

Perceived Devaluation and STI Testing Uptake among a Cohort of Street-Involved Youth in a Canadian Setting

Mohammad Karamouzian^{1,2,3} · Jean Shoveller^{1,2} · Huiru Dong¹ · Mark Gilbert^{2,5} · Thomas Kerr^{1,4} · Kora DeBeck^{1,6}

Received: 2 September 2016 / Revised: 28 April 2017 / Accepted: 8 May 2017
© Springer Science+Business Media New York 2017

Abstract Perceived devaluation has been shown to have adverse effects on the mental and physical health outcomes of people who use drugs. However, the impact of perceived devaluation on sexually transmitted infections (STI) testing uptake among street-involved youth, who face multiple and intersecting stigmas due to their association with drug use and risky sexual practices, has not been fully characterized. Data were obtained between December 2013 and November 2014 from a cohort of street-involved youth who use illicit drugs aged 14–26 in Vancouver, British Columbia. Multivariable generalized estimating equations were constructed to assess the independent relationship between perceived devaluation and STI testing uptake. Among 300 street-involved youth, 87.0% reported a high perceived devaluation score at baseline. In the multivariable analysis, high perceived devaluation was negatively associated with

STI testing uptake after adjustment for potential confounders (Adjusted Odds Ratio = 0.38, 95% Confidence Interval 0.15–0.98). Perceived devaluation was high among street-involved youth in our sample and appears to have adverse effects on STI testing uptake. HIV prevention and care programs should be examined and improved to better meet the special needs of street-involved youth in non-stigmatizing ways.

Keywords Perceived devaluation · Stigma · Sexually transmitted infections · Homeless youth · Substance use · Sexual behavior

Introduction

In Canada, street-involved youth are a highly marginalized population who often experience reduced access to healthcare, and are more likely to become involved with the criminal justice system and exposed to food insecurity, homelessness, and unstable housing, as well as limited job and education opportunities (Tyler & Johnson, 2006; Worthington et al., 2008; Zivanovic et al., 2016). Studies have shown that up to 95% of street-involved youth have ever used illicit drugs, whereas over 40% have ever injected drugs (Barnaby, Penn, & Erickson, 2010; Kerr et al., 2009; Public Health Agency of Canada, 2006, 2007; Worthington et al., 2008). Compared to the general Canadian youth population, street-involved youth are also reportedly more likely to be sexually active, have multiple sex partners, experience sexual debut at an earlier age, report low rates of condom use, and engage in sex work (Kelly & Caputo, 2007; Marshall, 2008; Public Health Agency of Canada, 2006). These factors place street-involved young people at an elevated risk of acquiring sexually transmitted infections (STI). Indeed, prior research shows that the incidence of both chlamydia and gonorrhea among street-involved youth in Canada is ten times that of their

✉ Kora DeBeck
uhri-kd@cfenet.ubc.ca

¹ British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC V6Z 1Y6, Canada
² School of Population and Public Health, University of British Columbia, 2206 East Mall, Vancouver, BC V6T 1Z3, Canada
³ HIV/STI Surveillance Research Center, and WHO Collaborating Center for HIV Surveillance, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman 7616911320, Iran
⁴ Department of Medicine, University of British Columbia, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC V6Z 1Y6, Canada
⁵ Clinical Prevention Services, BC Centre for Disease Control, 655 West 12th Avenue, Vancouver, BC V5Z 4R4, Canada
⁶ School of Public Policy, Simon Fraser University, Suite 3271 – 515 West Hastings Street, Vancouver, BC V6B 5K3, Canada

peers (Public Health Agency of Canada, 2006). Furthermore, the prevalence of HIV among street-involved youth is three times that of the Canadian adult population (Public Health Agency of Canada, 2006).

Street-involved youth are often severely socially marginalized and experience multiple and intersecting stigmas (Kidd, 2003, 2007) (e.g., social labeling and stereotyping; social and physical separation from the general population; loss of social status; discrimination in a range of sectors, including educational and employment). Many young people are stigmatized through an association with illicit drug use (Ahern, Stuber, & Galea, 2007; Albizu et al., 2015; Kidd, 2007). Drug use is also often viewed as a demonized and stigmatized behavior across various international settings, and people hold negative opinions about people who use drugs (PWUD); they are frequently seen as weak, immoral, and dangerous (Ahern et al., 2007). Experiencing multiple forms of stigma at a critical juncture in youth's social development contributes to ongoing perceived devaluation and alienation whereby negative self-perceptions are internalized and reinforced over the life course (Ahern et al., 2007; Link, Struening, Rahav, Phelan, & Nuttbrock, 1997; Ritsher, Otilingam, & Grajales, 2003; Rivera, DeCuir, Crawford, & Fuller, 2015). Furthermore, PWUD experience discrimination in addition to the burdens of stigmatization which include a range of exclusions and unequal treatments attributed to drug use (Ahern et al., 2007; Krieger, 1999; Link et al., 1997). Perceived devaluation refers to 'beliefs that members of a stigmatized group have about the prevalence of stigmatizing attitudes and actions in society' and occurs when illicit drug users think that most people believe common negative stereotypes about drug users (Link et al., 1997; Luoma et al., 2007). These beliefs have been shown to have damaging influences on the mental and physical health of PWUD (Ahern et al., 2007; Link et al., 1997; Ritsher et al., 2003; Young, Stuber, Ahern, & Galea, 2005) and may persist even after drug use or street involvement is discontinued (Link et al., 1997).

Perceived devaluation may also create barriers to health seeking (Ahern et al., 2007; Albizu et al., 2015; Link et al., 1997; Reif, Golin, & Smith, 2005; Ritsher et al., 2003), and a growing body of literature has documented the association between perceived stigma and health outcomes among adults who use illicit drugs (e.g., heightened stress responses; participation in unhealthy behaviors; nonparticipation in healthy behaviors) (Ahern et al., 2007; Meyer, 2003; Pascoe & Smart Richman, 2009; Ritsher et al., 2003; Rivera et al., 2015). The adverse health outcomes associated with perceived stigma could vary across young men and women due to the existing gender inequalities that provide the social context for stigma and often operate through health-related gender differences (Risman, 2004, 2011). For example, gender relations influenced by a number of sociocultural norms and expectations influence female youth's sexual health prac-

tices and STI testing uptake (Oliffe et al., 2013). Nonetheless, we do not yet fully understand how perceived devaluation may affect STI testing uptake among street-involved youth who are likely to experience other forms of stigmas due to the use of illicit drug or risky sexual practices. Therefore, this study examines whether perceived devaluation is independently associated with reduced STI testing uptake among street-involved youth, and whether gender modifies the effect of perceived devaluation on STI testing uptake of street-involved youth. We hypothesized that (1) higher level of perceived devaluation is independently associated with reduced STI testing uptake among street-involved youth and (2) gender modifies the effect of perceived devaluation on youth's STI testing uptake.

Method

Participants

Data were obtained from the At-Risk Youth Study (ARYS), a prospective cohort study initiated in 2005 among street-involved youth in Vancouver, BC, Canada. Eligibility criteria include individuals aged 14–26, who have used illicit drugs other/in addition to marijuana in the last 30 days, provided informed consent, and were "street-involved" (i.e., being temporarily or absolutely without housing in the last 6 months, or having accessed street-based youth services during that period). Details of the study design and recruitment have been described elsewhere (Wood, Stoltz, Montaner, & Kerr, 2006). In brief, youth were recruited through snowball and outreach sampling approaches aiming to maximize the representativeness of the sample. Participants complete an interviewer-administered questionnaire and provide blood specimens for HIV and HCV serological tests at baseline and study follow-up. The questionnaire includes items on socio-demographics, substance use, sexual and drug-related risk behaviors, encounters with the criminal justice system, and healthcare utilization. Data used in the present analysis were obtained between December 2013 and November 2014 because measures of perceived stigma were only available during this wave of data collection. Participants who reported having been sexually active in the past 6 months were included in the analysis.

Measures

The primary outcome of interest in this study was a history of STI testing in the past 6 months. The primary outcome of interest was ascertained by examining responses to the following question: "Have you ever been tested for a sexually transmitted infection (STI) other than HIV in the last 6 months?"

Primary Exploratory Variable

The primary explanatory variable of interest in this study was a composite measure of one aspect of perceived stigma—perceived devaluation. Perceived devaluation was measured using three statements (i.e., most people think that someone who uses drugs is reliable; most people think that someone who uses drugs is a good person; and most people think that someone who uses drugs is not dangerous) on a 5-point Likert scale, 1 (strongly agree) to 5 (strongly disagree), with summed scores ranging from 3 to 15 and final scores were divided by 3 to reach a mean perceived devaluation score. High scores on the perceived devaluation scale suggest dissatisfaction with self-image, feelings of low self-esteem, and fear of falling short of aspirations and therefore, reflect greater perceptions of devaluation. Mean scores were then categorized into three levels: (1) low (mean score <3), (2) moderate (mean score = 3), and (3) high (mean score >3) (Ahern et al., 2007).

Secondary Exploratory Variables

Other secondary explanatory variables of interest, chosen based on their known or a priori hypothesized relationship with perceived devaluation and STI testing uptake, included age (<19 vs. ≥19), Indigenous ancestry (self-reported First Nations, Metis, Inuit, Aboriginal vs. other), gender (women vs. men), Lesbian/Gay/Bisexual/Transgender (LGBT) (yes vs. no), stable relationship (yes [Regular partner, marriage or common law] vs. no [single or non-regular partner or divorced]), and education (≥high school vs. <high school). Other individual-level factors examined included unprotected sex (yes vs. no), involvement in sex work (yes vs. no), sex with an HIV/STI-infected partner (yes vs. no), multiple sex partners (yes vs. no) and depression at baseline. The presence of depressive symptoms was evaluated based on The Center for Epidemiologic Studies Depression Scale (CES-D) using a clear cut-off (yes [score of ≥22] vs. no [score of <22]) (Radloff, 1977). Substance-related variables included injection drugs use (yes vs. no), non-injection binge drug use (yes [using non-injection drugs more than usual] vs. no), binge alcohol use (yes [drinking alcohol more than usual] vs. no), accessing drug/alcohol treatment (yes vs. no), daily crystal methamphetamine use (yes vs. no), daily cocaine use (yes vs. no), daily heroin use (yes vs. no), and daily crack use (yes vs. no). Lastly, structural-level variables examined included homelessness (yes vs. no), health service utilization (yes [Seen a doctor, nurse or other health professionals] vs. no), and sexual/physical violence (yes vs. no). All behavioral and structural variables pertained to the 6 months prior to the interview.

Data Analysis

We first examined participants' baseline characteristics stratified by STI testing in the past 6 months. Comparisons were made using

Pearson's chi-square test and the Fisher's exact test for contingency tables in which 25% or more of the expected cell frequencies were <5.

As the analyses of STI testing included serial measures for each participant, generalized estimating equations (GEE) with logit link function were used, which provided standard errors adjusted by multiple observations per person using an exchangeable working correlation structure. We first built bivariable GEE models to examine the association between STI testing and each explanatory variable. Because the objective of this analysis was to determine whether perceived devaluation, independent of established individual- and macro-level factors, was associated with STI testing, multivariable GEE models were fit using a conservative stepwise backward selection approach (Maldonado & Greenland, 1993). All variables that were associated with STI testing uptake in unadjusted analyses at p value of <.10 were included in a full multivariable model and a stepwise approach was used to fit a series of reduced models. After comparing the value of the coefficient of the perceived devaluation in each reduced model, the secondary variable associated with the smallest relative change were dropped until the minimum change exceeded 5% (Lee et al., 2015; Marshall et al., 2009; Milloy et al., 2013). Potential modifying effects of gender on the effect of perceived devaluation on STI testing practices was examined by introducing an interaction term to the final regression model. All statistical modeling were conducted using SAS software 9.4 (SAS, Cary, NC), and all reported p values are two-sided.

Results

During the study period, 360 youth completed the study questionnaire among whom 300 reported having been sexually active and were therefore included in the current analyses. Among the study sample, 85 (28.3%) were Indigenous, 109 (36.3%) were female, and 68 (22.7%) were LGBT with an overall mean (SD) age of 24.6 years (3.51) at baseline. The majority of the sample ($n = 261$, 87.0%) reported a high perceived devaluation score. Characteristics of the sample stratified by STI testing history are shown in Table 1.

The crude and adjusted longitudinal estimates of the odds ratio of STI testing being associated with perceived devaluation are shown in Table 2. In multivariable analyses, after adjusting for potential confounders including sexual and drug-related variables, high perceived devaluation was independently associated with lower odds of STI testing (Adjusted Odds Ratio [AOR] = 0.38, 95% Confidence Interval [CI] 0.15–0.98), while moderate perceived devaluation was not statistically significant (AOR = 0.28, 95% CI 0.07–1.16). In sub-analysis to check the model selection process, several variables were forced into the multivariable model (e.g., being in stable relationship, LGBT status, and depression) to reflect their hypothesized confounding effects; however, the main estimates remained unchanged (data not

Table 1 Sample characteristics stratified by STI testing uptake in the previous 6 months among street-involved youth in Vancouver, British Columbia

Characteristics	Total <i>n</i> = 300 (%)	STI test = Yes <i>n</i> = 88 (29.3%)	STI test = No <i>n</i> = 212 (70.7%)	<i>p</i> value
Perceived devaluation				
Low	19 (6.3)	8 (9.1)	11 (5.2)	.185 ^b
Moderate	20 (6.7)	3 (3.4)	17 (8.0)	
High	261 (87.0)	77 (87.5)	184 (86.8)	
Age (Years)				
<19	15 (5.0)	4 (4.5)	11 (5.2)	.816 ^b
≥19	285 (95.0)	84 (95.5)	201 (94.8)	
Aboriginal ancestry				
Yes	85 (28.3)	29 (33.0)	56 (26.4)	.252
No	215 (71.7)	59 (67.0)	156 (73.6)	
Gender				
Women	109 (36.3)	50 (56.8)	59 (27.8)	<.001
Men	191 (63.7)	38 (43.2)	153 (72.2)	
Education				
≥high school	93 (31.0)	25 (28.4)	68 (32.1)	.560
<high school	202 (67.3)	61 (69.3)	141 (66.5)	
LGBT ^a				
Yes	68 (22.7)	22 (25.0)	46 (21.7)	.575
No	229 (76.3)	66 (75.0)	163 (76.9)	
Stable relationship				
Yes	91 (30.3)	31 (35.2)	60 (28.3)	.245
No	208 (69.3)	57 (64.8)	151 (71.2)	
Depressive symptoms				
Yes	121 (40.3)	39 (44.3)	82 (38.7)	.300
No	151 (50.3)	40 (45.5)	111 (52.4)	
Unprotected sex ^c				
Yes	220 (73.3)	68 (77.3)	152 (71.7)	.274
No	78 (26.0)	19 (21.6)	59 (27.8)	
Involvement in sex work ^c				
Yes	38 (12.7)	18 (20.5)	20 (9.4)	.009
No	262 (87.3)	70 (79.5)	192 (90.6)	
Sex with an HIV/STI-infected partner ^c				
Yes	33 (11.0)	12 (13.6)	21 (9.9)	.347
No	267 (89.0)	76 (86.4)	191 (90.1)	
Multiple sex partners ^c				
Yes	144 (48.0)	49 (55.7)	95 (44.8)	.076
No	154 (51.3)	38 (43.2)	116 (54.7)	
Injection drug use ^c				
Yes	146 (48.7)	48 (54.5)	98 (46.2)	.189
No	154 (51.3)	40 (45.5)	114 (53.8)	
Non-Injection drugs binge use ^c				
Yes	114 (38.0)	36 (40.9)	78 (36.8)	.504
No	186 (62.0)	52 (59.1)	134 (63.2)	
Binged on alcohol ^c				
Yes	111 (37.0)	38 (43.2)	73 (34.4)	.244
No	180 (60.0)	50 (56.8)	130 (61.3)	
Accessed drug or alcohol treatment ^c				
Yes	150 (50.0)	57 (64.8)	93 (43.9)	<.001

Table 1 continued

Characteristics	Total <i>n</i> = 300 (%)	STI test = Yes <i>n</i> = 88 (29.3%)	STI test = No <i>n</i> = 212 (70.7%)	<i>p</i> value
No	150 (50.0)	31 (35.2)	119 (56.1)	
Daily meth use ^c				
Yes	74 (24.7)	22 (25.0)	52 (24.5)	.931
No	226 (75.3)	66 (75.0)	160 (75.5)	
Daily cocaine use ^c				
Yes	3 (1.0)	0 (0.0)	3 (1.4)	.558 ^b
No	297 (99.0)	88 (100.0)	209 (98.6)	
Daily heroin use ^c				
Yes	75 (25.0)	27 (30.7)	48 (22.6)	.143
No	225 (75.0)	61 (69.3)	164 (77.4)	
Daily crack use ^c				
Yes	15 (5.0)	6 (6.8)	9 (4.2)	.352
No	285 (95.0)	82 (93.2)	203 (95.8)	
Homelessness ^c				
Yes	141 (47.0)	40 (45.5)	101 (47.6)	.793
No	158 (52.7)	47 (53.4)	111 (52.4)	
Health services utilization ^c				
Yes	248 (82.7)	81 (92.0)	167 (78.8)	.006
No	52 (17.3)	7 (8.0)	45 (21.2)	
Sexual/physical violence ^c				
Yes	100 (33.3)	35 (39.8)	65 (30.7)	.141
No	198 (66.0)	53 (60.2)	145 (68.4)	

^a *LGBT* lesbian/gay/bisexual/transgender

^b *p* value is obtained from Fisher's exact test because of small cell count

^c Activities/behaviors in the previous 6 months

shown). Gender did not modify the relationship between perceived devaluation and STI testing (interaction term *p* value = .543).

Discussion

This study found that perceived drug-related devaluation was high among our sample of street-involved youth and negatively associated with STI testing. Such a high prevalence of perceived devaluation among street-involved youth may be attributed to their experiences of multiple layers of stigma associated with being perceived as 'troubled youth'—reflecting ageism, stereotypes about young people who are street-involved, as well as normative views regarding risky sexual and drug use practices. While data on perceived drug-related stigma among youth are sparse, these findings are consistent with a previous study among 1008 outreach adult PWID where 85% of participants reported perceived devaluation (Ahern et al., 2007). Compared to another sample of adults who use drugs recruited from residential and outpatient addiction treatment centers in the U.S., feelings of perceived stigma in the current study among youth were notably higher (60 vs. 87% respectively) (Luoma et al., 2007). These

differences could in part be explained by differences between the scales used in the current study and the U.S.-based study or they could reflect the findings of other investigations that have found that young street-involved people report more stigma than adult populations with regard to HIV/STI-related stigma (Wood & Aggleton, 2004). Higher perceptions of devaluation among the participants in the current study were significantly associated with lower STI testing uptake. This complements the findings of previous studies suggesting that externalized sources of stigma affect sexual health practices of youth and create barriers to their STI testing uptake (Bailey et al., 2010; Beery & Zucker, 2011; Knight, Shoveller, Oliffe, Gilbert, & Goldenberg, 2013; Knight, Small, & Shoveller, 2016; Shoveller, Knight, Johnson, Oliffe, & Goldenberg, 2010).

Although some suggest that perceived drug use stigma deters drug use and therefore results in beneficial health outcomes, findings of this study are in line with a large body of literature in other marginalized populations (e.g., racial or sexual minorities; mental health patients) pointing to a strong relationship between perceived devaluation and harmful health outcomes (Jackson et al., 1995; Meyer, 1995; Ritsher & Phelan, 2004). Further examinations of the role of perceived devaluation on health outcomes among PWUD are warranted.

Table 2 Univariable and multivariable GEE analyses of factors associated with STI testing uptake among street-involved youth in Vancouver, British Columbia

Variables	Unadjusted odds ratio (95% CI)	<i>p</i> value	Adjusted odds ratio (95% CI)	<i>p</i> value
Perceived devaluation				
Moderate versus Low	0.23 (0.06–0.82)	.024	0.28 (0.07–1.16)	.079
High versus Low	0.45 (0.19–1.10)	.081	0.38 (0.15–0.98)	.045
Age (≥ 19 vs. <19)	1.02 (0.35–3.02)	.969		
Indigenous ancestry (Yes vs. No)	1.29 (0.79–2.08)	.305		
Gender (Women vs. Men)	3.04 (1.93–4.80)	$<.001$	3.61 (2.24–5.82)	$<.001$
Education (\geq high school vs. $<$ high school)	0.84 (0.52–1.36)	.482		
LGBT (Yes vs. No) ^b	1.25 (0.75–2.10)	.394		
Stable relationship (Yes vs. No)	1.15 (0.76–1.74)	.511		
Depression (at baseline) (Yes vs. No)	1.44 (0.90–2.29)	.129		
Unprotected sex (Yes vs. No) ^a	1.22 (0.77–1.95)	.400		
Sex work (Yes vs. No) ^{a,c}	2.65 (1.53–4.60)	$<.001$		
Sex with an HIV/STI-infected partner (Yes vs. No) ^a	1.23 (0.69–2.19)	.485		
Multiple sex partners (Yes vs. No) ^a	1.68 (1.15–2.43)	.007	1.68 (1.08–2.61)	.021
Injection drug use (Yes vs. No) ^a	1.32 (0.86–2.04)	.207		
Non-injection drugs binge use (Yes vs. No) ^a	1.21 (0.76–1.93)	.412		
Binged on alcohol (Yes vs. No) ^a	1.16 (0.76–1.79)	.490		
Accessed drug/alcohol treatment (Yes vs. No) ^a	2.35 (1.55–3.56)	$<.001$	2.53 (1.61–3.99)	$<.001$
Daily meth use (Yes vs. No) ^a	1.07 (0.67–1.73)	.773		
Daily cocaine use (Yes vs. No) ^a	2.18 (0.38–12.45)	.380		
Daily heroin use (Yes vs. No) ^a	1.38 (0.85–2.23)	.187		
Daily crack use (Yes vs. No) ^a	0.96 (0.35–2.62)	.943		
Homelessness (Yes vs. No) ^a	0.97 (0.63–1.51)	.905		
Health services utilization (Yes vs. No) ^{a,c}	2.53 (1.31–4.86)	.005		
Sexual/physical violence (Yes vs. No) ^a	1.46 (0.94–2.26)	.091	1.41 (0.86–2.30)	.171

^a Activities/behaviors in the previous 6 months

^b *LGBT* lesbian/gay/bisexual/transgender

^c Although all variables with a *p* value of $<.10$ in univariate analyses were eligible for inclusion in the final model, only confounding variables (i.e., variables that affected the estimate of the main exposure variable—perceived devaluation—by $\geq 5\%$) were included in the final model. Forcing the sex work and health services utilization variables into the multivariate model resulted in no substantive difference in the estimate of perceived devaluation (AOR = 0.37; 95% CI 0.14–0.99)

Gender was not found to modify the effect of perceived devaluation on STI testing uptake, which should be interpreted with caution given the small sample size in low or moderate perceived devaluation categories that might have affected the observed association. However, gender remained a significant confounder of the observed association and the odds of STI testing among young women was approximately three times higher than young men. Although seeking STI testing varies across different sub-population of youth, young men have been shown to represent a disproportionately low rate of testing compared to young women (Bailey et al., 2010; Beery & Zucker, 2011; Knight et al., 2013, 2016; Shoveller et al., 2010). Low STI testing rates among young men have been associated with individual- and structural-level factors inside and outside the healthcare service delivery systems. For example, studies have shown how gender relations and masculinities influenced by a set of social expectations influence men's sexual health practices and

experiences (Bailey et al., 2010; Beery & Zucker, 2011; Knight et al., 2013, 2016; Oliffe et al., 2013; Shoveller et al., 2010). Also, these experiences have been linked to anxiety-inducing environments of STI testing clinics for young men where their sexual orientation is interrogated (Knight et al., 2013). Therefore, existing STI testing policies and procedures should be examined to assess their unintentional contribution to stigmatizing behaviors toward young PWUD. Moreover, it has been argued that the sexual healthcare delivery system positions women to take on the bulk of sexual and reproductive health responsibilities (Knight et al., 2016; Oliffe et al., 2013; Shoveller et al., 2010). Together, these findings suggest that future interventions aimed at increasing STI testing uptake among marginalized youth would likely benefit from gender-sensitive approaches.

The current study had limitations that are common to studies on hard-to-reach populations. While efforts were made to recruit a

representative sample of street-involved youth, given the non-random recruitment approach used, these findings may not be generalizable to all street-involved youth or PWUD in Vancouver; however, the demographic profile of this sample is similar to other studies on street-involved youth in British Columbia (Martin, Lampinen, & McGhee, 2006; Ochnio, Patrick, Ho, Talling, & Dobson, 2001). Given the lack of substance abuse stigma scales among young PWUD, the measures used in this study were directly adopted from an earlier study on adult PWUD (Ahern et al., 2007) and adjusted for this population and could potentially suffer from issues with content validity. Future research could illuminate what items might be modified, added, or removed from the measure of perceived devaluation among street-involved young PWUD. Moreover, our study instrument did not include multiple items to measure other types of stigma. In future, it could be useful to include items in addition to perceived devaluation that assess other aspects of stigma (e.g., discrimination, rejection and maltreatment experiences) and various types of stigma (e.g., anticipated or enacted stigma). This would allow for a more fulsome assessment of stigma and the combined impacts of multiple types of stigma on STI testing uptake among uptake young PWUD. Lastly, similar to other studies among this sub-population, these interpretations were prone to self-reported, recall, and social desirability biases. However, efforts were made to increase the accuracy of the data by limiting the analysis to recent variables (past 6 months).

Conclusions

In summary, study findings suggest that young PWUD experience high levels of perceived stigma and that associated experiences of perceived devaluation may decrease STI testing uptake. These findings have implications for health policy makers, healthcare providers, and researchers. Considering the adverse impact of perceived devaluation on STI testing practices of street-involved youth, it is important for healthcare staff to attend to the effect of perceived stigma (and the multiple facets through which stigma is generated) on their clients. Interventions targeting care providers to reduce stigmatizing attitudes or behaviors toward this sub-population could be helpful in encouraging marginalized youth to seek sexual health care. Shifting the focus onto the system and providers may provide an important means by which to better meet the special needs of street-involved youth in non-stigmatizing ways by concentrating on intersecting forms of stigma (e.g., ageism, drug use, gender stereotypes) among marginalized youth.

Acknowledgements The authors thank the study participants for their contribution to the research, as well as current and past researchers and staff. We would specifically like to thank Cody Callon, Deborah Graham, Peter Vann, Steve Kain, Kristie Starr, Tricia Collingham, Sabina Dobrer, and Carmen Rock for their research and administrative assistance.

Funding The study was supported by the US National Institutes of Health (U01DA038886). This research was undertaken, in part, thanks to funding from the Canada Research Chairs program through a Tier 1 Canada Research Chair in Inner City Medicine which supports Dr. Evan Wood. Dr. Kora DeBeck is supported by a MSFHR/St. Paul's Hospital Foundation-Providence Health Care Career Scholar Award and a CIHR New Investigator Award.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the UBC-Providence Health Care Research Ethics Board (Approval #: H04-50160; Approval date: May 20, 2016) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

- Ahern, J., Stuber, J., & Galea, S. (2007). Stigma, discrimination and the health of illicit drug users. *Drug and Alcohol Dependence*, 88(2), 188–196.
- Albizu, C., Caraballo, J., Caraballo-Correa, G., Santiago, S., Mendez, A., & Rivera-Suazo, S. (2015). Assessing stigma towards drug users among health care providers. *Drug and Alcohol Dependence*, 146, e204.
- Bailey, J. V., Murray, E., Rait, G., Mercer, C. H., Morris, R. W., Peacock, R., ... Nazareth, I. (2010). Interactive computer-based interventions for sexual health promotion. *Cochrane Database of Systematic Reviews*. doi:10.1002/14651858.CD006483.pub2.
- Barnaby, L., Penn, R., & Erickson, P. G. (2010). *Drugs, homelessness & health: Homeless youth speak out about harm reduction*. The Shout Clinic Harm Reduction Report. www.wellesleyinstitute.com/wp-content/uploads/2010/02/WI_Webinar_HRNAPPP_Feb2010_v1.pdf.
- Beery, A. K., & Zucker, I. (2011). Sex bias in neuroscience and biomedical research. *Neuroscience and Biobehavioral Reviews*, 35(3), 565–572.
- Jackson, J. S., Brown, T. N., Williams, D. R., Torres, M., Sellers, S. L., & Brown, K. (1995). Racism and the physical and mental health status of African Americans: A thirteen year national panel study. *Ethnicity and Disease*, 6(1–2), 132–147.
- Kelly, K., & Caputo, T. (2007). Health and street/homeless youth. *Journal of Health Psychology*, 12(5), 726–736.
- Kerr, T., Marshall, B. D., Miller, C., Shannon, K., Zhang, R., Montaner, J. S., et al. (2009). Injection drug use among street-involved youth in a Canadian setting. *BMC Public Health*, 9, 171. doi:10.1186/1471-2458-9-171.
- Kidd, S. A. (2003). Street youth: Coping and interventions. *Child and Adolescent Social Work Journal*, 20(4), 235–261.
- Kidd, S. A. (2007). Youth homelessness and social stigma. *Journal of Youth and Adolescence*, 36(3), 291–299.
- Knight, R., Shoveller, J. A., Oliffe, J. L., Gilbert, M., & Goldenberg, S. (2013). Heteronormativity hurts everyone: Experiences of young men and clinicians with sexually transmitted infection/HIV testing in British Columbia, Canada. *Health*, 17(5), 441–459.
- Knight, R., Small, W., & Shoveller, J. A. (2016). HIV stigma and the experiences of young men with voluntary and routine HIV testing. *Sociology of Health & Illness*, 38(1), 153–167.
- Krieger, N. (1999). Embodying inequality: A review of concepts, measures, and methods for studying health consequences of discrimination. *International Journal of Health Services*, 29(2), 295–352.

- Lee, W., Ti, L., Marshall, B. D., Dong, H., Wood, E., & Kerr, T. (2015). Childhood sexual abuse and syringe sharing among people who inject drugs. *AIDS and Behavior*, *19*(8), 1415–1422.
- Link, B. G., Struening, E. L., Rahav, M., Phelan, J. C., & Nuttbrock, L. (1997). On stigma and its consequences: Evidence from a longitudinal study of men with dual diagnoses of mental illness and substance abuse. *Journal of Health and Social Behavior*, *38*(2), 177–190.
- Luoma, J. B., Twohig, M. P., Waltz, T., Hayes, S. C., Roget, N., Padilla, M., & Fisher, G. (2007). An investigation of stigma in individuals receiving treatment for substance abuse. *Addictive Behaviors*, *32*(7), 1331–1346.
- Maldonado, G., & Greenland, S. (1993). Simulation study of confounder-selection strategies. *American Journal of Epidemiology*, *138*(11), 923–936.
- Marshall, B. D. (2008). The contextual determinants of sexually transmissible infections among street-involved youth in North America. *Culture, Health & Sexuality*, *10*(8), 787–799.
- Marshall, B. D., Kerr, T., Shoveller, J. A., Patterson, T. L., Buxton, J. A., & Wood, E. (2009). Homelessness and unstable housing associated with an increased risk of HIV and STI transmission among street-involved youth. *Health & Place*, *15*(3), 783–790.
- Martin, I., Lampinen, T. M., & McGhee, D. (2006). Methamphetamine use among marginalized youth in British Columbia. *Canadian Journal of Public Health*, *97*(4), 320–324.
- Meyer, I. H. (1995). Minority stress and mental health in gay men. *Journal of Health and Social Behavior*, *36*(1), 38–56.
- Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychological Bulletin*, *129*(5), 674–697.
- Milloy, M., Kerr, T., Salters, K., Samji, H., Guillemi, S., Montaner, J., & Wood, E. (2013). Incarceration is associated with used syringe lending among active injection drug users with detectable plasma HIV-1 RNA: A longitudinal analysis. *BMC Infectious Diseases*, *13*(1), 565. doi:10.1186/1471-2334-13-565.
- Ochnio, J. J., Patrick, D., Ho, M., Talling, D. N., & Dobson, S. R. (2001). Past infection with hepatitis A virus among Vancouver street youth, injection drug users and men who have sex with men: Implications for vaccination programs. *Canadian Medical Association Journal*, *165*(3), 293–297.
- Oliffe, J. L., Chabot, C., Knight, R., Davis, W., Bungay, V., & Shoveller, J. A. (2013). Women on men's sexual health and sexually transmitted infection testing: A gender relations analysis. *Sociology of Health & Illness*, *35*(1), 1–16.
- Pascoe, E. A., & Smart Richman, L. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin*, *135*(4), 531–554.
- Public Health Agency of Canada. (2006). *Street youth in Canada: Findings from enhanced surveillance of Canadian street youth, 1999–2003*. www.phac-aspc.gc.ca/std-mts/reports_06/pdf/street_youth_e.pdf.
- Public Health Agency of Canada. (2007). *Canadian street youth and substance use*. www.phac-aspc.gc.ca/sti-its-surv-epi/report07/index-eng.php.
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*(3), 385–401.
- Reif, S., Golin, C., & Smith, S. (2005). Barriers to accessing HIV/AIDS care in North Carolina: Rural and urban differences. *AIDS Care*, *17*(5), 558–565.
- Risman, B. J. (2004). Gender as a social structure theory wrestling with activism. *Gender & Society*, *18*(4), 429–450.
- Risman, B. J. (2011). Gender as structure or trump card? *Journal of Family Theory & Review*, *3*(1), 18–22.
- Ritsher, J. B., Otilingam, P. G., & Grajales, M. (2003). Internalized stigma of mental illness: Psychometric properties of a new measure. *Psychiatry Research*, *121*(1), 31–49.
- Ritsher, J. B., & Phelan, J. C. (2004). Internalized stigma predicts erosion of morale among psychiatric outpatients. *Psychiatry Research*, *129*(3), 257–265.
- Rivera, A. V., DeCuir, J., Crawford, N. D., & Fuller, C. (2015). Factors associated with internalized injection drug user stigma among injection drug users in New York City. *Drug and Alcohol Dependence*, *146*, e81. doi:10.1016/j.drugalcdep.2014.09.589.
- Shoveller, J., Knight, R., Johnson, J., Oliffe, J. L., & Goldenberg, S. (2010). 'Not the swab!' Young men's experiences with STI testing. *Sociology of Health & Illness*, *32*(1), 57–73.
- Tyler, K. A., & Johnson, K. A. (2006). Pathways in and out of substance use among homeless-emerging adults. *Journal of Adolescent Research*, *21*(2), 133–157.
- Wood, K., & Aggleton, P. (2004). *Promoting young people's sexual and reproductive health: Stigma, discrimination and human rights. Safe passages to adulthood*. London Thomas Coram Research Unit, Institute of Education, University of London.
- Wood, E., Stoltz, J., Montaner, J., & Kerr, T. (2006). Evaluating methamphetamine use and risks of injection initiation among street youth: The ARYS study. *Harm Reduction Journal*, *3*(1), 18. doi:10.1186/1477-7517-3-18.
- Worthington, C., MacLaurin, B., Huffey, N., Dittmann, D., Kitt, O., Patten, S., ... Leech, J. (2008). *Calgary youth, health and the street—Final report*. Calgary, AB: University of Calgary.
- Young, M., Stuber, J., Ahern, J., & Galea, S. (2005). Interpersonal discrimination and the health of illicit drug users. *American Journal of Drug and Alcohol Abuse*, *31*(3), 371–391.
- Zivanovic, R., Omura, J., Wood, E., Nguyen, P., Kerr, T., & DeBeck, K. (2016). Eviction and loss of income assistance among street-involved youth in Canada. *Journal of Public Health Policy*, *37*(2), 244–259.