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Impact of Social Network Characteristics on Shelter Use Among Street Youth in San Francisco

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Abstract

Purpose—We examined the cross-sectional and longitudinal association between social network characteristics and street youths' shelter use, a determinant of health outcomes for homeless youth.

Methods—We analyzed interview data from 138 street youth recruited through venue-based sampling in San Francisco, to assess the cross-sectional relationship between shelter use in youths' social networks and youths' reported shelter use. We also assessed the relationship between baseline network shelter use and shelter use at 6-month follow-up.

Results—Low proportions of street youth reported shelter use at baseline (38%) and follow-up (29.6%). Twenty-nine (26.9%) youth were in networks with shelter users at baseline, compared with 17 youth (15.7%) at follow-up. In cross-sectional analysis, youth in networks with shelter users had 5-fold increased odds of reporting shelter use (OR: 5.86, $p = .006$). A 1-person increase in the number of network shelter users was associated with 2-fold increased odds of youths' shelter use (OR: 2.16, $p = .02$). In longitudinal analysis, youth in networks with shelter users at baseline had nearly 5-fold increased odds of shelter use at follow-up (OR: 4.95, $p = .01$). A 1-person increase in the number of network shelter users at baseline was associated with 3-fold increased odds of shelter use at follow-up (OR: 3.15, $p = .004$).

Conclusion—Shelter users seem to cluster together. Shelter use by extended network members was associated with increased odds of youths' own shelter use. Understanding how network behaviors influence street youths' health-related behaviors, such as shelter use, could inform network-based interventions encouraging service uptake among marginalized and hard-to-reach street youth populations.

Keywords

Homeless youth; Street youth; Shelter utilization; Shelters; Social networks

Background

Five hundred thousand to 2.8 million youth are estimated to live on the streets in the United States. The true number is unknown due to challenges in defining and counting the population [1]. Street youth suffer adverse health outcomes associated with engagement in risk behaviors to meet basic survival needs or to cope with street life, including alcohol and other substance use [2–5]; survival sex (the exchange of sex for money, drugs, shelter, or protection) [2,3,6]; and other risky sexual behaviors, such as earlier sexual onset, unprotected intercourse, sex while intoxicated or high, sex with high-risk partners, anonymous sex partners, and multiple partners [3,7]. Adverse health outcomes include physical and sexual victimization [2,8], sexually transmitted infections [7,9,10], higher HIV infection rates [11], unintended pregnancy [12], hunger [13], depression and suicidal ideation [5], and chronic illnesses, such as asthma, tuberculosis, diabetes, and hepatitis [13,14].

Youth shelters offer emergency services, food, showers, counseling, social skills training, temporary housing, and employment assistance, with an emphasis on stable housing as a first step toward extrication from the streets [15]. Among street youth using emergency shelters and crisis services, evidence suggests a short-term positive effect on substance use, family relationships, and runaway behavior [16]. For this analysis, we therefore classified shelter use as a health-related behavior and a form of self-care.

Research examining service utilization among street youth suggests that many who could benefit from shelter services do not access them regularly [10,17–21]. Pergamit and Ernst [19] identified three central reasons for poor service utilization among street youth: not knowing services exist; not knowing where to find services; and feeling like they do not need services. Structural and social barriers, such as long wait lists, restrictive entry rules, fear of violence, confidentiality concerns, unrealistic provider expectations, and perceived stigmatization also discourage street youth from accessing shelters [18,20,22,23]. Programs designed to aid homeless adults or families with children may lack the expertise to support street youth, resulting in negative shelter experiences [1,24]. Research among San Francisco street youth found low proportions of shelter use among African-Americans (22%) and whites (14%), although reasons for shelter avoidance differed by race/ethnicity [20]. Given that many street youth engage in illegal activities for survival, fear of legal repercussions deters high-risk youth from seeking help, thereby reinforcing a cycle of risky behaviors, avoidance of services, and subsequent health consequences [1,18].

The degree to which service utilization among street youth is a function of the social environment, particularly social networks, is not well understood. Social networks represent groups in which members can influence peer norms and practices through interpersonal relationships that facilitate or hinder exposure to risk [25,26]. Several studies have demonstrated that social network dynamics are associated with health-related behaviors, which in turn affect personal health outcomes. Christakis and Fowler [27] found that peer behavior in one's extended social networks mitigated or reinforced obesity. Homeless youth in networks with more substance users report increased substance and alcohol use [28]. Rice et al. [29] reported competing influences of pro-social and HIV risk peers on sexual risk and drug taking behavior among homeless youth. Similarly, pro-social peers may model self-care behaviors, such as shelter utilization. Although existing literature discusses the association between networks and risky behavior, there is limited research on the specific impact of social networks on street youths' service utilization behavior, despite the mediating role services can have on street youths' exposure to risk. Research suggests that peer support from street networks may facilitate street youths' own service utilization [22], and that street youth affiliated with different peer groups and street subcultures report

varying levels of service utilization [6]. An understanding of network behavioral norms and whether they impact street youths' shelter use could inform interventions that encourage and facilitate shelter use, thereby improving youths' health outcomes.

Objectives

We examined the cross-sectional relationship between street youths' shelter use and social network characteristics. We also examined how these network characteristics are associated with shelter use over time.

Methods

Research design and sample

Our study recruited youth ages 15–24 years old from streets and street youth programs in San Francisco. Eligibility criteria included having been unstably housed in the prior 6 months, defined as “having to stay two nights or more in a place that is not your home,” or “not having a home, including having to stay in a shelter, outdoors, a squat, with a stranger or someone not known well, a car, public transportation, or hotel.” Youth were excluded if they were acutely emotionally distressed or visibly intoxicated or high, as these states impeded their ability to provide informed consent. All youth were offered condoms, a list of local services, and linked to local providers, if needed.

Recruitment was carried out through venue-based sampling, a method of recruiting people at places where they are known to congregate. We selected 28 venues in three San Francisco neighborhoods, based on prior ethnographic research and provider consultation described elsewhere [20,30–32].

Data collection

An audio computer-administered self-interview survey was used to collect demographics, history of homelessness, and participation in street economy. A trained interviewer then asked each youth (i.e., egos) to name up to 20 individuals (i.e., alters) with whom they spend time, pool resources, have sex and/or inject drugs. “Ego” refers to the interviewed youth respondent, and “alter” refers to peers named by the ego. Egos were asked to list their relationship with each alter and report alters' age, race, gender, and housing status (including shelter utilization).

Due to limited tracking resources, an envelope was opened at the end of each interview to randomly select a subsample of youth for tracking and a 6-month follow-up interview, using a similar questionnaire to that used at baseline. Because the original study tracked youth for notification of STI test results, youth completed extensive forms that captured their phone numbers, e-mails, contact information for people they stayed in touch with, frequent hangouts, and organizations or individuals from whom they received services [33]. To maximize retention, youth were tracked by their original interviewer. The research team also kept an ongoing street presence, maintained provider relationships, and met weekly to strategize retention of hard-to-reach cases.

Youth provided informed consent, per the rights of minors ages 15 and above in California to consent to their own medical care, if they live independently and support themselves by any means [34]. Youth were reimbursed \$20 for completing the survey. This study protocol was approved by the University of California at San Francisco's Institutional Review Board.

Variables

Ego characteristics—Gender was categorized as male and female. Transgender youth were excluded from analysis. Race/ethnicity was categorized as African-American, white, and other (Native American/Alaskan, Latino, Pacific Islander/Polynesian, Mixed, Don't know, Refused), based on self-identification. Age was analyzed as a continuous variable. Severity of homelessness, or “literal homelessness,” in the past 6 months was defined as “having lived on the street, in a park or abandoned building, on the beach, in a vehicle, with a stranger or someone you did not know well, or in a “John's” (paying sexual partner's) house or apartment.”

Egos were classified as shelter users if they chose “transitional housing” or “shelter” from a list of responses to either of two questions: “Where do you live most of the time?” and “Where did you stay last night?” In addition, if egos indicated they stayed in at least one of a list of shelters in the past 3 months (“Where have you stayed in the past 3 months?”), or chose “shelter or mission” from a list of responses to the question, “In the past month, what other places have you lived in?”, they were classified as shelter users.

Personal network characteristics—Personal network refers to each ego's self-identified network. For our analysis, each personal network included up to 20 alters named during the interview. Degree (total number of alters) was calculated for each ego. Alters were classified as shelter users if egos chose “shelter or mission” from a list of responses to either of two questions: “Where does [alter] live most of the time?” and “In the past month, in what other places has [alter] lived?” Measurement of shelter use in personal networks is therefore based on the ego's perception, rather than a direct report from the alters themselves. Shelter use in personal networks was analyzed as both a binary (“Does ego have any alters using shelters in their network?”) and continuous variable (total number of alters using shelters). Changes in personal network shelter use measures and overall personal network size between baseline and follow-up interviews were also calculated.

Component network characteristics—To gain insight into the overall connectivity of street youth networks, a match on full name, aliases, age, race, and gender was performed to identify alters interviewed as egos, or named by multiple egos. Matches were then used to join otherwise distinct personal networks into larger components, or subgroups of individuals in which any two individual members are connected. Variables for shelter use in component networks and changes between baseline and follow-up interviews were then calculated in the same manner as for personal networks.

Analysis

Simple logistic regression was used to examine bivariate relationships between ego's shelter use and demographics. For cross-sectional bivariate analyses, two baseline network measures were examined in relationship to ego's baseline shelter use: (I) any alter shelter use; and (II) total number of alter shelter users. Multivariate cross-sectional models I and II then adjusted for age, race, gender, literal homelessness, and network size.

For longitudinal bivariate analyses, two baseline network measures were examined in relationship to ego's shelter use at follow-up: (III) any alter shelter use; and (IV) total number of alter shelter users. An additional measure (V) examined the effect of change in number of alter shelter users between baseline and follow-up on ego shelter use at follow-up. Multivariate longitudinal models III–V adjusted for age, race, gender, and literal homelessness since baseline. Multivariate model III–IV also adjusted for total network size at baseline. Multivariate model V adjusted for change in network size. Personal and component networks were analyzed separately. However, given the similar findings, only

component network results are presented here. Statistical significance was set at $p < .05$. All statistical analyses were conducted using Statistical Analysis System (SAS) 9.1.3 (SAS Institute, Cary, NC).

Results

A total of 265 youth were recruited from the street (81.9%) and two street youth programs (a shelter and a transitional housing program) (18.1%). Of these, 188 were randomly selected for tracking over a 6-month period. Youth not selected for tracking did not differ significantly from those tracked by any analysis variables. Of those tracked, 138 were administered a follow-up interview. Youth not located for follow-up were more likely to report literal homelessness at the baseline interview ($p = .02$), but did not differ by demographics or shelter utilization. Due to small numbers and limited power, four transgender youth in the tracked subsample were removed from analysis. Key questions used to classify shelter use were not asked of the initial study participants. Therefore, an additional 26 youth were excluded, resulting in a final sample size of 108.

Of the final 108 youth, the majority were male ($n = 65$, 60.2%). Whites accounted for the largest proportion ($n = 51$, 47.2%), followed by African-Americans ($n = 32$, 29.6%) and other race/ethnicity ($n = 25$, 23.1%) (Table 1).

Baseline versus follow-up

At baseline, 57.4% of youth reported being literally homeless in the prior 6 months and 38% reported using shelters. Median age was 20.5 years (Table 1). Median number of alters per ego was 8, with a range of 0–15. Twenty-nine (26.9%) egos were in components with shelter users.

At follow-up, 58.3% of youth reported being literally homeless in the prior 6 months, and 29.6% reported using shelters. Median age was 21 years (Table 1). Median number of alters per ego was 7, with a range of 0–11. Seventeen (15.7%) egos were in components with shelter users.

Cross-sectional analysis

In bivariate cross-sectional analysis, youth of other race/ethnicity reported much higher shelter use (72%) than either whites or African-Americans (21.6% and 37.5%, respectively), and had increased odds of reporting shelter use than white youth (OR: 9.4, 95% CI: 3.1–28.1, $p < .0001$). Youth reporting literal homelessness reported less shelter use than youth not reporting literal homelessness (22.6% vs. 58.7%, respectively; OR: .21, 95% CI: .09–.47, $p = .0002$). Youth in components with shelter users reported more shelter use than youth not in components with shelter users (69% vs. 26.6%, respectively; OR: 6.1, 95% CI: 2.4–15.6, $p = .0001$). A one-person increase in the number of component members using shelters was associated with a two-fold increased odds of ego's shelter use (OR: 2.3, 95% CI: 1.4–3.6, $p = .0008$). Gender, age, African-American race/ethnicity, degree, and component size were not associated with shelter use.

In multivariate cross-sectional analyses, youth of other race/ethnicity and being literally homeless remained significantly associated with shelter use in all models, with youth of other race/ethnicity reporting more shelter use compared with whites, and youth reporting literal homelessness also reporting less shelter use (Table 2). Youth in components with shelter users reported more shelter use than did youth not in components with shelter users (Model I: OR: 5.86, 95% CI: 1.65–20.81, $p = .006$) (Table 2). A one-person increase in the

number of component members using shelters was associated with a two-fold increased odds of ego's shelter use (Model II: OR: 2.16, 95% CI: 1.16–4.02, $p = .02$).

Longitudinal

In bivariate longitudinal analyses, African-Americans and youth of other race/ethnicity reported more shelter use (46.9% and 48%, respectively) at follow-up than white youth (9.8%), and had increased odds of reporting shelter use compared to white youth (OR: 8.12, 95% C.I.: 2.6–25.8, $p = .0004$ and OR: 8.49, 95% C.I.: 2.5–28.5, $p = .0005$, respectively). Youth in components with shelter users at baseline reported more shelter use at follow-up than youth not in components with shelter users at baseline (58.6% vs. 19%, respectively; OR: 6, 95% CI: 2.4–15.3, $p = .0001$). A one-person increase in the number of component members using shelters at baseline was associated with increased odds of ego's shelter use at follow-up ($p < .0001$). A one-person increase in the overall component size between baseline and follow-up was associated with slightly increased odds of shelter use (OR: 1.17, 95% CI: 1.02–1.34, $p = .02$). Gender, literal homelessness, age, degree, and change in number of component shelter users were not associated with shelter use at follow-up.

In multivariate longitudinal analyses, youth in components with shelter users at baseline had increased odds of shelter use at follow-up (Model III: OR: 4.95, 95% CI: 1.42–17.3, $p = .01$) (Table 3). A one-person increase in the number of shelter users in a youth's component at baseline was also associated with three-fold increased odds in ego's shelter use at follow-up (Model IV: OR: 3.15, 95% CI: 1.5–6.8, $p = .004$). Adjusting for change in overall component size, a one-person increase in the number of component shelter users was associated with decreased odds of ego shelter use at follow-up (Model V: OR: .53, 95% CI: .29–.98, $p = .01$). Change in overall component size remained significantly associated with shelter use at follow-up (Model 5: OR: 1.26, 95% CI: 1.05–1.52, $p = .04$).

Discussion

Our study examined the association of social network characteristics with shelter utilization among street youth in San Francisco. At baseline, we found that having shelter users in one's network was associated with increased odds of shelter use. We also found that the more shelter users one had in one's network, the greater the odds of shelter use oneself, independent of overall network size. Longitudinally, we found that being in networks with shelter users at baseline and an increase in network size were associated with greater odds of shelter use at follow-up.

Limitations

Although similarly low levels of runaway shelter use have been reported in other studies [18], those data were not based on street-recruited samples, making comparison difficult. Also, cross-sectional analysis does not allow for assessment of causality. For example, the baseline association with network shelter use could be due to egos meeting network members in shelters. Although we are unable to determine where youth in this study met, another study found that homeless youth meet few members of their social networks in shelters [35]. Network members' shelter use was also based on ego's perception, rather than self-report by alters. Although this could be considered a limitation, perception versus reality of social norms in one's peer group can play a significant role in youths' decision-making processes and behavior [36]. Several recruited youth were excluded from analysis, because they did not have the opportunity to answer all questions used to classify the outcome variable (shelter use). Transgender youth were also excluded due to small numbers. Re-analysis including these excluded youth did not change the significance of our findings. Connecting distinct personal networks into larger connected components is dependent on the

ability to match identifying information for a single individual, which can be challenging for a transient population that frequently utilizes aliases. Lastly, the findings from this San Francisco-based study may not be generalizable to other street youth populations.

The positive association between being in networks with shelter users and ego's reported shelter use suggests either that shelter users tend to cluster together or, given our longitudinal findings, that shelter use may spread through youth networks. This suggests, in turn, that the influential nature of social networks might be harnessed to positively affect youths' perception and utilization of shelters. Our finding that network size was not significantly associated with baseline shelter use also supports the idea that perception of peer shelter use may influence youth behavior, regardless of how many peers one has overall. Surprisingly, we found that an increase in the number of network shelter users between baseline and follow-up was associated with a decrease in ego shelter use, contradicting our other results. This may be due to the instability of having low numbers of shelter users in the sample overall. An association between knowing shelter users and decreased shelter use may also indicate negative peer influences [29]. For example, if more peers describe negative shelter experiences than positive, youth may be less likely to use shelters themselves. Future research is needed into how positive and negative norms related to service utilization travel through street youth networks and risk subgroups of different size and structure. Qualitative and quantitative research could also consider how shelter users are positioned in their social networks, and whether peer outreach campaigns that encourage youth with positive shelter experiences to positively influence perception of shelters among hard-to-reach street youth in their networks could encourage both service uptake and program improvement.

Youth of color reported more shelter use than white youth. Race/ethnicity groups with smaller numbers were collapsed into a single category, "other," reducing statistical power. Given the higher reports of shelter use among youth of "other" race/ethnicity, however, one might consider how social networks and street identity within these groups compare to those of African-Americans or whites, as well as to each other. For example, among San Francisco street youth, African-Americans express perceived stigma over being labeled "homeless," while whites express both pride in being a member of street culture and resistance to the conditional rules of access imposed by shelters [20]. It may be that youth of other race/ethnicity also have distinct experiences and perceptions of their street status that directly relate to their shelter use behavior. It may also be that these youth lack opportunities to form homologous groups by race/ethnicity, leaving them feeling exposed, less supported, and more inclined to take advantage of shelter resources. Understanding the social factors at home and on the streets that impact the behavior of youth of color could inform shelter services and outreach planning.

The finding that shelter use did not significantly differ by gender conflicts with prior research that determined women are more likely to use services than men [18,21,37]. Prior quantitative and ethnographic work suggests that females experience increased vulnerability to street violence, and that social networks may differentially affect their risk compared with males [2,5,8,38–40]. Further ethnographic work is needed to explore how the decision to utilize shelters may be approached differently by male and female street youth.

Literal homelessness, a measure of homelessness severity, was associated with decreased odds of shelter use, emphasizing that youth in greater need of shelters are not accessing them. This result supports findings from other studies that identify severity or duration of homelessness as a correlate of high-risk behavior, increased HIV risk, and less service utilization [37,38]. Research into the social network composition of literally homeless youth

may indicate whether network-based interventions could positively impact their shelter utilization.

Implications

Prior research suggests that street youth are at increased risk of physical, emotional, and mental trauma, yet few report regular shelter utilization. Our finding that shelter users seem to cluster together, and that extended network shelter use is associated with increased odds of one's own shelter use suggests that a network norm of shelter use may influence street youth's decisions regarding shelter use. Understanding how positive and negative norms pass through street youth networks, and how they influence health-related behavior, such as shelter use, could inform innovative, network-based interventions that encourage increased service uptake among hard-to-reach street youth populations.

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IMPLICATIONS AND CONTRIBUTION

This study of street youth demonstrates that shelter users seem to cluster together and network shelter use is associated with increased odds of youths' own shelter use, both cross-sectionally and over time. Understanding how network behavior influences service utilization may inform network-based interventions that encourage service uptake among street youth.

Table 1

Demographics, network characteristics, and shelter utilization at baseline and follow-up

	<u>Baseline</u>	<u>Shelter users</u>		<u>Follow-up</u>	<u>Shelter users</u>	
	n = 108	n = 41	%	n = 108	n = 32	%
Gender						
Male	65	24	36.9	65	21	32.8
Female	43	17	39.5	43	11	25
Race/ethnicity						
White	51	11	21.6	51	5	9.8
Black/African-American	32	12	37.5	32	15	46.9
Other ^a	25	18	72	25	12	48
Literal homelessness						
No	46	27	58.7	45	21	33.3
Yes	62	14	22.6	63	11	24.4
Median age	20.5	20		21	21	
Component networks						
Median degree (# alters)	8	8		7	9	
Median # shelter users	0	0		0	0	
Any shelter use?						
No	79	21	26.6	91	21	23.1
Yes	29	20	69	17	11	64.7

^a Other race/ethnicity includes Latino, Native American/Alaskan, Pacific Islander/Polynesian, Mixed, Don't Know, Refused.

Table 2

Cross-sectional multivariate association between baseline network characteristics and shelter use

	Model I^a				Model II^b			
	β	AOR	95% CI	P	β	AOR	95% CI	P
Gender (ref = Male)	-.06	.95	.35-2.59	.91	-.11	.90	.33-2.46	.84
Race/ethnicity (ref = White)								
Black/African-American	-.30	.74	.21-2.65	.64	-.69	.50	.13-1.95	.32
Other ^c	2.05	7.73	2.1-28.6	.002	1.92	6.83	1.9-24.7	.003
Literal homelessness (ref = No)	-2.02	.13	.04-.42	.0006	-1.98	.14	.04-.44	.0007
Age	.01	1.01	.80-1.29	.92	1.92	6.83	.81-1.30	.86
Component size	.04	1.04	.95-1.14	.35	-1.98	1.02	.92-1.12	.68
Component shelter use								
Any shelter use? (ref = No)	1.77	5.86	1.65-20.81	.006	—	—	—	—
# Alters using shelters	—	—	—	—	.77	2.16	1.16-4.02	.02

^aModel I examines the association of ego shelter use and component shelter use: “any shelter use?”, adjusting for demographics and component size.

^bModel II examines the association of ego's shelter use and component shelter use: “# Alters using shelters,” adjusting for demographics and component size.

^cOther race/ethnicity includes Latino, Native American/Alaskan, Pacific Islander/Polynesian, Mixed, Don't Know, Refused.

Table 3

Longitudinal multivariate association between baseline network characteristics and shelter use at follow-up, and changes between baseline and follow-up network characteristics and shelter use at follow-up

	Model III ^d				Model IV ^b				Model V ^c			
	β	AOR	95% CI	P	β	AOR	95% CI	P	β	AOR	95% CI	P
Gender (ref = male)	-.40	.67	.24-1.86	.44	-.55	.58	.20-1.67	.31	-.41	.66	.25-1.78	.41
Race/ethnicity (ref = white)												
Black/African-American	2.33	10.3	2.7-39.6	.0007	1.96	7.08	1.8-27.5	.005	2.22	9.19	2.6-33.1	.0007
Other ^d	2.25	9.44	2.3-38.6	.002	2.04	7.69	1.9-31.5	.005	2.29	9.86	2.6-38	.0009
Literal homelessness (ref = No)	.03	1.20	.92-1.56	.19	.17	1.23	.91-1.6	.22	-.04	.96	.34-2.72	.94
Age	.18	1.04	.35-3.06	.95	.21	1.18	.41-3.7	.70	.12	1.13	.86-1.46	.37
Baseline component size	.03	1.03	.96-1.12	.41	-.02	.98	.89-1.07	.60	—	—	—	—
Component shelter use												
Any shelter use? (ref = No)	1.60	4.95	1.42-17.3	.01	—	—	—	—	—	—	—	—
# Alters using shelters	—	—	—	—	1.15	3.15	1.5-6.8	.004	—	—	—	—
Component changes												
Change in component size	—	—	—	—	—	—	—	—	.23	1.26	1.05-1.52	.04
Change in # shelter users	—	—	—	—	—	—	—	—	-.63	.53	.29-.98	.01

^aModel III examines the association of ego shelter use and baseline component shelter use: “any shelter use?”, adjusting for demographics and component size.

^bModel IV examines the association of ego shelter use and baseline component shelter use: “# Alters using shelters,” adjusting for demographics and component size.

^cModel V examines the association of ego's shelter use and change in component size, and change in # shelter users between baseline and follow-up.

^dOther race/ethnicity includes Latino, Native American/Alaskan, Pacific Islander/Polynesian, Mixed, Don't Know, Refused.