

Time Spent in Canada and Ethnic Identity Moderate the Relationship Between Race-Based Traumatic Stress Symptoms and Cognitive and Emotional Processes

Noémie Bergeron-Germain¹, MSc; Nicholas Hickens¹, BSc, BScAHN; and Christine Lackner¹, PhD

¹ Psychology Department, Mount Saint Vincent University

DOI: 10.15273/hpj.v4i1.11993

Abstract

Introduction: Racial stress is a form of race-based stress triggered by real or perceived discriminatory racial encounters experienced directly or vicariously. Racial stress symptoms resemble post-traumatic stress disorder, which is linked to significant cognitive and emotional disturbances. **Objectives:** This study investigated the relationship between racial stress symptoms and executive functioning. It explored the moderating effects of potentially protective factors like racial socialization processes, ethnic identity, and proportion of time spent in Canada (PTSC). **Methods:** Seventy-three participants ($M = 29.01$ years, $SD = 11.10$ years; 42 women, 30 men, and one non-binary) were recruited through purposive and convenience sampling and subsequently completed online measures of racial stress, executive functioning (EF), ethnic identity, and racial socialization. Demographic data were also collected. **Results:** About 20% of participants reported clinically significant symptoms in at least one racial stress domain. Racial stress, executive functioning, and racial socialization were significantly associated. Ethnic identity and racial socialization were significantly associated. Ethnic identity and PTSC moderated the relationship between racial stress and EF in such a way that lower levels of ethnic identity and higher PTSC, respectively, predicted a worse effect of racial stress on two domains of EF. **Conclusion:** Racialized individuals experience high levels of racial socialization. Although there are differences in those levels across and within minoritized communities, these high levels of racial stress likely lead to executive dysfunction akin to traditional stress. Environmental variables like minority status and high rates of discrimination likely contribute to this association. Specific aspects of the psychological impact of racial discrimination on EF are moderated by PTSC and ethnic identity.

Keywords: Racial Discrimination, Racial Stress, Executive Functioning

Canada's visible minority and Indigenous populations are growing, and the occurrence of trauma among Canadians of colour is high (e.g., Williams et al., 2022). Such

traumas are tied to an increased risk of developing more severe and chronic post-traumatic stress disorder (PTSD) than for non-Hispanic white individuals (Alegría et al., 2013;

Sibrava et al., 2019). Notably, racially motivated surveillance, policing, and extrajudicial killings (Bor et al., 2018; Edwards et al., 2019; Hayle et al., 2016; Wortley, 2019), whether witnessed or experienced, have deleterious effects on Black individuals' mental health (Bor et al., 2018). The legacy of colonization perpetuates intergenerational trauma within Indigenous communities (Barnes & Josefowitz, 2019; Cheah & Nelson, 2004; Currie et al., 2013). The rise of anti-Asian xenophobia during the COVID-19 pandemic caused hate incidents to skyrocket (Yellow Horse et al., 2021). Both direct and vicarious experiences of racism have been associated with trauma symptoms such as hyperarousal (Anderson, 1989; Williams et al., 2021), anger reactions (Bor et al., 2018), anxiety, and depression (Berger & Sarnyai, 2015; Heard-Garris et al., 2018).

The growing body of evidence linking racial discrimination and mental health culminated in a theory proposed by Carter (2007) in which discriminatory racial encounters (ranging from microaggressions [Skiba & Williams, 2014] to racially motivated killings [Buhler, 2017]) constitute the mechanism through which symptoms of racial trauma develop. This conceptualization of racial trauma departs from clinical descriptions, but its symptoms overlap with PTSD. If racial trauma is conceptually different from PTSD, it raises the question of whether individual differences in the experience of racial stressors affect cognitive functioning similarly to non-racial stressors.

Executive Functions (EFs)

Executive functions (EFs; see Appendix for full list of abbreviations) are higher-order cognitive skills that help coordinate other cognitive and behavioural functions (Roth et al., 2005). EFs include working memory, inhibition, attention, emotional regulation, and cognitive flexibility. EFs are regulated by prefrontal brain systems (Rahdar & Galván, 2014; Shen et al., 2020) containing a high density of receptors for the stress hormone cortisol (McKlveen et al., 2013). Accordingly, stress has been consistently

associated with EF disruption (Rahdar & Galván, 2014; Shields et al., 2016). This study examined whether that relationship held when the stressors were race-based.

Protective Factors

In addition to the negative consequences of stress, literature on traditional stress has identified resilience factors as a necessary consideration. Coping strategies such as positive reappraisal and social support are linked to a reduced risk of developing PTSD (Laffaye et al., 2008; Prati & Pietrantonio, 2009). This study investigated whether race-specific factors exist that foster racial stress resilience, as described below.

Ethnic Identity and Birthplace

Individuals differ in the strength of their ethnic identity (EI), or the extent to which they feel clarity on the ethnic aspects of their identity. A strong sense of EI can provide a buffer against the effects of racial stress (Umaña-Taylor et al., 2018). However, the effect of EI on racial stress depends on an individual's birthplace (termed nativity status in other literature; i.e., native-born, or foreign-born). A strong sense of EI has been associated with lower race-based distress among immigrants to the U.S. (i.e., foreign-born) but with exacerbated distress for U.S.-born individuals (Mossakowski et al., 2019; Vang et al., 2015). Therefore, an individual's country of birth may prove to be a key consideration when determining whether a strong sense of EI makes someone vulnerable or resilient to racial stress. This study further probed Mossakowski's findings by investigating EI and birthplace's relationship to racial stress and EF.

Racial Socialization (RS)

Racial socialization (RS) refers to how families communicate about racial dynamics to help youth cope with racial discrimination (reviewed by Lesane-Brown, 2006). For instance, Anderson and Stevenson (2019) found that RS can protect Black youth against racial discrimination's negative effects, as it can foster the development of healthy racial identities.

Similarly, Berkel et al. (2010) and Xie et al. (2021) found that high RS was associated with better psychosocial outcomes in Latinx and Asian youth, respectively. In contrast, Phinney and Chavira (1995) found that parental RS was not linked to adolescent outcomes in a sample of Asian American, Mexican American, and African American families. Studies investigating racial coping in Indigenous individuals or family structures have focused on cultural resilience instead of RS, due to the unique history and perspectives of Indigenous Peoples in North America (e.g., Kirmayer et al., 2011). Spence and colleagues (2016) found that high levels of cultural resilience compensated for the detrimental effects of racial discrimination on levels of stress in Indigenous adults from the Kettle and Stony Point First Nation. The discrepancy in findings of RS and coping may be partly accounted for by differing operationalizations of RS. Recently, two main patterns of RS have been identified: Legacy and Literacy. With Legacy RS, parents aim to increase youths' knowledge about racial dynamics by unidirectionally communicating their beliefs, attitudes, and ideological and historical messages (Stevenson, 2014). In contrast, Literacy RS encourages bidirectional communication between caregivers and youths, and teaches youth to decode, reappraise, and resolve racially stressful events (Anderson & Stevenson, 2019). Conversely to Legacy RS, Literacy RS aims to equip youths with the skills to handle racial stress, notably through racial self-efficacy coping (Anderson & Stevenson, 2019). This study investigated both patterns as protective factors for racial stress symptoms.

Current Study

The literature linking racial stress symptoms and EF is primarily focused on the United States. Addressing the racial trauma of Canadian minorities in psychology research is profoundly challenging due in part to structural inequities ingrained in methodologies that perpetuate exclusion and harm (Webb et al., 2022). Consequently, the limited availability of Canadian race-based data (e.g., Williams et al.,

2022) falsely supports the idea that the repercussions of oppression on Indigenous and Black individuals and people of colour in Canada are not as harmful as those in the U.S. (Maynard, 2017). Thus, the overarching aim of this project was to generate distinct Canadian race-based psychological data on this topic. From past literature, we hypothesized that individuals who experienced more racial stress would experience more EF impairment compared to those who experienced less racial stress. Additionally, we hypothesized that Indigenous and Black individuals and people of colour who have resided in Canada for a larger proportion of their lives would experience more racial stress compared to those who have resided in Canada for a smaller proportion of their lives due to increased exposure to racially charged experiences.

RS, EI, and birthplace were examined as potential resilience factors. Birthplace was computed as the continuous variable "proportion of time spent in Canada" (PTSC; see Methods). Based on previous findings, we hypothesized that individuals with a greater PTSC would experience more racial stress-induced EF disruption than those with a smaller PTSC. Similarly, we hypothesized that individuals with a stronger sense of EI would experience less racial stress-induced EF disruption than those with a weaker sense of EI.

Based on prior literature, we hypothesized that Literacy RS would be associated with better EF and lower levels of racial stress, while the associations would be reversed for Legacy RS. We also hypothesized that individuals who have experienced more Literacy RS would show less racial stress-induced EF disruption compared to those who have experienced less Literacy RS. Finally, we hypothesized that individuals who have experienced more Legacy RS would show more racial stress-induced EF disruption compared to those who have experienced less Legacy RS. To our knowledge, this is the first Canadian study to investigate race-specific and individual-differences resilience factors for racial stress.

Methods

Participants

Seventy-three participants ($M_{age} = 29.01$ years, $SD_{age} = 11.10$ years; Range = 18-62 years; 42 women, 30 men, one non-binary person) completed online measures of racial stress, racial socialization, EI, and EF, and provided demographic data such as self-reported racial identification. Racial identification categories were provided, but participants were also able to identify as they wished within an open-text field. It is important to note that while racial identification was selected as a measure of community belonging in this study, the authors understand that race itself is a socio-political construct without any true biological basis that has long served as a tool for oppressive practices and structural inequalities (Flanagin, Frey, & Christiansen, 2021; Flanagin, Frey, Christiansen, & Bauchner, 2021), and examined their outcomes in relation to racial identification with this premise in mind. The recruitment process involved leveraging racialized and prominent immigrant-populated hubs, hosting events and research fairs, and setting up pop-up booths in Halifax, Nova Scotia. Additionally, recruitment posters were uploaded to social media platforms, online forums, and university internal systems. Finally, recruitment also involved snowball sampling. The current study was part of a larger research study involving electroencephalographic data collection and a computerized visual stimuli detection task completed in the laboratory. Accordingly, the eligibility criteria for this study included being at least 18 years old; having normal or corrected-to-normal vision; having no history of seizure or neurocognitive or psychiatric disorder; and self-identifying as Indigenous, Black, person of

colour, or a combination of those identities. Participants who were students enrolled at the university where the research took place were eligible for a maximum of two bonus points in a participating half-unit credit course as per departmental policies.¹ All participants were compensated with \$40 for their time. They received a \$10 Amazon gift card for completing the questionnaire, and \$30 in cash for completing the electroencephalographic component of the study. Some participants were also eligible for reimbursement if they required cornrows to facilitate access to the scalp for the electroencephalography system.

Materials

Racial Stress

The Race-Based Traumatic Stress Symptom Scale (RBTSSS; Carter et al., 2013; Carter & Sant-Barket, 2015) is a 52-item scale that assesses reactions to one memorable discriminatory racial encounter across seven dimensions: depression, anger, physical reactions, avoidance, intrusion, hypervigilance/arousal, and low self-esteem. Participants rated the severity of their reactions on a five-point Likert scale ranging from 0 (*does not describe my reaction*) to 4 (*this reaction would not go away*). Cronbach's alphas for each scale range between 0.66 and 0.90. Participants' raw scores were standardized using the sample's mean and standard deviation (Carter & Sant-Barket, 2015).

EF

The Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A; Roth et al., 2005) is a 75-item scale that assesses nine domains of self-regulation: inhibit, shift, emotional control, self-monitor, initiate,

¹ The guidance and information document for using bonus points as an incentive for research was provided by the current research's University Research Ethics Board (REB.INFO.506). Importantly, to ensure that participation in the research is voluntary and to minimize the risk of undue inducement, faculty members who offered bonus points for participation in

the current study also provided a comparable activity with comparable time and effort for a comparable reward for students who did not wish to participate in research. Per university policy, students may not pass a course based on bonus points alone (e.g., bonus points cannot be used to bump a student from a 48% to a 50%). There was no partnership with a specific professor.

working memory, plan/organize, task-monitor, and organization of materials. Participants rated the frequency of specific behaviours within those domains over the past six months on a three-point Likert scale ranging from 1 (*never a problem*) to 3 (*often a problem*). Composite indices captured participants' ability to use inhibitory skills and shifting attention to modulate their behaviour (Behavioral Regulation Index; BRI) and their ability to manage and monitor performance on tasks efficiently (Metacognition Index; MI). A full-scale score measured global EF (Global Executive Composite; GEC), with higher scores indicating greater impairment. Cronbach's alphas for this scale range between 0.93 and 0.96 (Roth et al., 2005).

Proportion of Time Spent in Canada (PTSC) and Ethnic/Racial Identity

To quantify the proportion of time spent in Canada, participants indicated the number of years they lived in Canada, which was then divided by their age.

The revised Multigroup Ethnic Identity Measure (MEIM-R; Phinney & Ong, 2007) is a six-item survey with commitment and exploration subscales. Participants indicated their agreement with each item on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alphas for the scale range between 0.76 and 0.78 (Phinney & Ong, 2007).

Racial Socialization (RS)

Literacy RS. The Racial Socialization Competency Scale (RaSCS; Anderson et al., 2020) is a 27-item scale with three subscales: Confidence, Skills, and Stress. While the scale was initially developed to assess parental RS skills and confidence, it was modified for individual assessment in this study. For each item, participants were given two prompts for current confidence and skills (i.e., *I believe I can* and *I am/would be prepared to*, respectively) and one modified prompt for RS teachings received from caregivers (i.e., *growing up, my parent/caregiver taught me to*). Participants rated their experience on a five-point Likert

scale ranging from 1 (*I do not believe I can; I am not/would not be prepared to; and growing up, my parent/caregiver did not teach me to*) to 5 (*I greatly believe I can; I am/would be greatly prepared to; and growing up, my parent/caregiver greatly taught me to*). Each subscale could contribute a maximum of 135 points toward the total score of 405 points.

Legacy RS. The Family Racial Socialization Scale (FRSS) is a nine-item scale that measures the content and frequency of RS messages received by participants from their families (Coleman & Stevenson, 2013). Participants rated the frequency of statements on a five-point Likert scale ranging from 1 (*never*) to 5 (*very often*). The Cronbach's alpha for the total scale is 0.95 (Coleman & Stevenson, 2013).

Procedure

Participants were sent an email link to the online demographic questionnaire, MEIM-R, RaSCS, FRSS, BRIEF-A, and RBTSSS. Before beginning the questionnaires, participants digitally signed the informed consent. Participants were instructed to complete the survey privately and had no time limit for completion. Upon completion, participants were thanked for their participation and compensated.

Data Analysis

All data analyses were performed using IBM SPSS Statistics 27.0. All analyses were conducted at the sample level due to a lack of power within the various self-reported racial identification sub-groups. To protect anonymity, self-reported identification sub-groups containing two or fewer participants were aggregated. Where possible, data stratified by self-reported racial identification sub-groups are presented in a scatterplot. Bivariate Pearson correlations were run to investigate the relationships between study variables. Several moderation analyses were conducted using the PROCESS macro (Hayes, 2013) with the BRIEF-A composites as dependent variables, the RBTSSS subscales as the independent variables,

and PTSC, Literacy RS, Legacy RS, and EI as moderators. Supplemental moderation analyses were conducted with each appropriate subscale of the BRIEF-A composites as independent variables if the analysis with that composite was significant (e.g., if PTSC significantly moderated depression and BRI, supplemental analyses were run with inhibit, shift, emotional control, and self-monitor). The Literacy RS subscales were used as moderators in follow-up analyses if the Literacy RS total scale moderator was significant. Finally, for all significant moderations, post-hoc simple slope analyses were performed in which data were grouped in low (one standard deviation below the mean), moderate (mean), and high (one standard

deviation above the mean) categories to examine group differences in BRIEF-A scores.

An elevation in psychopathological symptoms is clinically significant at one standard deviation above the mean. Elevations on the RBTSSS were calculated accordingly for each subscale (see the Results section).

Results

On average, participants spent 36% of their life in Canada ($M = 0.36, SD = 0.40, Range = 0.002-1.00$). Table 1 shows participants' PTSC by self-reported racial identification.

Table 1
Self-Reported Racial Identification and PTSC

Racial Identification	n	%	PTSC $M(SD)$
Asian or Pacific Islander	22	30.14	0.32(0.40)
Black or African Canadian	19	26.03	0.35(0.40)
Indigenous ^a	3	4.11	1.00(0.00)
Black or African Canadian and Indigenous	4	5.48	1.00(0.00)
Latinx/Hispanic non-white	6	8.22	0.18(0.24)
Other (Indian)	3	4.11	0.03(0.02)
Other (Middle Eastern)	4	5.48	0.22(0.36)
Other (Multiracial)	2	2.74	0.55(0.64)
Other (South Asian)	2	2.74	0.48(0.60)
Did not self-identify	8	10.96	0.29(0.30)
Total	73	100	-

Note. PTSC = proportion of time spent in Canada; M = mean; SD = standard deviation. PTSC was computed by dividing participants' age, in years, by the number of years they lived in Canada. Participants were allowed to check more than one box. These multiple selections are reflected by categories joined by "and."

When participants selected "Other," they were asked to specify by writing their racial self-identification.

^a Participants who self-identified as Indigenous were asked to indicate their group and community. To protect anonymity, values related to specific Indigenous groups and communities are not disclosed in this study.

Descriptive Analyses

Scores on the RBTSSS at the sample level were considered elevated if they were greater than 61 (i.e., approximately one standard deviation above the group mean). Clinical elevations could not be computed by self-reported racial identification sub-groups due to lack of power. Group data from the RBTSSS revealed that between 16% and 22% of participants reported clinical elevations on at least one racial stress symptom scale (total scale = 16.44%, depression = 16.44%, intrusion = 17.81%, anger = 21.92%, hypervigilance = 17.81%, physiological arousal = 21.92%, low self-esteem = 19.18%, and avoidance = 21.92%). Participants reported moderate levels of Literacy RS ($M = 285.62$, $SD = 57.00$, Range = 115–400) and moderate levels of Legacy RS (M

= 24.92, $SD = 5.75$, Range = 12–37). For Literacy RS specifically, participants reported higher levels of Confidence ($M = 103.71$, $SD = 16.70$, Range = 49–135) and Skills ($M = 101.99$, $SD = 19.76$, Range = 34–135) than Growth ($M = 79.92$, $SD = 32.60$, Range = 115–400). On average, participants reported a strong sense of ethnic identity ($M = 24.03$, $SD = 3.67$, range = 14–30). They also reported moderate levels of GEC difficulties ($t = 54$, percentile rank = 65), moderate levels of BRI difficulties ($t = 54$, percentile rank = 63), and moderate levels of MI difficulties ($t = 55$, percentile rank = 69). Table 2 shows the descriptive statistics for all scales in this study. The data for focal measures stratified by self-reported racial identification can be found in Table 3. Importantly, there is considerable individual variation in the scale scores.

Table 2
Descriptive Statistics for Study Scales and Subscales

Variable	<i>M</i>	<i>SD</i>	Minimum	Maximum
RBTSSS				
Total racial stress symptoms	52.01	9.52	38.13	72.80
Depression	51.76	9.86	39.76	79.66
Anger	51.91	9.67	39.07	71.67
Hypervigilance	51.84	9.75	39.41	71.46
Physiological arousal	51.54	10.10	41.02	75.59
Low self-esteem	51.68	9.90	39.60	78.41
Avoidance	51.47	10.09	40.83	71.39
FRSS				
Legacy RS	24.92	5.75	12.00	37.00
RaSCS				
Literacy RS	285.62	57.00	115.00	400.00
Confidence	103.71	16.70	49.00	135.00

Variable	<i>M</i>	<i>SD</i>	Minimum	Maximum
Skills	101.99	19.76	34.00	135.00
Growth	79.92	32.60	27.00	135.00
MEIM-R				
Total Ethnic Identity Scale	24.03	3.67	14.00	30.00
BRIEF-A				
Global Executive Composite	114.36 ^a	26.17	72.00	171.00
Behavioral Regulation Index	48.78 ^a	10.97	31.00	75.00
Inhibit	12.78	3.14	8.00	22.00
Shift	10.03	2.61	6.00	16.00
Emotional control	16.95	5.21	10.00	27.00
Self-monitor	9.03	2.17	6.00	15.00
Metacognition Index	65.58 ^a	15.57	41.00	102.00
Initiate	13.18	3.80	8.00	24.00
Working memory	13.41	3.78	8.00	23.00
Plan/organize	16.32	4.30	10.00	27.00
Task-monitoring	10.04	2.57	6.00	15.00
Organization of materials	12.63	3.68	8.00	23.00

Note. *N* = 73. BRIEF-A = Behavior Rating Inventory of Executive Function—Adult version; FRSS = Family Racial Socialization Scale; MEIM-R = Multigroup Ethnic Identity Measure—Revised; RaSCS = Racial Socialization Competency Scale; RBTSSS = Race-Based Traumatic Stress Symptom Scale; RS = racial socialization; *M* = mean, *SD* = standard deviation.

^a *T*-scores and percentile ranks were derived from the average raw scores and the average sample age using the combined gender norms listed in Appendix A of the BRIEF-A professional manual (Roth et al., 2005).

Table 3
Descriptive Statistics for Focal Scales by Self-Reported Racial Identification

Variable	RBTSSS	RaSCS	FRSS	MEIM-R	BRIEF-A
	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>
Asian or Pacific Islander	50.81(8.26)	287.59 (56.26)	23.41(6.17)	22.95(3.05)	115.68(25.02)
Black or African Canadian	51.73(11.44)	285.58(63.35)	27.05(4.85)	24.37(3.39)	116.63(26.85)
Indigenous	56.80(2.87)	292.33(16.56)	23.67(0.58)	26.33(2.89)	107.00(7.94)
Black or African Canadian and Indigenous	58.22(1.60)	291.75 (36.36)	29.25(6.02)	27.75(2.22)	113.00(10.80)
Latinx/Hispanic non-white	51.64(7.89)	257.50(60.28)	26.17(6.37)	23.17(5.85)	121.50(21.37)
Other (Indian)	42.88(3.48)	295.00(41.22)	20.00(5.57)	26.33(2.52)	113.33(44.75)
Other (Middle Eastern)	58.22(8.39)	310.75(62.59)	22.00(3.56)	22.75(1.50)	95.50(13.08)
Other (Multiracial)	56.61(7.31)	279.50(2.12)	30.50(0.71)	26.00(5.66)	156.50(20.51)
Other (South Asian)	41.23(2.11)	276.50(31.82)	19.50(9.19)	22.50(0.71)	114.00(16.97)
Did not self-identify	53.26(12.87)	283.50(82.98)	24.63(5.48)	23.75(5.01)	102.75(21.49)

Note. $N = 73$. BRIEF-A = Behavior Rating Inventory of Executive Function—Adult version; FRSS = Family Racial Socialization Scale; M = Mean; MEIM-R = Multigroup Ethnic Identity Measure—Revised; RaSCS = Racial Socialization Competency Scale; RBTSSS = Race-Based Traumatic Stress Symptom Scale; SD = standard deviation.

Correlational Analyses

Bivariate Pearson correlations revealed moderate, positive correlations between EI and Legacy RS, $r(72) = 0.33, p = .005$, and EI and all aspects of Literacy RS (Confidence, $r[72] = 0.36, p = .002$; Skills, $r[72] = 0.42, p < .001$; Growth, $r[72] = 0.41, p < .001$; Total RS, $r[72] = 0.48, p < .001$). EI was not significantly associated with total racial stress symptoms, $r(72) = 0.05, p = .691$; PTSC, $r(72) = -0.08, p = .547$; or EF, $r(72) = 0.11, p = .373$.

Confidence was associated with less severe depression, $r(72) = -0.26, p = .028$, and fewer low self-esteem symptoms, $r(72) = -0.35, p = .002$. Confidence was also associated with lowered scores in shift, $r(72) = -0.30, p = .011$; self-monitor, $r(72) = -0.24, p = .038$; initiate,

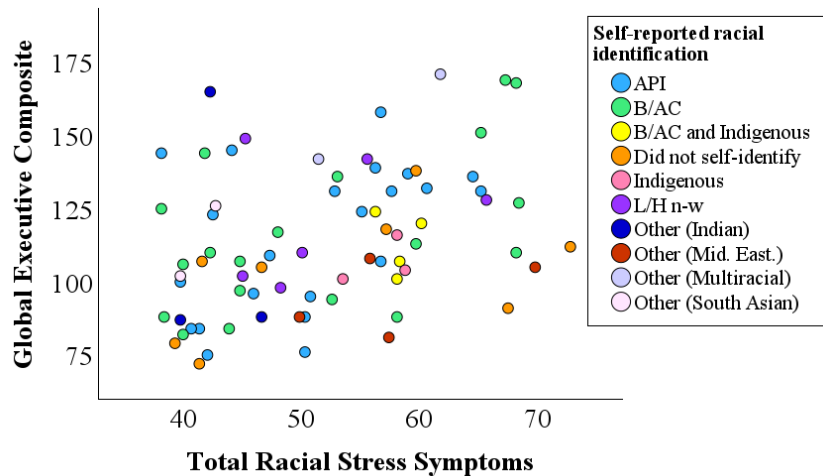
$r(72) = -0.30, p = .011$; working memory, $r(72) = -0.26, p = .028$; plan/organize, $r(72) = -0.41, p < .001$; task-monitor, $r(72) = -0.32, p = .006$; and organization of materials, $r(72) = -0.31, p = .008$. Confidence was also associated with lowered overall EF difficulties, $r(72) = -0.32, p = .005$, and metacognitive scores, $r(72) = -0.38, p = .001$. Skills was associated with less severe symptoms of low self-esteem, $r(72) = -0.27, p = .024$, and lowered plan/organize, $r(72) = -0.29, p = .014$; task-monitor, $r(72) = -0.24, p = .05$; and metacognitive difficulties, $r(72) = -0.26, p = .031$. Legacy RS was significantly associated with increased global EF, $r(72) = 0.24, p = .041$; plan/organize, $r(72) = 0.24, p = .039$; task-monitor, $r(72) = 0.26, p = .029$; organization of materials, $r(72) = 0.38, p = .001$; and metacognitive scores, $r(72) = 0.27, p = .022$.

Legacy RS was also associated with more severe total symptoms of racial stress: $r(72) = 0.26, p = .027$. Literacy RS and Legacy RS were not significantly correlated. Finally, as shown in Table 4, bivariate analyses revealed that symptoms of racial stress were robustly associated with increased EF difficulties across several scales. The overarching relationship between racial stress symptoms and global

executive function stratified by self-reported racial identification is presented in Figure 1. While some group sample sizes are small, which limited the power to detect group effects, the correlation appears in the same direction for all groups with more than two participants—that is, experiencing more racial stress symptoms is associated with experiencing more severe executive dysfunction.

Figure 1

Association Between Racial Stress and Executive Function by Self-Reported Racial Identification



Note. $N = 73, r = 0.36, p = .002$. The x-axis reflects total scores on the Race-Based Traumatic Stress Symptom Scale. The y-axis reflects scores on the Global Executive Composite of the Behavior Rating Inventory of Executive Function—Adult version. API = Asian or Pacific Islander, B/AC = Black or African Canadian, L/H n-w = Latinx/Hispanic non-white, Mid. East. = Middle Eastern.

Table 4
Bivariate Pearson Correlations for Racial Stress (RBTSSS) and EF (BRIEF-A)

Variable	Inhibit	Shift	Emotional control	Self-monitor	Initiate	Working memory	Plan/organize	Task-monitoring	Organization of materials	BRI	MI	GEC
Total scale	0.30*	0.30*	0.40*	0.26*	0.22	0.25*	0.27*	0.21	0.32*	0.40*	0.30*	0.36*
Depression	0.21	0.27*	0.33*	0.20	0.12	0.14	0.15	0.16	0.28*	0.32*	0.20	0.27*
Intrusion	0.33*	0.31*	0.36*	0.18	0.14	0.20	0.17	0.14	0.21	0.37*	0.20	0.29*
Anger	0.29*	0.27*	0.52*	0.29*	0.24*	0.24*	0.25*	0.22	0.27*	0.45*	0.29*	0.38**
Hypervigilance	0.26*	0.23*	0.34*	0.24*	0.25*	0.27*	0.32*	0.22	0.33*	0.34*	0.33*	0.36*
Physiological Arousal	0.17	0.17	0.26*	0.17	0.08	0.16	0.19	0.14	0.25*	0.25*	0.19	0.23*
Low self-esteem	0.36*	0.39*	0.30*	0.33*	0.38*	0.37*	0.36*	0.32*	0.42*	0.40**	0.43*	0.45*
Avoidance	0.25*	0.18	0.21	0.18	0.21	0.18	0.23	0.06	0.20	0.25*	0.21	0.24*

Note. BRI = Behavioral Regulation Index; BRIEF-A = Behavior Rating Inventory of Executive Function—Adult version; GEC = Global Executive Composite; MI = Metacognition Index; RBTSSS = Race-Based Traumatic Stress Symptom Scale. Higher scores on the BRIEF-A indicate more difficulties with executive functioning.

* $p < .05$

** $p < .00$

Moderation Analyses

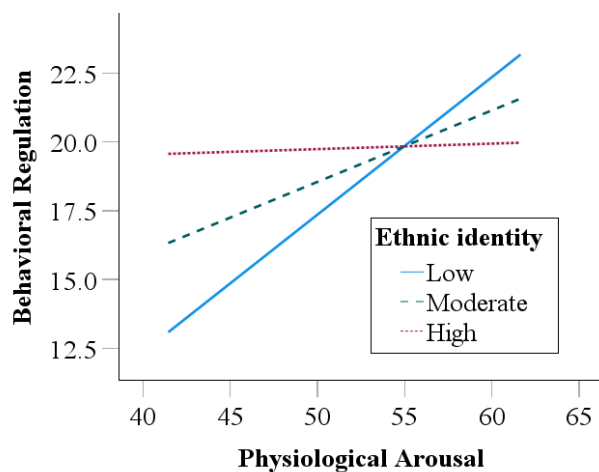
RS

Neither Legacy nor Literacy RS significantly moderated the relationship between racial stress and EF, all $F_s(3, 69) < 2.44$, all $p_s > .123$.

EI

Physiological arousal, EI, and their interaction significantly accounted for 11.21% of the variance in BRI: $F(3, 69) = 2.90, p = .041, R^2 = .11$. Physiological arousal, $b = 1.83, t = 2.30, p = .023$, and EI, $b = 3.60, t = 2.00, p = .050$, significantly predicted an increase in BRI. The interaction was significant: $b = -0.07, t = -1.99, p = .051$. Post-hoc simple slopes showed that the effect of physiological arousal on BRI was enhanced for individuals with a lower, $b = 0.50, t = 2.92, p = .005$, and moderate sense of EI, $b = 0.26, t = 2.10, p = .039$, but not for those with a higher sense of EI, $b = .02, t = 0.11, p = .909$ (Figure 2).

Figure 2
Interaction of Physiological Arousal and Ethnic Identity in Relation to Behavioral Regulation

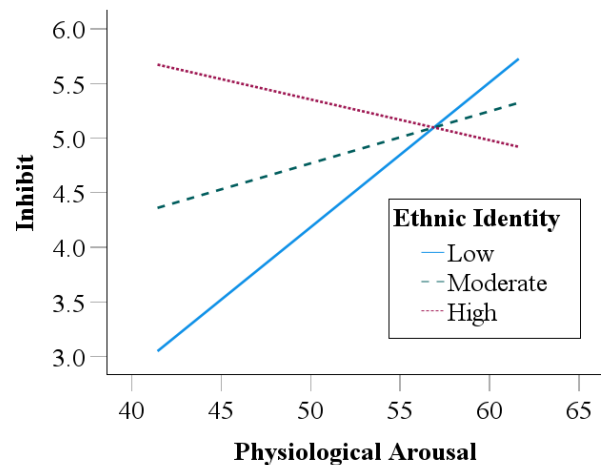


Note. $N = 73$. The x-axis reflects scores on the Physiological Arousal subscale of the Race-Based Traumatic Stress Symptom Scale. The y-axis reflects scores on the Behavioral Regulation Index of the Behavior Rating Inventory of Executive Function—Adult version. Low ethnic identity (EI; -1 SD) corresponds to a score of 20 on the Multigroup Ethnic Identity Measure—Revised (MEIM-R), moderate EI (mean) corresponds to a score of 24 on the MEIM-R, and high EI (+1 SD) corresponds to a score of 27 on the MEIM-R.

high EI (+1 SD) corresponds to a score of 27 on the MEIM-R.

Supplemental analyses revealed that inhibit and shift, subscales of the BRI, were similarly moderated. The model with physiological arousal, EI, and their interaction accounted for 11.24% of the variance in inhibit: $F(3, 69) = 2.90, p = .041, R^2 = .11$. Physiological arousal, $b = 0.60, t = 2.64, p = .01$, and EI, $b = 1.32, t = 2.56, p = .013$, significantly predicted an increase in inhibit score. The interaction was significant: $b = -0.02, t = -2.46, p = .017$. Post-hoc simple slopes revealed that the effect of physiological arousal on inhibit was enhanced for individuals with a lower sense of EI, $b = 0.13, t = 2.71, p = .009$, but not for those with a moderate, $b = 0.05, t = 1.35, p = .182$, or higher sense of EI, $b = -0.04, t = -0.75, p = .458$ (Figure 3).

Figure 3
Interaction of Physiological Arousal and Ethnic Identity in Relation to Inhibit

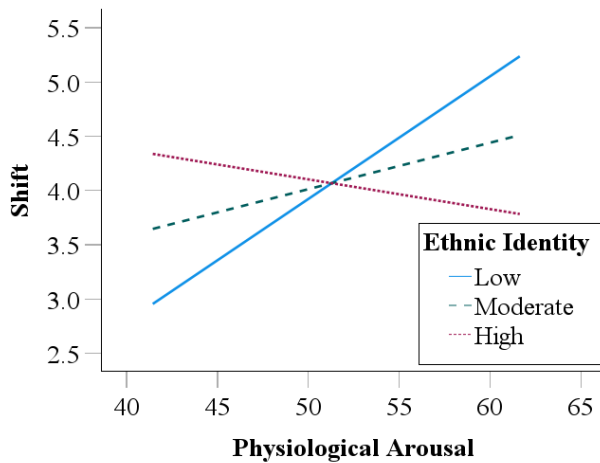


Note. $N = 73$. The x-axis reflects scores on the Physiological Arousal subscale of the Race-Based Traumatic Stress Symptom Scale. The y-axis reflects scores on the Inhibit subscale of the Behavior Rating Inventory of Executive Function—Adult Version. Low ethnic identity (EI; -1 SD) corresponds to a score of 20 on the Multigroup Ethnic Identity Measure—Revised (MEIM-R), moderate EI (mean) corresponds to a score of 24 on the MEIM-R, and high EI (+1 SD) corresponds to a score of 27 on the MEIM-R.

The model with physiological arousal, EI, and their interaction significantly accounted

for 10.89% of the variance in shift: $F(3, 69) = 2.81, p = .046, R^2 = .10$. Physiological arousal, $b = 0.50, t = 2.64, p = .010$, and EI, $b = 0.98, t = 2.29, p = .025$, significantly predicted an increase in shift score. The interaction was significant: $b = -0.02, t = -2.44, p = .017$. Post-hoc simple slopes revealed that the effect of physiological arousal on shift was enhanced for those with a lower sense of EI, $b = 0.11, t = 2.77, p = .007$, but not for those with a moderate, $b = 0.04, t = 1.45, p = .151$, or higher sense of EI, $b = -0.03, t = 0.66, p = .512$ (Figure 4).

Figure 4
Interaction of Physiological Arousal and Ethnic Identity in Relation to Shift



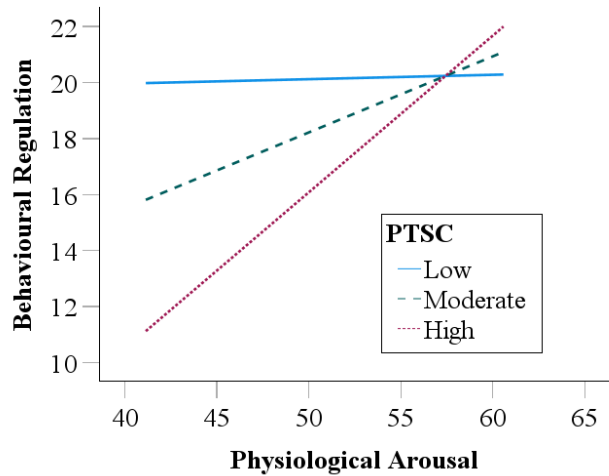
Note. $N = 73$. The x-axis reflects scores on the Physiological Arousal subscale of the Race-Based Traumatic Stress Symptom Scale. The y-axis reflects scores on the Shift subscale of the Behavior Rating Inventory of Executive Function—Adult version. Low ethnic identity (EI; -1 SD) corresponds to a score of 20 on the Multigroup Ethnic Identity Measure—Revised (MEIM-R), moderate EI (mean) corresponds to a score of 24 on the MEIM-R, and high EI (+1 SD) corresponds to a score of 27 on the MEIM-R.

PTSC

Physiological arousal, PTSC, and their interaction significantly accounted for 14.38% of the variance in BRI: $F(3, 69) = 3.36, p = .025, R^2 = .14$. PTSC significantly predicted a decrease in BRI, $b = -41.49, t = 2.29, p = .026$, but not physiological arousal, $b = 0.01, t = 0.07, p = .94$. The interaction was significant: $b = 0.72, t = 2.11, p = .039$. Post-hoc simple slopes showed that the effect of physiological arousal on BRI was

enhanced for those with a moderate, $b = 0.27, t = 2.02, p = .048$, and higher PTSC, $b = 0.56, t = 3.01, p = .004$, but not for those with a lower PTSC, $b = 0.02, t = 0.08, p = .933$ (Figure 5).

Figure 5
Interaction of Physiological Arousal and Proportion of Time Spent in Canada (PTSC) in Relation to Behavioral Regulation

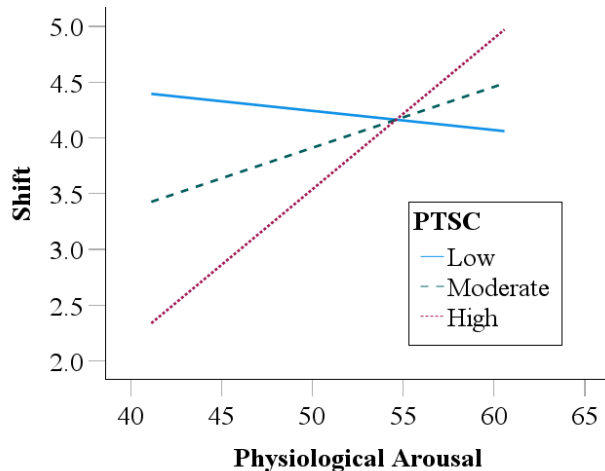


Note. $N = 73$. The x-axis reflects scores on the Physiological Arousal subscale of the Race-Based Traumatic Stress Symptom Scale. The y-axis reflects scores on the Behavioral Regulation Index of the Behavior Rating Inventory of Executive Function—Adult version. Low proportion of time spent in Canada (PTSC; -1 SD) corresponds to a PTSC of 0%, moderate PTSC (mean) corresponds to a PTSC of 36%, and high PTSC (+1 SD) corresponds to a PTSC of 76%.

Supplemental analyses showed that the model with physiological arousal, PTSC, and their interaction significantly accounted for 13.93% of the change in shift: $F(3, 69) = 3.24, p = .028, R^2 = .14$. PTSC significantly predicted a decrease in shift score, $b = -11.08, t = -2.54, p = .014$, but not physiological arousal, $b = -0.02, t = 0.39, p = .695$. The interaction was significant: $b = 0.20, t = 2.46, p = .017$. Post-hoc simple slopes revealed that the effect of physiological arousal on shift was enhanced for those with a higher PTSC, $b = 0.14, t = 3.03, p = .004$, but not for those with moderate, $b = 0.36, t = 1.69, p = .096$, or lower PTSC, $b = -0.17, t = 0.38, p = .702$ (Figure 6).

Figure 6

Interaction of Physiological Arousal and Proportion of Time Spent in Canada (PTSC) in Relation to Shift



Note. $N = 73$. The x-axis reflects scores on the Physiological Arousal subscale of the Race-Based Traumatic Stress Symptom Scale. The y-axis reflects scores on the Shift subscale of the Behavior Rating Inventory of Executive Function—Adult version. Low proportion of time spent in Canada (PTSC; -1 SD) corresponds to a PTSC of 0%, moderate PTSC (mean) corresponds to a PTSC of 36%, and high PTSC (+1 SD) corresponds to a PTSC of 76%.

Discussion

Race-based research is necessary to understand the contemporary effects of oppression. In recent years, Canadian studies show that the consequences of anti-Indigenous, anti-Black, anti-Asian, and anti-Muslim racism on well-being (e.g., Barnes & Josefowitz, 2019; Chen et al., 2020; Mahrouse, 2018; Williams et al., 2022) mirror those outlined in American studies, such as a higher prevalence of psychiatric disorders (Cénat et al., 2023; Hodgson et al., 2022). However, the EF correlates of race-based stress have yet to be identified, a particularly important endeavour due to the staggering predictability of EF for mental health and well-being.

This study investigated whether, like in the case of traditional stress, EF was sensitive to racial stress. Potential resilience factors for racial stress-induced EF disruption were also examined.

As hypothesized, higher levels of racial stress were robustly associated with worse EF across nearly all domains. While the data were not stratified for this analysis, results suggested that this general association held across all self-reported racial identification groups with two or more participants. This suggests that the brain systems involved in regulating the effects of traditional stress may also regulate the effects of racial stress and disrupt the same EF domains as traditional stress. This finding nuances the current clinical understanding of stress-related disorders across ethno-racial groups and suggests that further changes to diagnostic manuals may be warranted.

In contrast to our hypothesis, overall racial stress symptoms were non-significantly associated with EI. Additionally, there were no significant zero-order associations between racial stress symptoms and PTSC. These findings contrast previous literature that showed links between better psychosocial adjustment and a stronger sense of EI (Umaña-Taylor et al., 2018; Townsend et al., 2020) and between worse PTSD symptoms and birthplace (Cénat et al., 2023; Mossakowski et al., 2019), although further investigations with larger sample sizes should investigate how these effects differ by self-reported racial identification.

Given the sample’s average low PTSC, individuals may have experienced a limited number of discriminatory events that led to racial stress, as they may have faced less discrimination in their country of origin. Alternatively, individuals immigrating to Canada from countries where their racial group is the majority may be initially less perceptive to subtle racial prejudice in Canadian society.

As expected, Literacy RS was associated with less severe symptoms of depression and low self-esteem and with better EF across shift, plan/organize, metacognition, and global EF domains. Results suggest that the confidence aspect of Literacy RS was associated with fewer EF problems across a greater number of domains (i.e., shift, self-monitor, initiate, working memory, plan/organize, task-monitoring, organization of materials, metacognition, and global EF) than other

Literacy RS skills. As hypothesized, Legacy RS was associated with worse EF across plan/organize, task-monitoring, and organization of materials domains. It was also associated with more severe racial stress symptoms of intrusion, anger, hypervigilance, physiological arousal, and total symptoms. Taken together, these findings provide further support to the conceptual distinction of patterns of RS (Anderson & Stevenson, 2019) and the evidence that Literacy RS, and not Legacy RS, accounts for the positive outcomes associated with better psychological adjustment in Black individuals (Anderson & Stevenson, 2019; Stevenson, 2014). This is likely due to the effective rehearsal of racial coping skills in Literacy RS, compared to coping strategies like emotion-focused or avoidance in Legacy RS (Anderson & Stevenson, 2019), which are often identified as less effective (Penley et al., 2002; Stanisławski, 2019).

As expected, more severe symptoms of physiological arousal predicted worse behavioural regulation and attention shifting, and this effect was enhanced for individuals with a higher PTSC. This finding aligns with prior evidence that birthplace plays a role in determining the severity of racial stress symptoms (Cénat et al., 2023; Mossakowski et al., 2019). The disparities that Indigenous, Black, Asian, Latinx, and otherwise racialized communities experienced during the COVID-19 pandemic and the mediatized police killings of Black and Brown bodies exposed the contemporary consequences of the Atlantic slave trade and white nationalism (Eichstaedt et al., 2021a; Eichstaedt et al., 2021b; Kim & Botswick, 2020; Klein et al., 2023). Individuals with longer-standing direct exposure to this zeitgeist are likely more aware of its consequences and, thus, more vulnerable to racial stress-induced EF disruption.

As expected, individuals with a moderate or lower sense of EI were more vulnerable to the effect of physiological arousal on behavioural regulation, attention shifting, and inhibition, which suggests a strong sense of EI may buffer against the effect of racial stress. The PTSC and EI moderation findings suggest that attention

shifting and response inhibition are particularly sensitive to race-based physiological arousal. This symptom is also common in PTSD and anxiety (American Psychiatric Association, 2022, pp. 250, 301) and makes it difficult to function optimally in contexts that require concentration and self-restraint, like school and work. These findings highlight the importance of contextualizing documented race-based disparities in educational and occupational achievement (Chetty et al., 2020; Gould, 2020; McCarter, 2017; Owens & McLanahan, 2020) and identifying resilience factors like EI that can help close these gaps. Future research should explore how resilience-based interventions relate to achievement outcomes.

Unexpectedly, Literacy RS did not significantly moderate the relationship between racial stress and EF, despite significant associations with less severe racial stress symptoms and better EF. Similarly, while the zero-order associations between Legacy RS and racial stress and EF were as hypothesized, Legacy RS did not significantly moderate the relationship between racial stress and EF. These findings suggest that other stress-related constructs may better account for the relationship between racial stress and EF. Finally, given the low PTSC of our overall sample, there may also be variables specific to the newcomer experience influencing this relationship that this study has failed to capture.

This study is not without limitations. Firstly, the RaSCS contains a parental stress subscale that was replaced with an individual growth subscale. Changes to validated scales need to be accompanied by careful interpretations of results.

Secondly, the RBTSSS used to identify racial stress symptoms has yet to be validated for diagnostic purposes. Whether participants met a clinical cut-point for a trauma and stress-related disorder cannot be determined. RBTSSS scores should be interpreted cautiously.

Thirdly, due to a lack of statistical power, this study's outcomes were not stratified by self-reported racial identification groups or other demographic variables. There exists a vast heterogeneity of experiences between and

within Indigenous, Black, Asian, and Latinx communities (Buchanan et al., 2021) that were not captured in the current analysis. While the consequences of racial discrimination affect all racialized individuals, the extent of their impact varies across and within communities. Importantly, readers should keep the unique legacies that Indigenous and African Nova Scotian communities in Nova Scotia bear at the forefront of their minds when interpreting the results of the current study. While Indigenous and African Nova Scotians are distinct groups of peoples with distinct histories, they share themes of cultural erasure, community displacement, and ongoing systemic oppression that can be uniquely traced to the beginning of colonization. In the same vein, additional markers of group heterogeneity, such as ethnicity or nationality, were not presented in this study alongside the self-reported racial identification groups because it would have likely jeopardized the anonymity of respondents. This study's findings should be interpreted according to the current scope of racial identification operationalization. Future studies should expand on the current findings using larger sample sizes that will allow for the disaggregation of data by various demographic variables to obtain a deeper and more nuanced understanding of various groups' experiences in relation to racial stress and behavioural and emotional processes.

Despite its limitations, this study was the first in Canada to examine the link between racial stress and EF, emphasizing protective factors and revealing consistent preliminary patterns of individual-differences relationships between them. A strong sense of EI and Literacy RS were significantly associated with positive racial stress and EF outcomes. It is hoped that the findings from this study are used to amplify the voices of participants and to support advocacy efforts for better racially specific interventions and programs.

Acknowledgements

We express our gratitude to the participants for dedicating their significant time and energy to this research endeavor. Special

thanks are due to MacKenzie Daniels and Brianna Montrope for their invaluable research assistance. Additionally, we acknowledge the generous support provided by The Canadian Foundation for Innovation, the John R. Evans Leaders Fund, and the National Sciences and Engineering Research Council of Canada for this project. Our appreciation also extends to the peer-reviewers for their insightful feedback on earlier versions of this manuscript.

Author Notes

Noémie Bergeron-Germain is now at the Department of Psychology, Acadia University, Wolfville, Nova Scotia, Canada

Nicholas Hickens is now at the Department of Family Medicine, McGill University, Montreal, Quebec, Canada

References

- Alegría, M., Fortuna, L. R., Lin, J. Y., Norris, F. H., Gao, S., Takeuchi, D. T., Jackson, J. S., Shrout, P. E., & Valentine, A. (2013). Prevalence, risk, and correlates of posttraumatic stress disorder across ethnic and racial minority groups in the United States. *Medical Care, 51*(12), 1114–1123. <https://doi.org/10.1097/mlr.0000000000000007>
- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text revision). <https://doi.org/10.1176/appi.books.9780890425787>
- Anderson, N. B. (1989). Racial differences in stress-induced cardiovascular reactivity and hypertension: Current status and substantive issues. *Psychological Bulletin, 105*(1), 89–105. <https://doi.org/10.1037/0033-2909.105.1.89>
- Anderson, R. E., Jones, S. C. T., & Stevenson, H. C. (2020). The initial development and validation of the Racial Socialization Competency Scale: Quality and quantity. *Cultural Diversity and Ethnic Minority Psychology, 26*(4), 426–436. <https://doi.org/10.1037%2Fcdp0000316>

- Anderson, R. E., & Stevenson, H. C. (2019). RECASTing racial stress and trauma: Theorizing the healing potential of racial socialization in families. *American Psychologist, 74*(1), 63–75. <https://doi.org/10.1037/amp0000392>
- Barnes, R., & Josefowitz, N. (2019). Indian residential schools in Canada: Persistent impacts on Aboriginal students' psychological development and functioning. *Canadian Psychology, 60*(2), 65–76. <https://doi.org/10.1037/cap0000154>
- Berger, M., & Sarnyai, Z. (2015). "More than skin deep": Stress neurobiology and mental health consequences of racial discrimination. *Stress, 18*(1), 1–10. <https://doi.org/10.3109/10253890.2014.989204>
- Berkel, C., Knight, G. P., Zeiders, K. H., Tein, J.-Y., Roosa, M. W., Gonzales, N. A., & Saenz, D. (2010). Discrimination and adjustment for Mexican American adolescents: A prospective examination of the benefits of culturally-related values. *Journal of Research on Adolescence, 20*(4), 893–915. <https://doi.org/10.1111/j.1532-7795.2010.00668.x>
- Bor, J., Venkataramani, A. S., Williams, D. R., & Tsai, A. C. (2018). Police killings and their spillover effects on the mental health of Black Americans: A population-based, quasi-experimental study. *The Lancet, 392*(10144), 302–310. [https://doi.org/10.1016/S0140-6736\(18\)31130-9](https://doi.org/10.1016/S0140-6736(18)31130-9)
- Buchanan, N. T., Perez, M., Prinstein, M. J., & Thurston, I. B. (2021). Upending racism in psychological science: Strategies to change how science is conducted, reported, reviewed, and disseminated. *American Psychologist, 76*(7), 1097–1112. <https://doi.org/10.1037/amp0000905>
- Buhler, S. (2017). "Don't want to get exposed": Law's violence and access to justice. *Journal of Law and Social Policy, 26*, 68–89. <https://doi.org/10.60082/0829-3929.1256>
- Carter, R. T. (2007). Racism and psychological and emotional injury: Recognizing and assessing race-based traumatic stress. *The Counseling Psychologist, 35*(1), 13–105. <https://doi.org/10.1177/0011000006292033>
- Carter, R. T., Mazzula, S., Victoria, R., Vazquez, R., Hall, S., Smith, S., Sant-Barket, S., Forsyth, J., Bazelais, K., & Williams, B. (2013). Initial development of the Race-Based Traumatic Stress Symptom Scale: Assessing the emotional impact of racism. *Psychological Trauma: Theory, Research, Practice, and Policy, 5*(1), 1–9. <https://doi.org/10.1037/a0025911>
- Carter, R. T., & Sant-Barket, S. M. (2015). Assessment of the impact of racial discrimination and racism: How to use the Race-Based Traumatic Stress Symptom Scale in practice. *Traumatology, 21*(1), 32–39. <https://doi.org/10.1037/trm0000018>
- Cénat, J. M., Dalexis, R. D., Darius, W. P., Kogan, C. S., & Guerrier, M. (2023). Prevalence of current PTSD symptoms among a sample of Black individuals aged 15 to 40 in Canada: The major role of everyday racial discrimination, racial microaggressions, and internalized racism. *The Canadian Journal of Psychiatry, 68*(3), 178–186. <https://doi.org/10.1177/07067437221128462>
- Cheah, C. S. L., & Nelson, L. J. (2004). The role of acculturation in the emerging adulthood of Aboriginal college students. *International Journal of Behavioral Development, 28*(6), 495–507. <https://doi.org/10.1080/01650250444000135>
- Chen, J. A., Zhang, E., & Liu, C. H. (2020). Potential impact of COVID-19-related racial discrimination on the health of Asian Americans. *American Journal of Public Health, 110*(11), 1624–1627. <https://doi.org/10.2105/ajph.2020.305858>
- Chetty, R., Hendren, N., Jones, M. R., & Porter, S. R. (2020). Race and economic opportunity in the United States: An intergenerational perspective. *Quarterly Journal of*

- Economics*, 135(2), 711–783.
<https://doi.org/10.1093/qje/qjz042>
- Coleman, S., & Stevenson, H. C. (2013). The racial stress of membership: Development of the faculty inventory of racialized experiences in schools. *Psychology in the Schools*, 50(6), 548–566.
<https://doi.org/10.1002/pits.21693>
- Currie, C. L., Wild, T. C., Schopflocher, D. P., Laing, L., Veugelers, P., & Parlee, B. (2013). Racial discrimination, post traumatic stress, and gambling problems among urban Aboriginal adults in Canada. *Journal of Gambling Studies*, 29(3), 393–415.
<https://doi.org/10.1007/s10899-012-9323-z>
- Edwards, F., Lee, H., & Esposito, M. (2019). Risk of being killed by police use of force in the United States by age, race–ethnicity, and sex. *Proceedings of the National Academy of Sciences of the United States of America*, 116(34), 16793–16798. <https://doi.org/10.1073/pnas.1821204116>
- Eichstaedt, J. C., Sherman, G. T., Giorgi, S., Roberts, S. O., Reynolds, M. E., Ungar, L. H., & Guntuku, S. C. (2021a). Correction for Eichstaedt et al., The emotional and mental health impact of the murder of George Floyd on the US population. *Proceedings of the National Academy of Sciences of the United States of America*, 118(47), Article e2118233118.
<https://doi.org/10.1073/pnas.2118233118>
- Eichstaedt, J. C., Sherman, G. T., Giorgi, S., Roberts, S. O., Reynolds, M. E., Ungar, L. H., & Guntuku, S. C. (2021b). The emotional and mental health impact of the murder of George Floyd on the US population. *Proceedings of the National Academy of Sciences of the United States of America*, 118(39), Article e2109139118.
<https://doi.org/10.1073/pnas.2109139118>
- Flanagin, A., Frey, T., & Christiansen, S. L. (2021). Updated guidance on the reporting of race and ethnicity in medical and science journals. *JAMA*, 326(7), 621–627. <https://doi.org/10.1001/jama.2021.13304>
- Flanagin, A., Frey, T., Christiansen, S. L., & Bauchner, H. (2021). The reporting of race and ethnicity in medical and science journals: Comments invited. *JAMA*, 325(11), 1049–1052.
<https://doi.org/10.1001/jama.2021.2104>
- Gould, E. (2020, February 20). *State of working America wages 2019: A story of slow, uneven, and unequal wage growth over the last 40 years*. Economic Policy Institute.
<https://epi.org/183498>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- Hayle, S., Wortley, S., & Tanner, J. (2016). Race, street life, and policing: Implications for racial profiling. *Canadian Journal of Criminology & Criminal Justice*, 58(3), 322–353.
<https://doi.org/10.3138/cjccj.2014.E32>
- Heard-Garris, N. J., Cale, M., Camaj, L., Hamati, M. C., & Dominguez, T. P. (2018). Transmitting trauma: A systematic review of vicarious racism and child health. *Social Science & Medicine*, 199, 230–240.
<https://doi.org/10.1016/j.socscimed.2017.04.018>
- Hodgson, C. R., DeCoteau, R. N., Allison-Burbank, J. D., & Godfrey, T. M. (2022). An updated systematic review of risk and protective factors related to the resilience and well-being of Indigenous youth in the United States and Canada. *American Indian & Alaska Native Mental Health Research*, 29(3), 136–195. <https://doi.org/10.5820/aian.2903.2022.136>
- Kim, S. J., & Bostwick, W. (2020). Social vulnerability and racial inequality in COVID-19 deaths in Chicago. *Health Education & Behavior*, 47(4), 509–513.
<https://doi.org/10.1177/1090198120929677>
- Kirmayer, L. J., Dandeneau, S., Marshall, E., Phillips, M. K., & Williamson, K. J. (2011). Rethinking resilience from Indigenous perspectives. *The Canadian Journal of*

- Psychiatry*, 56(2), 84–91.
<https://doi.org/10.1177/070674371105600203>
- Klein, B., Ogbunugafor, C. B., Schafer, B. J., Bhadricha, Z., Kori, P., Sheldon, J., Kaza, N., Sharma, A., Wang, E. A., Eliassi-Rad, T., Scarpino, S. V., & Hinton, E. (2023). COVID-19 amplified racial disparities in the US criminal legal system. *Nature*, 617(7960), 344–350.
<https://doi.org/10.1038/s41586-023-05980-2>
- Laffaye, C., Cavella, S., Drescher, K., & Rosen, C. (2008). Relationships among PTSD symptoms, social support, and support source in veterans with chronic PTSD. *Journal of Traumatic Stress*, 21(4), 394–401. <https://doi.org/10.1002/jts.20348>
- Lesane-Brown, C. L. (2006). A review of race socialization within Black families. *Developmental Review*, 26(4), 400–426.
<https://doi.org/10.1016/j.dr.2006.02.001>
- Mahrouse, G. (2018). Minimizing and denying racial violence: Insights from the Québec mosque shooting. *Canadian Journal of Women and the Law*, 30(3), 471–493.
<https://doi.org/10.3138/cjwl.30.3.006>
- Maynard, R. (2017). *Policing Black lives: State violence in Canada from slavery to present*. Fernwood Publishing.
- McCarter, S. (2017). The school-to-prison pipeline: A primer for social workers. *Social Work*, 62(1), 53–61.
<https://doi.org/10.1093/sw/sww078>
- McKlveen, J. M., Myers, B., Flak, J. N., Bundzikova, J., Solomon, M. B., Seroogy, K. B., & Herman, J. P. (2013). Role of prefrontal cortex glucocorticoid receptors in stress and emotion. *Biological Psychiatry*, 74(9), 672–679.
<https://doi.org/10.1016/j.biopsych.2013.03.024>
- Mossakowski, K. N., Wongkaren, T., Hill, T. D., & Johnson, R. (2019). Does ethnic identity buffer or intensify the stress of discrimination among the foreign born and U.S. born? Evidence from the Miami-Dade Health Survey. *Journal of Community Psychology*, 47(3), 445–461.
<https://doi.org/10.1002/jcop.22130>
- Owens, J., & McLanahan, S. S. (2020). Unpacking the drivers of racial disparities in school suspension and expulsion. *Social Forces*, 98(4), 1548–1577.
<https://doi.org/10.1093/sf/soz095>
- Penley, J. A., Tomaka, J., & Wiebe, J. S. (2002). The association of coping to physical and psychological health outcomes: A meta-analytic review. *Journal of Behavioral Medicine*, 25(6), 551–603.
<https://doi.org/10.1023/a:1020641400589>
- Phinney, J. S., & Chavira, V. (1995). Parental ethnic socialization and adolescent coping with problems related to ethnicity. *Journal of Research on Adolescence*, 5(1), 31–53.
- Phinney, J. S., & Ong, A. D. (2007). Conceptualization and measurement of ethnic identity: Current status and future directions. *Journal of Counseling Psychology*, 54(3), 271–281.
<https://doi.org/10.1037/0022-0167.54.3.271>
- Prati, G., & Pietrantonio, L. (2009). Optimism, social support, and coping strategies as factors contributing to posttraumatic growth: A meta-analysis. *Journal of Loss and Trauma*, 14(5), 364–388.
<https://doi.org/10.1080/15325020902724271>
- Rahdar, A., & Galván, A. (2014). The cognitive and neurobiological effects of daily stress in adolescents. *NeuroImage*, 92, 267–273.
<https://doi.org/10.1016/j.neuroimage.2014.02.007>
- Roth, R. M., Isquith, P. K., & Gioia, G. A. (2005). *BRIEF-A: Behavior rating inventory of executive function—Adult version*. Psychological Assessment Resources.
- Shen, K.-K., Welton, T., Lyon, M., McCorkindale, A. N., Sutherland, G. T., Burnham, S., Fripp, J., Martins, R., & Grieve, S. M. (2020). Structural core of the executive control network: A high angular resolution diffusion MRI study. *Human Brain Mapping*, 41(5), 1226–1236.
<https://doi.org/10.1002/hbm.24870>

- Shields, G. S., Sazma, M. A., & Yonelinas, A. P. (2016). The effects of acute stress on core executive functions: A meta-analysis and comparison with cortisol. *Neuroscience & Biobehavioral Reviews*, *68*, 651–668. <https://doi.org/10.1016/j.neubiorev.2016.06.038>
- Sibrava, N. J., Bjornsson, A. S., Pérez Benítez, A. C. I., Moitra, E., Weisberg, R. B., & Keller, M. B. (2019). Posttraumatic stress disorder in African American and Latinx adults: Clinical course and the role of racial and ethnic discrimination. *American Psychologist*, *74*(1), 101–116. <https://doi.org/10.1037/amp0000339>
- Skiba, R. J., & Williams, N. T. (2014, March). *Are Black kids worse? Myths and facts about racial differences in behavior*. The Equity Project, Indiana University. https://indrc.indiana.edu/tools-resources/pdf-disciplineseries/african_american_differential_behavior_031214.pdf
- Spence, N. D., Wells, S., Graham, K., & George, J. (2016). Racial discrimination, cultural resilience, and stress. *The Canadian Journal of Psychiatry*, *61*(5), 298–307. <https://doi.org/10.1177/0706743716638653>
- Stanisławski, K. (2019). The Coping Circumplex Model: An integrative model of the structure of coping with stress. *Frontiers in Psychology*, *10*, Article 694. <https://doi.org/10.3389/fpsyg.2019.00694>
- Stevenson, H. C. (2014). *Promoting racial literacy in schools: Differences that make a difference*. Teachers College Press.
- Townsend, T. G., Kaltman, S., Saleem, F., Coker-Appiah, D. S., & Green, B. L. (2020). Ethnic disparities in trauma-related mental illness: Is ethnic identity a buffer? *Journal of Interpersonal Violence*, *35*(11–12), 2164–2188. <https://doi.org/10.1177/0886260517701454>
- Umaña-Taylor, A. J., Kornienko, O., Douglass Bayless, S., & Updegraff, K. A. (2018). A universal intervention program increases ethnic-racial identity exploration and resolution to predict adolescent psychosocial functioning one year later. *Journal of Youth and Adolescence*, *47*(1), 1–15. <https://doi.org/10.1007/s10964-017-0766-5>
- Vang, Z., Sigouin, J., Flenon, A., & Gagnon, A. (2015). The healthy immigrant effect in Canada: A systematic review. *Population Change and Lifecourse Strategic Knowledge Cluster Discussion Paper Series*, *3*(1), Article 4. <https://ir.lib.uwo.ca/pclc/vol3/iss1/4/>
- Webb, E. K., Etter, J. A., & Kwasa, J. A. (2022). Addressing racial and phenotypic bias in human neuroscience methods. *Nature Neuroscience*, *25*(4), 410–414. <https://doi.org/10.1038/s41593-022-01046-0>
- Williams, M. T., Haeny, A. M., & Holmes, S. C. (2021). Posttraumatic stress disorder and racial trauma. *PTSD Research Quarterly*, *32*(1), 1–3.
- Williams, M. T., Khanna Roy, A., MacIntyre, M.-P., & Faber, S. (2022). The traumatizing impact of racism in Canadians of colour. *Current Trauma Reports*, *8*(2), 17–34. <https://doi.org/10.1007/s40719-022-00225-5>
- Wortley, S. (2019, March). *Halifax, Nova Scotia: Street checks report*. Nova Scotia Human Rights Commission. https://humanrights.novascotia.ca/sites/default/files/editor-uploads/halifax_street_checks_report_march_2019_0.pdf
- Xie, M., Fowle, J., Ip, P. S., Haskin, M., & Yip, T. (2021). Profiles of ethnic-racial identity, socialization, and model minority experiences: Associations with well-being among Asian American adolescents. *Journal of Youth and Adolescence*, *50*(6), 1173–1188. <https://doi.org/10.1007/s10964-021-01436-w>
- Yellow Horse, A. J., Jeung, R., & Matriano, R. (2021). *Stop AAPI hate: National report*. AAPI Equity Alliance. <https://stopaapihate.org/wp-content/uploads/2021/11/21-SAH-NationalReport2-v2.pdf>

Appendix

Abbreviation List

BRI	Behavioral Regulation Index
BRIEF-A	Behavior Rating Inventory of Executive Function—Adult version
EF	Executive functioning
EFs	Executive functions
EI	Ethnic identity
FRSS	Family Racial Socialization Scale
GEC	Global Executive Composite
MEIM-R	Multigroup Ethnic Identity Measure—Revised
MI	Metacognition Index
PTSC	Proportion of time spent in Canada
PTSD	Post-traumatic stress disorder
RaSCS	Racial Socialization Competency Scale
RBTSSS	Race-Based Traumatic Stress Symptom Scale
RS	Racial socialization