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Characterizing latent classes of social support among persons who inject drugs

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1. Introduction

Lifetime injection drug use in the United States has been estimated at 2.6% (6.6 million) of persons aged 13 years and older (Lansky et al., 2014). Injection drug use remains associated with a number of harms including drug overdose, hepatitis C virus infection (HCV), HIV infection, psychiatric comorbidity (Latkin et al., 2013) and homelessness (Degenhardt et al., 2017). Social networks of persons who inject drugs (PWID) can influence drug use and sexual risk behavior norms, including exchanging sex for drugs (Latkin et al., 2010), sharing needles (Latkin et al., 1996) and frequency of injection (Latkin et al., 1995). Indeed, many of these behaviors drive the increased risk of HIV, HCV, sexually transmitted infections (Oster et al., 2014; Young et al., 2013) and soft tissue infections (Ebright and Pieper, 2002). On the other hand, social support provided by the same network members may also help PWID acquire the resources to help navigate healthcare systems to meet their complex health needs.

Social support is the appraisal of an individual's relationships (ties) and the resources they provide (Gottlieb and Bergen, 2010; Valente, 2010). It can be conceptualized as a latent construct in that some types of support cannot be directly observed, but they influence

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measurable indicators that are believed to represent the variable of support (Bollen, 2002). Types of social support include (1) emotional (cultivating feelings of comfort, care and love); (2) instrumental (materials and aid that solve practical problems); and (3) informational (advice, guidance and knowledge to help understand situations) (Jacobson, 1986).

Social support has been associated with several factors. For example, social support has been shown to be protective against depression in western countries (Garipey et al., 2016) and to vary by housing stability for persons with substance use disorder (Gabrielian et al., 2018). It has been further demonstrated that trust is high among networks of individuals with similar attributes and experiences, which facilitates diffusion of positive behaviors (Valente, 2010). Non-conflictive relationships and instrumental and emotional support have been associated with greater medical treatment adherence (DiMatteo, 2004), which may be particularly important for PWID who experience a high degree of multimorbidity. Indeed, prior work found a positive association of emotional support with retention in outpatient care for PWID living with HIV (Knowlton et al., 2005; Mizuno et al., 2006). Latkin and colleagues found that PWID living with HIV or HCV may be less likely to receive emotional support (someone to talk to or give advice) and more likely to receive instrumental support (borrow money) from their network members (Latkin et al., 2011).

These previous social network evaluations of PWID have elicited broadly defined social networks (Boodram et al., 2015; Havens et al., 2013; Latkin et al., 2003b; Tobin et al., 2007). However, it has been demonstrated that it is the smaller set of close social ties that may most strongly influence health (O'Malley et al., 2012; Reis et al., 2000), including HIV risk behaviors (Choi et al., 2013) and substance use norms (Shaw et al., 2007). Individuals with closer ties interact more frequently and have fewer close relationships if they are more highly responsive (Clark and Lemay, 2010).

Accordingly, this analysis focused on understanding the types and intensity of social support that PWID receive from the closest and potentially most influential network members. Moreover, as PWID in the US are aging and frequently transition in and out of injection (Galai, 2003; Genberg et al., 2011), there are likely substantial changes in network composition due to turnover of network members (Costenbader et al., 2006). We hypothesized that those who had ceased injection would have higher levels of social support than those who were currently injecting. We also sought to compare classes of social support for individual and network characteristics.

2. Methods

This study was an analysis of cross-sectional survey data from the AIDS Linked to the IntraVenous Experience (ALIVE) study. ALIVE is a longitudinal cohort that examines the epidemiology of injection drug use and associated health factors among adults 18 years of age or older with a history of injection drug use (Vlahov et al., 1991). Briefly, 2,946 participants were initially recruited in 1988–1989 through extensive community outreach. Additional recruitments occurred in 1994–95, 1998, 2005–08 and 2015–2018. At baseline and semi-annual follow-up visits, ALIVE participants completed standardized

questionnaires, Audio Computer-Assisted Self-Interview, in-person interviews and provided bio-specimens for behavioral, socioeconomic, demographic and clinical parameters at 6-month visits.

A supplemental 59-question social network survey module was adapted from previously validated surveys eliciting types of social support (Latkin et al., 2003b; Sherbourne and Stewart, 1991) to gather information from participants about their social network members. The survey was implemented between April 1, 2016, and June 30, 2017. A name generator began with the prompt: “Looking back over the past 6 months, who are the people that have been important to you? Please think about all the people you associate with closely including friends, sexual partners, associates and family who are at least 13 years old or older.” The remainder of the social network survey focused on the first five people listed, here after referred to as the “closest ties”. We chose the first five nominations to represent the “closest ties” as prior studies indicated that the most important network members are nominated first (Burt, 1984; Hickson et al., 2017; Merluzzi and Burt, 2013). Participants were then asked to describe each network member with respect to sociodemographic characteristics, relationship-level characteristics, and the type(s) of support provided (emotional, instrumental, and informational) by each network member in the past 6 months. This analysis reports on 3,388 network members from 970 ALIVE participants who completed the survey.

2.1. Variables

2.1.1. Social Support Classification Indicators—Seven social support indicators were used to represent three domains of social support provided by each network member. Emotional support was measured with two questions asking how often: (1) could you talk to him/her if you were feeling down?; and (2) would you say he/she is “in your corner”? Instrumental support was measured with three questions asking how often: (1) would he/she pitch in to help you do things that you needed some help with?; (2) would he/she loan you some money over \$25?; and (3) would he/she let you stay at their place if you needed a place to stay? Informational support was measured with two questions asking how often: (1) would you say he/she is someone to give you advice or help you understand a situation?; and (2) did he/she help you understand information about your health? Response options for each of the above questions were: 1 = never; 2 = a little; 3 = sometimes; 4 = frequently; and 5 = always.

To construct latent classes of support, we collapsed the responses to each of the seven support variables from five to three by combining ‘never’ with ‘a little’ and ‘sometimes’ with ‘frequently’. This approach had advantages for the interpretation and analysis of our data. First, the Likert data are assumed to be nonparametric, the scale items do not represent equal intervals. Second, collapsing these items may minimize ambiguity due to response categories. Third, keeping all five items on the scale resulted in a large number of parameters and a sparse distribution of some item rating scores.

2.1.2. Network characteristics and independent variables—Binary variables were computed to describe the type and quality of individual relationships based on response

categories and scales: Interaction “at least daily” vs. “less than daily” (categories of daily, weekly, monthly or greater than monthly interaction); trust with life vs. don’t trust with life (scale from 1-no trust to 5-trust with life); very close vs. less than very close (scale from a 1-not very close to 5-very close); and frequently/always argue vs. argue less than frequently (scale from 1-never argue to 5-always argue). Multiplexity was defined as the number of different social support roles fulfilled by each network member (max=7). Homophily was computed as the percent of dyads with study participant and network members having the same race (white; black; other); gender; age (5-year categories); injection drug use status (in the prior 6-months yes vs. no); and HIV status. For descriptive purposes and modeling associations with latent class membership, network variables were binary and defined as one or more members of a participant’s network having a given characteristic (1) or not (0).

We examined whether support networks differed among persons who were injecting drugs compared to those who had ceased injection. As prior work in this cohort demonstrated that relapse into injection drug use commonly occurs within six months following cessation (Galai, 2003; Genberg et al., 2011), we defined current drug injection as any injection within the prior 12 months and cessation as no injection drug use for at least 12 months to allow adequate time for observation of changes in key social network members and roles.

Additional individual-level factors were considered based on prior analyses of social support among PWID/persons who use drugs (Latkin et al., 2013; Latkin et al., 2011). For depressive symptoms, we used a cutoff of 22 based on the Center for Epidemiological Studies-Depression scale (Weissman et al., 1977). HIV status was determined through enzyme-linked immunosorbent assay and confirmatory Western blot. Chronic hepatitis C infection was defined as ever having had a detectable hepatitis C viral RNA (Centers for Disease Control and Prevention, 2016).

2.2. Statistical analysis

Pearson’s chi-square test (categorical variables) and Wilcoxon rank-sum (continuous variables) tests were used to compare individual and network characteristics by participants who were actively injecting (current) vs. those who had ceased injecting in the prior 12 months (former). We also examined differences in types and levels of support provided stratified by participant injection status and the number of network members listed. To account for non-independence of characteristics for multiple network members listed by a study participant, we used logistic regression which clustered on study participants.

Latent class analysis (LCA) was used to identify subgroups with different levels and types of underlying, unobservable constructs of social support (informational, instrumental and emotional) provided by network members (Santos et al., 2015). We employed a three-step approach that first builds a latent class model, next obtains probabilities of class membership and finally relates latent classes to other variables. Personal networks were conceptualized at multiple levels: the relationship between the participant and each network member (level 1) and attributes aggregated across the personal network for each participant (level 2) (Snijders et al., 1995). We defined latent classes of support based on similarities in the type of support received by each study participant (level 2, n=970) from their network ties (level 1, n=3388). Because participants could name multiple network members, we used multi-level latent class

analysis, which considered each participant as an independent cluster. This approach allowed the model to focus on differences between participant's social networks, while accounting for the similarities between network members named by a single participant.

A series of models with increasing numbers of latent classes were run to identify the number of classes that best described the data using the collapsed 3-item responses for each of the seven social support classification indicators. The model with the optimal number of classes was determined by iteratively specifying an additional class starting with two and comparing measures of fit for: Akaike's Information Criteria; sample size adjusted Bayesian Information Criteria; the Lo-Mendell Rubin adjusted likelihood ratio test for n versus $n-1$ classes; entropy, which indicates the separation of the latent classes; and interpretability of the results. The patterns and relationships of classification indicators were interpreted for each class and the classes were given descriptive names accordingly. Latent class analysis was executed using MPlus version 8.0 (Muthén and Muthén, 2017) and class assignment was based on the highest probability of class membership.

We used multinomial logistic regression with moderate support as the reference group to identify individual and network correlates (i.e., counts of network members with a given characteristic) of different class membership. Variables with statistically significant associations with class membership ($p < 0.05$) were included in the adjusted model. Latent class membership and regression analysis were performed using Stata version 15.0 (StataCorp, College Station, TX).

3. Results

Of 970 participants (Table 1), 596 reported that they last injected drugs more than 12 months prior (61.4% defined as former PWID) and 374 reported injecting within 12 months (38.6% defined as current PWID). Current PWID were younger and earned less income; were less likely to be Black, HIV-positive or to live alone; and they were more likely to be homeless and have depressive symptoms in the past six months.

The 970 individuals identified 3,388 close ties (the first 5 network members listed) (Table 2). Current PWID had a significantly smaller median network size (3 vs 4; $p=0.015$) and were more likely to have a spouse/partner (47.1% vs. 39.5%; $p=0.024$). Additionally, current PWID reported knowing network members for significantly fewer years (31 vs. 34 years; $p=0.009$) as well as reported interacting with fewer network members daily and lower median trust scores, though the latter two associations were not statistically significant.

Compared to former PWID, current PWID had a smaller proportion of network members that always provided support. This relationship was found among persons with smaller (0–3 members) and larger (4–5 members) networks (Table S.1). Current PWID were less similar to their network members in terms of sex, race, injection drug use in the last six months and history of ever using street drugs and were more similar to their network members with respect to age, HIV status and history of ever injecting drugs (Table S.2); Finally, current PWID were less likely to report network members who provided all seven domains of support and more likely to report network members who provided no support (Table S.3).

3.1. Latent classes of social support

Results of the latent class analysis comparing models with two to five latent classes are in Table 3. Entropy was good for all solutions, with higher values indicating clear separation of classes. While the AIC and sample size adjusted BIC were lowest for the five-class model, the Lo-Mendell Rubin adjusted likelihood ratio test (LMR) showed no significant improvement in model fit going from a three to four class solution. Based on the LMR and in the interest of model interpretability and parsimony, the three-class model was selected.

Figure 1.a, 1.b, and 1.c illustrate the conditional probabilities of participant class membership and the class prevalence based on the estimated posterior probabilities of response level for each of the seven indicators of social support. Each figure includes a table of probabilities of latent class membership. We labeled these three groups as moderate, high and very high support based on the patterns and intensity of informational, emotional and instrumental support reported by study participants.

Moderate support (N=249): The probabilities of network members always providing any social support was below 0.40 for all indicators. However, the probabilities of providing a moderate level of support, denoted as sometimes/frequently, were over 0.50 for having someone to talk to, always being in your corner, pitching in and giving general advice.

High support (N=366): The probability of network members always providing support for each of the seven indicators ranged from 0.58 to 0.82, followed by sometimes/frequently from 0.158 to 0.31 and none/a little from 0.02 to 0.11.

Very high support (N=355): The probabilities for network members always providing support for each of the seven indicators was very high, ranging from 0.91 to 0.99. Probabilities for sometimes/frequently and none/a little were below 0.05 for both.

3.2. Associations with social support class membership

Table 4 shows results of the multinomial regression of the associations with latent class membership using the moderate class of support as the reference for comparisons with the high and very high support classes. While participant current injection drug use was associated with lower unadjusted odds of high and very high support, the association was not statistically significant in adjusted analysis. In the multivariable analysis, participant use of non-injection illicit drugs (AOR 0.58; 95% CI: 0.37, 0.92) and having 3 very close ties (AOR 0.50; 95% CI: 0.29, 0.85) were significantly associated with a lower likelihood of receiving the 'very high' class of support.

Network member characteristics positively associated with receiving the 'high' class of support were having older network members (AOR: 1.03; 95% CI: 1.01, 1.05), more network members with whom the participant interacted daily (AOR: 1.33; 95% CI: 1.14, 1.56) and having more network members to do something enjoyable with (AOR: 3.24; 95% CI: 2.20, 4.78). Having network members with a history of illicit drug use (AOR: 0.81; 95% CI: 0.69, 0.95) was negatively associated with receiving the 'high' class of support. Network member characteristics associated with receiving the 'very high' class of support were

having older network members (AOR: 1.03; 95% CI: 1.01, 1.05), more network members with whom the participant interacted daily (AOR: 1.54; 95% CI: 1.30, 1.83) and having more network members to do something enjoyable with (AOR: 7.74; 95% CI: 4.87, 12.30). Having network members who used any illicit drugs (AOR: 0.60; 95% CI: 0.49, 0.73) and more network members with whom the participant frequently/always argued (AOR: 0.59; 95% CI: 0.44, 0.78) were negatively associated with receiving the ‘very high’ class of support.

4. Discussion

Participants reported receiving very high levels of emotional, instrumental and informational support from their closest network members. Although we observed some differences in the networks of current vs. former PWID, there were no substantial differences in the average frequency of contact, trust or closeness with network members. Moreover, while current injection drug use was associated with lower social support in the bivariate analysis, this association was attenuated after adjusting for other factors including use of non-injection drugs and network member characteristics. Specifically, we observed higher levels of network support among networks that included fewer members who had ever used drugs and more members with whom the participant interacted daily and did not argue.

The lack of an observed association between current injection drug use and social support may be a consequence of the 12-month cutoff chosen, which may not account for the episodic nature of injection drug use or capture differences that exist beyond 12 months of injection cessation. Interestingly, participants receiving the ‘very high’ class of support were significantly less likely to use non-injection drugs or have network members that ever used non-injection drugs. Substance use by friends has been associated with low or no support in communities with a high prevalence of substance use (Bohnert et al., 2010). Among PWID, having close network members that do not use drugs might be considered a form of social capital and promote adoption of norms that discourage substance use (Valente et al., 2004). These associations and the low levels of homophily by injection drug use status in this sample may be reflective of an older aged cohort that may have ceased injection drug use but still frequently uses non-injection drugs.

Our data provide further insight into the types and levels of support received by current and former PWID. Among those receiving the ‘very high’ level of support, most network members always provided support for each indicator. For the high class of support, the probabilities of network members always providing support were highest for emotional and lowest for financial and health advice. This class can be described as high support with an emphasis on emotional support. The moderate support class had the lowest levels of support overall, with higher probabilities of network members providing help with a situation by pitching in and lower probabilities of emotional support and situational advice. This class could be described as moderate support with an emphasis on instrumental help.

Even with these distinctions, all three latent classes represented relatively high levels of support. This level of high support is in agreement with findings from study (Althoff et al., 2017) that used a similar approach used to elicit the names of social networks (up to five of the most important people spoken to in the prior month) and then identified latent classes of

support based on the quantity (number of network members providing support) and quality (frequency of contact and proximity) of relationships. Like our findings, this study found most (59%) were classified in the high support group and most had at least one person available to provide emotional, instrumental and informational support.

The high closeness with network members is indicated by the long median relationship duration and high proportion of network members that are relatives and partners suggesting that well-established relationships remain important across transitions in injection drug use. Ties with family members and partners are particularly close and provide the most intimate bonds and support (Gottlieb and Bergen, 2010). We found a greater proportion of partners, women and relatives who always provided six to seven domains of support compared to men and friends. There may be overlap of the high level of support from women and partners as over two-thirds of partners were women.

Participants receiving very high support also had a lower likelihood of conflict with their network members. This finding is important as negative interactions, including criticism, privacy invasion, and interference in affairs (Lincoln, 2000), have been associated with lower health-related quality of life (Mitchell et al., 2017). Some individuals have a negative orientation toward accessing health services and social support resources when experiencing health problems, which may be mediated by negative social interactions with peers (Rini et al., 2016).

It has been suggested that one means by which social support is positively associated with better health is through reduced loneliness, which can result from participation in leisure and recreational activities (Segrin and Domschke, 2011). This is consistent with our finding that having someone to do something enjoyable with was associated with greater odds of receiving the 'very high' class of support.

Although our study was limited to the first five network members named, keeping the network to five may not be a substantial limitation given that previous work in a similar population found the mean size of the social support network to be about 5 (Suh et al., 1997) and the number of network members providing health advice and financial support were 2.9 and 2.7, respectively (Latkin et al., 2003). Social desirability may have resulted in participants reporting greater levels of support than actually exist, but this is not expected to differ by current injection status. The cross-sectional nature of this study also limits our ability to determine the influence of cessation of injection drug use on social network composition and levels of support received. While there was limited variability in social support across the five-level Likert scale, the predominance of network members 'always' providing support is not surprising given the name generator aimed to elicit the most important, closest relationships.

5. Conclusions

These findings shed light on the nature of the core social support networks among current and former PWID. It was encouraging that this sometimes-disenfranchised population had high levels of support across the seven support classification indicators for informational,

instrumental and emotional support. Results showing high levels of perceived closeness and support overall suggest a potentially impactful resource for positively influencing health through social network interventions. Given that network members are able to influence social norms, for example, by discussing or modeling particular health behaviors (Latkin and Knowlton, 2015) or transportation assistance to get to appointments, the closest relationships are potentially the most influential (O'Malley et al., 2012; Reis et al., 2000). Health promotion interventions that focus on the small core of long-standing and very close ties, particularly relatives and partners, may be most effective.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Support from close network ties was generally high, with three latent classes of social support identified as moderate, high and very high.
- Participants with more close ties (≥ 4 vs. <4) had a lower odds of receiving the 'very high' class of support.
- The odds of receiving 'very high' support increased for each one-unit increase in mean network member age.
- Latent classes of social support did not differ for those who currently vs. formerly injected drugs.
- Non-injection use of street drugs was associated with lower odds of receiving 'very high' support

Figure 1.a.
Moderate support class with social support indicator response probabilities.

Figure 1.b.

High support class with social support indicator response probabilities.

Figure 1.c.

Very high support class with social support indicator response probabilities.

Table 1.

Participant characteristics by time since last injection drug use (n=970).

Characteristic	Total N=970 N (%)	Former PWID N=596 N (%)	Current PWID N=374 N (%)	p value ¹
Age, median (IQR)	56 (50–60)	57 (52–61)	53 (45–58)	<0.001
Female	315 (32.5)	201 (33.7)	114 (30.5)	0.29
Black	834 (86.0)	548 (91.9)	286 (76.5)	<0.001
Any homelessness ²	101 (10.4)	30 (5.0)	71 (19.0)	<0.001
Income <\$5, 000 ²	626 (65.1)	346 (58.9)	280 (74.9)	<0.001
HIV-positive	294 (30.3)	203 (34.1)	91 (24.3)	0.001
Hepatitis C positive ³	535 (55.9)	306 (52.1)	229 (61.9)	0.003
Number of comorbidities ⁴				
0	311 (32.1)	165 (27.7)	146 (39.0)	<0.001
1	286 (29.5)	171 (28.7)	115 (30.7)	
2	373 (38.5)	260 (43.6)	113 (30.2)	
CESD>22 ⁵	245 (25.3)	103 (17.3)	142 (38.0)	<0.001
Live alone ²	370 (38.2)	243 (40.8)	127 (34.0)	0.036
<u>Substance use</u>				
Injection drug use (past 6 months)				
Inject heroin	176 (18.1)	--	176 (47.1)	--
Inject cocaine	100 (10.3)	--	100 (26.7)	--
Inject speedball	139 (14.3)	--	139 (37.2)	--
Inject other	10 (1.0)	--	10 (2.7)	--
Injection freq. (past month)				
None	681 (70.4)	--	86 (23.1)	
<Daily	158 (16.3)	--	158 (42.4)	
Daily	129 (13.3)	--	129 (34.6)	
Crack cocaine ²	243 (25.1)	81 (13.6)	162 (43.3)	<0.001

Characteristic	Total N=970	Former PWID N=596	Current PWID N=374	p value ¹
	N (%)	N (%)	N (%)	
Opioid replacement therapy ²	478 (49.3)	229 (38.4)	249 (66.6)	<0.001
Sedative/tranquilizer acquired on the street ²	85 (8.8)	25 (4.2)	60 (16.0)	<0.001
Painkiller acquired on the street ²	61 (6.3)	14 (2.3)	47 (12.6)	<0.001
Marijuana ²	155 (16.0)	65 (10.9)	90 (24.1)	<0.001
Alcohol, daily ²	36 (3.7)	13 (2.2)	23 (6.1)	<0.001
Substance use support group ²	426 (44.1)	242 (40.7)	184 (49.5)	0.007

Former PWID= reported last injecting drugs more than 12 months ago; Current PWID= reported injecting drugs within the last 12 months; IQR=interquartile range

¹Test of significance: Wilcoxon rank-sum for age and Pearson's chi-square for categorical variables.

²Last 6 months

³Detectable Hepatitis C RNA

⁴HIV, diabetes mellitus, hypertension, heart disease, cardiovascular disease, stroke, renal disease, respiratory disease, seizure disorder, dyslipidemia

⁵Center for Epidemiological Studies-Depression score greater than 22

Table 2.

Social network characteristics overall and by injection status in the past 12 months (n=970).

Characteristic	Total N=970	Former PWID N=596	Current PWID N=374	p value
Network size, median (IQR)	4 (2–5)	4 (2–5)	3 (2–5)	0.015
Personal Network Density, mean (SD) ¹	0.99 (0.08)	0.98 (0.09)	0.99 (0.08)	0.94
Age, median (IQR)	54 (42–63)	54 (43–63)	54 (41–62)	0.70
Female ²	891 (92.7)	548 (92.9)	343 (92.5)	0.80
Black ²	867 (89.6)	561 (94.4)	306 (81.8)	<0.001
HIV-positive ²	122 (12.8)	71 (12.1)	51 (13.8)	0.46
Hepatitis C positive ²	210 (22.4)	117 (20.4)	93 (25.5)	0.066
Partner/spouse ²	409 (42.2)	232 (38.9)	177 (47.3)	0.010
Friend ²	453 (46.7)	275 (46.1)	178 (47.6)	0.66
Relative ²	848 (87.4)	523 (87.8)	325 (86.9)	0.70
Professional ²	23 (2.4)	15 (2.5)	8 (2.1)	0.71
Years known, median (IQR)	32 (23–42)	34 (24–43)	31 (20–41)	0.009
Interact with at least daily	850 (87.6)	531 (89.1)	319 (85.3)	0.080
Trust ^{2,3}	913 (94.2)	567 (95.3)	346 (92.5)	0.071
Closeness ^{2,4}	894 (93.3)	560 (94.6)	334 (91.3)	0.044
Argue with ^{2,5}	283 (29.2)	175 (29.4)	108 (29.0)	0.91

970 individuals had a total of 3,388 network members

Former PWID= reported last injecting drugs more than 12 months ago; Current PWID= reported injecting drugs within the past 12 months; IQR=interquartile range

¹Number of social ties within a network that know each other as a proportion of all possible ties (based on study participant's perception of relationships among their contacts)

²One or more members of a participant's network with a given characteristic

³Trust with life, on a scale from 1=Don't trust to 5=Trust with life

⁴Very close, on a scale from 1=Not very close to 5=Very close

Frequently=always, on a scale from 1=Never to 5=Always

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Table 3.

Model fit and selection criteria for latent classes of social support (n=970).

Criteria	Class 2	Class 3	Class 4	Class 5
Parameters	29	44	59	74
AIC	32687.306	31301.778	30665.369	30210.899
BIC ¹	32772.872	31431.602	30839.451	30429.238
LMR(p) ²	<0.0001	<0.0001	0.1241	--
Entropy	0.945	0.921	0.920	0.900

¹ Sample size adjusted BIC

² Lo-Mendell Rubin adjusted likelihood ratio test for n versus n-1 classes

Table 4.
Correlates of latent class membership for high and very high support compared to moderate support (N=970).

	Bivariate		Multivariate	
	High OR (95 CI)	Very high OR (95 CI)	High AOR (95 CI)	Very high AOR (95 CI)
<i>Participant</i>				
Female	1.12 (0.79, 1.59)	1.3 (0.92, 1.85)		
Age, years	1.01 (1.00, 1.03)	1.02 (1.00, 1.04)	0.99 (0.96, 1.01)	0.99 (0.96, 1.01)
Injected last 12 months.	0.69 (0.49, 0.95)	0.52 (0.37, 0.73)	0.80 (0.52, 1.23)	0.85 (0.53, 1.36)
Street drugs (not injected)	0.63 (0.46, 0.88)	0.43 (0.31, 0.60)	0.82 (0.54, 1.24)	0.58 (0.37, 0.92)
Any homelessness (past 6 months)	0.55 (0.34, 0.89)	0.31 (0.18, 0.53)	0.86 (0.48, 1.51)	0.57 (0.28, 1.16)
HIV-positive	0.94 (0.65, 1.34)	1.36 (0.96, 1.94)		
Depressive symptoms	0.65 (0.46, 0.92)	0.36 (0.25, 0.53)	0.93 (0.61, 1.43)	0.65 (0.39, 1.06)
Network size (4–5 vs. 0–3)	1.18 (0.85, 1.64)	0.63 (0.46, 0.88)	0.97 (0.60, 1.56)	0.50 (0.29, 0.85)
<i>Network members (0–5)</i>				
Female	1.17 (1.02, 1.35)	1.06 (0.92, 1.22)	1.08 (0.89, 1.30)	1.13 (0.91, 1.40)
Age, mean years	1.02 (1.01, 1.04)	1.03 (1.01, 1.05)	1.03 (1.01, 1.05)	1.03 (1.01, 1.05)
Ever injected drugs	0.93 (0.78, 1.11)	0.58 (0.46, 0.72)	0.99 (0.79, 1.25)	0.75 (0.56, 1.00)
Ever used street drugs	0.85 (0.75, 0.96)	0.54 (0.47, 0.63)	0.81 (0.69, 0.95)	0.60 (0.49, 0.73)
Talk to daily	1.39 (1.23, 1.58)	1.43 (1.26, 1.63)	1.33 (1.14, 1.56)	1.54 (1.30, 1.83)
Do something enjoyable with	3.44 (2.45, 4.84)	7.93 (5.36, 11.72)	3.24 (2.20, 4.78)	7.74 (4.87, 12.30)
Argue with frequently-always	0.92 (0.76, 1.12)	0.59 (0.46, 0.74)	0.81 (0.64, 1.02)	0.59 (0.44, 0.78)

OR=odds ratio; AOR=adjusted odds ratio; CI=confidence interval