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The validity of reporting willingness to use a supervised injecting facility on subsequent program use among people who use injection drugs

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Abstract

Background—Innovative health programs for injection drug users (IDUs), such as supervised injecting facilities (SIFs), are often preceded by evaluations of IDUs' willingness to use the service. The validity of these surveys has not been fully evaluated. We sought to determine whether measures of willingness collected prior to the opening of a Canadian SIF accurately predicted subsequent use of the program.

Methods—Data were derived from a prospective cohort of IDUs. The sample size for this study was 640 IDUs. Using multivariate logistic regression, it was assessed if a history of reporting willingness to use the program, were it available, was associated with subsequent use. In sub-analysis restricted to individuals who had a history of reported willingness, we used multivariate longitudinal analysis to identify factors associated with not attending the SIF.

Results—Among 442 IDUs, 72% of those who reported initial willingness to use a SIF later attended the program, and a prior willingness to use a SIF significantly predicted later attendance (adjusted odds ratio = 1.67). In sub-analyses restricted to those who had a history of reporting willingness to use the SIF, not using the program was predicted by not frequenting the neighborhood where the SIF was located.

Conclusion—Our findings indicate that reported willingness measures collected from IDUs regarding potential SIF program participation prior to its opening independently predicted later attendance even when variables that were likely determinants of willingness were adjusted for. These data suggest that willingness measures are reasonably valid tools for planning the delivery of health services among IDU populations.

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Author contributions:

KD, TK, JM, and EW were responsible for study design; CL conducted the statistical analyses; KD prepared the first draft of the analysis; TK, JB, JM, and EW contributed to the main content and provided critical comments on the final draft. All authors approved the final manuscript.

Declaration of Interest

Dr. Julio Montaner has received grants from, served as an ad hoc advisor to, or spoke at various events sponsored by Abbott, Argos Therapeutics, Bioject Inc., Boehringer Ingelheim, Bristol-Myers Squibb (BMS), Gilead Sciences, GlaxoSmithKline, Hoffmann-La Roche, Janssen-Ortho, Merck Frosst, Pfizer, Schering, Serono Inc., TheraTechnologies, Tibotec, and Trimeris. The authors declare no other competing interests.

Keywords

injection drug use; supervised injection facilities; validity of willingness measures

INTRODUCTION

Illicit drug use continues to be associated with a broad range of health and social harms and there is growing recognition that innovative interventions are needed to address these problems (1–4). However, illicit drug use, particularly injection drug use, is highly stigmatized and it can be difficult for public health programs to connect with and effectively serve this often hidden population (5–7). This poses unique challenges for public health programmers, as it is often difficult to predict whether a specific program will be accepted by drug-using communities (8–11).

One strategy that has been employed to assess the level of acceptance of innovative health programs, such as supervised injection facilities (SIFs) where injection drug users (IDUs) can bring pre-obtained illicit drugs and inject under the supervision of a nurse, has been to survey the target population and measure their willingness to use the proposed service (12–14). Behavioral willingness is considered to be distinct from behavioral intention, as willingness is typically conceived in relation to what an individual is willing to do while intention reflects what an individual plans to do (15,16). Some studies report that compared with intention measures, willingness measures are actually better predictors of behaviors (16–19). Although willingness measures have been used to determine acceptance of safer SIFs in several settings including Vancouver, Montreal, San Francisco, London, Ireland, Melbourne, and Sydney (12,20–26), the validity of these surveys among illicit drug-using populations has not been fully evaluated. To assess whether willingness measures may be effective tools for planning the delivery of public health programs for IDU populations, we sought to determine whether measures of willingness collected prior to the opening of a Canadian SIF accurately predicted later use of the program.

Methods

Data for this study were obtained from the Vancouver Injection Drug Users Study (VIDUS), an open prospective cohort that began enrolling IDUs through street outreach and self-referral in May 1996. To be eligible, participants at recruitment must reside in the Greater Vancouver Regional District, have injected illicit drugs in the previous month, and be willing and able to provide written informed consent. This study has been described in detail previously (27,28). In brief, at enrolment and on bi-annual basis, participants complete an interviewer-administered questionnaire and, after an examination by a study nurse, provide a blood sample for serologic testing. At each study visit, participants are provided with a stipend ($20 CDN) for their time. The study has received ethics approval from St. Paul's Hospital and the University of British Columbia's Research Ethics Board.

In the primary analysis, we assessed whether reports of willingness to use a SIF before the program opened were associated with subsequent self-reported attendance at the facility after it was established in the Downtown Eastside (DTES) of Vancouver in September 2003. Initial willingness measures were assessed during the pre-SIF period of December 2001 to May 2003. A total of 640 individuals were seen for study follow-up during the pre-SIF study period. Willingness was based on the question "If a supervised safe injection site was available, would you use it?" "Yes" responses were compared with "no" responses, and individuals who replied that they were "unsure" were assessed in sub-analyses. Attendance

at the facility was measured during the post-SIF period of December 2003 to November 2005 based on the question "Have you ever used the InSite SIS?"

Our primary analysis sought to determine whether there was a significant relationship between our main dependent variable of interest (attendance at the SIF) and our primary independent variable (prior report of willingness to attend a SIF). To consider this association while evaluating potential confounders, we a priori selected a range of secondary explanatory independent variables hypothesized to be associated with both attendance and initial willingness to attend based on previous research (12,20,29). Secondary explanatory factors included age (younger than 39 years of age vs. older); gender (female vs. male); unstable housing, defined as living in a single occupancy room in a hotel, a treatment or recovery house, jail, shelter or hostel, or having no fixed address for the last 6 months (yes vs. no); frequent exposure to the DTES, which is Vancouver's well-described drug use epicenter and where the Vancouver SIF is situated (20), defined as residing in or visiting the DTES at least 2–3 times per week (yes vs. no); daily cocaine injection (yes vs. no); daily heroin injection (yes vs. no); daily crack cocaine smoking (yes vs. no); non-fatal overdose (yes vs. no); and using injection drugs in public locations, such as city streets, parks, and alleys (yes vs. no). All drug use and behavioral variables refer to the previous 6-month period and were measured at participants first study visit during our study period.

As a first step, we compared baseline characteristics stratified by attendance at the Vancouver SIF. We used Pearson's χ^2-test for dichotomous variables and the Mann–Whitney test for continuous variables. We were primarily concerned with identifying whether there was an independent relationship between just two variables (attendance at the SIF and prior report of willingness to attend a SIF). To address this, we used a backward selection process with automated procedures, previously described by Maldonado and Greenland (30) and Rothman and Greenland (31), which is specific to fitting multivariate models in these instances. Specifically, we began by including all variables in a fixed model. We subsequently generated a series of confounding models by removing secondary variables one at a time. For each of these models, we assessed the relative change in the coefficient for our primary independent variable of interest (prior willingness to use a SIF). The secondary variable that resulted in the smallest absolute relative change in the coefficient of "prior willingness to use a SIF" was then removed. This approach allowed us to identify the secondary variables that had the strongest influence on the coefficient for our primary variable of interest. Using this automated procedure, secondary variables continued to be removed until the smallest relative change in the coefficient of "prior willingness to use a SIF" exceeded 5% of the value of the coefficient. The final model included prior willingness to use a SIF and all remaining secondary explanatory variables.

To further explore the relationship between initial willingness and later use of a SIF, we conducted a number of sub-analyses. First, among individuals who reported that they had not attended the SIF, we assessed rates of non-injection drug use in the past 6 months during the post-SIF period, as well as infrequent exposure to the neighborhood where the supervised injection site was located. Infrequent exposure was defined as not residing in the DTES and visiting the neighborhood less than monthly. We then sought to identify factors associated with not attending the SIF among participants who initially reported willingness to use the facility. Factors that we hypothesized might be associated with not attending the Vancouver SIF included: age (younger than 39 years of age vs. older); gender (female vs. male); infrequent exposure to the DTES (yes vs. no); infrequent cocaine injection (< daily vs. ≥ daily); infrequent heroin injection (< daily vs. ≥ daily); being recently incarcerated (yes vs. no); and recently being involved in any kind of addiction treatment program (yes vs. no). All variables, including our outcome of interest, refer to behaviors in the previous 6 months.

Since for this analysis we were interested in identifying multiple factors that might be associated with not using the SIF, we did not use the previous model-building protocol which is designed to adjust for confounding and determine whether there is an independent relationship between just two factors of interest. Another distinguishing feature of this sub-analysis was that it focused on the post-SIF follow-up period of 24 months, and we had multiple observations per person for factors potentially associated with not using the SIF as well as serial measures for each subject. Therefore, to determine factors associated with our outcome of interest throughout the entire 24-month follow-up period we used generalized estimating equations (GEE) for binary outcomes with logit link for the analysis of correlated data (32). These methods provided standard errors adjusted by multiple observations per person using an exchangeable correlation structure. With this approach, data from every participant follow-up visit were considered in this analysis. Missing data were addressed through the GEE mechanism which uses the all available pairs method to encompass the missing data from dropouts or intermittent missing. All non-missing pairs of data are used in the estimators of the working correlation parameters.

As a first step, GEE univariate analyses were conducted to obtain unadjusted odds ratios (ORs) and 95% confidence intervals (CIs) for variables of interest. In order to adjust for potential confounding, all variables that were $p < .05$ in GEE univariate analyses were entered into a multivariate logistic GEE model. All statistical analyses were performed using SAS software version 9.1 (SAS, Cary, NC, USA). All p-values are two sided.

RESULTS

In the pre-SIF period 344 (54%) participants reported being willing to use a SIF, 256 (40%) reported being unwilling, and 40 (6%) were unsure (see Figure 1). Among the “unsure” group 11 (28%) were not seen for study follow-up during the post-SIF study period, and of the remaining 29 “unsure” individuals, 18 (62%)subsequently used the facility. Among the 600 participants who reported either being willing or unwilling to use a SIF, 158 (70 and 88, respectively) were not seen for study follow-up during the post-SIF study period and were therefore excluded from further analyses. Those lost to follow-up were significantly less likely to report being willing to use a SIF ($p < .001$). The remaining 442 participants were included in our primary comparison of those that reported yes versus no willingness. Among the 274 participants within this group who reported being initially willing to use a SIF, 198 (72%) later reported attending the SIF, while 91 (54%) of those who were initially unwilling later reported attending the SIF. The characteristics of the study sample stratified by reported attendance at the SIF are presented in Table 1. The univariate analyses of behavioral and socio-demographic variables are also presented in Table 1. Initial willingness to use a SIF was significantly associated with later use of the facility (OR = 2.20, 95% CI: 1.47–3.30). The results of the final multivariate logistic regression are shown in Table 2. Our primary explanatory variable, initial willingness to use a SIF, remained independently associated with attending the SIF (adjusted OR (AOR) = 1.67, 95% CI: 1.09–2.55). Unstable housing (AOR = 1.54, 95% CI: 1.01–2.34) and using injection drugs in public were also independently associated with using the SIF (AOR = 2.35, 95% CI: 1.46–3.77). In sub-analyses, we found that among participants who did not attend the SIF, 31 (19%) reported at some point during the post-SIF study period that they had not injected drugs in the previous 6 months. Similarly, during the same period and among the same group, 32 (21%) individuals reported infrequent exposure to the DTES.

In the sub-analysis restricted to the 274 individuals who initially reported being willing to use a SIF (see Table 3), being younger than 39 years of age, infrequent exposure to the DTES, infrequent cocaine injection, infrequent heroin injection, and engagement in any addiction treatment program were significantly associated with not using the SIF in

univariate GEE analyses. In multivariate GEE analyses, infrequent exposure to the DTES (AOR = 1.89, 95% CI: 1.31–2.71), infrequent cocaine injection (AOR = 1.54, 95% CI: 1.13–2.09), and infrequent heroin injection (AOR = 2.37, 95% CI: 1.77–3.17) were significantly positively associated with not using the SIF, while being younger than 39 years of age (AOR = 0.03, 95% CI: 0.01–0.05) was significantly negatively associated with not using the SIF.

DISCUSSION

Our study found that initial willingness to use a SIF was independently associated with subsequent attendance at Vancouver's SIF, even after adjusting for other determinants of willingness. We also found that not actively injecting drugs and infrequent exposure to the neighborhood where Vancouver's SIF is located were factors that appear to negatively influence whether individuals use a SIF following a report of being willing to use the program before it opened.

These findings are largely consistent with a broad literature suggesting that behavioral intention is a reasonable predictor of later action (16,33). Intention measures have been found to be correlated with health-related behaviors in a number of areas including adolescent smoking, illicit drug use, and sexual health (15,17,34–37). More specifically, these findings support previous studies suggesting that willingness measures are generally good predictors of future behaviors (16–19).

While our study indicates that willingness predicts future SIF use, it is also noteworthy that personal circumstances including cessation from injection drug use, lower intensity injection drug use, and infrequent exposure to the DTES appear to have an expected deterrent effect on SIF use. These effects are expected given that actively injecting drugs is a prerequisite for using the SIF, and the SIF has been shown to attract high-intensity drug injectors (38). Being an infrequent visitor to the neighborhood where the SIF was established would also be expected to reduce the likelihood that an individual would use the facility. Indeed, previous studies indicate that travel time to the SIF from where the IDU resides and purchases drugs is a significant barrier to using the injection facility (39). The association between younger age and lower likelihood of using the SIF may reflect the demographic character of the neighborhood where the SIF was established. Previous research in our study setting suggests that street-involved youth who use drugs tend to spatially separate themselves from Vancouver's DTES neighborhood and prefer to congregate in the Downtown South area of the city (40). This distancing may partially explain why younger age was associated with not using Vancouver's injection site despite being initially willing. In addition to the factors identified in our analysis, there are a number of other considerations that could influence whether or not an individual chooses to use a facility of this nature. For example, waiting times and operating regulations such as a ban on assisted injections could present barriers to individuals suffering from drug withdrawal symptoms or who do not have the ability to self-inject. This might hinder the ability of these individuals to use the facility despite an initial willingness or intention to use it. Clearly, situational factors are relevant in determining SIF utilization; however, we found that despite these multiple factors, willingness measures are meaningful indicators of later SIF use.

These findings have implications for the validity of willingness studies that have been conducted in other settings to assess the acceptability of establishing SIFs. For instance, a willingness study conducted among IDUs in San Francisco recently reported that 85% of local IDUs were willing to use a SIF (21). Our study suggests that policy planners in San Francisco can be confident that this measure is a good indicator of client uptake, should a SIF be established in that area.

Our findings are also relevant to the planning of other types of public health programs and services for IDU populations as they suggest that willingness measures are relatively accurate markers of a population's intention to use a particular service. We should note that directly engaging with people who use drugs and assessing willingness prior to the establishment of a health service or program are consistent with a growing recognition of the importance of involving target populations in the planning and delivery of health and social services, particularly among vulnerable populations (6,41). Although assessing willingness is not a substitute for meaningful involvement, we suggest it can be a useful first step in engaging a target population in service design and delivery.

Our study has a number of potential limitations. First, our measures relied on self-report which can be subject to socially desirable reporting and recall bias. Most importantly, socially desirable reporting could have inflated our measure of SIF attendance, given its widespread support and acceptance among local drug users. While it would have been favorable to validate self-reported attendance against the database of registered clients of the SIF a number of data limitations prevented this. First, in an effort to build trust among local drug users and establish a low threshold service, the SIF client registry was not fully operational until 6 months after the facility opened (42). Second, the opportunity to consent to linking VIDUS participants with the SIF client registry was only offered during specific study follow-up periods. As a result not all VIDUS participants in our study sample were given the option of consenting to this process. Given the significant data limitations resulting from these factors, it was unfortunately not feasible to accurately validate self-reports with the SIF client registry.

Another potential limitation of our study is the generalizability of our findings. The VIDUS is not a randomized sample of IDUs and may not be reflective of other drug user populations. It is, however, believed to be representative of IDUs in the community (43,44).

CONCLUSIONS

In summary, we found that individuals who indicated that they were willing to use a SIF were more likely to later attend the Vancouver SIF once it was opened, even after we adjusted for factors expected to be associated with willingness. These data suggest that willingness measures may be valid tools for planning the delivery of health services among IDU populations and should be considered by future health program planners.

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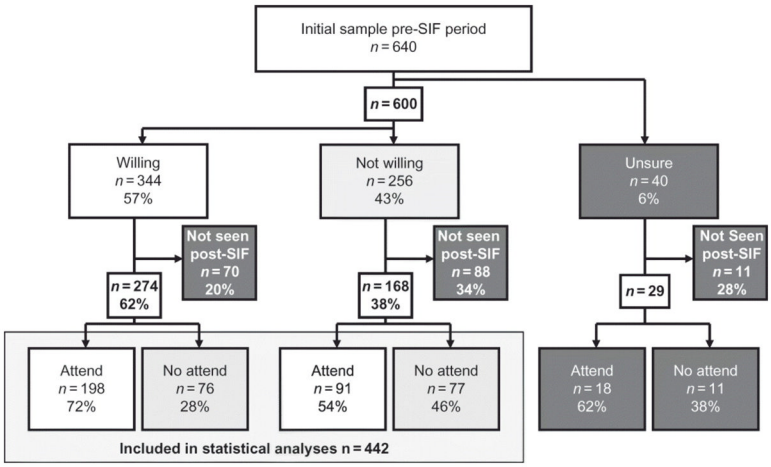

FIGURE 1.
Study sample.
Note: SIF, supervised injection facility.

TABLE 1

Univariate analyses of study population stratified by attendance at Vancouver's SIF (n = 442).

	Attended SIF		Univariate	
Characteristic[1]	**Yes (n= 289), n (%)**	**No (n= 153), n (%)**	**OR (95% CI)**	**p-Value**
Prior willingness to use SIF				
Yes	198(69)	76(50)	2.20(1.47–3.30)	<.001
No	91 (31)	77(50)		
Younger than 39 years of age[2]				
Yes	160(55)	60 (39)	1.92(1.29–2.86)	<.001
No	129(45)	93(61)		
Female gender				
Yes	122 (42)	64 (42)	1.02(0.68–1.51)	.938
No	167(58)	89(58)		
Unstable housing[2,3]				
Yes	162(56)	64 (42)	1.77(1.19–2.64)	.005
No	127 (44)	89(58)		
Frequent exposure to DTES[2]				
Yes	163(56)	77(50)	1.28(0.86–1.89)	.223
No	126 (44)	76(50)		
Daily cocaine injection[2]				
Yes	94 (33)	31 (20)	1.90(1.19–3.02)	.007
No	195(67)	122(80)		
Daily heroin injection[2]				
Yes	95 (33)	24 (16)	2.63(1.60–4.34)	<.001
No	194(67)	129(84)		
Daily crack use[2]				
Yes	153(53)	57 (37)	1.89(1.27–2.83)	.002
No	136(47)	96(63)		
Overdose(non-fatal)[2]				
Yes	21 (7)	1 (1)	11.91(1.59–89.42)	016
No	268(93)	152(99)		
Public injecting[2]				
Yes	142(49)	36 (24)	3.14(2.02–4.87)	<.001
No	147(51)	117(76)		

Notes: SIF, supervised injection facility; OR, odds ratio; CI, confidence interval; DTES, Downtown Eastside of Vancouver, which is the neighborhood where the SIF is located.

[1] All explanatory variables measured at first study visit during study period.

[2] Denotes activities or situations referring to previous 6 months.

[3] Unstable housing is defined as living in a single occupancy room in a hotel, a treatment or recovery house, jail, shelter or hostel, or having no fixed address for the last 6 months.

TABLE 2

Multivariate logistic regression analysis of factors associated with attending Vancouver's SIF versus not attending the facility (n = 442).

Characteristic[1]	Adjusted odds ratio	(95% confidence interval)	*p*-Value
Prior willingness to use SIF			
Yes versus no	1.67	(1.09–2.55)	.019
Unstable housing[2,3]			
Yes versus no	1.54	(1.01–2.34)	.044
Daily cocaine injection[2]			
Yes versus no	1.52	(0.93–2.48)	.095
Daily heroin injection[2]			
Yes versus no	1.63	(0.95–2.81)	.076
Public injecting[2]			
Yes versus no	2.35	(1.46–3.77)	<.001

Notes: Overdose was not considered in this model due to low-frequency counts. SIF, supervised injection facility.

[1] All explanatory variables were measured at first study visit during study period.

[2] Denotes activities or situations referring to previous 6 months.

[3] Unstable housing is defined as living in a single occupancy room in a hotel, a treatment or recovery house, jail, shelter or hostel, or having no fixed address for the last 6 months.

TABLE 3

GEE analysis of factors associated with not using the SIF in the last 6 months (n = 76) versus using the facility among those who initially reported being willing to use an injection site (n = 274)

	Univariate		Multivariate	
Characteristic[1]	**OR(95% CI)**	***p*-Value**	**AOR(95% CI)**	***p*-Value**
Younger than 39 years of age				
Yes versus no	1.65(1.18–2.29)	.003	1.68(1.21–2.34)	.002
Gender				
Female versus male	1.09(0.75–1.58)	.660		
Infrequent exposure to DTES[2]				
Yes versus no	1.93(1.38–2.71)	<.001	1.86(1.30–2.66)	<.001
Infrequent cocaine injection[2]				
< daily versus > daily	1.82(1.36–2.44)	<.001	1.52(1.12–2.06)	.007
Infrequent heroin injection[2]				
< daily versus > daily	2.80(2.11–3.71)	<.001	2.46(1.84–3.28)	<.001
Incarceration[2]				
Yes versus no	0.78(0.59–1.09)	.141		
Any addiction treatment[2]				
Yes versus no	1.42(1.05–1.93)	.024	1.23(0.90–1.68)	.185

Notes: GEE, generalized estimating equations; SIF, supervised injection facility; OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio; DTES, Downtown Eastside of Vancouver, which is the neighborhood where the SIF is located, infrequent exposure defined as being in the neighborhood less than 2–3 times per week.

[1]Variable measures collected between December 2003 and November 2005.

[2]Denotes activities or situations referring to previous 6 months.