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Drug use in the social networks of heroin and cocaine users before and after drug cessation

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Abstract

The present study examined Social Control processes in drug cessation among adults. Social Control theory posits that the association between drug use and the drug use of a person's social network results from an individual seeking out similar peers. The data included 629 individuals who reported past-year heroin or cocaine use at baseline and had follow-up data in a community study in Baltimore, MD. Negative binomial regression modeling indicated that the reduction in social network drug use was significantly greater for quitters than those who did not quit. Compared to non-quitters at baseline, the IRR of the number of drug-using network members was 0.86 for quitters at baseline, 0.71 for non-quitters at follow-up, and 0.28 for quitters at follow-up (all $p < 0.05$). These findings support Social Control theory in adult drug use cessation. Future research should extend the length of follow-up and assess bidirectional influences.

Keywords

sociology; epidemiology; social networks, social control theory; negative binomial regression modeling

1. Introduction

Social network analysis (SNA) is an approach to conceptualizing and measuring the people with whom an individual has social interactions and who may influence an individual's behaviors and attitudes (Latkin et al., 1995). A social network consists of an index individual and the individuals with whom the index is connected by interactions or behaviors of interest (Wasserman and Galaskiewicz, 1994). Social networks have been used to examine drug use (e.g., Latkin et al., 1995; Costenbader et al., 2006; Gyarmathy and Neaigus, 2006). Only recently has SNA begun to be used for theory testing (Baerveldt, 2005; Helleringer and Kohler, 2005). The focus of the present study was to examine one theory on the relationship between cessation of drug use and social network drug use.

Prior research has consistently demonstrated a relationship between an individuals' substance use and the substance use of their social network members (e.g. Latkin et al., 1995; Best et al., 2005; Kandel et al., 1978; Latkin et al., 1999). There are several competing theories that explain this relationship. One key difference among the theories is directionality, i.e. whether drug

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using-peers lead to drug use or drug use leads to drug-using peers. Social Control (also referred to as Social Selection) posits that individuals who have poor bonding to conventional society use drugs, and consequently seek out drug-using friends (Hirschi, 1974). The theory further hypothesizes that an individual who has increased their bond to society, often through marriage or a new job, decreases their association with drug-using individuals.

Research that has examined these theories have largely focused on adolescents (Akers, et al., 1988). Among adults, drug cessation is a particularly critical area in the study of drug use transitions (Bruneau et al., 2004), in part due to the high mortality and morbidity associated with drug use (Hser et al., 2001). Prior research on social factors and drug cessation has tended to focus on individuals seeking treatment, yet the majority of individuals who use drugs quit without treatment (Granfield and Cloud, 2001). Furthermore, out-of-treatment samples have been found to have higher rates of HIV, risk behaviors, stimulant use, and are also older and more often non-white (Flynn et al., 1993; Watkins et al., 1992). Additionally, time in treatment is associated with improved cognitive and psychological functioning (Bell et al., 1996).

The present study used longitudinal data from a community sample of adults who use drugs to examine whether quitting is associated with a subsequent change in drug use among social network members. Evidence that individuals decrease their connections with drug-using individuals when they quit would suggest that Social Control processes play a role in adult drug use cessation.

2. Methods

2.1 Participants

Data for the present secondary analysis come from interviews conducted at waves 1 and 2 (with an average of nine months between) of the SHIELD (Self-Help In Eliminating Life-threatening Diseases) HIV Prevention Study (Latkin et al., 2003) in Baltimore, MD. Eligibility to the study included having contact with drug users and age 18 or older. While the majority of the sample was found through street-recruitment methods, 35% of the total sample was recruited from the social networks of other participants. At baseline, 1,184 (72.3%) reported heroin/cocaine use in the prior 6 months. Among those 1,184 individuals, 629 individuals were interviewed at time 2 and had complete network data (not all participants were selected for a second interview).

2.2 Measures

2.2.1 Outcome—A social network member was considered an active drug user if the index participant reported in their network inventory that the contact had used heroin or cocaine/crack in the prior 6 months. The outcome measure was a count of the number of social network members who are active drug users at each assessment. We also considered the count of non-drug-using network members.

2.2.2 Covariates—Drug use was defined as self-reported heroin/cocaine/crack use. Participants were considered “quitters” if they self-reported no heroin/cocaine/crack use in the 6 months prior to the time 2 interview. Age at baseline, and was coded as 32 or less (reference), between 33 and 42, and between 43 and 67, based on the distribution of the complete sample at baseline. Dichotomous variables were male gender, having a high school diploma, daily heroin and/or cocaine use, and having a main sexual partner. Involvement in drug treatment, which included self-help groups, methadone, outpatient, and detoxification programs, was assessed for the past 30 days at baseline and in the past 6 months at the second assessment. Participants were asked if they were often on bad terms with each of their network members, as well if each network member would give them monetary aid. “Contact with network” was

calculated by adding the ratings of contact (from 1 for less than once a year to 6 for everyday) for all network members. Similarly, “Closeness” was calculated by adding the ratings of trust (from 1 to 10) for the network.

2.3 Data Analysis

We modeled the counts of social network members who use drugs with negative binomial regression (Hilbe, 2007). A model with an interaction term of assessment (time 2 = 1, time 1 = 0) with quit status (quit = 1, did not quit = 0) was used to test if the change in network drug use between assessments was different for quitters compared to non-quitters. Model results were reported as Incidence Rate Ratios (IRR) with a variable that represents the 4 possible combinations of the variables in the interaction for ease of interpretation. The model adjusted for demographic factors, and used Generalized Estimating Equations to handle repeated measurement.

We specified a negative binomial regression model, as the distribution of the outcome had greater variability than expected under a Poisson distribution. The sample mean of the outcome (3.2) was substantially smaller than its variance (5.4), and the log of the dispersion parameter, 0.13, had a 95% confidence interval did not include zero, indicating overdispersion. All models were estimated using Stata, version 9.2 (StataCorp, 2005). These methods were repeated for the count of non-drug-using network members.

3. Results

Of the 629 individuals, 121 (19%) reported quitting by time 2. Quitters had a greater reduction in the percent of their network made up of active drug users (24%, from 40% to 16%) than non-quitters (6%, from 44% to 38%), in a two-sample test of proportions ($p < 0.001$).

Table 1 demonstrates that quitters were not statistically different than those who did not quit in age, having a main partner, attainment of a high school diploma, gender, and network characteristics at baseline. Drug treatment in the prior 30 days at baseline and in the prior 6 months at time 2 was associated with drug cessation, but neither was associated with the outcome. Modeling using treatment at either assessment as a covariate did not substantially alter the results. Consequently, this variable was not included in final models, as the differing windows of time used at each assessment would introduce an inconsistency in the meaning of the variable at the two waves.

Table 2 reports the results of the negative binomial regression model of the count of drug-using network members. The quitter group's total count of drug-using network members was 0.86 times that of the non-quitters at baseline, holding demographic variables constant ($p < 0.05$). Individuals who had not quit had reduced the number of active drug users in their networks by a factor of 0.71 between times 1 and 2 ($p < 0.01$). The number of active drug users in the network of quitters at time 2 was 0.28 of that of non-quitters at baseline ($p < 0.01$). The reduction in network drug use was significantly greater among quitters than non-quitters ($p < 0.01$, from the interaction term in a model not shown).

Table 2 also reports the negative binomial regression model of the count of non-drug-using network members. Those who quit had 1.12 times more non-drug-using network members as non-quitters at baseline, holding demographic variables constant ($p < 0.05$). Non-quitters reduced the number of non-drug-using network members between times 1 and 2 by a factor of 0.92 ($p < 0.01$), and quitters at time 2 had 1.17 times non-drug-using network members compared to non-quitters at time 1 ($p < 0.01$). The change in count of non-drug-using network members between times 1 and 2 was different for quitters and non-quitters ($p < 0.05$ from the model with an interaction term).

4. Discussion

The results of this study lend support for Social Control processes in the cessation of drug use among adults. The findings lend partial support to the suggestion by drug treatment programs to avoid contact with active drug users. However, the majority of those who quit continued to report drug users in the social networks, albeit a diminished number. Those who did not quit reported fewer non-drug-using network members at follow-up, unlike those who quit. Collectively the models suggest that participants were selecting social ties whose behavior matches their own as they did or did not continue to use drugs, consistent with Social Control theory. Changes may indicate turnover in and out of the network, or change in the behavior of network members over time. Prior research has suggested that there is a substantial degree of turnover in the present sample (Costenbader et al., 2006). Further exploration with microsocial analysis (Reifman et al., 2006) is indicated.

Unlike several prior studies, the present study elicited the behavior of social network members rather than interviewee's perception of friends' beliefs, which are likely biased towards the interviewee's own beliefs. However, those who quit drugs may be less aware of their friends' drug use than those who continue to use, as those who quit may not have drug interaction with network members anymore and hence have less accurate information about their drug use. Nevertheless, this variable is also an indication of the index's perception of drug use among his or her social contacts. Under Social Control theory, a person who has decided to quit drugs will drift away from drug-using individuals, for reasons such as not wanting to be around people engaged in criminal behavior. If the person quitting does not know that a friend is using drugs, the behavior that they are unaware of is unlikely to affect their decision to spend time with that person.

Validity of self-reported drug use data is an area of concern. However, reviews of self-report drug data suggest that it has a moderate to strong degree of reliability and validity (Darke, 1998; Harrison, 1997). The reduction in network members overall in the study may be indicative of a reporting bias with time.

Although these data suggest that a reduction in drug network size is linked to cessation of drug use, future research should extend the analysis to longer follow-up, assess bidirectional influences, and incorporate microsocial analysis.

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Table 1

Sample characteristics of 629 individuals reporting past year heroin/cocaine use at baseline and their drug use status at follow-up: data from the SHIELD study in Baltimore, MD.

Characteristic	Quit at time 2 n = 121	Did not quit at time 2 n = 508
Demographic	%	%
Male Gender (vs. Female)	59	61
Age:		
Under 32	17	17
33 to 42	42	50
43 to 67	41	34
Has a Main Sexual Partner	64	66
Treatment: ^a		
Past 30 Days at Baseline	22	14 [*]
Past 6 Months at Time 2	41	29 [*]
Completed at least High School	49	51
Drug Use in the prior 6 months: Daily		
Time 1	43	53 [*]
Time 2	-	42
Network and Relationships ^b	Mean (S.D.)	Mean (S.D.)
Count of Drug-Using Network Members		
-Time 1	3.45 (0.19)	4.00 (0.11) [*]
-Time 2	1.13 (0.12)	2.84 (0.09) ^{**}
Count of Non-Drug Using Network Members		
-Time 1	5.60 (0.29)	5.03 (0.12)
-Time 2	5.87 (0.27)	4.63 (0.12) ^{**}
Ratings of Closeness	71.69 (2.98)	69.11 (1.33)
Count of Network Members with whom the Index has Conflict	1.12 (0.10)	1.20 (0.05)
Total Contact with Network	18.20 (0.96)	18.73 (0.46)
Count of Network Members who could give Material Aid	2.56 (0.14)	2.35 (0.07)

^a compared to no treatment.

^b all network variables measured at baseline.

^{*} p < 0.05

^{**} p < .01, by χ^2 test or two-sample t-test with unequal variances.

Table 2

Negative binomial regression models of the number of social network members who are and who are not active heroin/cocaine users, among 629 participants reporting past year heroin/cocaine use at baseline and who were retained for follow-up: data from the SHIELD study in Baltimore, MD.

Variable	Count of Drug-Using Network Members		Count of Non-Drug-Using Network Members	
	IRR	95% Confidence Interval	IRR	95% Confidence Interval
Time and Quitting ^a				
-Time 1, Non-Quitters	1.00	-	1.00	-
-Time 1, Quitters	0.86*	0.76, 0.97	1.12*	1.00, 1.25
-Time 2, Non-Quitters	0.71**	0.66, 0.76	0.92**	0.87, 0.97
-Time 2, Quitters	0.28**	0.23, 0.35	1.17**	1.06, 1.30
Male Gender	0.95	0.87, 1.04	0.99	0.92, 1.07
Age 33 to 42 ^b	1.14*	1.01, 1.29	1.01	0.91, 1.12
Age 43 to 67 ^b	1.10	0.97, 1.26	0.95	0.85, 1.05
Completed at least High School	1.04	0.96, 1.13	1.06	0.98, 1.13
Has a Main Sexual Partner	0.91*	0.83, 0.99	1.00	0.92, 1.08

^a An interaction term between time and quitting was significant at $p < 0.05$ in both models.

^b compared to reference group of age 32 or less.

* $0.01 < p < 0.05$

** $p < .01$