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The Cedar Project: Historical, structural and interpersonal determinants of involvement in survival sex work over time among Indigenous women who have used drugs in two Canadian cities

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ABSTRACT

Background: Indigenous women involved in survival sex work face multiple layers of discrimination, criminalization and alarming levels of intergenerational and lifetime trauma. This longitudinal study examined historical, structural and interpersonal factors associated with survival sex work involvement among Indigenous women who have used drugs in British Columbia (BC), Canada.

Methods: The Cedar Project is an ongoing cohort study involving young Indigenous people who have used illicit drugs in Vancouver and Prince George, BC. Data was collected every 6 months from 2007 to 2016. Generalized linear mixed-effects modeling was used to model survival sex work involvement, defined as exchanging sex for money, drugs, food or shelter in the previous six months.

Results: Among 292 participants, 34% reported their family always/often lived by traditional culture and 37% reported their family always/often spoke their traditional language. In contrast, 48% had a parent in residential school and 72% were removed from their biological parents. In total, 55% of women were involved in survival sex work at baseline. In adjusted analyses, those who were single (ARR: 1.91; 95% CI: 1.50–2.35), identified as two-spirit (ARR: 2.16; 95% CI: 1.36–2.91), experienced sexual assault (ARR: 1.90; 95% CI: 1.22–2.58), were denied access to shelter (ARR: 1.71; 95% CI: 1.18–2.28), used crack daily (ARR: 2.85; 95% CI: 2.36–3.31), used injection drugs (ARR: 2.52; 95% CI: 1.98–3.07), and were unable to access substance use treatment (ARR: 1.58; 95% CI: 1.15–2.05) were more likely to be involved in sex work.

Conclusion: Indigenous-governed, wellness-based harm-reduction interventions, and structural reforms addressing housing insecurity and normalization of a culture of violence against Indigenous women, especially those involved in survival sex work, are urgently needed in Canada.

List of abbreviations
TRC – Truth and Reconciliation Commission

Background

Indigenous leaders in Canada are concerned that young Indigenous women and girls involved in survival sex work face structural threats and barriers to their wellness, rooted in discrimination, criminalization and intergenerational and colonial traumas (Christian and Spittal, 2008; NWAC, 2014). First Nations, Inuit and Métis women comprise 4% of the female population nationally (Arriagada, 2016). Yet, they are over-represented in sex work. Estimates of Indigenous women among all women involved in sex work vary, up to 50% in Vancouver, British

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Columbia (BC) to 14–60% across Canada (Farley, Lynne, and Cotton, 2005; Canadian Public Health Association (CPHA) 2014). Young Indigenous women's involvement in sex work is overwhelmingly rooted in the need to survive (ONWA, 2016; Sethi, 2007). Survival sex work – the exchange of sexual services for food, shelter, drugs, alcohol and money – can be a 'constrained choice' for young Indigenous people, some of whom are structurally disenfranchised and exposed to economic violence (Gorkoff and Runner, 2003; JJ, 2013; Pooyak, 2009).

Survival sex work among young Indigenous women has historical roots in legislated violence, contributing to intergenerational trauma. Indigenous Elders and scholars assert that prior to colonization in what is now known as North America, cultural systems, traditions, and practices upheld women's status as highly valued members of the community (Allen, 1992). Despite the socio-cultural diversity among Indigenous societies, many are matrilineal – wealth, power and inheritance have been passed down through the mother and maternal uncles – and gender roles have often been complementary and egalitarian (Braveheart-Jordan and Deburyn, 1995; Chansonneuve, 2005; Guerrero, 2003). Elder Indigenous women have had central roles in society and been revered for upholding religious and spiritual teachings of their communities (Weaver, 2009). Women have held positions of leadership and have been responsible for land holdings and allocation of resources (Hanson, 2009). However, subjugation of Indigenous women began at contact through the imposition of patriarchy, aggressive Christianization, and devaluation of gender identity, power and freedoms (Anderson, 2011).

Colonization disrupts Indigenous political and social institutions, displaces people from traditional lands, and suppress Indigenous cultures, ceremonies and economic development (Kelm, 1998). A critical legacy of colonization that continues today is the normalization of violence against Indigenous women in Canada. Sexual violence against Indigenous women was an important part of nineteenth-century settler 'strategies of domination' (Million, 2014; Razack, 2000; Smith, 2003). Settler colonialism has drawn upon the discourse of the 'squaw' – sexually available and violable female – for securing control over Indigenous peoples and lands while enabling violence against Indigenous women and children (Bourgeois, 2014). Victorian values around chastity created what Cherokee scholar Rayna Green has termed the "Pocahontas perplex". This restrictive binary of the Indian Princess/Squaw imposed that if an Indigenous woman could not be deemed virtuous by Euro-Christian standards, she was unworthy of respect (Green, 1975). In the late 1800s, white settlers created social and spatial boundaries where Indigenous women were represented as dangerous, promiscuous and a threat to the white community, juxtaposed against white women, projected as "civilizing" agents, virtuous and pure (Carter, 1993). Normalization of violence against Indigenous women was further enshrined through the *Indian Act* of 1876, which stripped women of their status if they married non-status men, denied their right to possess land and marital property, and excluded them from community governance (Government of Canada, 1969). Stereotypical representations of Indigenous women as immoral and of "abandoned characters" were used to justify regulation of their movement and confinement to reserves (Razack, 2002). Critical race scholar Sherene Razack has argued that the *Indian Act,* "severed Indigenous women from their power, their traditional roles, and their communities and lands, thereby increasing their vulnerability to male and state violence" (Razack, 2016).

A powerful mechanism for state sanctioned violence in Canada was the residential school system, legislated from 1874 to 1996 (Truth and Reconciliation Commission of Canada, 2015). Over 150,000 Indigenous children as young as three years old were forcibly removed from their homes and placed in residential schools throughout Canada as part of a church/state political partnership (Milloy, 1999). These schools were sites of rampant physical, emotional, spiritual, cultural and sexual abuse, with an explicit purpose of "killing the Indian in the child" (Chansonneuve, 2005). The Indian Residential Schools Settlement Agreement, the largest class-action lawsuit in Canadian history was implemented in 2007. It was followed by an official apology from the Canadian government in 2008 (Government of Canada, 2008). Another key element of the agreement was establishment of the Truth and Reconciliation Commission of Canada (TRC). Between 2007–2015, the TRC heard from 6500 survivors and witnesses who revealed horrific details of traumatic removals from their families, institutionalized child labor, maltreatment and neglect, sexual violence, erasure of cultural identity and language, starvation, forced arranged marriages, and death. The TRC concluded that the establishment of residential schools was a central element of Canada's assimilationist policy, best described as "cultural genocide" (Truth and Reconciliation Commission of Canada, 2015). In 2015, the final report compelled the Canadian government and institutions to respond to the commission's 94 "Calls to action", a framework for healing and reconciliation between non-Indigenous and Indigenous peoples in Canada (Truth and Reconciliation Commission of Canada, 2015).

The first five calls to action address the separation of Indigenous children from their families. As the residential school system was dismantled, it morphed into the wide-scale apprehension of Indigenous children through the child 'welfare' system (Blackstock, 2007). Amendments to Section 88 of *the Indian Act* in 1951 shifted responsibility for child welfare to the provinces. Federal funding was provided per capita, effectively incentivizing the removal of Indigenous children, with no funding for prevention to keep families intact (Fournier and Crey, 1997). As a result, thousands of Indigenous children continued to be removed from their families and placed in foster or adoptive homes across Canada and internationally during the 'Sixties Scoop'. By the end of the 1960s, 30–40% of all legal wards of the Canadian state were Indigenous children, even though they comprised less than 4% of the population (Fournier and Crey, 1997). Currently, the child 'welfare' system continues to remove Indigenous children from their families, disconnecting them from their communities and cultures in what is known as the 'millennial scoop' - an amendment to the 'Sixties Scoop' (Government of Canada, 2008; (2019). In 2011, Indigenous children represented 7% of all children in Canada, and yet accounted for almost half (48%) of all foster children in the country (Statistics Canada 2016). As of May 2016, more than 60% of all children in 'care' of the BC government were Indigenous, even though they comprised only 8% of the total population of children and youth ages 0 to 18 years (Special Advisor on Indigenous Children in Care, 2016). A recent report from the BC Representative for Children and Youth noted that between 2011 and 2014, 145 incidents of sexualized violence were reported among 121 children and youth in care – 61% of those victimized were Indigenous girls (Turpel-Lafond, 2016). Mi'kmaq lawyer, scholar and activist Dr. Pam Palmater has explained how Indigenous girls in foster care become targets for sexual predators as, "child welfare is also a pipeline to child exploitation, sex trafficking and murdered and missing Indigenous women and girls" (Palmater, 2017).

Previous Cedar Project findings have demonstrated the alarming links between child welfare, lifetime sexual abuse and survival sex work (Clarkson et al., 2015; Mehrabadi et al., 2008). In addition, young women involved in sex work in the Cedar Project were four times more likely to transition from non-injection to injection drug use (Miller et al., 2011b). However, most epidemiological evidence focuses on individual behaviours pertaining to drug use and sexual risk among women in survival sex work residing in large urban centres such as Vancouver's Downtown Eastside (DTES). For example, survival sex work is associated with polysubstance use, higher HIV prevalence and hepatitis C (HCV) infection (Chettiar, Shannon, Wood, Zhang, and Kerr, 2010; Miller et al., 2011a; Shannon et al., 2011). It is important to note however, that in many of these analyses, Indigenous status is often treated as a risk factor. This is problematic as it suggests that Indigenous identity is inherently 'risky', contributing to a pathologized image, rooted in colonial ideas around Indigenous bodies and ill-health (Kelm, 1998).

This deficit-based approach with a singular focus on individual

behavior devoid of colonial and structural contexts contributes to a violent and harmful mischaracterization of Indigenous women (Pooyak, 2009). Indigenous Elders remind us that their communities have complex systems of wellness rooted in the four components of human wholeness: mental, emotional, physical and spiritual (Marshall, Marshall, and Bartlett, 2015). Indigenous women's involvement in survival sex work must necessarily be looked at 'wholistically'. We must account for not just individual behavioral factors (often deemed "risk--behavior"), but also the cultural, historical, and structural factors influencing and impacting interpersonal behavior.

Survival sex work is a product of intersecting dominant systems of oppression including colonization, race, gender, and class (Culhane, 2003; (Hill Collins & Bilge, 2016). This study examines the impact of cultural connections, historical and ongoing colonial violence, physical and mental health, access to services and treatment, and substance use on survival sex work over time among Indigenous women who have used drugs in Vancouver and Prince George, BC. To our knowledge, this is the first longitudinal epidemiological study that looks at the confluence of these factors, while centering the experiences of Indigenous women in survival sex work.

Materials and methods

Study setting

The Cedar Project, initiated in 2003, is a prospective cohort study involving young Indigenous people who have used drugs in Vancouver and Prince George, BC. The study rationale is to provide an epidemiological evidence base requested by Indigenous leadership to lobby for resources on behalf of the young people in their communities who are at risk of HIV and HCV infection due to substance use. Vancouver is a large city in southern BC, on the traditional territory of the Coast Salish Peoples. Prince George is a mid-sized city in the northern interior of BC, on the traditional territory of Lheidli T'enneh First Nation. The rationale and study design of the Cedar Project study have been previously published in detail (Spittal et al., 2007). The eligibility criteria included self-identifying as a descendant of the Indigenous Peoples of North America (including First Nations, Métis, Inuit, and Status and Non-Status Indians), being between 14 and 30 years old at baseline, having smoked or injected illicit drugs (other than marijuana) in the month before enrollment and providing informed consent. Participants were recruited through health care providers, street outreach, and word of mouth. Follow-up interviews with participants were carried out every six months. Drug use was confirmed using saliva screens (ORAL-screen, Avitar Onsite Diagnostics). Venous blood samples were collected for HIV and HCV antibody tests at each visit. Each participant was given a $30 (CAD) stipend per visit. Interviewer-administered baseline and follow-up questionnaires asked participants about sociodemographic characteristics, cultural connections, historical and ongoing colonial violence, physical and mental health, access to services and treatment, substance use practices, and sexual risk behaviours. This analysis included data collected between 2007 - 2016, and was restricted to participants who completed the baseline questionnaire and at least one follow-up questionnaire over the study period to allow for longitudinal analysis.

Ethical considerations

Indigenous collaborators and investigators, collectively known as the Cedar Project Partnership governed the entire research process and were involved in the conception, design, and interpretation of this study and approved this manuscript for publication. This study follows the guidelines in the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans – Chapter 9 Research Involving the First Nations, Inuit and Métis Peoples of Canada (Canadian Institutes of Health Research, 2010). The University of British Columbia/Providence Health Care Research Ethics Board also approved the study. All participants provided their informed consent.

Outcome and variables of interest

Outcome Variable: The primary outcome in this study was involvement in survival sex work in the past six months (no/yes) over the study period. Survival sex work was defined as having received money, shelter, food, or drugs or alcohol in exchange for sex. Participants were asked, "Have you been paid or exchanged anything for sex in the last six months?"

Study Variables: We examined time-invariant variables measured at baseline. In addition, time-varying variables of interest (experiences in the past six months prior to the interview) were measured at each follow-up. In this study, variables of interest were collected and organized into the following seven thematic clusters:

Sociodemographic characteristics: Time-invariant variables included location (Prince George/Vancouver); education level (high school graduate or more/ less than high school); and sexual identity (straight/ two-spirit). Two-spirit includes diversely-identified groups of Indigenous gay, lesbian, bisexual, transgender, transsexual, queer questioning and two-spirit people (Hunt, 2016). Time-varying variables included: age; relationship status (in a relationship/single); incarcerated overnight or longer (no/yes); and slept on the streets for more than three nights in a row (no/yes).

Cultural connection: Time-invariant variables included frequency that family lived by traditional culture (never-rarely/often-always); and family spoke traditional languages when growing up at home (never-rarely/often-always). Time-varying variables included participating in traditional ceremonies (never-rarely/often-always); knowing how to speak traditional language (no/a bit/yes); and frequency of speaking traditional language (never-rarely/often-always). Frequency of living by traditional culture (never-rarely/often-always) was defined as living according to values inherent to customary Indigenous ways of life and taught by Elders, including humility, honesty, love, respect, loyalty, remembering where you are from, and putting family first (Pearce et al., 2015). All cultural connection variables were defined by Indigenous Elders Violet Bozoki (Lheidli T'enneh) and Earl Henderson (Cree/Métis) who are traditional knowledge keepers and members of the Cedar Project Partnership (Pearce et al., 2015).

Historical and ongoing colonial violence: Time-invariant variables included having at least one parent who attended residential school (no/yes/unsure); removed from biological parents (no/yes); and having experienced sexual abuse in childhood (no/yes), defined as having experienced any type of forced sex or molestation prior to 16 years of age. Time-varying variables included having their children apprehended by child welfare (no/yes); experiencing physical violence (no/yes); and being sexually assaulted (no/yes), defined as having experienced sexual violence in the past six months.

Physical and mental health: Time-varying variables included HIV and HCV serostatus; suicide attempt (no/yes); and suicide ideation (no/yes).

Access to services and treatment: Time-varying variables included being denied access to any services (no/yes); being denied access to shelter (no/yes); trying to access drug or alcohol treatment but unable to (no/yes); being in any kind of alcohol or drug treatment (no/yes); and seeing a counsellor (no/yes).

Substance use: Time-varying variables included using crack daily (no/yes); using cocaine daily (no/yes); overdose (no/yes); blacking out from alcohol use (no/yes); and injection drug use (no/yes).

Injection drug use: Participants who reported recent injection drug use were asked about daily use of injection drugs including opioids, cocaine, and crystal meth (no/yes); injecting with used rigs (no/yes); lending used rigs to someone else (no/yes); finding it hard to get new rigs (no/yes); needing help injecting (no/yes); and binge injection drug use (no/yes), defined as periods when drugs were injected more often than usual.

Study variables had missing data, ranging from 0.0% to 6.8% and

sensitivity analyses confirmed results were not impacted by excluded individuals.

Analysis

A descriptive analysis was performed for the study population. Contingency tables were used to compare baseline time-invariant sociodemographic, cultural connection and historical and ongoing colonial violence variables for Indigenous women in survival sex work compared to those not in survival sex work (Table 1). Pearson's chi-square and Fisher's exact test were used to assess the association between categorical variables. Kruskal Wallis test was used to assess differences between the medians of continuous variables (Hollander, Wolfe, and Chicken, 2013).

Given the large number of variables examined and the increased likelihood of observing correlations among them, they were partitioned into seven clusters as described above. A generalized linear mixed-effects modeling approach with a random intercept for participants and an unstructured covariance was used to identify factors associated with survival sex work involvement over the study period. The mixed-effects models used available data from all follow-up time points and accommodated missing data under the missing at random assumption. Several assumptions were evaluated to ensure that model outcomes were reliable. Multicollinearity was assessed using the variance inflation factor (VIF) metric to ensure that two or more explanatory variables included in a multiple logistic regression model were not highly correlated. No model term was found to have a VIF of more than 1.5 in any of the fitted models. Diagnostic plots as well as model validation tests were obtained using the DHARMa package (Hartig, 2020), to assess the distribution of predicted values, the presence of outliers, as well as residual dispersion and zero inflation. Variables within each cluster were examined at an unadjusted level. The multivariable cluster models were selected via comparison of nested models based on the parametric bootstrap likelihood-ratio test (BLRT) as implemented in the 'mixed' function of the 'afex' package in R (Singmann, Bolker, Westfall, Aust, and Ben-Shachar, 2020). A similar procedure was performed to select the final inter-cluster model (Table 3) from those variables selected in the multivariable cluster models. Potential interactions were investigated and ruled out (data not shown).

Unadjusted (URR) and adjusted relative risks (ARR) with corresponding 95% confidence intervals (CI) and p-values are reported for each effect of interest. The odds ratios and corresponding confidence intervals from mixed effects regression models were transformed into relative risks (and their corresponding confidence intervals) using the method of Zhang et al.(1998) as implemented in the 'sjstats' package (Lüdecke, 2020) in R. The reported p-values for RR estimates were calculated directly from their confidence intervals (Altman and Bland, 2011). R statistical software (R Core Team, 2016) with the 'lme4' package (Bates, Mächler, Bolker, and Walker, 2015) was used for fitting the mixed-effects regression models. Results were interpreted through the lens of intersectionality and critical race theory, acknowledging the role of power and the women's multiple intersecting identities (Crenshaw, 1991).

Follow-Up

Participants had a median number of 7 follow-up study visits (IQR: 3–12). The loss-to-follow-up rate was 28% over the study period. Non-inclusion bias was investigated through Chi-square comparisons on several background variables. No significant differences were found, with the exception of location. Participants in Vancouver were less likely to be included in the analysis than those in Prince George (OR: 0.34; $p = <0.001$).

Table 1
Baseline descriptive statistics for participants in recent survival sex compared to those not in survival sex work ($n = 289$).

Variables	All participants n	%	In Survival sex work n	%	Not in Survival sex work n	%	*p*-value
	289	100	158	54.7%	131	45.3%	
Sociodemographic characteristics							
Median age, IQR	23.15 [19.8–26.2]		23.2 [20.4–25.9]		22.6 [19.1–27.0]		0.202
Median age at initiation into survival sex work, IQR			16.0 [14.0–19.0]				
Location							
Prince George	160	55.4%	87	54.4%	73	45.6%	1.000
Vancouver	129	44.6%	71	55.0%	58	45.0%	
Education level							
High school or more	45	15.6%	20	44.4%	25	55.6%	0.176
Less than high school	238	82.4%	135	56.7%	103	43.3%	
Sexual Identity							
Straight	242	83.7%	123	50.8%	119	49.2%	0.005
Two-spirit	47	16.3%	35	74.5%	12	25.5%	
Cultural Connection							
Family lived by traditional culture							
Never/Rarely	132	45.7%	76	57.6%	56	42.4%	0.071
Always/Often	99	34.3%	43	43.4%	56	56.6%	
Family spoke traditional language at home							
Never/Rarely	151	52.3%	82	54.3%	69	45.7%	0.702
Always/Often	106	36.7%	57	53.8%	49	46.2%	
Historical and ongoing colonial violence							
Parent(s) attended residential school							
No	83	28.7%	42	50.6%	41	49.4%	0.582
Unsure	66	22.8%	39	59.1%	27	40.9%	
Yes	138	47.8%	76	55.1%	62	44.9%	
Ever removed from biological parents							
No	81	28.0%	46	56.8%	35	43.2%	0.749
Yes	208	72.0%	112	53.9%	96	46.1%	
Median age at removal, IQR	5.0 [2.0–8.0]		4.0 [2.0–8.0]		5.0 [1.0 – 9.0]		0.090
Childhood sexual abuse							
No	109	37.7%	52	47.7%	57	52.3%	0.061
Yes	172	59.5%	103	59.9%	69	40.1%	
Median age at first abuse, IQR	6.5 [5.0 – 10.0]		7.0 [5.0–10.0]		6.0 [4.0–9.0]		0.040

*N may not add up to 289 due to missing values.

Results

A total of 292 female participants completed baseline and at least one follow-up questionnaire between 2007 and 2016, and were included in this analysis. Baseline data on survival sex work involvement was available for 289 (99.0%) participants and is presented in Table 1. The median age of participants at baseline was 23 years old. Among them, 55% reported being involved in survival sex work in the past 6 months. The median age participants first started living on their own was 15 years old and the median age of initiation in survival sex work was 16 years old. Thirty-four percent of women reported that their family always or often lived by traditional culture and 37% reported their family spoke a traditional language at home while they were growing up. A vast majority of women, 84% identified as straight, and 55% enrolled in Prince George. Forty-eight percent of women had a parent who attended residential school, and an overwhelming 72% were removed from their biological parents. The median age at removal was 5.0 years old. Almost 60% had experienced childhood sexual abuse, with a median age of 6.5 years at first abuse.

In unadjusted bivariate analyses (Table 2), the sociodemographic characteristics cluster revealed that women located in Vancouver, who identified as two-spirit, were single, and had recently slept on the streets more than three nights in a row were more likely to be involved in survival sex work. None of the variables in the cultural connection cluster reached statistical significance at the 5% level. In the historical and ongoing colonial violence cluster, women who had recently experienced physical violence and sexual assault were more likely to be involved in survival sex work. In the physical and mental health cluster, living with HCV and having recently thought about suicide were associated with involvement in survival sex work. Being denied access to shelter and trying to access drug and alcohol treatment but being unable were also associated with increased likelihood of being involved in survival sex work in the access to treatment and services cluster. However, women who recently saw a counselor were less likely to be in survival sex work. Using crack and/or cocaine daily, recent overdose, blacking out from alcohol use, and using injection drugs were all associated with increased likelihood of involvement in survival sex work in the substance use cluster. Among those who used injection drugs, daily cocaine injection and injecting with a used rig were associated with involvement in survival sex work.

Cluster-specific multivariable models adjusted for age and location are presented in Table 2. Women located in Vancouver, who identified as two-spirit, were single, and had recently slept outside more than three nights in a row remained more likely to be involved in survival sex work in the socio-demographic cluster. Within the historical and ongoing colonial trauma cluster, women who experienced recent physical assault and recent sexual assault remained more likely to be involved in survival sex work. Being HCV antibody positive and having suicide ideation remained significant with increased likelihood of involvement in survival sex work in the physical and mental health cluster. Being denied access to shelter, trying to access drug and alcohol treatment but unable, and seeing a counselor remained significantly associated with survival sex work in the access to services and treatment cluster. Women who reported daily crack use, blacking out from alcohol use and using injection drugs remained more likely to be involved in survival sex work within the substance use cluster. Finally, among participants who reported recent injection drug use, injecting cocaine daily or more and injecting with a used rig remained significantly associated with survival sex work.

In the final inter-cluster multivariable model, identifying as two-spirit, being single, experiencing recent sexual assault, being denied access to shelter, trying to access drug and alcohol treatment but unable, using crack daily, and injection drug use remained independently associated with recent survival sex work involvement after adjusting for age and location (Table 3). Blacking out from alcohol use was marginally significantly associated with survival sex work after adjusting for other variables.

Discussion

This study confirms what Indigenous leaders and youth already know – young Indigenous women who have used drugs in BC are involved in survival sex work in alarming proportions (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019; (Martin and Walia, 2019). More than 50% of participants in this study were involved in survival sex work, with a median age of 16 years at initiation. Young Indigenous women's involvement in survival sex work is profoundly linked with historical and ongoing colonial violence rooted in forced separation from families, communities, and traditional territories. Indigenous young people in what is now called Canada insist, "We are not at risk. Colonization creates risk. The system creates the risk" (Hunt, 2017). In this study, 55% of women involved in survival sex work had parents who survived residential schools, 54% were removed from their biological parents by the state, and 60% had survived childhood sexual abuse. These findings are consistent with previous Cedar Project research revealing that at baseline, survival sex work was associated with sexual abuse (Mehrabadi et al., 2008; Pearce et al., 2008). In addition, participants who were taken into the child welfare system were more likely to have sexual abuse histories and have ever been paid for sex (Clarkson et al., 2015). In the present study, substance use and related harms, particularly using crack and injection drugs, were highly correlated with survival sex work. Taken together these findings affirm that structural violence, survival sex work and polysubstance use operate within a reinforcing cycle (Bourgeois, 2014; Duff et al., 2013). Among Indigenous women involved in survival sex work, substance use may be a way to cope with unresolved grief and loss rooted in ongoing colonial violence, and intergenerational impacts of residential schools and childhood sexual abuse (Walters and Simoni, 2002).

Indigenous peoples have long stated that connections to culture and language are the foundation of wellness and the key to breaking cycles of colonial trauma (2018). More than a third of all women in this study reported their family lived by traditional culture or spoke a traditional language. Despite not retaining significance in adjusted models, this finding merits attention. Previous Cedar Project findings have affirmed that culture and language are buffers that support resilience (Pearce et al., 2015). A growing body of literature has demonstrated the importance of culture as intervention in overall wellness and increased resilience (Gone, 2013; Howell, Auger, Gomes, Brown, and Young Leon, 2016). Indigenous women involved in survival sex work in BC have been clear that more culturally based services, including a focus on traditional languages and arts, talking circles, and connection with Elders are urgently needed (Benoit, Carroll, and Chaudhry, 2003; (Ouspenski, 2014). The TRC Calls to Action 13–15 demand the preservation and promotion of Indigenous languages as a key part of healing and Indigenous self-determination. The Canadian government must fund Indigenous language revitalization and preservation initiatives that support Indigenous wellness through cultural connections (Truth and Reconciliation Commission of Canada, 2015).

Women who identified as two-spirit were over two times more likely to be involved in survival sex work. Two-spirit people's health must be understood within the intersections of colonialism, racism, homophobia, and transphobia (Hunt, 2016). Indigenous women's and two-spirit people's role as decision makers and holders of traditional knowledge, and their role in matriarchal governance was disrupted through colonization and a violent enforcement of the gender binary. Today, two-spirit people continue to experience violence as a direct consequence of this disruption and the resultant internalized homophobia and transphobia (2017). In a Vancouver-based qualitative study, one-third of two-spirit respondents said they were forced out of their communities because of their sexual or gender identity (Ristock, Zoccole, & Potskin, 2011). Two-spirit women were five times more likely to be violently victimized as compared to heterosexual Indigenous women (National

Table 2
Unadjusted and adjusted relative risks of factors associated with survival sex among women.

Variable	Parameter	Unadjusted			Multivariable*		
		RR	95%CI	P-value	RR	95%CI	P-value
Sociodemographic characteristics							
Age		1.03	[0.98;1.09]	0.283	1.01	[0.95;1.06]	0.797
Location	Prince George	Ref			Ref		
	Vancouver	1.60	[1.08;2.18]	0.009	1.54	[1.03;2.11]	0.018
Education level	High school or more	Ref					
	Less than high school	1.44	[0.75;2.32]	0.207			
Sexual identity	Straight	Ref			Ref		
	Two-spirit	2.68	[1.89;3.32]	<0.001	2.63	[1.85;3.27]	<0.001
Relationship status (recent)	In a relationship	Ref			Ref		
	Single	1.92	[1.55;2.31]	<0.001	1.87	[1.51;2.26]	<0.001
Incarcerated overnight or longer (recent)	No	Ref					
	Yes	0.88	[0.64;1.17]	0.386			
Slept on the streets or more than three nights (recent)	No	Ref			Ref		
	Yes	1.86	[1.51;2.21]	<0.001	1.81	[1.47;2.17]	<0.001
Cultural connection							
Family lived by traditional culture	Never/Rarely	Ref					
	Always/Often	0.84	[0.57;1.19]	0.346			
Family spoke traditional language at home	Never/Rarely	Ref					
	Always/Often	0.79	[0.52;1.15]	0.239			
Participating in traditional ceremonies (recent)	No	Ref					
	Yes	1.00	[0.71;1.36]	0.981			
Knowing how to speak traditional language (recent)	No	Ref					
	A bit	0.94	[0.66;1.30]	0.734			
	Yes	0.75	[0.35;1.43]	0.422			
Frequency of speaking traditional language (recent)	Never/Rarely	Ref					
	Always/Often	0.82	[0.38;1.55]	0.574			
Historical and ongoing colonial violence							
Parent(s) attended residential school	No	Ref					
	Unsure	1.14	[0.57;1.92]	0.679			
	Yes	1.18	[0.67;1.85]	0.519			
Ever removed from biological parents	No	Ref					
	Yes	1.04	[0.61;1.61]	0.878			
Childhood sexual abuse	No	Ref					
	Yes	1.26	[0.77;1.89]	0.321			
Children apprehended	No	Ref					
	Yes	1.10	[0.66;1.66]	0.697			
Physical violence (recent)	No	Ref			Ref		
	Yes	1.52	[1.22;1.86]	<0.001	1.42	[1.12;1.75]	0.002
Sexual assault (recent)	No	Ref			Ref		
	Yes	2.36	[1.78;2.88]	<0.001	2.22	[1.62;2.77]	<0.001
Physical and mental health							
HIV+	No	Ref					
	Yes	1.21	[0.71;1.85]	0.428			
HCV+	No	Ref			Ref		
	Yes	1.64	[1.12;2.24]	0.005	1.65	[1.13;2.26]	0.005
Suicide attempt (recent)	No	Ref					
	Yes	1.43	[0.94;2.00]	0.061			
Suicide ideation (recent)	No	Ref			Ref		
	Yes	1.40	[1.04;1.79]	0.017	1.46	[1.09;1.87]	0.006
Access to services and treatment							
Denied access to any services (recent)	No	Ref					
	Yes	1.10	[0.73;1.58]	0.601			
Denied access to shelter (recent)	No	Ref			Ref		
	Yes	1.94	[1.50;2.39]	<0.001	1.91	[1.46;2.36]	<0.001
Tried to access alcohol & drug treatment but unable to (recent)	No	Ref			Ref		
	Yes	1.68	[1.31;2.08]	<0.001	1.69	[1.30;2.09]	<0.001
Been in any alcohol or drug treatment (recent)	No	Ref					
	Yes	1.02	[0.82;1.24]	0.874			
Saw a counsellor (recent)	No	Ref			Ref		
	Yes	0.75	[0.58;0.94]	0.017	0.72	[0.56;0.92]	0.009
Substance use							
Using crack daily (recent)	No	Ref			Ref		
	Yes	3.12	[2.70;3.51]	<0.001	2.98	[2.54;3.39]	<0.001
Using cocaine daily (recent)	No	Ref					
	Yes	1.74	[0.97;2.53]	0.025			
Overdosed (recent)	No	Ref			Ref		
	Yes	1.72	[1.18;2.28]	0.001	1.45	[0.93;2.05]	0.063
Blackout from alcohol use (recent)	No	Ref			Ref		
	Yes	1.53	[1.20;1.88]	<0.001	1.53	[1.18;1.90]	<0.001
Injection drug use (recent)	No	Ref			Ref		
	Yes	2.71	[2.25;3.16]	<0.001	2.51	[2.02;2.99]	<0.001
Injection drug use							
Daily injection of opioids (recent)	No	Ref					

(*continued on next page*)

Table 2 (*continued*)

Variable	Parameter	Unadjusted RR	Unadjusted 95%CI	Unadjusted P-value	Multivariable* RR	Multivariable* 95%CI	Multivariable* P-value
	Yes	1.17	[0.90;1.44]	0.186			
Daily injection of cocaine (recent)	No	Ref			Ref		
	Yes	1.67	[1.25;2.00]	<0.001	1.64	[1.21;1.98]	<0.001
Daily injection of crystal meth (recent)	No	Ref					
	Yes	0.86	[0.58;1.19]	0.425			
Injected with used rig (recent)	No	Ref			Ref		
	Yes	1.53	[1.07;1.91]	0.004	1.52	[1.05;1.90]	0.006
Lent used rig to someone else (recent)	No	Ref					
	Yes	1.40	[0.90;1.84]	0.065			
Finding it hard to get new rigs (recent)	No	Ref					
	Yes	1.23	[0.88;1.59]	0.165			
Needed help to inject (recent)	No	Ref					
	Yes	1.12	[0.84;1.42]	0.392			
Binge injection drug use (recent)	No	Ref					
	Yes	1.16	[0.86;1.46]	0.286			

Note: RR = relative risk; CI = confidence interval; "recent" = previous six months; * = Cluster specific multivariable models obtained via comparison of nested models using the bootstrap likelihood ratio test (BLRT). All cluster models were adjusted for both age and location.

Table 3
Inter-cluster multivariable model of factors associated with survival sex work.

Variable	Parameter	RR	CI.95	P-value
Age		0.96	[0.91;1.02]	0.204
Location	Prince George	Ref		
	Vancouver	1.22	[0.76;1.80]	0.368
Sexual identity	Straight	Ref		
	Two-spirit	2.16	[1.36;2.91]	<0.001
Relationship status (recent)	In a relationship	Ref		
	Single	1.91	[1.50;2.35]	<0.001
Sexual assault (recent)	No	Ref		
	Yes	1.90	[1.22;2.58]	0.001
Denied access to shelter (recent)	No	Ref		
	Yes	1.71	[1.18;2.28]	0.001
Tried to access alcohol & drug treatment but unable (recent)	No	Ref		
	Yes	1.58	[1.15;2.05]	0.002
Used crack daily (recent)	No	Ref		
	Yes	2.85	[2.36;3.31]	<0.001
Used injection drugs (recent)	No	Ref		
	Yes	2.52	[1.98;3.07]	<0.001
Blackout from alcohol use (recent)	No	Ref		
	Yes	1.31	[0.96;1.71]	0.071

Inquiry into Missing and Murdered Indigenous Women and Girls, 2019). According to the McCreary Centre Society https://www.mcs.bc.ca/, in BC, 34% of two-spirit youth had considered suicide and 30% had attempted suicide in the past year (McCrearySociety, 2016). Two-spirit youth are over-represented among Indigenous street-involved and homeless youth in Vancouver, and are more likely to report sexual exploitation than street-involved heterosexual Indigenous youth (Saewyc et al., 2008). Safety concerns are magnified for two-spirit women as they face greater barriers and discrimination when accessing sexual health, housing, counselling or victim services (Martin and Walia, 2019). Rights-based, Indigenous-governed programs and services that reflect and support two-spirit identities and agency, while accounting for individual and collective experiences of trauma must move away from heteropatriarchal and cisnormative models of care (Hunt, 2013; JJ, 2013).

In the current study, women who had recently experienced sexual violence were almost twice as likely to be involved in survival sex work. Indigenous women in Canada face unacceptable levels of, racialized and gendered violence. These realities are evidenced in both Cedar study sites, where the murders and disappearances of Indigenous women in sex work have been well documented. Since the early 1970s, over 30 women have been abducted and disappeared near Prince George along Highway 16 – now known as the "Highway of Tears". Between 1990 and 2001 in Vancouver, serial killer Robert Pickton abducted and murdered between 30 and 49 women involved in survival sex work from the Vancouver Downtown Eastside, many of whom were Indigenous (Oppal, 2012). In 2004, a provincial judge in Prince George, David Ramsey was convicted of pedophilia and sexually assaulting at least four young Indigenous girls involved in survival sex work (Pan et al., 2013). These examples and others elsewhere in Canada demonstrate how Indigenous women's bodies are constructed as violable not just by the predators themselves, but also violated and dehumanized within the criminal justice system. Even following their deaths, Indigenous women involved in sex work in Canada have faced further racialized and sexist dehumanization within Canadian courtrooms, in which their deaths have been framed as a "natural by-product" of being both involved in sex work and an Indigenous woman (Benoit, Jansson, Smith, and Flagg, 2018; Fine, 2018; Razack, 2000, 2002).

In 2014, Statistics Canada estimated that incidence of sexual assault over the previous 12 months was 115 per 1000 Indigenous women compared with 35 per 1000 non-Indigenous women (Statistics Canada, 2015) Previous Cedar Project findings revealed that women in survival sex work who were offered more money to not use a condom were 7.3 times more likely to be sexually assaulted (Pearce et al., 2015). Criminalization and policing of clients may impact women's ability to screen or negotiate the terms of sexual transactions, and displace them to isolated areas, further increasing their risk for HIV and HCV (Krusi et al., 2014). Indigenous women often do not report sexual assaults given previous negative interactions, including lack of trust and fear of violence from the police, threat of child apprehension, or being charged with a criminal offense themselves (Martin and Walia, 2019). It is not surprising then that survival sex work and sexual assault are associated with an increased risk for psychological distress among women, as previously highlighted by the Cedar Project (Pearce et al., 2018).

TRC Call to Action 41 demanded the Canadian government establish a public inquiry into the disproportionate victimization of Indigenous women and girls (Truth and Reconciliation Commission of Canada, 2015). In 2019, the resulting National Inquiry into Missing and Murdered Indigenous Women and Girls concluded that the targeted violence towards Indigenous women, girls and two-spirit people amounts to a race-based genocide of Indigenous peoples, rooted in colonial violence racism and oppression (National Inquiry into Missing and Murdered Indigenous Women and Girls, 2019). The detrimental role of the criminal justice system and its attitudes and behaviours towards Indigenous women involved in survival sex work must be investigated in BC. Culturally-safe sexual assault services that provide wholistic wrap-around supports for survivors including social, legal and health services are urgently required in Vancouver and Prince George.

As young Indigenous women in survival sex work continue to face cycles of structural and interpersonal violence in the course of their work and daily lives, the opportunity to heal from intergenerational traumas can remain out of reach. Subsequent reliance on substance use continues to put young Indigenous women involved in survival sex work at risk of death. Recent Cedar Project findings have established that Indigenous women who use injection drugs are 15.8 times more likely to die compared to Canadians of the same age (Jongbloed et al., 2017). First Nations women are 8 times more likely to overdose and 5 times more likely to die from overdose than non-First Nations women in BC (2017). This demonstrates that while a focus on harm reduction services is absolutely necessary, it is insufficient as a singular response to breaking the reinforcing cycles of substance use, violence, survival sex work and death among young Indigenous women who have used drugs. The implications of inaction on the overdose epidemic are truly devastating for Indigenous women and require urgent response.

Access to addiction treatment and services is critical given that women who were unsuccessful in accessing drug and alcohol treatment were more than 1.5 times more likely to be involved in survival sex work in this study. Lack of culturally-safe health services and discrimination and racism are repeatedly noted as barriers to substance use treatment for Indigenous women in BC (Benoit et al., 2003, 2017). A previous Cedar Project study demonstrated that participants, especially women and those who use injection drugs, have reduced access to methadone maintenance treatment (Yang et al., 2011). Young women in survival sex work in Vancouver are less likely to access methadone maintenance therapy as compared to older women in sex work (Miller et al., 2011b). Fear of violence and policing displaces sex work to primarily industrial settings and side streets, pushing women further away from health and social supports (Shannon, Bright, Gibson, and Tyndall, 2007). Geographic isolation, ill-effects of substance use, coupled with paternalistic, judgemental and oppressive attitudes from social services mean that Indigenous women in survival sex work are not served well by existing supports (Ouspenski, 2014). The TRC Calls to Action 21 and 22 demand that the Canadian government provide sustainable funding for Indigenous healing centres to address physical, mental, emotional, and spiritual traumas. Indigenous people involved with substance use and survival sex work must have meaningful control in the development and governance of culturally-safe, wellness-based, wholistic treatment models that address struggles with addiction, and provide opportunities to heal (Jeal, Macleod, Salisbury, and Turner, 2017).

Women who were denied access to shelter were 1.7 times as likely to be involved in survival sex work, consistent with our previous findings demonstrating the relationship between housing insecurity and survival sex work (Jongbloed et al., 2015). Indigenous homelessness is not just about 'lack of housing', but instead reflects colonial disconnections between individuals, families and communities and their relationships to land, family culture and identity (Martin and Walia, 2019). For Indigenous women, homelessness is connected with safety and child welfare – where they have to make impossible decisions between staying in unsafe spaces, or becoming homeless and having their child apprehended (Martin and Walia, 2019). Indigenous two-spirit people have reported being denied access to shelters that are gender segregated (Ristock, Zoccole, & Potskin, 2011). Many shelters are abstinence-focused and penalize people who use substances by denial of entry (Krusi, Fast, Small, Wood, and Kerr, 2010). Enforcement of curfews and guest policies in low income housing or single-room occupancy (SRO) hotels can force women involved in survival sex work to accept riskier dates, limiting their ability to negotiate safety and condom use (Lazarus, Chettiar, Deering, Nabess, and Shannon, 2011). According to Statistics Canada, Indigenous people who have been violently victimized are 2.5 times more likely to have a history of homelessness, highlighting the relationship between homelessness and safety (Statistics Canada, 2015). Given the increased risk of violence and death, there is an urgent need for low-barrier safe family housing options for young Indigenous women who are involved in substance use and survival sex work.

Finally, women who reported being single were 1.9 times more likely to be involved in survival sex work as compared to those who were in a relationship. Single status may be another indicator for economic need as women who face tremendous financial barriers initiate or stay in survival sex work to support their families (Duff et al., 2015; McCarthy, Benoit, and Jansson, 2014). Experiencing multiple disadvantages accumulated throughout the life cycle rooted in systemic disinvestments and intergenerational poverty can exacerbate vulnerability to sexual exploitation and involvement in survival sex work (ONWA, 2016; Pooyak, 2009). The TRC Call to Action 55 demands that all levels of Canadian governments provide annual reports on the progress towards reconciliation including closing the gaps in educational and income attainments of Indigenous people and non-Indigenous people in Canada (Truth and Reconciliation Commission of Canada, 2015). It is imperative that the Canadian government systematically and purposefully invests in Indigenous women's educational and employment outcomes, so they are better able to support their families and communities.

Limitations

Several limitations should be acknowledged. Data are self-reported; therefore, it is possible that participants may under-report behaviours that may be painful to recall, illegal or stigmatizing. We have attempted to mediate this through repeated assurances of confidentiality and relationship building over 15 years between participants and research staff. In addition, we must be cautious in the interpretation of the results given the issue of temporality. We have not examined causality in this analysis, and it is therefore not possible to determine whether the associated factors have a causative or predictive effect (Mehrabadi et al., 2008). However, the relationships observed have been well supported in the literature as demonstrated. This analysis focused on determinants of sex work, and not on potential health outcomes associated with survival sex work involvement. These include experiences related to sexual and reproductive health and wellbeing. This study focused on young Indigenous women who use injection and non-injection drugs in Vancouver and Prince George, and generalizations cannot be made to Indigenous peoples generally or to the general population of people involved in sex work. Indigenous women worldwide have a diversity of experiences in relation to survival sex work within different colonial, legal, and societal contexts. Due to the focus on Indigenous women involved in substance use, some variables such as experiences of childhood sexual abuse and other historical variables may be more common when compared to experiences among Indigenous women who do not use drugs or non-Indigenous women involved in sex work. Despite these limitations, this study contributes to a wholistic understanding of the historical, structural and interpersonal factors associated with survival sex work involvement over time among young Indigenous women who have used drugs in BC.

Conclusion

Young Indigenous women involved in survival sex work in this study face alarming structural threats to their wellness from historical and ongoing colonial violence, forced removal of children from families, systemic racism, and a systematic disinvestment in their safety. This is unacceptable. Colonialism is not a historical event; it is an ongoing process in Canada. We have identified multiple specific TRC Calls to Action that must be implemented to interrupt the cycles of colonialism that contribute to survival sex work among Cedar Project participants. Despite the disruption of traditional ways of life, the story of Indigenous women remains one about strength, survival, and resistance. To our knowledge, this is the first epidemiological study that has exclusively focused on Indigenous women's experiences in survival sex work from a wholistic perspective. The women in this study have taught us that we must move beyond "at-risk" programs that continue to pathologize and focus on individual-level risk factors. Instead, we need a decolonized

approach that centers the voices and needs of Indigenous people involved in survival sex work (Hunt, 2013). Canada must confront the systemic devaluing of Indigenous women and two-spirit people rooted in colonial history. The normalization of a culture of violence against Indigenous women and two-spirit people, especially those involved in survival sex work must be disrupted. Anti-racist structural reforms that address housing insecurity, and economic violence are urgently needed. Young Indigenous women involved in survival sex work must have meaningful control in the development, implementation and evaluation of wellness-based, harm-reduction interventions critical in their healing journeys.

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Ethics approval and consent to participate

Indigenous collaborators and investigators, collectively known as the Cedar Project Partnership governed the entire research process and were involved in the conception, design, and interpretation of this study and approved this manuscript for publication. This study follows the guidelines in the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans – Chapter 9 Research Involving the First Nations, Inuit and Métis Peoples of Canada. The University of British Columbia/Providence Health Care Research Ethics Board also approved the study (#H15–03,318). All participants provided their informed consent.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to the possibility of compromising individual privacy, but are available from the corresponding author on reasonable request.

Authors' contribution

RS led the conceptualization of this study, conducted the data analysis and drafted this manuscript. DZ contributed to the statistical analysis. SP, PS and MS contributed to the conceptualization of the study, the data analysis plan and interpretation of the findings. KJ, AM, and MP provided feedback in the preparation of this manuscript. The Cedar Project Partnership oversees all research conducted with Cedar Project participants and were integral to all parts of this research study. All authors reviewed and approved the final manuscript.

Declaration of competing interest

The authors declare they have no competing interests.

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