



Descriptive and injunctive network norms associated with nonmedical use of prescription drugs among homeless youth



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HIGHLIGHTS

- 23.61% of homeless youth (n = 1046) reported non-medical use of prescription drugs (NMUPD).
- Significant associations were found between perceived network norms (descriptive and injunctive) and NMUPD among this at-risk population.
- The associations between network norms and NMUPD varied by network type.
- Findings also indicate associations between other drug use (marijuana, heroin and injection drug use) and NMUPD.
- Interventions designed to target social network norms of NMUPD might be a viable strategy to reduce NMUPD among homeless youth.

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ABSTRACT

Background: Nonmedical use of prescription drugs (NMUPD) among youth and young adults is being increasingly recognized as a significant public health problem. Homeless youth in particular are more likely to engage in NMUPD compared to housed youth. Studies suggest that network norms are strongly associated with a range of substance use behaviors. However, evidence regarding the association between network norms and NMUPD is scarce. We sought to understand whether social network norms of NMUPD are associated with engagement in NMUPD among homeless youth.

Methods: 1046 homeless youth were recruited from three drop-in centers in Los Angeles, CA and were interviewed regarding their individual and social network characteristics. Multivariate logistic regression was employed to evaluate the significance of associations between social norms (descriptive and injunctive) and self-reported NMUPD.

Results: Approximately 25% of youth reported past 30-day NMUPD. However, more youth (32.28%) of youth believed that their network members engage in NMUPD, perhaps suggesting some pluralistic ignorance bias. Both descriptive and injunctive norms were associated with self-reported NMUPD among homeless youth. However, these varied by network type, with presence of NMUPD engaged street-based and home-based peers (descriptive norm) increasing the likelihood of NMUPD, while objections from family-members (injunctive norm) decreasing that likelihood.

Conclusions: Our findings suggest that, like other substance use behaviors, NMUPD is also influenced by youths' perceptions of the behaviors of their social network members. Therefore, prevention and interventions programs designed to influence NMUPD might benefit from taking a social network norms approach.

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1. Introduction

1.1. NMUPD among youth and young adults

The nonmedical use of prescription drugs (NMUPD) is a serious public health problem in the United States (White House Office of National

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Drug Control Policy, 2011). NMUPD is defined as using medications that were not prescribed or were taken only for the experience or feeling that they caused, with the most commonly misused drugs being opioid pain relievers, stimulants, tranquilizers, and sedatives. The most recent data from the National Survey on Drug Use and Health indicates that an estimated 655,000, or 2.6% of adolescents' aged 12 to 17 reported NMUPD in 2014. For those aged 18 to 25, an estimated 1.6 million, or 4.4% of young adults, reported NMUPD in the same year (Center for Behavioral Health Statistics and Quality, 2015). These numbers are concerning, particularly given that NMUPD is associated with a variety of negative health correlates for young adults, such as sexual risk behaviors, mental health concerns, and drug overdose (Drazdowski, 2016; Zullig & Divin, 2012).

1.2. Social norms of NMUPD

Perception of social norms is an important aspect of drug use. Norms are defined as perceived rules or properties of a group that typify specific beliefs around what behaviors are considered acceptable or common within that group (Kincaid, 2004). Perceived social norms form a crucial component of many common theories of health behaviors (Bandura, 1977; Fishbein, Middlestadt, & Hitchcock, 1994; Fisher & Fisher, 1992), and have been linked to both behavior and behavioral intentions (Barrington et al., 2009). Perceived norms have been generally characterized as descriptive or injunctive norms. Descriptive norms indicate the perceived prevalence of a behavior in a group, whereas injunctive norms refer to perceived approval or disapproval of a behavior (Davey-Rothwell & Latkin, 2007).

Social network analysis provides a fruitful means through which one can assess the prevalence of both descriptive and injunctive norms in naturally occurring social groups (Latkin et al., 2009). There is an important distinction between “social norms” and “network norms”. For example, most studies assessing social norms have used survey data, in which participant respond to a “question regarding the level of drug use their peers engage in” and those responses are used to assess perceived social norms. Researchers have found this to be a little problematic because of the ambiguity regarding who these peers are (i.e., the specificity of the reference group. In a recent meta-analysis, Borsari and Carey (2003) reported that the degree to which youth were able to correctly estimate their peers' drug use depended on the degree of familiarity and proximity of the relationship. Youth generally tend to know better what their close friends are doing compared to a hypothetical or typical peer group (Pape, 2012). The use of network methods partially mitigates this issue because respondents are asked about a very specific network (i.e. people they regularly communicate or interact with) instead of a hypothetical group of people.

Extant research shows that network norms are strongly associated with substance use behavior. However, most of the research describing the association between network norms and drug use behaviors has tended to focus either on college students, especially in relationship to alcohol and marijuana use (Barrett, Darredeau, Bordy, & Pihl, 2005; McCabe, Knight, Teter & Wechsler, 2005; Rabiner et al., 2009) or regarding adult persons who inject drugs (Knowlton, Hua, & Latkin, 2005; Kottiri, Friedman, Neaigus, Curtis, & Des Jarlais, 2002; Latkin, Kuramoto, Davey-Rothwell, & Tobin, 2010).

Additionally, studies have also found that norms are not one-dimensional by nature. More specifically, different kinds of referent groups contribute different kinds of norms surrounding both risk and protective behaviors. For example, while one's family members might promote norms around abstinence, peer groups might promote norms promoting substance use behaviors (Latkin et al., 2009). Conventional wisdom dictated that homeless youth have strained family relationships and their social networks are only comprised of other similarly situated street peers (Whitbeck, 2009). However, evidence from various studies suggests that homeless youth's relationships are not confined to street associations alone (Rice, Milburn, & Rotheram-Borus, 2007; Wenzel et al., 2012; Whitbeck & Hoyt, 1999). Homeless youth relationships involve

parents, other relatives, home-based peers (peers to whom homeless youths were connected before they became homeless), and social service program staff members (de la Haye et al., 2012; Ennett, Bailey, & Federman, 1999; Rice, Milburn, & Monro, 2011). To the best of our knowledge, no study has yet network norms regarding NMUPD vary based on different referent groups in the homeless youth population.

Though less commonly researched, some studies have explored social norms regarding NMUPD. A recent systematic review examined risk and protective factors associated with NMUPD among youth aged 14 to 24 from a social ecological perspective and included 7 longitudinal studies, 36 cross-sectional studies, and 7 reviews (Nargiso, Ballard, & Skeer, 2015). In the interpersonal domain related to peers, the review found that peer approval of substance use (an injunctive norm) and NMUPD were strongly associated, and that a close friend's use of substances (a descriptive norm) was one of the strongest and most consistent risk factors for NMUPD (Nargiso et al., 2015). Several of the studies included in the review analyzed data from the National Survey on Drug Use and Health and the majority of the others used convenience samples from schools and colleges.

1.3. NMUPD among homeless youth: individual correlates and the role of social norms

Much less is known about the prevalence of NMUPD among homeless youth and perceived social norms related to nonmedical use of prescription drugs in this population. To the best of our knowledge, this is the first study to investigate associations between social network norms and NMUPD among homeless youth. Extant data from smaller studies of homeless or street-involved youth have reported that 9% to 22% of homeless youth engage in NMUPD (Al-Tayyib, Rice, Rhoades, & Riggs, 2014; Hadland et al., 2014; Rhoades, Winetrobe, & Rice, 2014), which is several times the rate reported in the general population of youth and young adults. One study of 16 to 24 year olds, in which 60% of participants were currently homeless, found that 69% of participants reported lifetime nonmedical use of prescription opioids, tranquilizers, and stimulants (Lankenau et al., 2012).

A vast majority of the literature on NMUPD has been focused on school or college going housed youth (Berenson & Rahman, 2011; Zullig & Divin, 2012). Fewer studies have tried to assess NMUPD specifically among homeless youth (Al-Tayyib et al., 2014; Rhoades et al., 2014). Among youth in the general population, NMUPD has been associated with depression (Zullig & Divin, 2012), post-traumatic stress disorder (PTSD) (Berenson & Rahman, 2011) and use of other substances such as heroin, marijuana and methamphetamine (Lankenau et al., 2012). In samples of homeless youth, NMUPD has been associated with hard drug use, unprotected sex, suicidal ideation and history of foster care (Al-Tayyib et al., 2014; Rhoades et al., 2014). However, beyond these two studies, not much is known about NMUPD among homeless youth.

Notably, interventions attempting to reduce drug use have successfully utilized social networks to disseminate and reinforce behavioral norms that are supportive of protective behaviors related to drug use, especially among hard-to-reach populations (Barrington et al., 2009). Unfortunately, little is known about social norms of NMUPD among homeless youth, leaving researchers and service providers with a dearth of evidence for how to design effective network interventions. Given the paucity of information related to social norms surrounding NMUPD among homeless youth, we sought to understand how social norms regarding NMUPD is associated with self-reported NMUPD in a particularly vulnerable population.

2. Methods

2.1. Procedures

As part of a social network panel study, homeless youth ages 13–24 in Los Angeles ($N = 1046$) were surveyed between October 2011 and

June 2013. Participants were recruited from three homeless youth drop-in centers in Hollywood and Santa Monica across 4 different waves. Each wave of data collection was approximately 6 months apart. Youth were invited to participate at multiple waves, but only their baseline survey data were used in the current study. Any client receiving services at each respective agency was eligible to participate; this included youth living outdoors or in places not meant for human habitation, youth in shelters or transitional housing programs, and youth living with family, friends, or relatives but spending most of their time on the street. Recruitment was conducted for 19 days at each agency during each wave; during each recruitment period, researchers were present at the agency to approach youth for the duration of service provision hours. Signed voluntary informed consent was obtained from each youth, with caveats that child abuse and suicidal and homicidal intentions would be reported to appropriate authorities. Informed consent was obtained from youth 18 years of age and older and informed assent was obtained from youth 13 to 17 years old. The Institutional Review Board waived parental consent, as homeless youth under 18 years are unaccompanied minors who may not have a parent or adult guardian from whom to obtain consent.

The study consisted of two parts: a computerized self-administered survey and a social network interview. The social network interview was conducted using a free-recall name generator (Rice, Barman-Adhikari, Milburn, & Monro, 2012) to collect names of participants' network members, defined as someone with whom the youth had face-to-face, phone, or Internet contact in the last month. The social network-mapping interview conducted face-to-face by a trained research staff member. The research team used an iPad application to create the network map. Respondents are then asked to list as many people as they can. Additionally, 17 follow-up questions were asked about specific types of interactions with each network member, and their perceptions of these youths' behaviors. All participants received \$20 in cash or gift cards as compensation for their time. The Institutional Review Board at the [redacted for review] approved all survey items and procedures. More detailed information about the study's design and data collection procedures may be found elsewhere (blinded for review).

2.2. Measures

2.2.1. NMUPD and substance use behaviors

Recent NMUPD was assessed by asking how many times a participant took a prescription drug without a doctor's prescription, used more of the drug than what was prescribed, or took the drug more often than prescribed within the last 30 days (Eaton et al., 2011; Youth Risk Behavior Survey [YRBS] [CDC, 2012]). Prescription drugs included sedatives, stimulants and opioids, however youth were not asked to separately specify which type of prescription drug that they had used nonmedically. Similarly, using items adapted from the YRBS (Eaton et al., 2011), we assessed for past 30-day use of binge drinking and marijuana, heroin, and injection drug use. Binge drinking was defined as having 5 or more drinks of alcohol in a row, that is, within a couple of hours.

2.2.2. Sociodemographic characteristics

Demographics included age, time spent homeless (in years), gender (male vs. female), ethnicity (White, Black, Latino/a, and other and mixed race), and sexual orientation (heterosexual vs. lesbian, gay, bisexual, or queer [LGBQ]). Youth experiencing literal homelessness were defined as those who indicated that they were currently staying in a shelter (emergency or temporary), a stranger's home, hotel, motel, street, beach, tent or campsite, abandoned building, car, or bus (vs. those living with their biological family, foster family, relative, friend, group home, sober living facility, transitional living program, or own apartment but still spent considerable time on the streets).

2.2.3. Health service use

The frequency of past month health service utilization was assessed with the question; "I have gone to a place(s) for medical or health care services." Responses ranged from "every day or almost every day" to "not at all this month," and then were dichotomized to indicate health service use versus non-use.

2.2.4. Depression

Depressive symptoms were assessed by the 10-item Center for Epidemiological Studies Depression Scale (CES-D; Kohout, Berkman, Evans, & Cornoni-Huntley, 1993).

2.2.5. Social norms of NMUPD

We assessed both descriptive as well as injunctive norms. In order to assess descriptive and injunctive norms regarding NMUPD, after youths finished nominating their network members, they were asked: "Out of the people you nominated, how many of them engage in NMUPD, would encourage and object you engaging in NMUPD?" This was calculated as the number of people specified by relationship type (i.e., street peers, home-based peers, family members (which included both biological and foster family, extended relatives and siblings, and finally case-workers/staff members) whom respondents thought engaged in or perceived would object to or encourage them to engage in NMUPD. These network members are all mutually exclusive. However, every youth could have more than one network member type in their total network (i.e. youth who have a family member engaging in NMUPD could also have a street-peer engaging in NMUPD).

To account for varying sized networks, we created network member proportion variables who either engaged in NMUPD, objected to or encourage NMUPD using the total number of network members nominated in the last 90 days as the denominator. However, these proportion variables were skewed as well. Typically, in the social network literature, the way skewness has been handled is to recode proportion into categorical variables (Barrington et al., 2009; Davey-Rothwell & Latkin, 2007; Latkin et al., 2010; Tucker et al., 2012; Tyler, 2013; Valente & Auerswald, 2013). The median is used to create a threshold for measures that are not uniformly distributed (Wang, Fan, & Willson, 1996). Based on the median, the descriptive norm and the injunctive norms (encourage and object NMUPD) were consequently dichotomized as either no network member (coded as 0) or at least one or more network members (coded as 1) who participants believed engaged in NMUPD or would encourage or object to them engaging in NMUPD.

2.3. Analytic approach

Data analyses were conducted using SAS Version 9.2 (SAS Institute Inc., 2008). Analyses examined bivariate associations between socio-demographic variables and perceived NMUPD social norms and self-reported NMUPD, using chi-square statistics for categorical variables and *t*-tests for continuous variables. Two-sided significance from Pearson's chi square tests was reported for all categorical variables and *t*-tests were used for continuous level variables. The degree of freedom for all binary variables was 1. Bivariate tests were not conducted for any of the service-related network variables because of the sparse nature of the cell sizes. Additionally, because these service-related networks could not be independently included in bivariate and multivariate logistic regression models, they were dropped from the subsequent bivariate and multivariate logistic analyses.

To evaluate the significance of the independent associations between perceived NMUPD norms and self-reported NMUPD, logistic regression was conducted. In order to preserve statistical power and degrees of freedom (because of the large number of variables being examined), bivariate analyses were first conducted to examine unadjusted associations between study variables and outcome measures. Any variable that was significantly associated with the outcome at $p < 0.10$ was retained in the multivariate model. Multivariate models were then

constructed based on these analyses (Hosmer & Lemeshow, 2004). Sociodemographic characteristics (i.e. age, gender, sexual orientation, race/ethnicity) were controlled for regardless of their significance in bivariate analysis. Significance levels were adjusted within each hypothesis using the step-down Bonferroni (Holm) procedure (SAS, 9.2.). The benefit of using step-down methods is that the tests are made more powerful (smaller adjusted p -values) while, in most cases, maintaining strong control of the familywise error rate (Holm, 1979).

Since we were interested in whether or not youth had initiated use and not on dependence or abuse, a dichotomous variable was created to indicate 0 = “no NMUPD use” versus 1 = “recent NMUPD use.” It is important to note that dichotomization does not significantly reduce statistical power and yields meaningful effect sizes (i.e. odds ratios) (Farrington & Loeber, 2000). Individual ORs were interpreted in accordance to Chen, Cohen, and Chen’s (2010) guidelines for small (OR = 1.46), medium (OR = 2.49), and large (OR = 4.14) effect sizes when predicted outcomes are present in at least or >10% of the general population. Tjur R-square (Tjur, 2009) was also used to assess overall strength of association. Tjur R2 was 0.28, which represents a moderate-to-strong effect size (Ferguson, 2009). Furthermore, multivariate analyses were restricted to participants without missing data for the variables included in the models. Therefore, the sample size for the multivariate model is smaller than the study’s total sample size ($n = 969$).

3. Results

3.1. Descriptive statistics

Socio demographic characteristics are presented in Table 1. The sample was predominantly male (70.27%) and heterosexual (75.10%). Average age of participants was 21.34 years. In terms of race/ethnicity, Whites represented the largest group (38.24%). A total of 247 youth (23.61%) reported engaging in NMUPD in the past 30 days. Participants differed significantly in their nonmedical use of prescription drugs by variables including race/ethnicity; health care access in the past 30 days; use of heroin, marijuana, or injection drugs in the past 30 days; and depressive symptoms. Participants who reported recent NMUPD compared to those who did not were more likely to be White (44.53% vs. 36.30%, $p < 0.05$) and less likely to be African-American (14.75% vs. 26.03%, $p < 0.0001$). Youth who accessed health care in the past 30 days were also more likely to report current NMUPD (51.74% vs. 39.41%, $p < 0.01$). Additionally, use of other substances was significantly associated with self-reported NMUPD, with increased rates of NMUPD for participants who reported using heroin (45.75% vs. 5.51%, $p < 0.0001$), marijuana (64.78% vs. 54.19%, $p < 0.01$), or injection drug use (43.72% vs. 4.63%, $p < 0.0001$). On average, participants who reported recent NMUPD had higher depression scores on the CES-D than those who did not report NMUPD ($M = 18.79$ vs. 17.02 , $p < 0.01$).

3.2. Network norm characteristics

Social network norm characteristics are also presented in Table 1. A total of 360 participants (32.28%) reported having any network members (aggregated across all network types) that they perceived would engage in NMUPD. There were variations when this was stratified by network type. More youth thought that their street-based peers were more likely to engage in NMUPD (18.99%) compared to home-based peers (9.02%), family-based network members (3.89%) and service-related network members (0.38%) engaging in NMUPD. In regards to injunctive norms, more youth believed that their network members would object to them engaging in NMUPD relative to perceptions of receiving encouragement from their network members.

Bivariate statistics indicated that participants differed significantly in their self-reported NMUPD based on these social norms especially by network type. Youth were more likely to engage in NMUPD if they had at least one street-based peer (32.68% vs. 17.27%, $p < 0.0001$) or

home-based peer (16.93% vs. 6.51%, $p < .0001$) who engage in NMUPD. Similarly, youth were more likely to endorse recent NMUPD if they had at least one street-based peer (26.88% vs. 10.64%, $p < 0.0001$) or home-based peer (9.84% vs. 2.88%, $p < .0001$) who encouraged them to engage in NMUPD. On the contrary, youth who had at least one family member who objected to NMUPD, youth were less likely to engage in NMUPD (45.25% vs. 58.69%, $p < .0001$).

3.3. Bivariate and multivariate logistic regression analyses

Bivariate and multivariate statistics are presented in Table 2. As noted above, only variables significant in the bivariate model at the $p < 0.10$ level were included in the bivariate model. In the multivariate model, having accessed health care in the last 30 days, recent heroin, marijuana, injection drug use, and NMUPD. Youth who accessed health care in the past 30 days were 1.91 times more likely to engage in NMUPD ($p < 0.001$). Youth who reported engaging in recent heroin, marijuana, and injection drug use were 4.50 times ($p < 0.0001$), 2.64 times ($p < 0.0001$) and 6.85 times ($p < 0.0001$) more likely to engage in NMUPD, respectively. Youth who perceived that at least one street-based network member engaged in NMUPD were 1.49 times more likely to report engaging in NMUPD themselves ($p < 0.001$). Alternatively, youth who perceived that at all family-based people in their network would object to them engaging in NMUPD were 31% less likely to engage in NMUPD ($p < 0.001$). When the final model was rerun using the more conservative Bonferroni step-down corrected alpha-levels, all variables remained significantly associated with recent NMUPD.

4. Discussion

The current study advances our understanding of NMUPD among homeless youth, a high-risk and especially hard-to-reach population, in many ways. First, this study, to the best of our knowledge, is the first to demonstrate an association between perceived norms of NMUPD and self-reported NMUPD among homeless youth. Both descriptive and injunctive norms were strongly and significantly associated with NMUPD, a finding consistent with previous research on social norms of NMUPD, although previous studies focused on housed and college attending populations (Meisel & Goodie, 2015).

While less than one-quarter of youth indicated that they had engaged in NMUPD, a greater percentage of youth (32.28%) believed that their network members (aggregating across all network relationships) engaged in NMUPD. This finding indicates that there might be an “over-estimation” of the prevalence of NMUPD among homeless youth, perhaps suggesting a “pluralistic ignorance” bias, in which individuals tend to misperceive their peers’ drug use, regardless of their own status as users or nonusers (Henry, Kobus, & Schoeny, 2011). Several studies have found evidence consistent with this phenomenon (Bourgeois & Bowen, 2001; Henry et al., 2011). The social norms intervention approach, however, is designed to correct the demonstrated inconsistency between actual and perceived behaviors (Ott & Doyle, 2005), and could provide an appropriate approach to address NMUPD with homeless youth. A few interventions have in fact been successful in demonstrating reduced misperceptions of norms of NMUPD (Schinke, Fang, & Cole, 2008). The current study was not specifically designed to understand the discrepancy between actual and perceived NMUPD, but given these preliminary findings, it would be prudent to explore this issue further.

Second, our study’s focus on injunctive norms furthers our understanding of perceived approval and disapproval as they relate to NMUPD. Injunctive norms continued to be significantly associated with NMUPD even after controlling for (i.e. holding constant) descriptive norms in the multivariate model. Extant research has found that descriptive and injunctive norms have an independent association with behavior across a number of behaviors, including drug use (McMillan & Conner, 2003), engagement in sexual risk (Peterson, Rothenberg,

Table 1
Sample characteristics of homeless youth in Los Angeles ($n = 1046$).

	Full sample		Recent NMUPD		No recent NMUPD		Chi-sq./t-test
	<i>n</i>	%	<i>n</i> = 247	% = 23.61	<i>n</i> = 799	% = 76.39	
Gender							
Male	735	70.27	165	66.80	570	71.34	1.85
Female	311	29.73	82	33.20	229	28.66	
Sexual orientation ($n = 1010$)							
Heterosexual	759	75.10	159	72.27	600	75.95	1.24
LGBQ	251	24.90	61	27.73	190	24.05	
Race/ethnicity							
African-American	244	23.33	36	14.57	208	26.03	13.84***
Latino	139	13.29	31	12.55	108	13.52	0.15
Other race	212	20.26	42	4.02	170	21.28	2.13
White	400	38.24	110	44.53	290	36.30	5.42*
Traveler							
Yes	377	36.00	99	34.79	278	40.08	2.28
Accessed health care in past 30 days ($n = 980$)							
Yes	411	41.90	104	51.74	307	39.41	9.97**
Alcohol use (binge drinking) in past 30 days							
Yes	936	89.50	225	91.09	711	88.99	0.89
Heroin use in past 30 days							
Yes	157	15.00	113	45.75	134	5.51	239.51****
Marijuana use in past 30 days							
Yes	593	56.70	160	64.78	433	54.19	8.61**
Injection drug use in past 30 days							
Yes	145	13.90	108	43.72	37	4.63	241.49****
<i>Descriptive norms</i>							
All alters using prescription drugs							
Any	360	32.28	131	48.99	229	27.41	40.04****
Street-based peer networks engage in NMUPD							
Any	221	20.99	83	32.68	138	17.27	27.58****
Home-based peer networks engage in NMUPD							
Any	95	9.02	43	16.93	52	6.51	25.49****
Family-based networks engage in NMUPD							
Any	41	3.89	16	4.00	25	5.69	2.45
Service-related networks engage in NMUPD							
Any	4	0.38	–	–	–	–	
<i>Injunctive norms (encouragement)</i>							
All alters encouraging prescription drug use							
Any	156	14.53	70	26.88	86	10.64	40.39****
Street-based peer networks encourage NMUPD							
Any	79	7.50	38	14.96	41	5.13	26.83****
Home-based peer networks encourage NMUPD							
Any	48	4.56	25	9.84	23	2.88	21.48****
Family-based networks encourage NMUPD							
Any	28	2.66	8	3.00	20	3.72	3.51
Proportion of service related networks encourage NMUPD							
Any	2	0.19	–	–	–	–	
<i>Injunctive norms (object)</i>							
All alters objecting to prescription drug use							
Any	776	73.69	158	70.16	618	74.98	3.23*
Street-based peer networks object NMUPD							
Any	509	48.34	111	43.70	398	49.81	2.88
Home-based peer networks object NMUPD							
Any	502	47.67	108	42.52	394	49.31	2.40
Family-based networks object NMUPD							
Any	577	54.80	138	45.25	439	58.69	15.88****
Service-related networks object NMUPD							
Any	4	0.38	–	–	–	–	
	Mean	SD	Mean	SD	Mean	SD	
Age	21.34	2.16	21.46	2.12	21.31	2.18	–0.91
Time homeless (0–7)	3.63	1.35	3.96	1.60	3.52	1.38	–0.41
CESD score (0–30)	18.37	9.74	18.79	9.00	17.02	11.75	2.5**

Note: bivariate tests not conducted for service related networks because of the sparse nature of cell sizes.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

**** $p < 0.0001$.

Kraft, Beeker, & Trotter, 2009), physical activity (Rhodes & Courneya, 2003), and violence (Norman, Clark, & Walker, 2005).

Injunctive norms, as noted before, refer to both perceived approval and disapproval of a behavior. What is encouraging about our findings is that while there is significant perceived disapproval of NMUPD use among homeless youths' network members, there is relatively little

perceived approval of it. Specifically, in this study, we found that only 7.50% of youth believed that their street-based peers and 4.56% believed that their home-based peers would encourage them to engage in NMUPD. However, a number of preventive interventions have based on the theory that there is active pressure on youth (especially in the form of peer encouragement) to use substances; therefore,

Table 2
Multivariate logistic regression of social network norms and prescription drug misuse (PDM) (n = 969).

Prescription drug misuse							Bonferri stepdown p		
	Unadj OR	95% CI		p	Adj OR	95% CI		p	
<i>Demographics</i>									
Age	1.03	0.96	1.11		1.04	0.95	1.14		
Male	1.05	0.76	1.46		1.05	0.65	1.67		
LGBQ (Ref = heterosexual)	1.21	0.87	1.70		1.23	0.78	1.96		
<i>Race (Ref = white)</i>									
African-American	0.47	0.32	0.69	***	0.72	0.43	1.22		
Latino	0.89	0.58	1.36		0.62	0.32	1.18		
Other race	0.73	0.51	1.06		0.68	0.40	1.16		
<i>Behavioral/situational variables</i>									
Traveler	0.61	0.44	0.84	**	–	–	–		
Accessed health care in last 30 days	2.34	1.75	3.12	****	1.91	1.28	2.85	***	*
CESD score (depression)	1.02	1.01	1.04	*	1.01	0.99	1.03		
Length of time homeless					–	–	–		
<i>Substance use (past 30 days)</i>									
Alcohol use (binge drinking)	1.31	0.80	2.13		–	–	–		
Heroin use	15.37	10.39	22.72	****	4.50	2.63	7.71	****	***
Marijuana use	1.44	1.08	1.92	**	2.64	1.70	4.09	****	****
Injection drug use	17.04	11.28	25.73	****	6.85	3.84	12.23	****	****
<i>Perceived social norms in network</i>									
<i>Descriptive norms</i>									
Street-based peer networks engage in NMUPD	1.62	1.35	1.93	****	1.49	1.22	1.83	***	**
Home-based peer networks engage in NMUPD	1.45	1.15	1.82	***	1.09	0.86	1.37		
Family-based networks engage in NMUPD	1.28	0.80	2.03		–	–	–		
<i>Injunctive norms (encouragement)</i>									
Street-based peer networks encourage NMUPD	1.42	1.21	1.68	****	1.12	0.92	1.36		
Home-based peer networks encourage NMUPD	1.62	1.22	2.16	***	1.04	0.71	1.53		
Family-based networks encourage NMUPD	1.50	0.88	2.55		–	–	–		
<i>Injunctive norms (object)</i>									
Street-based peer networks Object NMUPD	0.96	0.91	1.00		–	–	–		
Home-based peer networks object NMUPD	0.95	0.89	1.01		–	–	–		
Family-based networks object NMUPD	0.27	0.09	0.80	****	0.69	0.51	0.94	***	*
n					969				
AIC					736.50				
SC					813.37				
–2 log likelihood					704.50				
Wald chi-square					147.48****	df = 16			
Tjjur R2					0.28				

Note. LGBQ = lesbian, gay, bisexual, or questioning; OR = odds ratio; CI = confidence interval; AIC = Akaike information criterion; SC = Schwarz criterion; df = degrees of freedom. Note: Only variables significant in the bivariate model at $p < 0.10$ included in the multivariate model.

- * $p < 0.05$.
- ** $p < 0.01$.
- *** $p < 0.001$.
- **** $p < 0.0001$.

interventions have generally sought to provide the young person with social and interpersonal skills that would enable them to resist such proactive pressure (Coggans & McKellar, 1994; Denscombe, 2001). More studies are needed to understand whether the absence of such peer pressure is a matter of perception, or if peer pressure works in other, subtle ways not captured by survey data (Denscombe, 2001). It is possible that observational studies or qualitative studies could better capture the nuances of how such influence is exerted.

Perhaps the most compelling aspects of these data is the finding that the role of descriptive and injunctive norms on NMUPD varies depending on the nature of the referent (Borsari & Carey, 2003; Cho, 2006). Our findings indicate that while the presence of NMUPD engaged street-based and home-based peers increased the likelihood of youth reporting recent NMUPD, objections from family-members decreasing that likelihood. These findings support the “Social Identity Theory” (Turner & Tajfel, 1986), which proposes that norms are linked to specific social groups, and identification with these groups determines what will be regarded as normative. It can be assumed that homeless youth who are connected to family members have more role models to rely on in understanding what can be considered normative behavior. In

addition, it is also conceivable that the conversations that youth are having with their family members might act as sources of informational support, which is known, to influence the expression of norms and consequently engagement in behavior. However, it is important to mention that this study did not collect any data on the nature of these interactions, more specifically, what was discussed. A future study that collects detailed network level information on ties and the content of interactions across those ties would do much to increase our understanding of these processes, which could be critical in informing clinical interventions with youth and families.

In addition to network norm characteristics, our study found associations between other sociodemographic and behavioral characteristics and self-reported NMUPD. What is perhaps most compelling is the association between recent health care use and engagement in NMUPD. Nearly half (42%) of participants reported accessing health care in the past 30 days. Emerging research has indicated that one of the principal factors connected to increased NMUPD among youth and young adults is increased access to these drugs (McCabe, Cranford, Boyd, & Teter, 2007). This has been in part attributed to less than conservative prescribing practices of doctors of opioid painkillers and changing medical

guidelines (Twombly & Holtz, 2008). However, this also underscores the critical role that physicians can play in screening for and communicating about the negative effects of nonmedical use of prescription drugs with their patients. This may be particularly important for homeless youth, as building trusting relationships with health care providers is one of the key avenues through which substance abusing homeless youth are typically able to access treatment and resources (Hudson, Nyamathi, & Sweat, 2008).

Similar to other studies of NMUPD, we found a significant association between NMUPD and heroin use (Compton, Jones, & Baldwin, 2016). However, much of the existing literature describing the relationship between NMUPD and heroin use is in the adult population. Our findings add to the much smaller body of evidence suggesting that the association between NMUPD and heroin is present at a younger age. Though we did not capture information related to the specific route of administration for heroin, we also found a strong association between NMUPD and injection drug use.

In addition, youth who reported engaging in marijuana use were more likely to engage in NMUPD. This study reinforces previous evidence (Arria, O'Grady, Caldeira, Vincent, & Wish, 2008; Catalano, White, Fleming, & Haggerty, 2011; Haddox, Weiler, Pealer, & Barnett, 2014; McCabe, Knight, Teter & Wechsler, 2005; McCabe, Teter, Boyd, Knight & Wechsler 2005), which has found that marijuana and NMUPD are linked especially among college students. This study provides some preliminary evidence that marijuana could prove to be a gateway to NMUPD even among homeless youth. Given that these substance use behaviors are clustered, community-based interventions that address substance misuse more universally could provide a viable means of addressing NMUPD among youth populations.

4.1. Limitations and conclusions

Certain study limitations must be noted. First, the study includes cross-sectional data, thereby reducing the ability to draw causal conclusions. Thus, it is plausible that substance-using youth are more likely to perceive that their peers also use substances, and/or would approve of their substance use. Future research would benefit from longitudinal investigations of how network dynamics function over time to better discern the causal pathways through which network attributes facilitate the formation of substance use norms among homeless youth. Additionally, all behavioral study variables are self-reported, which could introduce bias. It is perhaps inevitable that some behaviors are under- or over-reported due to social desirability, despite reminders given to participants that data were confidential and that they could skip questions while completing the questionnaire. Further, the study's use of a computer-assisted self-interview modality, which has been shown to diminish threats of social desirability and impression management (Schroder, Carey, & Vanable, 2003), is likely to generate less biased responses. Moreover, norms variables were based on youths' perceptions and, as aforementioned, may not be accurately reflective of reality. Additional research regarding social norms would benefit from further incorporating independent confirmations of norms. Also, we did not assess for perceived availability of prescription drugs in our study. It is possible that perceived norms may have been confounded with availability/access of prescription drugs via network members. However, the social network interview was separate from the individual survey and was interviewer administered. We believe that knowing that these are separate questions assessing their perceptions of their network members' and having an interviewer clarify it for them might have reduced the confusion noted above. Last, but not the least, respondents were not asked to identify the type of prescription drug (i.e., stimulants, sedatives, and/or opioids) that they had used nonmedically. Previous studies (Kelly, Wells, Pawson, LeClair, & Parsons, 2014) have found that young adults who engage in NMUPD have different patterns and clusters of use and therefore are important to assess.

4.2. Conclusion

Our findings help further our understanding of the relationship between perceived norms of NMUPD and self-reported NMUPD among homeless youth. Given that NMUPD may be associated with youths' perceived prevalence of their peers' use (even if an overestimation of that use), and also by their perceived peers' approval or disapproval of NMUPD, such an understanding can help inform development of network interventions that specifically target prevention of NMUPD among homeless youth.

Conflict of interest

The authors of this manuscript report no financial interests or potential conflicts of interest.

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