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INCREASED BURDEN OF SUICIDALITY AMONG YOUNG STREET-INVOLVED SEX WORKERS WHO USE DRUGS IN VANCOUVER, CANADA

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ABSTRACT

Background: The risks of suicidality among street-involved youth who use drugs and engage in sex work is not well described. This study sought to evaluate if street-involved youth who engage in sex work were at an elevated risk for attempting suicide.

Methods: Data were derived from the At-Risk Youth Study, a prospective cohort of street-involved youth who use drugs in Vancouver, Canada. Multivariable generalized estimating equation analyses were employed to examine whether youth who engaged in sex work were at elevated risk of attempting suicide, controlling for possible confounders.

Results: Between September 2005 and May 2015, 1210 youth were recruited into the cohort, of whom, 173 (14.3%) reported recently attempting suicide at some point during the study period. In multivariable analysis, youth who engaged in sex work were significantly more likely to report a recent suicide attempt (adjusted odds ratio=1.93; 95% confidence interval: 1.28-2.91).

Conclusions: Street-involved youth who engage in sex work were observed to be at a significantly higher risk for suicidality. Systematic discrimination and unaddressed trauma may contribute to the observed increased burden of suicidality among this population. Interventions that support the mental health and well-being of street-involved youth who engage in sex work are urgently needed.

Word Count: 200

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INTRODUCTION

Youth are among the populations at greatest risk for suicide (1). The World Health Organization reported suicide as the second-leading cause of death among 15-29 year olds globally in 2017 (2). According to government data in Canada, suicide has been the second-leading cause of death for youth ages 15-24 consistently for the past ten years; with an age-specific mortality rate of approximately 10 per 100,000 population (3). However, these numbers are likely vast underestimates as they do not include suicides that take place on-reserve,[1] and given the legacy of colonization and intergenerational trauma (5, 6), Indigenous youth commit suicide at much higher rates than Canada's non-Indigenous youth population (7). Every year in Canada, hundreds of thousands of youth attempt to take their own lives (8), and a recent systematic review confirmed that prior suicide attempts were a risk factor for subsequent mortality (9). These findings suggest that suicidality is a pressing public health concern and an area of research that warrants further investigation.

It is estimated that 35-40,000 youth experience homelessness or street-involvement every year in Canada (10). "Street-involved youth" are defined as youth age 25 and under who are either precariously housed (e.g., homeless, couch-surfing, staying in a hotel) or use services for street youth (11, 12). Among street-involved youth, a number of

1 In Canada, an "Indian reserve" is designated land for Indigenous populations specified in the *Indian Act* as a "tract of land, the legal title to which is vested in Her Majesty, that has been set apart by Her Majesty for the use and benefit of a band"(4).

determinants of suicide attempts and completion have been established. These include: a history of childhood abuse and neglect, sexual minority status, depression, substance use, and victimization and violence (9, 13-16). While street-involved youth are known to engage in high-risk income generating activities (17), the risk of suicidality among youth who engage in sex work is not well described. The objective of the current analysis was to investigate whether street-involved youth who engaging in sex work were at an elevated risk of suicidality.

METHODS

Study design

Data for the present analyses were collected between September 2005 and May 2015 from the At-Risk Youth Study (ARYS). ARYS was established in 2005 as a community-recruited, ongoing open prospective cohort study of street-involved youth in Vancouver, Canada. Recruitment is undertaken using snowball sampling and extensive outreach efforts involving peer research associates who are formerly or currently street-involved youth. Youth are eligible if they: are between the ages of 14-26 at the time of enrolment; are "street-involved," defined as being absolutely or temporarily without stable housing or having used a service for street-involved youth in the past-six-months; report past-month illicit "hard" drug use (e.g., heroin, cocaine, crack, crystal methamphetamine); and provide written informed consent. At study enrolment and

semi-annual study visits thereafter, youth complete an interviewer-administered questionnaire that captures information on socio-demographics, income generating activities, and drug use patterns. To reduce attrition in the cohort, field office staff use several techniques to remind youth of their semi-annual study visit (e.g., social media, contact lists), and make regular rounds of services and areas where street-involved youth are known to frequent. At each study visit, youth are given a $30 CAN stipend for their time and research expertise. Further details of ARYS have been published elsewhere (15). The Providence Healthcare/University of British Columbia Research Ethics Board approved this study.

Variable selection

Our primary outcome of interest was the response to the question, "In the last six months, have you attempted suicide?" This question was administered by study nurses trained in differentiating intentional suicide attempts from accidental drug overdoses. Emergency mental health services were available for youth who reported active suicidal ideation, and social services were available for youth who were minors and reported ongoing abuse or neglect. Our primary independent variable of interest was past-six-month engagement in sex work, defined as exchanging sex for money, shelter, drugs, or other commodities (yes vs. no).

To adjust for variables that are known or hypothesized to be associated with suicidality (13, 14), we examined a wide range of potential confounders. These included:

age at baseline (per year older); gender (female vs. male); self-reported Indigenous ancestry (First Nations, Metis, Inuit, Aboriginal vs. other); sexual orientation (lesbian, gay, bisexual, two-spirit [originating from North American Indigenous cultures and commonly defined as embodying both masculine and feminine spirits simultaneously (18)] vs. heterosexual); high school incompletion (yes vs. no); past-six-month homelessness (yes vs. no); depression at baseline, as captured by the Center for Epidemiologic Studies Depression (CES-D) scale, a validated instrument for detecting depressive symptomology in youth (standardized cutoff of ≥22 vs. <22) (19); past-six-month injection drug use (yes vs. no); past-six-month daily alcohol use (yes vs. no); and childhood maltreatment, defined using the Childhood Trauma Questionnaire (20), a validated 25-item measure to detect various types of childhood neglect and abuse previously used among street-involved youth populations (severe/moderate vs. low/none) (13, 14). Recognizing that drug use and behavioural variables can change over time, we used time updated variables, which is the repeated measurement of participants' responses for the same set of variables collected at each study visit over the study period.

Statistical Analyses

We stratified descriptive characteristics (listed above) according to whether or not participants at their baseline study visit reported that they had attempted suicide in the last six months (presented in Table 1). Next, since a single participant could contribute

multiple follow-up visits, we used generalized estimating equation (GEE) for binary outcomes with logit link for the analysis of correlated data (21). Specifically, these methods provided standard errors adjusted by multiple observations per person using an exchangeable correlation structure (22), and therefore, data from every participant follow-up visit were considered in this analysis. Missing data were addressed through the GEE estimating mechanism. This mechanism uses the all available pairs method to encompass the missing data from dropouts or intermittent missing data. All non-missing pairs of data are used in the estimators of the working correlation parameters (23).

We first used GEE bivariable analysis to identify factors associated with recent suicide attempts. To fit a multivariable confounding model, we employed a conservative variable selection procedure, where all variables significant at $p < 0.10$ were considered in the full model. Using a stepwise approach, we fit a series of reduced models and compared the value of the coefficient associated with the main independent variable of interest (sex work) in the full model to the value of the coefficient in each of the reduced models, dropping the secondary variable associated with the smallest relative change. We continued this iterative process until the minimum change exceeded 5%. The remaining variables were considered confounders in multivariable analysis. We have previously used this technique successfully (24, 25). Lastly, in order to examine if the estimates differed for women and men, we also repeated the model using an interaction term for the primary explanatory variable and gender. All statistical analyses were

performed using SAS software version 9.4 (SAS, Cary, NC). All tests of significance ($p < 0.05$) were two-sided.

RESULTS

During the study period, we enrolled 1210 street-involved youth of whom 375 (31.0%) identified as female, 281 (23.2%) identified as being of Indigenous ancestry, and 207 (17.1%) identified as lesbian/gay/bisexual/two-spirit. Among the 205 (16.9%) youth who reported engaging in sex work at some point over the study period (n=135 at baseline, n=70 additional participants during follow-up), 101 (49.3%) identified as female and 104 (50.7%) identified as male. Among the 173 (14.3%) youth who reported attempting suicide over the study period (n=102 at baseline, n=71 additional participants during follow-up), 53 (30.6%) reported engaging in sex work. The median age of the sample at baseline was 21.7 years (interquartile range [IQR]: 19.8-23.5). The median number of study visits was 3 (IQR: 1 - 5), and the median follow-up time per participant was 24.4 months (IQR: 15.7–58.0), with an average annual loss to follow-up of 5.95%. Our sample of 1210 youth contributed to a total of 4919 study observations with 221 (4.5%) observations involving a report of attempted suicide in the last six months.

Table 1 presents the descriptive characteristics, bivariable and multivariable GEE analyses of factors independently associated with recent suicide attempts. In multivariable analysis, engagement in sex work was positively and significantly

associated with recent suicide attempts (AOR = 1.93, 95% CI: 1.28 - 2.91), after adjustment for potential confounders. When we repeated the model using the interaction term for engagement in sex work and gender, the results were not statistically different between males and females ($p = 0.271$).

DISCUSSION

Main findings of this study and what is already known on this topic

Our findings indicate that suicide attempts are common among street-involved youth in this setting and that youth who engage in sex work were significantly more likely to report suicidality. To date, epidemiological research investigating the relationship between sex work and suicide is limited, particularly among younger populations. This is concerning given that street-involved youth frequently engage in sex work to generate income. Prior studies have found that in samples of street-involved youth, between 10-76% were involved in sex work at some point in their lives (26-28). Walls et al. conducted two cross-sectional studies across numerous cities in the United States and observed that street-involved youth who reported engaging in sex work experienced an elevated risk for attempting suicide, particularly among sexual minority youth who engaged in sex work (28, 29). A prior qualitative study found that among street youth, suicidal ideation and attempts were common and that structural conditions

surrounding engagement in street-based sex work may be a contributing, or mediating factor, influencing vulnerability (e.g., physical and sexual violence) (30).

What this study adds

Indeed, systematic discrimination and unaddressed trauma are well documented features of the risk environment in which street-based sex workers operate (31). A significant body of research has established that the criminalization of sex work is directly linked to a number of health-related harms for street-based sex workers including increased risks for violence, HIV infection, barriers to health and social services, and stigma (32). While the selling of sex has always been legal in Canada, most other aspects of sex work are criminalized. As of December 2014, an end-demand criminalization model was adopted in Canada that now criminalizes the purchase of sex. The longstanding adversarial relationship between law enforcement and sex workers coupled with the criminalization of clients continues to displace street-based sex workers, jeopardizing their health and safety (e.g., ability to screen clients, negotiate condom use, access emergency services) (33). In addition to the current risk environment, the deeply entrenched societal and systemic stigma sex workers experience (e.g., apathy to violence) and disengagement from services and supports likely contributes to the elevated risk for suicidality observed in the present study. Our findings support mounting calls from researchers and global policy bodies (31) to decriminalize sex work but also highlight the

urgent need for improved access to sex worker-friendly mental health services tailored specifically for street-involved youth.

Limitations of this study

This study has several limitations. First, as with all community-recruited cohorts, the ARYS cohort is not a random sample and all participants report recent illicit "hard" drug use at recruitment. Therefore, results may not generalize to other populations of street youth. Additionally, data were collected using self-reported interviews and may be subject to response biases such as social desirability reporting and recall bias, resulting in underreporting of drug use and other stigmatized behaviours. However, interviewers were trained extensively to work with vulnerable populations, build strong rapport with youth over study visits and continually reassure confidentiality for criminal or sensitive disclosures. Further, previous research has shown self-reported risk and drug use behaviour to be largely accurate among youth populations (34). It should be noted that our study findings cannot assert temporality and suicide attempts may have preceded engagement in sex work. Additionally, drawing on data linkages with British Columbia Vital Statistics Agency, we were able to identify that two participants committed suicide over the study period. We do not expect that the loss to follow-up from these fatalities have significantly biased our results. Lastly, although the literature suggests that street-involved LGBT groups are not monolithic with respect to health and social vulnerabilities

(33-35), due to low even counts we were unable to differentiate the risk for suicidality among LGBT females and LGBT males. Future research in this area is warranted.

In summary, our findings demonstrate that street-involved youth who engage in sex work are at a greater risk for suicidality. Systematic discrimination and unaddressed trauma likely contribute to the observed increased burden of suicidality among this population. Immediate community partnered interventions that support the mental health and well-being of street-involved youth who engage in sex work are urgently needed, as well as the removal of criminal laws that continue to disengage sex workers from safely accessing mental health and support services.

Table 1: Baseline distributions, bivariable and multivariable GEE analyses of factors associated with sex work and recent suicide attempts[a] among street-involved youth who use drugs, controlling for confounding variables.

	Attempted Suicide[a]			Unadjusted Odds Ratio		Adjusted Odds Ratio	
Characteristic	**Total** *n* = 1210 *n* (%)	**Yes** *n* = 102, *n* (%)	**No** *n* = 1108, *n* (%)	**OR (95% CI)**	***p-value***	**AOR (95% CI)**	***p-value***
Sex work[a]	**135 (11.2)**	**23 (22.5)**	**112 (10.1)**	**2.81 (1.98 – 3.98)**	**<0.001**	**1.93 (1.28 – 2.91)**	**0.002**
No	**1075 (88.8)**	**79 (77.5)**	**996 (89.9)**				
Age (per year older)[e]	21.7	21.7	21.7	1.00 (0.94 – 1.06)	0.965		
Median (IQR)[b]	(19.8-23.5)	(20.1-23.6)	(19.8-23.5)				
Female sex	375 (31.0)	43 (42.2)	332 (30.0)	1.32 (0.94 – 1.84)	0.107		
Male sex	835 (69.0)	59 (57.8)	776 (70.0)				
Indigenous ancestry	281 (23.2)	24 (23.5)	257 (23.2)	0.84 (0.58 – 1.23)	0.368		
Non-Indigenous	926 (76.5)	78 (76.5)	848 (76.5)				
LGBT[c]	207 (17.1)	33 (32.4)	174 (15.7)	1.97 (1.39 – 2.79)	<0.001	1.63 (1.09 – 2.42)	0.016
Heterosexual	990 (81.8)	69 (67.6)	921 (83.1)				
High school incompletion	902 (74.5)	81 (79.4)	821 (74.1)	1.22 (0.81 – 1.83)	0.347		
High school diploma	290 (24.0)	20 (19.6)	270 (24.4)				
Homeless[a]	895 (74.0)	78 (76.5)	817 (73.7)	1.63 (1.27 – 2.10)	<0.001		
No	310 (25.6)	24 (23.5)	286 (25.8)				
Depression (≥22)[d]	674 (55.7)	75 (73.5)	599 (54.1)	3.35 (2.16 – 5.19)	<0.001	2.90 (1.86 – 4.52)	<0.001
No	431 (35.6)	9 (8.8)	422 (38.1)				
Injection drug use[a]	403 (33.3)	37 (36.3)	366 (33.0)	1.65 (1.23 – 2.19)	<0.001	1.29 (0.93 – 1.78)	0.128
No	805 (66.5)	64 (62.7)	741 (66.9)				
Daily alcohol use[a]	176 (14.5)	17 (16.7)	159 (14.4)	1.12 (0.74 – 1.69)	0.596		
No	1026 (84.8)	84 (82.4)	942 (85.0)				
Childhood maltreatment	119 (9.8)	74 (72.5)	708 (63.9)	1.87 (1.23 – 2.84)	0.003		
No	368 (30.4)	20 (19.6)	348 (31.4)				

[a] Denotes activity in the last six months; [b] IQR=interquartile range; [c] lesbian, gay, bisexual, two-spirit; [d] depression variable measured by Center for Epidemiological Studies Depression (CES-D) scale; [e] the frequencies for age are reported as median and IQR, while the odds ratio for age reflects per additional year

Authors' contributions

K.D., T.K., and B.B. designed the study. H.D. conducted the statistical analyses in consultation with B.B. and K.D. and provided ongoing assistance. B.B. and K.D. drafted the initial manuscript and K.S., S.H., and T.K. provided extensive critical feedback and subject area expertise. B.B. and K.D. incorporated feedback. All authors made significant contributions to the final manuscript submitted and approved this version for publication.

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