Journal of Developmental Origins of Health and Disease

cambridge.org/doh

Original Article

Cite this article: Bombay A, McQuaid RJ, Schwartz F, Thomas A, Anisman H, Matheson K. (2019) Suicidal thoughts and attempts in First Nations communities: links to parental Indian residential school attendance across development. *Journal of Developmental Origins of Health and Disease* **10**: 123–131. doi: 10.1017/S2040174418000405

Received: 2 October 2017
Revised: 15 April 2018
Accepted: 6 May 2018
First published online: 20 June 2018

Key words:
collective trauma; developmental stage; Indigenous; intergenerational; mental health/illness

Address for correspondence:
A. Bombay, School of Nursing, Dalhousie University, 5869 University Avenue, PO BOX 15000, Halifax, Nova Scotia, Canada, B3H 4R2.
E-mail: amy.bombay@dal.ca

CAMBRIDGE UNIVERSITY PRESS

Suicidal thoughts and attempts in First Nations communities: links to parental Indian residential school attendance across development

A. Bombay[1], R. J. McQuaid[2], F. Schwartz[3], A. Thomas[4], H. Anisman[2,5] and K. Matheson[2,5]

[1]Department of Psychiatry and School of Nursing, Dalhousie University, Halifax, NS, Canada, [2]The Royal's Institute of Mental Health Research (IMHR), University of Ottawa, Ottawa, ON, Canada, [3]Department of Psychology and Neuroscience, Dalhousie University, Halifax, NS, Canada, [4]Michael G. DeGroote School of Medicine, McMaster University, Hamilton, ON, Canada and [5]Department of Neuroscience, Carleton University, Ottawa, ON, Canada

Abstract

The Indian residential school (IRS) system in Canada ran for over a century until the last school closed in 1996. Conditions in the IRSs resulted in generations of Indigenous children being exposed to chronic childhood adversity. The current investigation used data from the 2008–2010 First Nations Regional Health Survey to explore whether parental IRS attendance was associated with suicidal thoughts and attempts in childhood, adolescence and in adulthood among a representative sample of First Nations peoples living on-reserve across Canada. Analyses of the adult sample in Study 1 (unweighted $n = 7716$; weighted $n = 186{,}830$) revealed that having a parent who attended IRS was linked with increased risk for suicidal thoughts and attempts in adolescence and adulthood. Although females were negatively affected by having a parent who attended IRS, the link with suicidal ideation in adulthood was greater for males. Analyses of the youth sample in Study 2 (unweighted $n = 2883$; weighted $n = 30{,}190$) confirmed that parental IRS attendance was associated with an increased risk for suicidal ideation and attempts. In contrast to the adult sample, parental IRS attendance had a significantly greater relation with suicidal ideation among female youth. A significant interaction also emerged between parental IRS attendance and age in the youth sample, with the influence of parental attendance being particularly strong among youth ages 12–14, compared with those 15–17 years. These results underscore the need for culturally relevant early interventions for the large proportions of Indigenous children and youth intergenerationally affected by IRSs and other collective traumas.

Introduction

Suicide rates among Indigenous peoples around the world are appreciably greater compared with non-Indigenous populations, particularly in younger age groups.[1–4] Within First Nations communities in Canada, states of emergency as a result of very young children and youth dying by suicide are increasingly common.[5–7] Although numerous factors contribute to suicide, diminished mental health has been linked to the direct and intergenerational effects of historical and ongoing processes associated with colonization.[8–13]

A particularly harmful policy in Canada was the forced removal of Indigenous children from their communities to be placed in Indian Residential Schools (IRSs) as part of the government's strategy to abolish their cultural identities.[14,15] Generations of Indigenous children as young as age three were forcibly removed from their parents, and experienced years of chronic stress and trauma in the form of widespread abuse and neglect, eradication of connections to culture and familial bonds, and cultural shaming.[14–16] The IRS system was officially acknowledged as an attempt at cultural genocide by the Truth and Reconciliation Commission of Canada in their final report released in 2015. Not unexpectedly, survivors of IRSs are at increased risk for various physical, mental and social health challenges including high rates of post-traumatic stress disorder, substance use disorders and major depression.[11,17,18]

In addition to the effects on survivors themselves, the offspring of those who attended IRS demonstrated elevated risks for poorer self-reported health, chronic and infectious diseases psychological distress, as well as suicidal thoughts and attempts.[8,11,12,17–21] Offspring of IRS survivors further reported elevated rates of childhood adversity and stressors throughout adulthood, including race and culture-related stressors such as discrimination

experiences,[11,17,19,22] all of which contribute to poorer mental health outcomes.[19] In particular, many of these factors linked to parental residential school attendance are predictors of higher rates of suicide and suicidal behaviors and psychological distress across cultures.[4]

Parental childhood adversity has been linked with an earlier age of onset of psychological distress and suicidal behavior in non-Indigenous samples.[23–25] If this is the case within Indigenous populations affected by IRSs, it would be expected that those with a parent who attended IRS would be at an elevated risk for suicidal thoughts or attempts earlier in life, which could be a contributor to the differential rates of suicide evident in younger *v.* older age cohorts. Much of the research exploring the intergenerational effects of IRSs has focused on assessing these relationships in adult samples,[8,17] and we are unaware of any research assessing how parental IRS attendance interacts with age to influence mental health outcomes during adolescence or childhood. Considering the large proportions of First Nations adults, youth and children who have been intergenerationally affected by IRS system,[26] understanding when the risks associated with parental IRS attendance manifests themselves across the lifespan is important to inform effective culturally based mental health and wellness programming and interventions.

Familial factors and early-life adversity in predicting mental health across development

The development of severe psychological distress, suicidal ideation and the progression from ideation to suicide attempts are distinct phenomena with unique predictors and outcomes that vary across development.[27] For example, depression is associated with an increased risk for suicide attempts in non-Indigenous samples, but the strength of this association changes over the lifespan.[28,29] An international study across 21 countries revealed that childhood adversity (e.g., abuse, family violence, parental death or divorce) had the strongest associations with suicide attempts in childhood, and the strength of this relation decreased during adolescence, and declined still further in young adults, before a slight increase was apparent in older adulthood.[30] Similarly, studies conducted within the general population in the United States and Europe suggest that the influence of familial and early-life factors might be particularly strong predictors of mental health issues in earlier life.[31] Likewise, adult offspring of parents with mood disorders and a history of suicidal behavior reported a lower mean age of onset of suicidal ideation if they experienced childhood adversity,[24] and earlier age of onset for depressive symptoms as adults.[23,25,31,32] Studies that distinguished between the onset of depressive symptoms in childhood (before 12) or early adolescence (12–14) *v.* later adolescence (15–18) have revealed that earlier onset is linked with a greater risk for chronic suicidal behaviors, mental health problems and substance use in adulthood.[33–37]

Considering the chronic childhood adversity faced by many IRS survivors, and how this influenced the abilities of some to provide adequate environments for their children,[8,9,19] it would be expected that adults with a parent who attended IRS would be at risk for higher levels of mental health issues, and would also be more likely to have these difficulties earlier in life. To explore this possibility in a national representative sample of First Nations adults living on-reserve, analyses of the youth and adult versions of the 2008–2010 First Nations Regional Health Survey (RHS) were carried out. In Study 1, analyses assessed whether or not parental IRS attendance was related to suicide ideation and attempts in childhood, adolescence and/or in adulthood, and whether these relations varied by sex. In Study 2, analyses of the youth version of the RHS explored the links between parental attendance at IRS with suicidal thoughts and/or attempts within the past year, and whether these relations varied with age and sex.

Methods

The data were collected from 250 First Nation communities across Canada between 2008 and 2010 [see First Nations Information Governance Centre (FNIGC),[26] for detailed methodology of RHS). To achieve statistically valid estimates for the population sample, analyses were performed using the complex samples module of the Statistical Package for the Social Sciences (v. 20; IBM Corporation) to take into account the two-stage stratified sampling design of the RHS. The adult and youth surveys included questions asking if they had ever thought about suicide and/or attempted suicide in their lifetime (yes or no), and if yes, whether this occurred in the past year, in childhood (before the age of 12), in adolescence (12–17) and/or in adulthood (18 or older; latter option only included for adults).[26] Both adults and youth were asked about their parents' and/or grandparents' attendance at IRS, and adults were asked if they personally attended IRS. The adult version of the RHS was administered to 11,043 randomly selected First Nations adults who were 18 years of age or older (mean = 40.7 years; S.E. = 0.18), with equal representation of males (50.7%) and females (49.3%). The RHS youth questionnaire was administered to 4837 randomly selected youth between the ages of 12 and 17 years. In the youth sample, there was a nearly equal representation of males (51.3%) and females (48.7%), and their mean age was 14.51 years (S.E. = 0.04).

When the adult sample was categorized into mutually exclusive categories according to personal, parent and grandparent attendance at IRS, 26.0% reported that they did not personally attend IRS and that none of their parents or grandparents attended. Just under half (45.7%) reported that at least one of their parents attended, 9.8% had a grandparent (but no parent) who attended and 5.1% who attended IRS personally but did not have a parent who attended. An additional 13.4% who responded 'don't know' or 'refused' an answer to at least one of the IRS questions were excluded from further analyses. To focus on comparisons of the intergenerational effects of having a parent who attended IRS, those who personally attended IRS or who had a grandparent but no parent who attended were also excluded from the analyses. Thus, the final sample in Study 1 comprised 7716 adults (weighted $n = 186{,}830$).

In the youth sample in Study 2, 15.2% ($n = 692$) said that they didn't know or refused to answer questions about their parent/grandparent IRS attendance, and 28.9% ($n = 1262$) had a grandparent but no parent who attended IRS. These respondents were removed from the analyses, which left 27.8% who did not have a parent or grandparent who attended ($n = 1541$), and 28.1% who had at least one parent who attended ($n = 1342$). The final unweighted sample in Study 2 comprised 2883 youth (weighted $n = 30{,}190$).

Using the adult RHS in Study 1, binary logistic regression models assessed the main effects of parental IRS attendance (no = 0 *v.* yes = 1), sex (male = 1 *v.* female = 2), and the potential two-way interaction between parental IRS attendance and sex in predicting suicidal thoughts and attempts in childhood, adolescence and/or adulthood. Similarly, to assess the youth sample in Study 2, binary logistic regression models were used to test the

https://doi.org/10.1017/S2040174418000405 Published online by Cambridge University Press

main effects of parental IRS attendance, sex and age (continuous), and all two-way and three-way interactions in predicting past year suicide ideation and attempts. Cross-tabulations assessed interactions between parental IRS attendance, sex and age in Study 1 and 2, with non-overlapping 95% confidence intervals indicating statistical significance. In cases where there were fewer than five individuals per cell or the coefficient of variability was higher than 33.3%, data were suppressed and not released by FNIGC to protect anonymity (represented by 'ds').

Study 1: results in adult RHS sample

Of the adult sample analyzed, just over one-third (36.3%) reported that they did not have any parents who attended IRS, leaving just under two-thirds (63.7%) who had at least one parent who attended. Just under 1% (0.9%; 95% CI = 0.7–1.2%) reported having thoughts about suicide in childhood, 10.7% (95% CI = 9.8–11.7%) had such thoughts in adolescence and 10.0% (94% CI = 9.2–11.0%) reported suicidal ideation in adulthood. In considering suicide attempts during different phases of the lifespan, 0.5% (95% CI = 0.3–0.6%) reported that this occurred in childhood, 6.7% (95% CI = 6.0–7.4%) said it happened in adolescence and 6.2% (95% CI = 5.6–7.0%) said they had an attempt in adulthood.

The regression analyses predicting reports of suicidal ideation in childhood did not reveal any significant predictors. However, parental IRS attendance and being female were associated with greater ideation in adolescence, with no significant two-way interaction (Table 1). In predicting ideation in adulthood, there was a significant two-way interaction (Table 1), with the cross-tabulation analyses showing that parental IRS attendance was only a significant predictor of a greater likelihood of reporting suicidal ideation among males (Fig. 1).

When considering suicide attempts, there was a significant interaction between parental IRS attendance and sex in predicting an attempt in childhood (Table 2). It appeared that males affected by parental IRS attendance were more likely to report an attempt in childhood, but this relation was not significant among females (Fig. 2). That said, because of the small unweighted number of adults in the sample who reported an attempt in childhood, this should be interpreted with caution. There were no significant two-way interactions predicting attempts in adolescence or adulthood, but parental IRS attendance was linked with greater risk at both age spans. Sex was marginally significant in predicting attempts in adolescence, with females being at greater risk (Fig. 2).

Study 2: results in youth RHS sample

Of the total youth sample analyzed, 49.7% of youth reported that they did not have any parents who attended IRS, and 50.3% reported they had at least one parent who attended. In all, 7% (7.1%) said that they thought about suicide in the past year, and 3.0% reported an attempt in the past year. The regressions and cross-tabulations predicting suicidal ideation in the past year

Table 1. Binary logistic regressions predicting suicide ideation in childhood, adolescence and/or adulthood by parental Indian residential school (IRS) attendance and sex in the adult First Nations Regional Health Survey sample

	Suicide ideation in childhood		Suicide ideation in adolescence		Suicide ideation in adulthood	
	b	OR	*b*	OR	*b*	OR
Model 1						
IRS	0.26	1.30	0.40**	1.50	0.54***	1.72
Sex	−0.08	2.26	0.24*	1.27	−0.08	0.92
Model 2						
IRS	0.52	1.69	0.37*	1.45	0.33*	1.38
Sex	0.12**	2.92	0.22†	1.24	−0.20	0.82
IRS × sex	−0.76	0.47	0.07	1.07	0.43*	1.54

†$P < 0.10$, *$P < 0.05$ **$P < 0.01$, ***$P < 0.001$.

Table 2. Binary logistic regressions predicting suicide attempts in childhood, adolescence and/or adulthood by parental Indian residential school (IRS) attendance and sex in the adult First Nations Regional Health Survey sample

	Suicide attempt in childhood		Suicide attempt in adolescence		Suicide attempt in adulthood	
	b	OR	*b*	OR	*b*	OR
Model 1						
IRS	0.42	4.52	0.83***	2.30	0.70***	2.02
Sex	0.34	1.40	0.23†	1.23	0.004	1.00
Model 2						
IRS	−0.26	0.77	0.74**	2.10	0.81***	2.25
Sex	−0.20	0.87	0.18	1.20	0.05	1.05
IRS × sex	2.34**	10.41	0.21	1.23	−0.21	0.81

†$P < 0.10$, *$P < 0.05$ **$P < 0.01$, ***$P < 0.001$.

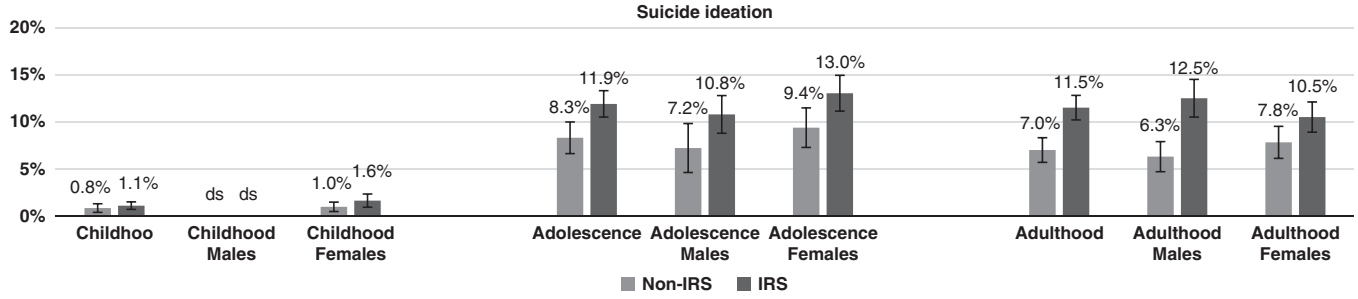

Fig. 1. The proportion of adults who reported having suicidal thoughts in childhood, adolescence and/or in adulthood as a function of having a parent who attended Indian residential school (IRS) or who did not attend IRS. Error bars represent 95% confidence intervals. The proportions could not be reported for males in childhood because of data suppression (ds).

https://doi.org/10.1017/S2040174418000405 Published online by Cambridge University Press

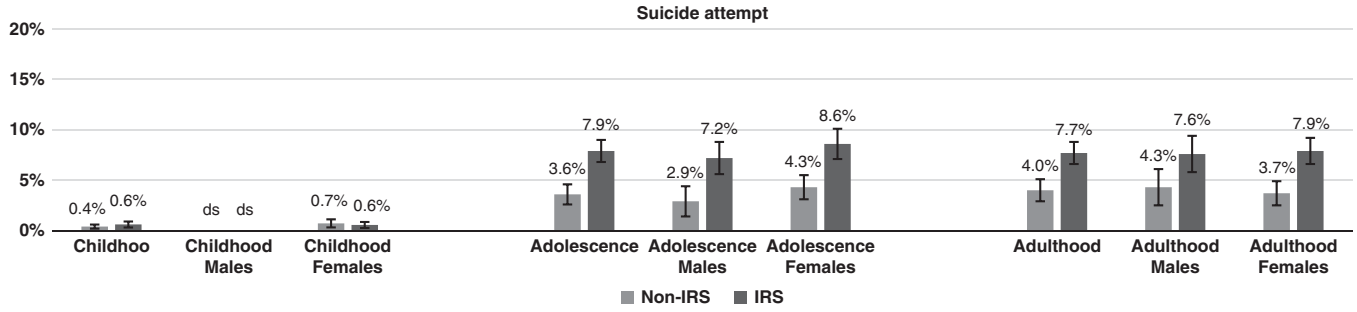

Fig. 2. The proportion of adults who reported suicide attempts in childhood, adolescence and/or in adulthood as a function of having a parent who attended Indian residential school (IRS) or who did not attended IRS. Error bars represent 95% confidence intervals. The proportions could not be reported for males in childhood because of data suppression (ds).

Table 3. Results from logistic regressions predicting past year suicidal ideation and suicidal attempts in the youth First Nations Regional Health Survey sample

	Past year suicide ideation		Past year suicide attempt	
	b	OR	*b*	OR
Model 1				
IRS	0.90***	2.50	0.89**	2.45
Age	−0.09†	1.51	0.20	1.22
Sex	0.41*	0.92	0.88†	0.92
Model 2				
IRS	6.62***	752.77	4.44*	76.09
Age	0.07	1.07	0.06	1.14
Sex	2.36	10.61	8.23***	10.61
IRS × age	−0.35***	0.71	−0.27*	0.79
IRS × sex	−1.11**	0.33	−0.88	0.40
Age × sex	−0.11	0.90	−0.48***	0.90

IRS, Indian residential school.
†$P < 0.10$, *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

revealed significant two-way interactions between parental IRS attendance with age and with sex, such that effects of having a parent who attended IRS were greater in younger youth and among females (the three-way interaction was not significant) (Table 3; Fig. 3). Likewise, the regressions and cross-tabulations predicting suicide attempts in the past year revealed a two-way interaction between parental IRS attendance and age, with the relation between IRS attendance and attempts being greater in younger youth (Fig. 4). The two-way interaction between parental IRS attendance and sex in predicting attempts was not significant, and the three-way interaction was not significant (Table 3).

Discussion

The current study adds to the growing evidence demonstrating the long-term outcomes associated with the IRS system among Indigenous adults,[8,9,11,12] and further demonstrates that the increased risks for suicidal thoughts and attempts associated with parental IRS attendance start to manifest early in life before adulthood. In Study 1, analyses of the 2008/2010 adult RHS sample revealed that parental IRS attendance was associated with greater retrospective reports of suicidal thoughts and attempts that occurred during adolescence (between the age of 12 and 17 years), and that increased risk persisted into adulthood. These data are consistent with the findings among mainstream samples suggesting that parental factors and early-life adversity can influence mental health outcomes throughout the lifespan.[38,39]

Although some studies have shown that certain parental risk factors and childhood experiences are more influential in predicting mental health outcomes in childhood and adolescence *v.* in adulthood,[40,41] this does not seem to be the case in relation to parental IRS attendance among First Nations living on-reserve. In this regard, the proportions of adults in Study 1 who reported suicidal thoughts and/or attempts in adulthood were comparable with their estimates of these occurrences in adolescence. Although the rates of reporting were greater among those whose parents attended IRS, the stability of reports was evident in both the IRS-affected group and those not affected by IRSs. These findings emphasize the long-lasting effects of the IRS system on the children of those who attended, as well as the increased need for targeted mental health and wellness programming beginning early in life. The higher risk for suicide ideation and attempts could be related to parenting styles that evolved as a result of the childhood experiences of survivors at IRS, including patterns of communication associated with parents' IRS trauma,[41] as well as epigenetic changes related to gene expression of several neurobiological factors. Inasmuch as the offspring of IRS survivors have further endured substandard living conditions and pervasive interpersonal and systemic discrimination, these factors may have additively or synergistically undermined well-being, including elevated levels of psychological distress and suicidal thoughts and behaviors.[19]

In assessing potential sex differences in the adult RHS sample, the influence of parental IRS attendance appeared to be generally the same among men and women in predicting retrospective reports of suicidal thoughts in their childhood and adolescence. However, it appeared that in the adult sample IRS exposure was somewhat more aligned with suicide ideation among males, although the trend was in the same direction for females. In non-Indigenous samples, sex differences have been reported in relation to the links between various types of childhood adversity and mental health outcomes in adulthood.[43,44]

However, in some studies suicidality was more likely to be associated with childhood environmental risk factors in females,[45] whereas in other studies a greater association occurred in males.[46] Cultural factors and the local context also moderate the influence of sex on various health and social outcomes,[5,6] and may explain some of these disparate results across populations. Within

https://doi.org/10.1017/S2040174418000405 Published online by Cambridge University Press

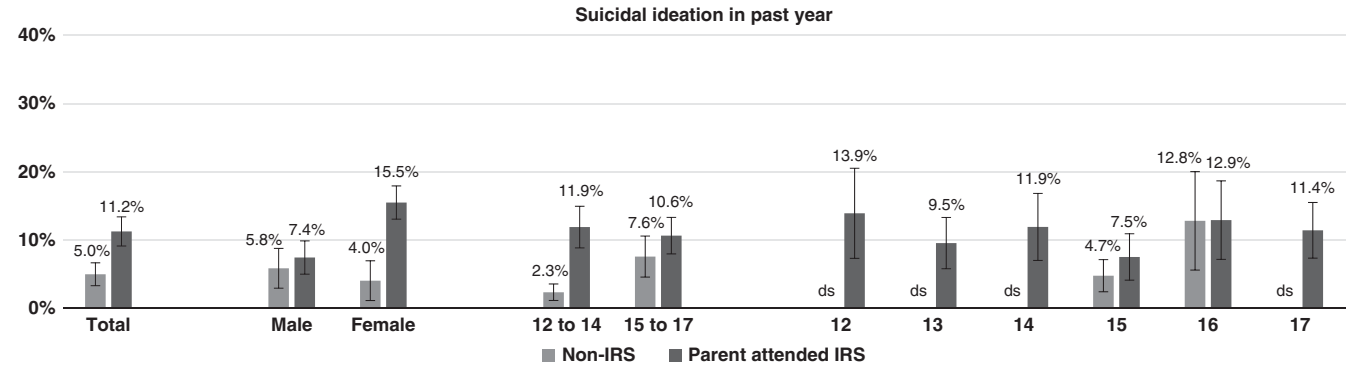

Fig. 3. The proportion of youth who reported suicidal ideation in the past year as a function of age, sex, and whether or not they had a parent who attended Indian residential school (IRS). Error bars represent 95% confidence intervals. The proportions could not be reported for each age because of data suppression (ds).

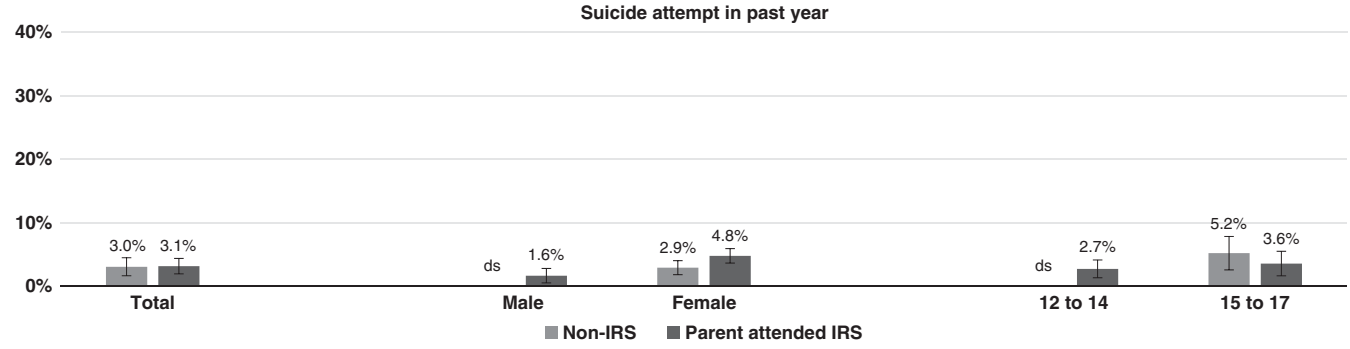

Fig. 4. The proportion of youth who reported suicidal attempts in the past year as a function of age, sex, and whether or not they had a parent who attended Indian residential school (IRS). Error bars represent 95% confidence intervals. The proportions could not be reported for males not affected by IRS or for each age because of data suppression (ds).

Indigenous contexts, it has been suggested that the high rates of suicide among males are linked to the significant social changes that have come with colonization, particularly in relation to the effects on traditional societal and family roles, responsibilities, identities, as well as patterns of interactions and social support networks.[6,47–49] Although there are many potential reasons for why males appeared to be more influenced than females by parents' IRS attendance in adulthood, it might be that the traditional roles for men in some First Nations communities are more obsolete relative to females who have maintained their traditional roles in caregiving for their children. At the same time, it is noteworthy that females in the adult sample recalled greater suicidal ideation during adolescence. The source for the adolescent *v.* adult disparity is uncertain, especially given that retrospective reports might not be entirely accurate, particularly those made by adults in relation to their childhood and adolescence.

Although it was expected that parental IRS attendance would be associated with elevated suicidal thoughts and attempts in childhood, there were no significant differences as a function of parental IRS attendance in the adult sample. This said, the frequency of such recollections were very small, and the conclusions that can be made in relation to the childhood estimates are hampered by data suppression and low coefficients of variabilities. What can be concluded in this cohort of adults in Study 1 is that those with at least one parent who attended IRS were at greater risk for suicidal ideation and attempts in adolescence before the age of 18, and that this greater risk continued into adulthood.

As in the adult sample, analyses of the youth sample in Study 2 indicated elevated reports of suicidal ideation and suicide attempts in the past year among youth with a parent who had attended IRS. The elevated ideation was present even among respondents as young as 12 years of age, and was greater among females than in males. These differential effects of sex in relation to suicidal ideation in Study 1 and 2 may reflect developmental differences in how factors associated with sex influence suicidal thoughts in youth *v.* adulthood. Alternatively, this difference could reflect a cohort effect such that the increased influence of parental IRS attendance for females may be a newer phenomenon in younger generations. The possibility of such a cohort effect in relation to the greater risk for ideation among adolescent females is consistent with the increasing rates of completed suicides in young females being reported in some First Nations communities,[50] among Inuit in Nunavik,[51] as well as in non-Indigenous samples in Canada[52] and in other countries.[53,54] One factor that may be particularly relevant for Indigenous populations, and other populations affected by collective trauma, is that many of the collective long-term outcomes include increased exposure to childhood adversity and violence,[9,55,56] particularly among young women relative to men.[11,51] Issues related to violence against women and childhood adversities may not have been present within Indigenous communities prior colonization, but may be associated with the pervasive intergenerational consequences of the residential school system that were associated with greater exposure to certain types of stressors and trauma that disproportionately affected females.[8,9]

Another possible explanation for this potential cohort effect related to sex differences is that certain risk factors for stress-related issues appear to be specific to the transmission from mothers to

https://doi.org/10.1017/S2040174418000405 Published online by Cambridge University Press

daughter whereas male offspring are not affected in the same way. In this regard, animal studies have revealed transgenerational epigenetic changes, occurring mostly in male offspring, as a result of chronic, unpredictable parental separation.[57] Likewise, several sex-dependent transmission patterns were proposed that were mediated by parental factors, possibly stemming from epigenetic actions.[58] Such outcomes may come about owing to distress in pregnant females causing glucocorticoid changes that promote sex-dependent epigenetic actions.[59] Indeed, stressors experienced some time before pregnancy in rodents led to changes of dendritic length and spine density within brain regions associated with cognitive functioning and mood (i.e., anterior cingulate cortex and prelimbic/infralimbic cortex), primarily among male offspring.[60] Understandably, less information concerning transgenerational effects of stressors is available in humans. Nevertheless, intergenerational changes associated with stressors have been reported.[61] An epidemiological analysis in humans likewise indicated that childhood trauma, in this case stemming from parental death, had transgenerational effects that varied with the age of the trauma among males, whereas age was less important in producing adverse effects in females.[62]

We have previously speculated that epigenetic changes might contribute to the transgenerational effects of the trauma related to the IRS experience.[8,20] Yet, as we indicated, the trauma experienced did not end with release from these schools, but continued when survivors returned to their communities.[9] Thus, in considering the specific pathways leading to psychological distress in children and grandchildren, prenatal and postnatal environmental factors, and their interactions, may underlie intergenerational patterns in stress-related outcomes, brain morphometry, and gene expression patterns, and could possibly vary in a sexually dimorphic fashion.

While some physiological pathways of transmission of risk and resilience factors across generations are limited to females, there are other mechanisms that influence both sexes and/or males only. For example, early life experiences and relationships, especially those with parents, may contribute to the development of particular coping styles, which, may influence affective responses elicited by stressors encountered in adulthood. However, these outcomes may be sex-dependent and may vary yet again with the bonding patterns with the male or female parent.[63] Likewise, in a sample of adolescents and their parents in a mainstream population, maternal depressive symptoms predicted increased late adolescent depressive symptoms for girls but not males, whereas paternal depressive symptoms predicted increase depressive symptoms in all youth.[64] There are certainly numerous interacting environmental and biological mechanisms that may be involved in the intergenerational transmission of risk that are involved in these effects, some of which influence males and females similarly and some that do not, and which might differ across the lifespan. The findings of the present investigation do not speak to the specific mechanisms involved, but they likely reflect the additive or interactive influence of multiple biopsychosocial and cultural factors that remains to be elucidated.

In considering the significant interaction between parental IRS attendance and age in predicting suicidal ideation and attempts in youth, cross-tabulations in Study 2 revealed that the proportions of those not affected by IRS reporting suicidal ideation and/or attempts was significantly lower among youth ages 12–14 years compared with those ages 15–17 years, which is consistent with the typical trajectory reported in mainstream samples. In contrast, there were no differences between those reporting suicidal ideation and/or attempts in the younger *v.* the older age cohort among those with a parent who attended IRS, suggesting these IRS-affected youth were at greater risk for an earlier onset of suicidal thoughts and behaviors. Knowing that exposure to childhood adversities is a key contemporary mediator of the intergenerational transmission of IRS trauma,[8,9,19] the findings related to age in the youth sample are consistent with prospective studies that have reported links between various forms of child maltreatment and the earlier emergence of mental health disturbances relative to controls.[65,66] In essence, these findings are in line with the view that parental IRS attendance not only increases risk of developing serious psychological distress and suicidal behaviors, it can accelerate onset of these features. Similar intergenerational relationships have been observed between parental exposure to collective trauma in childhood and negative mental health outcomes in youth,[38] however, we are unaware of studies that reported links with the earlier onset of such symptoms.

The timing of onset of psychological systems has significant implications in terms of prevention and treatment, as it has been suggested that etiology of early- *v.* late-onset disorders may differ and could potentially represent unique subtypes of certain mental[35] and physical[67] conditions. This makes the developmental stage at which symptoms manifest an important starting point for examining possible causes, risk factors and protective factors in males and females. The importance of identifying the risk and protective factors involved in the transmission of IRS trauma is highlighted by the fact that earlier onset of psychological distress, depression, suicidal ideation and suicide attempts appear to follow a distinct trajectory of greater chronicity, severity of symptoms and more deleterious behavioral, social and health outcomes.[24,68,69]

Considering the significant negative outcomes associated with early-onset mental health issues, and the large proportion of the on-reserve First Nations population affected by the IRS system, combined with the continued mental health inequities in Canada, further exploration is needed to build on findings of the present investigation. In this regard, however, the analyses were particularly limited in assessing how parental IRS was associated with suicidal thoughts in childhood due to the low unweighted sample sizes that lacked statistical power for these particularly variables. Another limitation, which may have particularly affected adults in Study 1, is that such retrospective reports tend to underestimate the incidence of mental health concerns as they are forgotten over time.[70,71] Generational differences may also have contributed to the underreporting of suicidality and differentially influenced the adult and youth cohorts assessed in Study 1 and Study 2. Yet another limitation is that we did not consider additional variables that might interact to predict suicidal thoughts, attempts and distress, such as substance use. For example, in a study of First Nations youth living on-reserve in the United States, earlier age of first substance use predicted developmental course and increased risk of later psychological outcomes.[72] The potential synergistic or additive effects of having both parents who attended, and/or of having a grandparent who attended, were also not considered in the analyses.[8,20] Finally, research in animal and human studies demonstrating the moderating influence of the parental sex in determining the transmission of risks and protective factors to their sons and/or daughters raises the potential importance of considering parental gender in future analyses.

Additional research should explore culture-related protective factors that can mitigate the transmission of risk factors across generations. For example, in mainstream samples, early-intervention cognitive-behavioral therapy (CBT) can be effective as either a prevention or intervention technique to reduce psychological risk in

https://doi.org/10.1017/S2040174418000405 Published online by Cambridge University Press

the offspring of individuals with a mental illness.[73,74] In this regard, CBT-based programs have been shown to reduce internalizing and externalizing symptomatology and rates of illness onset in the offspring of depressed parents.[73] Moreover, a family-based CBT program significantly reduced anxiety disorder onset in the 7–12-year-old offspring of anxious parents.[75] Because of the unique nature of the culture-related trauma faced by generations of Indigenous children who were exposed to cultural shaming and separation from their traditional beliefs, languages and lifestyles, interventions that build on the strengths that are inherent in First Nations cultures and communities are especially needed.[76,77] It is important to note that there are significant variations across First Nations communities with respect to distress levels, suicidal behavior, and the personal and collective impacts of the IRS system, and therefore, regional and community-level variations should also be explored. As suggested by others,[5,51] there is also a clear need for further research concerning how recent cultural changes in gender roles and expectations influence mental health and suicidal behaviors.

Notwithstanding the limitations, the current findings suggest that mental health and healing initiatives for Indigenous peoples should focus on improving the well-being of children and younger-aged youth and those showing signs of early-onset distress and mental health symptoms. Early identification of psychological distress is imperative due to potential sensitive periods of increased predisposition and greater potential for favorable outcomes from treatment.[78] Without intervening in the intergenerational cycles of distress and accompanying health and social problems in First Nations communities that have been catalyzed by the IRS system and other aspects of colonization, the significant mental health disparities might continue to persist.

Acknowledgments. We would like to acknowledge those who participated in the RHS, as well as the data collectors and those who worked to make the RHS possible. We would also like to acknowledge those who have been affected by the Indian Residential School system.

Financial Support. This work was supported by the Department of Psychiatry Research Fund at Dalhousie University.

Conflicts of Interest. None.

Ethical Standards. The secondary analyses of the Adult and Youth versions of the 2008/10 First Nations Regional Health Survey (RHS) presented in this paper were provided to the First Nations Information Governance Centre (FNIGC) for comment and review. That said, the analyses do not necessarily reflect the views of FNIGC. FNIGC requires that statistics reproduced from analyses of the RHS must be accompanied by a citation of the document, including a reference to the page on which the statistic in question appears. The subset of variables assessed in this paper were extracted from the RHS full data set on April 23, 2013 by FNIGC.

References

1. Campbell A, Balaratnasingam S, McHugh C, Janca A, Chapman M. Alarming increase of suicide in a remote Indigenous Australian population: an audit of data from 2005 to 2014. *World Psychiatry*. 2016; 15, 296–297.
2. Orellana JD, Balieiro AA, Fonseca FR, Basta PC, Souza ML. Spatial-temporal trends and risk of suicide in Central Brazil: an ecological study contrasting indigenous and non-indigenous populations. *Rev Bras Psiquiatr*. 2016; 38, 222–230.
3. Sumarokov YA, Brenn T, Kudryavtsev AV, Nilssen O. Suicides in the Indigenous and non-Indigenous populations in the Nenets Autonomous Okrug, Northwestern Russia, and associated socio-demographic characteristics. *Int J Circumpolar Health*. 2014; 73, 24308.
4. World Health Organization. *Preventing Suicide: A Global Imperative*. 2014. World Health Organization: Luxembourg. Retrieved January 2018 from http://www.who.int/mental_health/suicide-prevention/world_report_2014/en/.
5. Kirmayer LJ. Changing patterns in suicide among young people. *Can Med Assoc J*. 2012; 184, 1015–1016.
6. Kirmayer LJ, Brass GM, Holton T, *et al*. *Suicide Among Aboriginal People in Canada*. 2007. Aboriginal Healing Foundation: Ottawa, ON.
7. Mota N, Elias B, Tefft B, *et al*. Correlates of suicidality: investigation of a representative sample of Manitoba First Nations adolescents. *Am J Public Health*. 2012; 102, 1353–1361.
8. Bombay A, Matheson K, Anisman H. The intergenerational effects of Indian Residential Schools: implications for the concept of historical trauma. *Transcult Psychiatry*. 2014; 51, 320–338.
9. Bombay A, Matheson K, Anisman H. *Origins of Lateral Violence in Aboriginal Communities: A Preliminary Study of Student-to-Student Abuse in Indian Residential Schools*. 2014. Aboriginal Healing Foundation: Ottawa, ON.
10. Chandler MJ, Lalonde CE, Sokol BW, Hallett D, Marcia JE. Personal persistence, identity development, and suicide: a study of Native and non-Native North American adolescents. *Monogr Soc Res Child Dev*. 2003; 68, vii–viii, 1–130; discussion 131–138.
11. Elias B, Mignone J, Hall M, *et al*. Trauma and suicide behaviour histories among a Canadian Indigenous population: an empirical exploration of the potential role of Canada's residential school system. *Soc Sci Med*. 2012; 74, 1560–1569.
12. Hackett C, Feeny D, Tompa E. Canada's residential school system: measuring the intergenerational impact of familial attendance on health and mental health outcomes. *J Epidemiol Community Health*. 2016; 70, 1096–1105.
13. Walls ML, Whitbeck LB. The intergenerational effects of relocation policies on Indigenous families. *J Family Issues*. 2012; 33, 1272–1293.
14. Royal Commission on Aboriginal Peoples (RCAP). *Royal Commission on Aboriginal Peoples Report* (5 vols.), 1996. RCAP: Ottawa, ON.
15. Truth & Reconciliation Commission of Canada. *Canada's Residential Schools: The Final report of the Truth and Reconciliation Commission of Canada* (vol. 1), 2015. McGill-Queen's Press: Montreal & Kingston.
16. Sotero M. A conceptual model of historical trauma: implications for public health practice and research. *J Health Dispar Res Pract*. 2006; 1, 93–108.
17. Wilk P, Maltby A, Cooke M. Residential schools and the effects on Indigenous health and well-being in Canada-a scoping review. *Public Health Rev*. 2017; 38, 1–23.
18. Corrado RR, Cohen IM. *Mental health profiles for a sample of British Columbia's Survivors of the Canadian Residential School system*. 2003. Aboriginal Healing Foundation: Ottawa, Canada.
19. Bombay A, Matheson K, Anisman H. The impact of stressors on second generation Indian residential school survivors. *Transcul Psychiatry*. 2011; 48, 367–391.
20. McQuaid RJ, Bombay A, McInnis OA, *et al*. Suicide ideation and attempts among First Nations Peoples living on-reserve in Canada: the intergenerational and cumulative effects of Indian Residential Schools. *Can J Psychiatry*. 2017; 62, 422–430.
21. Menzies P. Homeless Aboriginal men: effects of intergenerational trauma. *Can Rev Soc Policy*. 2009; 58, 1–25.
22. Bombay A, Matheson K, Anisman H. Appraisals of discriminatory events among adult offspring of Indian Residential School survivors. *Cultur Divers Ethnic Minor Psychol*. 2013; 20, 75–86.
23. Docherty AR, Edwards AC, Yang F, *et al*. Age of onset and family history as indicators of polygenic risk for major depression. *Depress Anxiety*. 2017; 34, 446–452.
24. Melhem NM, Brent DA, Ziegler M, *et al*. Familial pathways to early-onset suicidal behavior: familial and individual antecedents of suicidal behavior. *Am J Psychiatry*. 2007; 164, 1364–1370.
25. Wilson S, Vaidyanathan U, Miller MB, McGue M, Iacono WG. Premorbid risk factors for major depressive disorder: are they associated with early onset and recurrent course? *Dev Psychopathol*. 2014; 26, 1477–1493.

26. First Nations Information Governance Centre (FNIGC). *First Nations Regional Health Survey (RHS) 2008/10: National Report on Adults, Youth and Children Living in First Nations Communities*, 2012. FNIGC: Ottawa, ON.
27. Klonksky ED, May AM, Saffer BY. Suicide, suicide attempts, and suicidal ideation. *Annu Rev Clin Psychol*. 2016; 12, 307–330.
28. Goldston DB, Daniel SS, Erkanli A, *et al*. Psychiatric diagnoses as contemporaneous risk factors for suicide attempts among adolescents and young adults: developmental changes. *J Consulting Clin Psychol*. 2009; 77, 281.
29. Rohde P, Lewinsohn PM, Klein DN, Seeley JR, Gau JM. Key characteristics of major depressive disorder occurring in childhood, adolescence, emerging adulthood, adulthood. *Clin Psychol Sci*. 2013; 1, 41–53.
30. Bruffaerts R, Demyttenaere K, Borges G, *et al*. Childhood adversities as risk factors for onset and persistence of suicidal behavior. *Br J Psychiatry*. 2010; 197, 20–27.
31. Kendler KS, Gatz M, Gardner CO, Pedersen NL. A Swedish national twin study of lifetime major depression. *Am J Psychiatry*. 2006; 163, 109–114.
32. Neuman J, Geller B, Rice JP, Todd RD. Increased prevalence and earlier onset of mood disorders among relatives of prepubertal versus adult probands. *J Am Acad Child Adolesc Psychiatry*. 1997; 36, 466–473.
33. Côté SM, Boivin M, Liu X, *et al*. Depression and anxiety symptoms: onset, developmental course and risk factors during early childhood. *J Child Psychol Psychiatry*. 2009; 50, 1201–1208.
34. Dekker MC, Ferdinand RF, Van Lang ND, *et al*. Developmental trajectories of depressive symptoms from early childhood to late adolescence: gender differences and adult outcome. *J Child Psychol Psychiatry*. 2007; 48, 657–666.
35. Hammen C, Hazel NA, Brennan PA, Najman J. Intergenerational transmission and continuity of stress and depression: depressed women and their offspring in 20 years of follow-up. *Psychol Med*. 2012; 42, 931–942.
36. Roza SJ, Hofstra MB, van der Ende J, Verhulst FC. Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: a 14-year follow-up during childhood, adolescence, and young adulthood. *Am J Psychiatry*. 2003; 60, 2116–2121.
37. Bittner A, Egger HL, Erkanli A, *et al*. What do childhood anxiety disorders predict? *J Child Psychol Psychiatry*. 2007; 48, 1174–1183.
38. Cowan CSM, Callaghan BL, Kan JM, Richardson R. The lasting impact of early-life adversity on individuals and their descendants: potential mechanisms and hope for intervention. *Genes Brain Behav*. 2016; 15, 155–168.
39. Benjet C, Borges G, Medina-Mora M. Chronic childhood adversity and onset of psychopathology during three life stages: childhood, adolescence and adulthood. *J Psychiatr Res*. 2010; 44, 732–740.
40. Bruwer B, Govender R, Bishop M, *et al*. Association between childhood adversities and long-term suicidality among South Africans from the results of the South African Stress and Health study: a cross-sectional study. *BMJ Open*. 2014; 4, e004644.
41. Santana GL, Coelho BM, Borges G, *et al*. The influence of parental psychopathology on offspring suicidal behavior across the lifespan. *PLoS ONE*. 2015; 10, e0134970.
42. Matheson K, Bombay A, Dixon K, Anisman H. Intergenerational communication regarding Indian Residential Schools: implications for cultural identity, perceived discrimination, and depressive symptoms. *Transcult Psychiatry*. 2018; (in press).
43. Evans EA, Grella CE, Upchurch DM. Gender differences in the effects of childhood adversity on alcohol, drug, and polysubstance-related disorders. *Soc Psychiatry Psychiatr Epidemiol*. 2017; 52, 901–912.
44. Pirkola S, Isometsä E, Aro H, *et al*. Childhood adversities as risk factors for adult mental disorders: results from the Health 2000 Study. *Soc Psychiatry Psychiatr Epidemiol*. 2005; 40, 769–777.
45. Angst J, Hengartner MP, Rogers J, *et al*. Suicidality in the prospective Zurich study: prevalence, risk factors and gender. *Eur Arch Psychiatry Clin Neurosci*. 2014; 264, 557–565.
46. Oquendo MA, Bongiovi-Garcia ME, Galfalvy H, *et al*. Sex differences in clinical predictors of suicidal acts after major depression: a prospective study. *Am J Psychiatry*. 2007; 164, 134–141.
47. Kral MJ. Postcolonial suicide among Inuit in Arctic Canada. *Cult Med Psychiatry*. 2012; 36, 306–325.
48. Leineweber M, Arensman E. Culture change and mental health: the epidemiology of suicide in Greenland. *Arch Suicide Res*. 2003; 7, 41–50.
49. Leineweber MP, Bjerregaard C, Baerveldt C, Voestermans P. Suicide in a society transition. *Int J Circumpolar Health*. 2001; 60, 280–287.
50. Eggertson L. Aboriginal youth suicide rises in Northern Ontario. *CMAJ*. 2015; 187, E335–E336.
51. Fraser SL, Geoffroy D, Chachamovich E, Kirmayer LJ. Changing rates of suicide ideation and attempts among Inuit youth: A gender-based analysis of risk and protective factors. *Suicide Life Threat Behav*. 2015; 45, 141–156.
52. Skinner R, McFaull S. Suicide among children and adolescents in Canada: trends and sex differences, 1980–2008. *Can Med Assoc J*. 2012; 184, 1029–1034.
53. LaFromboise TD, Medoff L, Lee CC, Harris A. Psychosocial and cultural correlates of suicidal ideation among American Indian early adolescents on a Northern Plains reservation. *Res Human Dev*. 2007; 4, 119–143.
54. Lahti A, Räsänen P, Riala K, Keränen S, Hakko H. Youth suicide trends in Finland, 1969–2008. *J Child Psychol Psychiatry*. 2011; 52, 984–991.
55. Somasundaram D. Collective trauma in northern Sri Lanka: a qualitative psychosocial-ecological study. *Int J Ment Health Syst*. 2007; 1, 5.
56. Somasundaram D. Collective trauma in the Vanni: a qualitative inquiry into the mental health of the internally displaced due to the civil war in Sri Lanka. *Int J Ment Health Syst*. 2010; 4, 22.
57. Franklin TB, Russig H, Weiss IC, *et al*. Epigenetic transmission of the impact of early stress across generations. *Biological Psychiatry*. 2010; 68, 408–415.
58. Ambeskovic M, Roseboom TJ, Metz GAS. Transgenerational effects of early environmental insults on aging and disease incidence. *Neurosci Biobehav Rev*. 2017; [Epub ahead of print].
59. Constantinof A, Moisiadis VG, Matthews SG. Programming of stress pathways: a transgenerational perspective. *J Steroid Biochem Mol Biol*. 2016; 160, 175–180.
60. Bock J, Poeschel J, Schindler J, *et al*. Transgenerational sex-specific impact of preconception stress on the development of dendritic spines and dendritic length in the medial prefrontal cortex. *Brain Struct Funct*. 2016; 221, 855–863.
61. Bowers ME, Yehuda R. Intergenerational transmission of stress in humans. *Neuropsychopharmacology*. 2016; 41, 232–244.
62. Vågerö D, Rajaleid K. Does childhood trauma influence offspring's birth characteristics? *Int J Epidemiol*. 2017; 46, 219–229.
63. Matheson K, Kelly O, Cole B, *et al*. Parental bonding and depressive affect: the mediating role of coping resources. *Br J Soc Psychol*. 2005; 44, 371–395.
64. Mason WA, Chmelka MB, Trudeau L, Spoth RL. Gender moderation of the intergenerational transmission and stability of depressive symptoms from early adolescence to early adulthood. *J Youth Adolesc*. 2017; 46, 248–260.
65. Andersen SL, Teicher MH. Stress, sensitive periods and maturational events in adolescent depression. *Trends Neurosci*. 2008; 31, 183–191.
66. Widom CS, DuMont K, Czaja SJ. A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. *Arch Gen Psychiatry*. 2007; 64, 49–56.
67. Singh M, Ding Y, Zhang L-Y, *et al*. Distinct breast cancer subtypes in women with early-onset disease across races. *Am J Cancer Res*. 2014; 4, 337–352.
68. Jaffee SR, Moffitt TE, Caspi A, *et al*. Differences in early childhood risk factors for juvenile-onset and adult-onset depression. *Arch Gen Psychiatry*. 2002; 59, 215–222.
69. Zisook S, Rush AJ, Lesser I, *et al*. Preadult onset vs. adult onset of major depressive disorder: A replication study. *Acta Psychiatr Scand*. 2007; 115, 196–205.
70. Moffitt TE, Caspi A, Taylor A, *et al*. How common are common mental disorders? Evidence that lifetime prevalence rates are doubled by prospective versus retrospective ascertainment. *Psychol Med*. 2010; 40, 899–909.

71. Simon GE, VonKorff M. Recall of psychiatric history in cross-sectional surveys: implications for epidemiologic research. *Epidemiol Rev*. 1995; 17, 221–227.
72. Sittner KJ. Trajectories of substance use: onset and adverse outcomes among North American Indigenous adolescents. *J Res Adolesc*. 2015; 26, 830–844.
73. Reupert AE, Cuff R, Drost L, *et al*. Intervention programs for children whose parents have a mental illness: a review. *Med J Aust*. 2013; 199, S18–S22.
74. Siegenthaler E, Munder T, Egger M. Effect of preventive interventions in mentally ill parents on the mental health of the offspring: systematic review and meta-analysis. *J Am Acad Child Adolesc Psychiatry*. 2012; 51, 8–17.
75. Ginsburg GS. The child anxiety prevention study: intervention model and primary outcomes. *J Consult Clin Psychol*. 2009; 77, 580–587.
76. Assembly of First Nations & the Thunderbird Partnership Foundation. *First Nations Mental Wellness Continuum Framework*, 2015. Health Canada: Ottawa, ON. Retrieved January 2018 from http://www.thunderbirdpf.org/wp-content/uploads/2015/01/24-14-1273-FN-Mental-Wellness-Framework-EN05_low.pdf.
77. Spear W. *Full Circle: The Aboriginal Healing Foundation and the Unfinished Work of Hope, Healing, and Reconciliation*. 2014. Aboriginal Healing Foundation: Ottawa, ON.
78. Heim C, Binder EB. Current research trends in early life stress and depression: review of human studies on sensitive periods, gene–environment interactions, and epigenetic. *Exp Neurol*. 2012; 233, 102–111.

https://doi.org/10.1017/S2040174418000405 Published online by Cambridge University Press