling score in unadjusted and adjusted analyses (Table 5). Specifically, in a bootstrapped fully adjusted linear regression model, PTSD score increased an average of 1.12 points for each additional situation racism was experienced in the past year (Fig. 4). In a separate bootstrapped and fully adjusted linear regression model, problem gambling score increased a quarter of a point with each additional situation racism had been experienced in the past year (Tables 4, 5). However, PTSD symptomology did not predict PG score in either unadjusted (Table 4) or adjusted analyses, and as a consequence, PTSD was not a significant mediator of the association between racial discrimination and problem gambling in this sample (Fig. 4). There was

Table 4 Pearson's *r* correlations between main study variables

	1	2	3	3a	3b	3c
1. Racial discrimination score	1.0	0.15*	0.22**	0.23**	0.20**	0.18**
2. PG score	0.20**	1.0	0.01	−0.05	0.03	0.02
3. PTSD full score	0.31**	0.05	1.0	0.87**	0.94**	0.87**
3a. Re-experiencing subscale score	0.28**	−0.02	0.89**	1.0	0.74**	0.62**
3b. Avoidance/numbing subscale score	0.29**	0.08	0.95**	0.77**	1.0	0.75**
3c. Hyperarousal subscale score	0.26**	0.05	0.90**	0.69**	0.79**	1.0

Zero order correlations are represented below the diagonal; partial correlations adjusted for age, gender, education, employment, marital status, and life course poverty are represented above it. ** $p < 0.001$; * $p = 0.007$

also no association between PTSD score and participant age (*Pearson's* $r = 0.02$, $p = 0.65$) or gender (t (351) $= 0.15$, $p = 0.88$).

Post Hoc Analyses

In the field of alcohol research, drinking to reduce negative affect is an important motive for drinking behaviour that is theorized to represent an important mechanism linking distal variables to the development of alcohol problems (Cooper 1994). Drinking to reduce negative effect remains associated with alcohol problems regardless of levels of alcohol consumed (Birch et al. 2006; Cooper 1994). Stewart and Zack (2008) similarly demonstrated that gambling to reduce negative affect remains associated with problem gambling regardless of how often or varied levels of gambling may be. These findings suggest gambling to reduce negative affect is inherently maladaptive and may preferentially predict the development of gambling problems independent of gambling involvement.

Given this literature, gambling to escape was measured in the present study as a second adverse gambling outcome that may, theoretically, represent a pathway linking PTSD symptoms occurring in reaction to racial discrimination to the development of gambling problems. The plausibility of gambling to escape as an outcome for PTSD is highlighted by the central role of avoidance/numbing behaviour in PTSD symptomology. The PTSD avoidant/numbing subscale examines the extent to which individuals take efforts to avoid thoughts, feelings, places, activities, and people associated with the social trauma they have experienced. This may, theoretically, include the use of gambling to escape the memories and feeling associated with race-based social trauma. To explore these ideas, a post hoc analysis examined the PTSD avoidance/numbing subscale as a mechanism through which racial discrimination might increase the use gambling to escape, and consequently, increase the development of gambling problems. Scores on the PTSD avoidance/numbing subscale ranged from 7 to 35 ($M = 11.1$, $SD = 5.1$) and internal consistency was good ($\alpha = 0.88$). The full PTSD scale and remaining PTSD subscales were not tested using this data to avoid problems associated with conducting multiple exploratory statistical tests.

This post hoc analysis unfolded in several steps, beginning with the replication of findings by Stewart and Zack (2008) in this sample. As shown in Fig. 5, problem gambling scores remained, on average, 3.65 points higher for Aboriginal participants who gambled to escape compared to those who did not in a bootstrapped linear regression model adjusted

Table 5 Bootstrapped point estimates and bias-corrected 95 % confidence intervals (CIs) for the direct effects of racial discrimination and hypothesized covariates on problem gambling scores

Variables	Model 1 ($adj\ R^2 = 0.04$)			Model 2 ($adj\ R^2 = 0.09$)			Model 3 ($adj\ R^2 = 0.09$)		
	B (95 % CI)	*SE*	β	B (95 % CI)	*SE*	β	B (95 % CI)	*SE*	β
Racism score	**0.38 (0.17–0.57)**	0.11	0.20	**0.30 (0.09, 0.54)**	0.12	0.16	**0.26 (0.05, 0.48)**	0.11	0.14
Age				**0.11 (0.07, 0.16)**	0.03	0.26	**0.12 (0.07, 0.17)**	0.03	0.28
Gender				0.39 (−1.41, 0.66)	0.52	0.04	0.22 (−1.28, 0.87)	0.55	0.02
Education				−0.44 (−0.93, 0.04)	0.09	−0.10	−0.38 (−0.84, 0.11)	0.24	−0.09
Unemployed				0.01 (−1.03, 1.36)	0.67	0.02	0.28 (−0.88, 1.52)	0.62	0.03
Divorced/separated				−0.27 (−1.97, 1.59)	0.87	0.01	−0.22 (−1.84, 1.41)	0.85	−0.02
Life course poverty				−0.06 (−0.58, 0.42)	0.24	−0.06	−0.06 (−0.61, 0.33)	0.23	−0.03
Parental separation							−0.42 (−1.44, 0.61)	0.53	−0.04
Abuse in childhood							0.09 (−1.03, 1.25)	0.57	0.01

Model 1 provides an unadjusted estimate of the association between racial discrimination score and problem gambling score. Model 2 provides an estimate adjusted for sociodemographic covariates (age, gender, education, unemployment status, martial status, and life course poverty). Model 3 includes additional adjustment for childhood trauma (parental separation and abuse). Results significant at $p < 0.05$ are given in bold

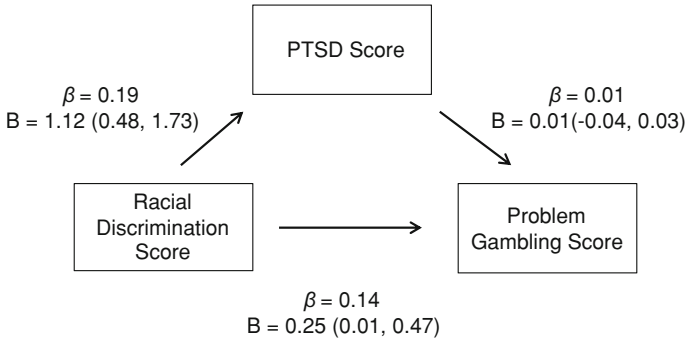

Fig. 4 Test of the hypothesized mediation of association between racial discrimination and problem gambling through increased PTSD symptoms via adjusted unstandardized bootstrapped linear regression coefficients (95 % confidence intervals). Regression models adjusted for age, gender, education, marital status, unemployment, life course poverty, separation from parents in childhood, abuse in childhood

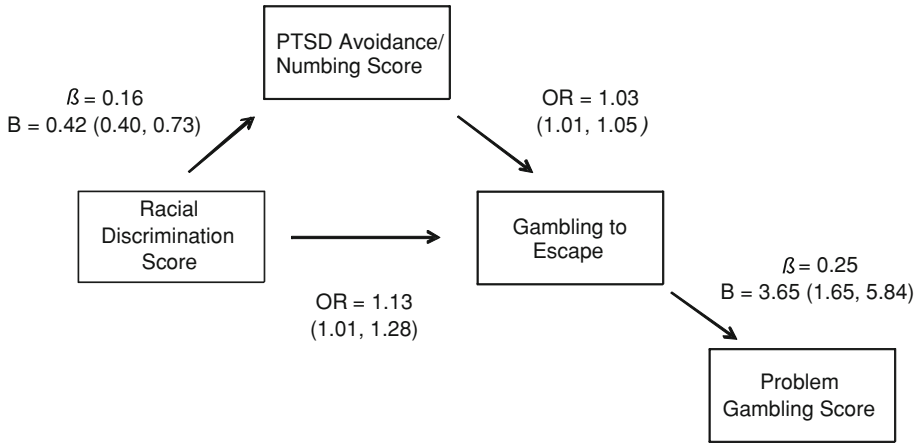

Fig. 5 Post hoc mediation test of association between racial discrimination and gambling to escape through increased PTSD symptoms via adjusted bootstrapped linear and logistic regression models. Regression models adjusted for age, gender, education, marital status, unemployment, life course poverty, separation from parents in childhood, abuse in childhood, with additional control for gambling frequency and gambling variety in the model predicting problem gambling score

for sociodemographic covariates, gambling frequency, and number of gambling activities in the past year (e.g., bingo, VLTs, lottery). This is a noteworthy increase in PG score given scores of 3 or more are typically considered to meet criteria for problem gambling using this measure. Thus, it appears that similar to the findings of Stewart and Zack, gambling to escape was intrinsically maladaptive for this sample of urban Aboriginal adults regardless of how often or varied their levels of gambling were.

Next, a bootstrapped logistic regression model adjusted for sociodemographic covariates was used to determine if racial discrimination was statistically associated with increased odds of gambling to escape. As shown in Fig. 5, there was a 13 % increase in the

odds of gambling to escape for each additional situation that racism had been experienced in the past year, up to a maximum of 9 situations.

Finally, the extent to which increased PTSD avoidance/numbing symptomology helped to explain the association between racial discrimination and gambling to escape was tested. A bootstrapped multivariate approach to the cross-products of the coefficients could not be used to test mediation in this case given gambling to escape is a dichotomous outcome, thus providing coefficients set on different scales within the mediational analysis (MacKinnon 2008). Coefficients can be made comparable by use of an additional set of equations and SPSS macro applications created for this purpose, with statistical significance tested using a Sobel test (Herr 2011; MacKinnon et al. 2002; Sobel 1982). The significance level was set at $p < 0.10$ for this test as it is well documented that the Sobel test is an overly conservative measure in small to moderately sized samples due to its use of a normal approximation which presumes a symmetric distribution despite the highly skewed nature of the *ab* distribution (MacKinnon et al. 1995). Findings from this test indicate increased PTSD avoidant/numbing symptomology was a significant mediator that helped to explain how racial discrimination increased the use of gambling to escape in this sample of urban Aboriginal adults (*Sobel test* $= 1.81$, $SE = 0.06$, $p = 0.07$).

Discussion

This study documents high levels of problem gambling in a sample of urban Aboriginal peoples living in Canada. The devastating impact of problem gambling on Aboriginal participants was highlighted by a threefold increase in past year suicide attempts by problem gamblers compared to non problem gamblers, despite a similar percentage of suicide attempts by PGs and non PGs over the life course.

More than 80 % of urban Aboriginal adults in this study had experienced discrimination due to Aboriginal race in the past year, with more than half reporting high levels racism in that time period. To place these findings in context, Aboriginal participants in this study experienced more frequent racism across a greater number of situations over a one-year period than same-aged African and Latino Americans in the US report in their lifetime using the same measure (Krieger et al. 2005). Aboriginal participants worried frequently about experiencing racism in their day-to-day lives, with more than half worrying about themselves frequently and 70 % worrying frequently about Aboriginal family and friends.

Previous studies have shown that discrimination is temporally associated with the development of substance-based addictions in minority populations. The present findings extend this evidence to a process-based addiction, and are the first to provide empirical support for the idea that racial discrimination may be associated with increased problem gambling, as well as the use of gambling to escape negative affect. Findings also suggest a significant and positive association between 12-month racial discrimination and current PTSD symptomology that could not be explained by other events or factors such as separation from birth parents in childhood, abuse in childhood, and exposure to poverty over the life course. Yet, contrary to what had been hypothesized, current PTSD symptoms were not associated with 12-month problem gambling score, and as a consequence, PTSD did not mediate the association between racial discrimination and PG in this study. However, a post hoc analysis suggests the extent of current PTSD avoidance/numbing symptoms did mediate the association between racial discrimination and the increased use of gambling to escape in the past 12 months.

A model that may be derived from these findings posits that racial discrimination results in states of subjective distress and suffering that are consistent with PTSD symptoms, including the desire to avoid thoughts and feelings associated with racist events. As a result, Aboriginal peoples who experience high levels of discrimination are at increased risk of gambling to escape the visceral emotional reactions they have to racist experiences, with gambling to escape forming a pathway linking racism to increased problem gambling among Aboriginal adults over time.

It is acknowledged that the present study cannot infer the temporal sequence of these events. However, given the form of discrimination measured in this study is based on race, a characteristic that does not vary within individuals over time, it may be argued that race-based discrimination is a fixed marker over the course of a person's life, making it, by definition, an antecedent to outcomes such as PTSD and maladaptive gambling behaviour (Vogt et al. 2010). The present findings support this assertion, documenting a positive correlation ($r = 0.49$) between levels of racism experienced in childhood and levels experienced in the past year. That said, prospective studies are needed to replicate the cross-sectional associations documented in this study and to test the temporal sequence of events implied in the theoretical model derived from these findings.

Strengths of this study include guidance by an Aboriginal Advisory Committee and the use of validated measures of racial discrimination, problem gambling and PTSD. Limitations include the use of a cross-sectional design, a relatively small volunteer sample of participants, and a single item to assess gambling to escape. Further research is needed to test the generalizability of these findings to other Aboriginal populations and other adverse outcomes.

Conclusions

The findings of this study address a gap in the literature and are the first to suggest that racial discrimination may be an important social determinant of problem gambling for Aboriginal peoples. Findings suggest gambling may be a coping response that some Aboriginal adults use to escape the negative affect that racist experiences elicit. Gambling to escape was strongly associated with PG, independent of gambling involvement, and may represent an important pathway linking high levels of discrimination directed at Aboriginal people to the high levels of problem gambling observed within this population. Results support policies aimed at reducing racism targeted at Aboriginal peoples in urban areas, and the growth of services to help Aboriginal peoples cope with racist events. Results also underline the need for further research to determine if racial discrimination may also help to explain the disproportionate burden of substance use problems observed among Aboriginal peoples in Canada.

Acknowledgments This study was funded by the Alberta Gambling Research Institute and the Alberta Centre for Child, Family and Communities. Dr. Currie was supported by stipend awards from Alberta Innovates: Health Solutions (AIHS) and the Alberta Centre for Child, Family and Community during the course of this research. Dr. Wild was supported by a stipend award from AIHS. All authors declare that they have no conflict of interest. We gratefully acknowledge the guidance of Dean Brown, Leona Carter, Jacqueline Fiala, Elena Jacobs, Miranda Jimmy, Patti LaBoucane-Benson, Donald Langford, Norman McCallum, and Hazel McKennitt, who served as members of the urban Aboriginal Advisory Committee for this study; and the Aboriginal participants who shared their valuable time and information.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders*. Washington, DC: Author.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Barron, F. L. (1988). The Indian pass system in the Canadian West, 1882–1935. *Prairie Forum, 21*, 25–42.

Barry, D. T., Stefanovics, E. A., Desai, R. A., & Potenza, M. N. (2011). Differences in the associations between gambling problem severity and psychiatric disorders among Black and White adults: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *The American Journal of Addictions, 20*(1), 69–77. doi:10.1111/j.1521-0391.2010.00098.x.

Bickel, W. K., & Yi, R. (2010). Neuroeconomics of addiction: rhe contribution of executive function. In D. Ross, H. Kincaid, D. Spurrett, & P. Collins (Eds.), *What is addiction?* (pp. 1–26). Cambridge, MA: Massachusetts Institute of Technology Press.

Biddle, D., Hawthorne, G., Forbes, D. C., & Coman, G. (2005). Problem gambling in Australian PTSD treatment-seeking veterans. *Journal of Traumatic Stress, 18*(6), 759–767.

Birch, C. D., Stewart, S. H., & Zack, M. (2006). Emotion and motive effects on drug-related cognition. In R. W. Wiers & A. W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 267–280). Thousand Oaks, CA: Sage Publications.

Borrell, L. N., Jacobs, D. R., Williams, D. R., Pletcher, M. J., Houston, T. K., & Kiefe, C. I. (2007). Self-reported racial discrimination and substance use in the coronary artery risk development in adults study. *American Journal of Epidemiology, 166*(9), 1068–1079. doi:10.1093/aje/kwm180.

Brewin, C. R., Lanius, R. A., Novac, A., Schnyder, U., & Galea, S. (2009). Reformulating PTSD for *DSM-V*: life after Criterion A. *Journal of Traumatic Stress, 22*(6), 363–373. doi:10.1002/jts.20443.

Brunner, E., & Marmot, M. (2006). Social organization, stress and health. In M. Marmot & R. G. Wilkinson (Eds.), *Social determinants of health* (2nd ed., pp. 6–30). Oxford: Oxford University Press.

Butts, H. F. (2002). The black mask of humanity: Racial/ethnic discrimination and post-traumatic stress disorder. *Journal of American Academy of Psychiatry and Law, 30*, 336–339.

Carter, R. T. (2007). Racism and psychological and emotional injury: Recognizing and assessing race-based traumatic stress. *The Counseling Psychologist, 35*(13), 13–105. doi:10.1177/0011000006292033.

Carter, R. T., & Forsyth, J. M. (2009). A guide to the forensic assessment of race-based traumatic stress reactions. *Journal of American Academy of Psychiatry and Law, 37*, 28–40.

Clark, R., Anderson, N. B., Clark, V. R., & Williams, D. R. (1999). Racism as a stressor for African Americans: A biopsychosocial model. *American Psychologist, 54*(10), 805–816.

Cloutier, E., Germain, R., Janz, M., Levett, A., Loder, R., Simon, P., et al. (2008). *Aboriginal peoples in Canada in 2006: Inuit, Métis and first nations, 2006 census.* Ottawa, ON: Statistics Canada. Retrieved from http://www12.statcan.ca/census-recensement/2006/as-sa/97-558/pdf/97-558-XIE2006001.pdf.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*(2), 117–128.

Currie, C. L., Wild, T.C., Schopflocher, D.P., Laing, L., Veugelers, P. (in press). Racial discrimination experienced by Canadian Aboriginal university students. Canadian Journal of Psychiatry.

De Bellis, M. D. (2002). Developmental traumatology: A contributory mechanism for alcohol and substance use disorders. *Psychoneuroendocrinology, 27*(1–2), 155–170. doi:10.1016/S0306-4530(01)00042-7.

Edmonton Urban Aboriginal Accord Initiative. (2005). *Aboriginal Edmonton: A statistical profile of the Aboriginal population of the City of Edmonton*. Edmonton, AB: Author.

Environics Institute (2010). *Urban aboriginal peoples study*. Toronto, ON: Author. Retrieved from http://www.cbc.ca/news/pdf/uaps-report-april5.pdf.

Ferris, J., & Wynne, H. (2001). *Canadian PG index: Final report*. Toronto, Ontario: Canadian Centre on Drug Abuse.

Fink, G. (2009). Stress: Definition and history. In L. R. Squire (Ed.), *Encyclopedia of neuroscience* (pp. 549–555). Oxford: Academic Press. doi:10.1016/B978-008045046-9.00076-0.

Fink, G. (2011). Stress controversies: Post-traumatic stress disorder, hippocampal volume, gastroduodenal ulceration. *Journal of Neuroendocrinology, 23*(2), 107–117. doi:10.1111/j.1365-2826.2010.02089.x.

Greenberg, A. S., Shuman, D. W., & Meyer, R. G. (2004). Unmasking forensic diagnosis. *International Journal of Law and Psychiatry, 27*(1), 15.

Herr, N. R. (2011). *Mediation with dichotomous outcomes*. Retrieved from http://www.nrhpsych.com/mediation/logmed.html.

Hodgins, D. C., Schopflocher, D. P., El-Guebaly, N., Casey, D. M., Smith, G. J., Williams, R. J., et al. (2010). The association between childhood maltreatment and gambling problems in a community sample of adult men and women. *Psychology of Addictive Behaviors, 24*(3), 548–554. doi:10.1037/a0019946.

Hunter, L. R., & Schmidt, N. B. (2010). Anxiety psychopathology in African American adults: Literature review and development of an empirically informed sociocultural model. *Psychological Bulletin, 136*(2), 211–235. doi:10.1037/a0018133.

Indian and Northern Affairs Canada (2009). *Fact sheet—Urban Aboriginal population in Canada.* Retrieved from http://www.ainc-inac.gc.ca/ai/ofi/uas/fs/index-eng.asp.

Jaccard, J., & Turrisi, R. (2003). *Interaction effects in multiple regression*. Newbury Park, CA: Sage.

Joëls, M. (2011). Impact of glucocorticoids on brain function: Relevance for mood disorders. *Psychoneuroendocrinology, 36*(3), 406–414. doi:10.1016/j.psyneuen.2010.03.004.

Jones, J. M. (1997). *Prejudice and racism*. New York, NY: McGraw-Hill Inc.

Kausch, O., Rugle, L., & Rowland, D. W. (2006). Lifetime histories of trauma among pathological gamblers. *The American Journal of Addictions, 15*(1), 35–43.

Kessler, R., Davis, C., & Kendler, K. (1997). Childhood adversity and adult psychiatric disorder in the U.S. National Comorbidity Survey. *Psychological Medicine, 27*, 1101–1119.

Kessler, R. C., Hwang, I., LaBrie, R., Petukhova, M., Sampson, N. A., Winters, K. C., et al. (2008). DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological Medicine, 28*, 1351–1360. doi:10.1017/S0033291708002900.

Kessler, R. C., Mickelson, K. D., & Williams, D. R. (1999). The prevalence, distribution, and mental health correlates of perceived discrimination in the United States. *Journal of Health and Social Behavior, 40*(3), 208–230.

Kilpatrick, D. G., Resnick, H. S., & Acierno, R. (2009). Should PTSD criterion A be retained? *Journal of Traumatic Stress, 22*(5), 374–383.

Krieger, N., Carney, D., Lancaster, K., Waterman, P. D., Kosheleva, A., & Banaji, M. (2010). Combining explicit and implicit measures of racial discrimination in health research. *American Journal of Public Health, 100*(8), 1485–1492. doi:10.2105/AJPH.2009.159517.

Krieger, N., Chen, J. T., Waterman, P. D., et al. (2008). The inverse hazard law. *Social Science and Medicine, 67*(12), 1970–1981.

Krieger, N., Smith, K., Naishadham, D., Hartman, C., & Barbeau, E. M. (2005). Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. *Social Science and Medicine, 61*, 1576–1596. doi:10.1016/j.socscimed.2005.03.006.

Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Ledgerwood, D. M., & Petry, N. M. (2006). Posttraumatic stress disorder symptoms in treatment-seeking pathological gamblers. *Journal of Traumatic Stress, 19*(3), 411–416.

Lewis, T. T., Everson-Rose, S. A., Powell, L. H., Matthews, K. A., Brown, C., Karavolos, K., et al. (2006). Chronic exposure to everyday discrimination and coronary artery calcification in African-American women: The SWAN Heart Study. *Psychosomatic Medicine, 68*(3), 362–368. doi:10.1097/01.psy.0000221360.94700.16.

Loo, J. M. Y., Raylu, N., & Oei, T. P. (2008). Gambling among the Chinese: A comprehensive review. *Clinical Psychology Review, 28*(7), 1152–1166. doi:10.1016/j.cpr.2008.04.001.

Lundgren, T., Dahl, J., & Hayes, S. C. (2008). Evaluation of mediators of change in the treatment of epilepsy with acceptance and commitment therapy. *Journal of Behavioral Medicine, 31*, 225–235.

MacKinnon, D. P. (2008). *Introduction to statistical mediation analysis*. New York: Taylor & Francis.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods, 7*, 83–104.

MacKinnon, D. P., Warsi, G., & Dwyer, J. H. (1995). A simulation study of mediated effect measures. *Multivariate Behavioral Research, 30*, 41–62.

McDonald, S. D., & Calhoun, P. S. (2010). The diagnostic accuracy of the PTSD Checklist: A critical review. *Clinical Psychology Review, 30*(8), 976–987. doi:10.1016/j.cpr.2010.06.012.

McEwen, B. S. (2000). Allostasis and allostatic load: Implications for neuropsychopharmacology. *Neuropsychopharmacology, 22*(2), 108–124. doi:10.1016/S0893-133X(99)00129-3.

McEwen, B. S. (2007). Physiology and neurobiology of stress and adaptation: Central role of the brain. *Physiological Reviews, 87*(3), 873–904. doi:10.1152/physrev.00041.2006.

McEwen, B. S. (2008a). Central effects of stress hormones in health and disease: Understanding the protective and damaging effects of stress and stress mediators. *European Journal of Pharmacology, 583*(2–3), 174–185. doi:10.1016/j.ejphar.2007.11.071.

McEwen, B. S. (2008b). Understanding the potency of stressful early life experiences on brain and body function. *Metabolism, 57*(Supplement 2), S11–S15. doi:10.1016/j.metabol.2008.07.006.

Molnar, B., Buka, S., & Kessler, R. (2001). Child sexual abuse and subsequent psychopathology: Results from the National Comorbidity Survey. *American Journal of Public Health, 91*(5), 753–760. doi:10.2105/AJPH.91.5.753.

Oakes, J., & Currie, C. L. (2005). *Gambling and problem gambling in First Nations communities*. Winnipeg, MB: Aboriginal Issues Press.

Oei, T. P., Lin, J., & Raylu, N. (2008). The relationship between gambling cognitions, psychological states, and gambling. *Journal of Cross-Cultural Psychology, 39*(2), 147–161. doi:10.1177/0022022107312587.

Paradies, Y. (2006). A systematic review of empirical research on self-reported racism and health. *International Journal of Epidemiology, 35*, 888–901.

Paradies, Y., & Cunningham, J. (2009). Experiences of racism among urban Indigenous Australians: Findings from the DRUID study. *Ethnic and Racial Studies, 32*(3), 548–573. doi:10.1080/01419870802065234.

Paradies, Y., Harris, R., & Anderson, I. (2008). *The impact of racism on Indigenous health in Australia and Aotearoa: Towards a research agenda* (No. discussion paper no. 4). Darwin, NT: Cooperative Research Centre for Aboriginal Health.

Peacock, T. D., Day, P. A., & Peacock, R. B. (1999). At what cost? The social impact of American Indian gaming. *Journal of Health & Social Policy, 10*(4), 23–34.

Peters, E. (1996). Aboriginal people in urban areas. In O. P. Dickason & D. Long (Eds.), *Visions of the heart: Canadian Aboriginal issues* (pp. 305–344). Toronto, ON: Harcourt Brace and Company.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*, 717–731.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879–891.

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

Redish, D. A. (2010). Addiction as a breakdown in the machinery of decision making. In D. Ross, H. Kincaid, D. Spurrett, & P. Collins (Eds.), *What is addiction?* (pp. 99–130). Cambridge, MA: Massachusetts Institute of Technology Press.

Robinson, J. S., & Larson, C. (2010). Are traumatic events necessary to elicit symptoms of posttraumatic stress? *Psychological Trauma: Theory, Research, Practice, and Policy, 2*(2), 71–76. doi:10.1037/a0018954.

Root, M. (2001). The problem of race in medicine. *Philosophy of the Social Sciences, 31*(1), 20–39.

Salter, M. A. (1979). Games, goods and gods: An analysis of Iroquoian gambling. *Canadian Journal of Applied Sport Sciences, 4*, 160–164.

Sellers, R. M., Caldwell, C. H., Schmeelk-Cone, K. H., & Zimmerman, M. A. (2003). Racial identity, racial discrimination, perceived stress, and psychological distress among African American young adults. *Journal of Health and Social Behavior, 44*(3), 302–317.

Simons, J., Correia, C. J., Carey, K. B., & Borsari, B. E. (1998). Validating a five-factor marijuana motives measure: Relations with use, problems, and alcohol motives. *Journal of Counseling Psychology, 45*(3), 265–273. doi:10.1037/0022-0167.45.3.265.

Smith, G., Currie, C. L., & Battle, J. (2011). Exploring gambling impacts in two Alberta Cree communities: A participatory action study. In Y. D. Belanger (Ed.), *First Nations gaming in Canada* (pp. 118–139). Winnipeg, MB: University of Manitoba Press.

Sobel, S. E. (1982). Asymptotic intervals for indirect effects in structural equations models. In S. Leinhart (Ed.), *Sociological methodology* (pp. 290–312). San Francisco, CA: Jossey-Bass.

Soto, J. A., Dawson-Andoh, N. A., & BeLue, R. (2011). The relationship between perceived discrimination and generalized anxiety disorder among African Americans, Afro Caribbeans, and non-Hispanic Whites. *Journal of Anxiety Disorders, 25*(2), 258–265. doi:10.1016/j.janxdis.2010.09.011.

Stewart, S. H., & Zack, M. (2008). Development and psychometric evaluation of a three-dimensional Gambling Motives Questionnaire. *Addiction, 103*(7), 1110–1117. doi:10.1111/j.1360-0443.2008.02235.x.

Taylor, T. R., Williams, C. D., Makambi, K. H., Mouton, C., Harrell, J. P., Cozier, Y., et al. (2007). Racial discrimination and breast cancer incidence in US Black women. *American Journal of Epidemiology, 166*(1), 46–54. doi:10.1093/aje/kwm056.

Van Hooff, M., McFarlane, A. C., Baur, J., Abraham, M., & Barnes, D. J. (2009). The stressor Criterion-A1 and PTSD: A matter of opinion? *Journal of Anxiety Disorders, 23*(1), 77–86. doi:10.1016/j.janxdis.2008.04.001.

Vogt, D. S., King, D. W., & King, L. A. (2010). Risk pathways for PTSD: Making sense of the literature. In M. J. Friedman, T. M. Keane, & P. A. Resick (Eds.), *Handbook of PTSD: Science and practice* (pp. 99–115). London: The Guilford Press.

Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1991). *The PTSD checklist—Civilian version (PCL-C)*. Boston, MA: Weathers National Center for PTSD, Boston Veterans Affairs Medical Center.

Wilkins, K. C., Lang, A. J., & Norman, S. B. (2011). Synthesis of the psychometric properties of the PTSD checklist (PCL) military, civilian, and specific versions. *Depress Anxiety, 28*, 596–606.

Williams, D. R. (1997). Race and health: Basic questions, emerging directions. *Annals of Epidemiology, 7*(5), 322–333. doi:10.1016/S1047-2797(97)00051-3.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20–47. doi:10.1007/s10865-008-9185-0.

Williams, D. R., Mohammed, S. A., Leavell, J., & Collins, C. (2010). Race, socioeconomic status, and health: Complexities, ongoing challenges, and research opportunities. *Annals of the New York Academy of Sciences, 1186*, 69–101. doi:10.1111/j.1749-6632.2009.05339.x.

Williams, R. J., Stevens, R. M., & Nixon, G. (2011). Gambling and problem gambling in North American Aboriginal people. In Y. D. Belanger (Ed.), *First Nations gambling in Canada: Current trends and issues* (pp. 166–194). Winnipeg, MB: University of Manitoba Press.

Williams, R. J., Volberg, R. A., & Stevens, R. M. G. (2012). *The population prevalence of problem gambling: Methodological influences, standardized rates, jurisdictional differences, and worldwide trends.* Guelph, ON: Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. Retrieved from https://www.uleth.ca/dspace/handle/10133/3068.

Wilson, K., & Peters, E. J. (2005). "You can make a place for it": Remapping urban First Nations spaces of identity. *Environment and Planning D: Society and Space, 23*, 395–413. doi:10.1068/d390.

Wise, L. A., Palmer, J. R., Cozier, Y. C., Hunt, M. O., Stewart, E. A., & Rosenberg, L. (2007). Perceived racial discrimination and the risk of uterine leiomyomata. *Epidemiology, 18*(6), 747–757.

World Health Organization (1992). *The ICD-10 classification of mental and behavioural disorders*. Geneva: Author. Retrieved from http://www.who.int/classifications/icd/en/.

Wu, Z., Noh, S., Kaspar, V., & Schimmele, C. M. (2003). Race, ethnicity, and depression in Canadian society. *Journal of Health and Social Behavior, 44*(3), 426–441.