

## Social-Level Correlates of Shooting Gallery Attendance: A Focus on Networks and Norms

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**Abstract** The purpose of this study was to examine the association between social network characteristics and peer norms related to sharing needles and shooting gallery use. Multivariate logistic regression modeling was used to identify factors that were independently associated with shooting gallery use among a sample of injection drug users recruited in Baltimore, Maryland. Of 842 study participants, 35% reported attending a shooting gallery in the past 6 months. Social networks of shooting gallery users were larger, had a greater number of injectors and crack smokers, were younger and less dense with fewer kin members compared to networks of non-gallery attenders. A greater proportion of those who used a gallery perceived that their peers shared needles and that peers would not disapprove if they used a dirty needle. Future research is needed to understand how social networks and peer norms are specific to behavioral settings and how this may impede adoption of preventive behaviors.

**Keywords** Shooting gallery · Social network · Peer norms · Injection drug user · HIV

### Introduction

A shooting gallery is a place where drug users congregate to inject and use drugs [1–4]. It is well established that shooting galleries are high-risk settings associated with

HIV risk behavior such as sharing needles and other drug paraphernalia [4–8].

As a “risk environment” [9]; shooting galleries are venues that facilitate social interactions between drug users and individuals who are involved with the drug economy (e.g. needle sellers), thus “bridging” various high-risk social networks, contributing to the transmission of HIV and other blood borne infections (e.g. hepatitis) [3, 10–14]. Previous studies have identified a range of individual level factors associated with shooting gallery use including being male and homeless [1] and recently arrested [4]. Less attention has been paid to social level factors associated with shooting gallery attendance, such as social network characteristics and peer norms.

Social networks have been widely recognized as having an important role in the study of HIV transmission [15–17]. A social network can be conceptualized as individuals connected to each other through social ties or behaviors [15]. Structural and functional characteristics of networks have been found to be associated with HIV risk such as sharing needles [12, 18, 19] and drug-related risk behaviors such as drug overdose [20]. The social network is also a source of social norms which influence behaviors [21]. Perceptions of others behaviors (descriptive norms) [22], have been consistently reported to be associated with sharing needles [23–25] and condom use [16, 26]. Injunctive norms are perceptions of the behaviors that may be approved or disapproved of by peers. Understanding the association between the social network characteristics, norms related to sharing needles and shooting gallery use of injection drug users can inform the development of appropriate HIV and other infectious disease prevention interventions.

In the current study we examine the role of individual level factors, social network characteristics and norms

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related to sharing needles and attendance of a shooting gallery to use drugs. We hypothesized that even after adjusting for individual level factors, social network characteristics and norms related to sharing needles would be associated with shooting gallery attendance.

## Methods

### Study Population

Data for this study came from the baseline sample of the STEP into Action Study, a social network oriented HIV prevention intervention. Two types of study participants (Index and Network) were recruited into the study between March, 2004 and March, 2006. Index participants were aged 18 years old or older who self-reported injection drug use in the prior 6 months. Index participants were recruited using street-based outreach methods that targeted areas that were identified as having high-rates of drug-related activity. Additionally, advertisements in local newspapers and referrals from the local needle exchange and drug treatment centers were used to recruit Index participants. Eligible Index participants provided written informed consent and completed a survey that assessed behavioral risk and health status and a social network survey. At the end of the Index baseline visit, the Index was asked to invite up to 5 of their risk Networks into the study. Indexes were provided with cards to give to their network with a description of the study and contact information for the Network to use to schedule a visit.

Inclusion criteria for Network participants were: aged 18 years old or older and nominated by Index participant as a drug or sex risk network. Network participants provided written informed consent and also completed a survey about their health and behavioral risk and a social network survey. All enrolled participants (Index and Network;  $n = 1,094$ ) were offered an HIV test and pre and post-test counseling. Testing was not required to enroll into the study. All participants received \$35 for completing the baseline visit and Index participants received \$10 for each Network who enrolled in the study. This research was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. Data for the present study was limited to any study participant (Index or Network) who reported at baseline injection drug use in the prior 6 months. The final sample included in this study was 842 participants.

### Measures

#### *Shooting Gallery Use*

The dependent variable of interest, attending a shooting gallery, was assessed with the question “in the past

6 months have you gone to a shooting gallery to use your drugs?” (yes or no).

#### *Social Level Variables*

**Social Network Characteristics** To measure the structure, function, and composition of the social network, names were elicited with a set of 17 questions [27] that asked about individuals with whom the participant has socialized, received emotional, financial or material support, live with, used drugs, and had sex. Once the list of names was collected, participants were then asked the age, race, gender, relationship (e.g. family, friend, professional), HIV status and employment status of each individual listed. To describe the composition of the drug network, participants were also asked about each individual’s drug use in the past 6 months by type (e.g. heroin, crack) and route (e.g. inject, snort). Trust between the participant and each individual listed was measured using a scale that ranged from 1 to 10 with one indicating that the participant does not trust the individual and 10 indicating that the participant trusts the individual “with their life”. Conflict between the participant and each individual listed was assessed by asking, “Who would you say you are often not on good terms with? By this I mean that you might disagree with, or argue or fight with this person.” Density is a measure of connectedness between individuals in the network and was assessed by asking, “Who on this list knows others on the list?” The density score is a sum of all of the connections between listed individuals and can range from zero, indicating that no individuals know each other to 1 indicating that all individuals know each other.

**Perceived Norms** To measure perceptions of peers injection risk behavior (descriptive peer norms), participants were asked, “How many of your drug buddies share needles with others?” (none, few, half, most, or all). Based on the distribution of responses, a dichotomous variable was constructed where 0 = none and 1 = few or greater.

To measure perceptions of peers’ approval about sharing needles (injunctive peer norms), participants were asked how much they agreed with the following statement: “My drug buddies would not say anything to me if they saw me use a dirty needle” (0 = disagree/not sure, 1 = agree).

#### *Demographics and Health Variables*

Gender, age, race/ethnicity, employment status and homelessness in the prior 6 months were self-reported. Drug use history was ascertained by asking about the types of drugs and routes of use. HIV status was operationalized using the results from a voluntary HIV test that was conducted at the baseline visit using Orasure specimen

collection and testing kits. In cases where the result was indeterminate or missing (because the participant declined to test) participant's self-reported status was used (0 = HIV negative or unknown and 1 = HIV positive). Participants were asked to report their sources of income. Those who reported selling drugs, selling needles, or providing street security for a drug dealer (e.g. being a look out) in the past 30 days were categorized as being involved in the drug economy.

### Analysis

Bivariate analyses were conducted using *t*-tests and chi-square statistics to identify associations between independent variables and shooting gallery use. Given that the sample included both Index and Network participants, there was a need to account for possible clustering of responses. To account for this correlation, General Estimating Equation (GEE) was employed [28]. GEE adjusts for variance within and between clusters of network members. Those independent variables that were statistically significant at the  $P \leq 0.05$  in the bivariate analyses were simultaneously entered into a multivariate logistic regression model to identify those that remained independently associated with shooting gallery use.

## Results

### Study Population

The sample for the present study ( $n = 842$ ) were majority male (64%), African-American (80%) and unemployed (91%) (Table 1). Approximately half had been arrested in the prior 6 months. Over one-third of the sample (35%) reported attending a shooting gallery to use drugs in the past 6 months. In unadjusted analyses, those who used a shooting gallery were more likely to be male, younger, homeless and involved with the drug economy compared to those who did not use a gallery. These findings are consistent with previous studies [1, 5].

### Social Level Correlates of Shooting Gallery Use

The social networks of shooting gallery users were larger (9.10 networks vs. 8.39; *t*-test statistic =  $-2.49$ ,  $P = 0.001$ ), younger (42.2 vs. 43.3 years; *t*-test statistic,  $P = 0.02$ ) and had fewer kin members (2.29 vs. 3.03; *t*-test statistic =  $2.30$ ,  $P = 0.02$ ) compared to non-attenders (Table 2). The composition of the drug network differed where shooting gallery users' networks had a greater number of injectors (3.88 vs. 2.89; *t*-test statistic =  $-5.91$ ,  $P = 0.001$ ) and crack smokers (3.46 vs. 2.85; *t*-test

statistic =  $-3.23$ ,  $P < 0.001$ ). There were no differences in the number of networks with whom the participant had conflict but the networks of attenders were less dense (fewer connections) and had lower trust with the individuals listed (6.94 vs. 7.72, *t*-test statistic =  $6.13$ ,  $P < 0.001$ ).

Both descriptive and injunctive norms related to sharing needles were associated with shooting gallery use (Table 3). A greater proportion of those who attended a gallery perceived that their drug buddies shared needles with others. Furthermore, a greater proportion did not perceive that their drug buddies would disapprove if they used a dirty needle.

The multivariate logistic regression model (Table 4) shows the social level factors that remained independently associated with shooting gallery use. Adjusting for network density, shooting gallery use was associated with having more injectors in the network, perceiving that drug buddies were engaging in sharing needles, perceptions that drug buddies would not disapprove of sharing needles, being male, homeless, recently arrested and involved with the drug economy.

## Discussion

We report that two social level factors: social network characteristics and perceived norms related to sharing needles are independently associated with shooting gallery use. Social networks of shooting gallery users in this study were significantly larger and had a greater number of injectors and crack smokers. These results suggest that shooting gallery users are connected to large networks of active users and therefore are in an optimal position to diffuse HIV and health-related information and skills within these networks. Previous studies have found that networks with a greater number of injectors have also been associated with elevated HIV prevalence, hepatitis prevalence, and drug overdose [20, 21, 29]. The confluence of high-risk people in shooting galleries may mutually promote risk behaviors through their social ties and interactions [27]. Peer-based interventions have been effective in delivering HIV prevention information and skills because of the increased credibility of the peer educator [30]. A shooting gallery may serve as an ideal setting for drug users to model HIV preventive behaviors to other attendees. Setting specific interventions may enable and augment network-oriented diffusion of intervention messages, skills building and resources to target those who are present at the setting, such as a shooting gallery. Interventions that target drug users who attend shooting galleries could include information and skills for reducing all drug related harms including hepatitis and overdose. Moreover, training

**Table 1** Demographic and health characteristics associated with shooting gallery use from 842 injection drug users enrolled in the STEP into Action study, Baltimore, Maryland

Variable	Shooting gallery use			Pearson's chi square statistic
	Total sample	No	Yes	
	<i>N</i> = 842	<i>N</i> = 549 (65)	<i>N</i> = 293 (35)	
Gender*				
Male	536 (64)	334 (61)	202 (69)	5.42
Female	306 (36)	215 (39)	91 (31)	
Race				
AA	672 (80)	447 (81)	225 (77)	2.73 ( <i>t</i> -test statistic)
White	156 (19)	92 (17)	64 (22)	
Other	14 (2)	10 (6)	4 (1)	
Mean age (SD)**	42.9 (8.17)	43.5 (8.01)	41.9 (8.37)	
Unemployed in past 6 months				
No	73 (9)	53 (10)	20 (7)	1.93
Yes	769 (91)	496 (90)	273 (93)	
Homeless in past 6 months***				
No	533 (63)	399 (73)	134 (46)	59.7
Yes	309 (37)	150 (27)	159 (54)	
Arrested in the past year***				
No	412 (49)	298 (54)	114 (39)	18.1
Yes	430 (51)	251 (46)	179 (61)	
HIV status				
Negative	695 (83)	450 (82)	245 (84)	0.36
Positive	147 (17)	99 (18)	48 (16)	
Involvement in the drug economy***				
No	651 (77)	464 (85)	187 (64)	46.7
Yes	191 (23)	85 (15)	106 (36)	

\* *P* ≤ 0.05, \*\* *P* ≤ 0.01, \*\*\* *P* ≤ 0.001

**Table 2** Social network characteristics associated with shooting gallery use from 842 injection drug users enrolled in the STEP into Action study, Baltimore, Maryland

Variable	Shooting gallery use		<i>t</i> -test statistic
	No	Yes	
	<i>N</i> = 549	<i>N</i> = 293	
Total network size***	8.39 (3.88)	9.10 (4.08)	−2.49
Mean age*	43.3 (6.78)	42.2 (6.85)	2.30
# HIV positive	0.23 (0.71)	0.29 (0.80)	−1.10
# Kin***	3.03 (2.37)	2.29 (1.99)	4.55
# Injectors***	2.89 (2.21)	3.88 (2.48)	−5.91
# Crack smokers***	2.85 (2.51)	3.46 (2.78)	−3.23
# Snorters***	2.01 (2.20)	2.57 (2.49)	−3.38
# Used heroin, cocaine and crack past 6 months***	4.16 (2.66)	5.15 (2.97)	−4.93
# With conflict	0.84 (1.31)	0.92 (1.17)	−0.95
Mean trust with networks (0–10) <sup>a</sup> ****	7.72 (1.72)	6.94 (1.83)	6.13
Density <sup>b</sup> ***	0.54 (0.27)	0.48 (0.28)	3.24

\* *P* ≤ 0.05, \*\* *P* ≤ 0.01, \*\*\* *P* ≤ 0.001

<sup>a</sup> Ranging from 0 = do not trust to 10 = trust with my life

<sup>b</sup> Ranging from 0 = no networks know each other to 1.00 = all networks know each other

proprietors of shooting galleries to promote HIV risk reduction in the shooting gallery has the potential to influence large networks of injectors [31, 32].

In this study we report that after adjusting for social network factors, both descriptive peer norms related to sharing needles (i.e. perception that others are sharing

**Table 3** Normative factors associated with shooting gallery use from 842 injection drug users enrolled in the STEP into Action study, Baltimore, Maryland

		Shooting gallery use		Pearson's chi square statistic
	Total sample N = 842	No N = 549 (65)	Yes N = 293 (35)	
Descriptive perceived norms***				
How many peers share needles with others?				
None	231 (28)	189 (35)	42 (14)	11.8
Few-All	602 (72)	352 (65)	250 (86)	
Injunctive peer norms***				
My drug buddies would not say anything if they saw me use a dirty needle				
Disagree	670 (80)	456 (83)	214 (73)	40.0
Agree	172 (20)	93 (17)	79 (27)	

\*  $P \leq 0.05$ , \*\*  $P \leq 0.01$ ,\*\*\*  $P \leq 0.001$ **Table 4** Social level correlates independently associated with shooting gallery use among 829 active injection drug users in Baltimore, Maryland

Variable	Adjusted odds ratio (95% confidence interval)
Gender (male)	1.38 (0.98–1.95)
Age (>49.2 years)	0.93 (0.62–1.40)
Homeless (yes)***	2.64 (1.88–3.70)
Arrest within past 6 months (yes)*	1.40 (1.02–1.92)
Number of injectors in network***	1.13 (1.05–1.21)
Density	0.74 (0.41–1.34)
Descriptive peer norms related to sharing needles***	2.28 (1.52–3.41)
Injunctive peer norms related to sharing needles**	1.86 (1.26–2.74)
Involvement with drug economy (yes)***	2.29 (1.61–3.26)

\*  $P \leq 0.05$ , \*\*  $P \leq 0.01$ , \*\*\*  $P \leq 0.001$ 

needles) and injunctive peer norms (i.e. perceptions that peers would not say anything about sharing needles) are associated with using a shooting gallery. These findings are consistent with previous studies that have found strong associations between both types of norms and sharing of needles [24]. One limitation of this study was that our measure of norms did not directly assess perceptions of drug buddies using shooting galleries. However, shooting galleries are an environment that are conducive to sharing used needles since other injectors are around and there is the opportunity to purchase, rent, or borrow injection equipment [4]. Thus, we feel confident that norms about needle sharing in general are applicable to norms about shooting gallery usage.

Another interesting finding was the significant association between involvement in the drug economy and shooting gallery use. We found that after adjusting for network characteristics and norms, odds of shooting gallery use was nearly 2.5 times greater if there was report of

selling needle, drugs or serving as a lookout in the prior 30 days. The drug economy is a dynamic social context where, in addition to the transactions of money and drugs, there are interactions between various individuals who occupy different social roles and functions [14, 33]. Drug users involved in the drug economy experience more severe addiction and higher levels of use [12, 33] and thus greater HIV risk. This finding suggests that providing HIV prevention interventions for individuals who are involved in the drug economy may be an additional avenue for reaching high-risk drug users.

While we did not find that HIV status was associated with shooting gallery attendance, 16% of those who reported attending a shooting gallery in the prior 6 months had known HIV seropositive status. Because the data was cross-sectional, we cannot make causal inferences, however, this underscores the importance of targeting shooting galleries for both primary and secondary HIV prevention, as HIV seropositive injectors are likely to be attending these venues.

This study has some additional limitations to be noted. First, the cross-sectional design limits our ability to draw any causal inferences about the influence of the social network and norms and shooting gallery attendance. Also, data for this study came from a sample of predominately heroin injectors in a city in the North East region of the United States. These findings may not be generalizable to other types of injectors (i.e. crystal methamphetamines) in other areas of the country [34]. Furthermore, the mean age of the sample was 43 years. Social networks and norms may vary by age and length of time injecting and therefore these results may not be generalizable to younger drug users.

## Conclusions

Two social level factors: social network characteristics and perceived norms were found to be independently



associated with shooting gallery use. These results support prior studies which emphasize the prominence of physical settings in HIV risk and prevention research [9, 35]. Future research is needed to understand how social network and peer-based norms are specific to behavioral settings which may promote and sustain or inhibit and impede adoption of preventive behaviors. Shooting galleries may be a setting that facilitates network mixing patterns such as sexual and drug networks and high versus low risk individuals. Interventions that incorporate aspects of place and social context are needed to effectively decrease HIV and other bloodborne disease transmission among injection drug users.

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