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Psychiatric Correlates of Injection Risk Behavior among Young People Who Inject Drugs

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Abstract

Background—People who inject drugs (PWID) and have mental health conditions, such as major depression, an anxiety disorder, or anti-social or borderline personality disorder, may have elevated risk for HIV/HCV infection. This study examined the associations between psychiatric disorders and risky injection behavior in an out-of-treatment sample of young PWID.

Design—We recruited participants through outreach and respondent-driven sampling. Participants completed a computer-assisted self-interview, and a psychiatric interview.

Methods—Interviews took place at a community-based field site of the Community Outreach Intervention Projects. Participants were 570 young adults (18-25 years) who injected drugs in the previous 30 days. Psychiatric diagnoses were based on interviews using the Psychiatric Research Instrument for Substance and Mental Disorders (PRISM). Injection behavior was classified into three categories: receptive syringe sharing, other equipment sharing only, and no sharing. Associations between injection risk behavior and psychiatric diagnoses were tested using RDS-weighted multinomial regressions.

Results—Substance-induced lifetime and past year major depression, and borderline personality disorder were significantly associated with a greater likelihood of receptive syringe sharing ($p < .001$). Substance-induced major depression in the past year was also associated with non-syringe equipment sharing ($p < .01$). Primary major depression, antisocial personality disorder, and anxiety disorders other than post-traumatic stress disorder were slightly more prevalent among injectors who shared syringes, however the associations were not statistically significant.

Conclusions—Substance-induced major depression and borderline personality disorder are common among young people who inject drugs and are associated with risky injection behavior.

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Keywords

injection drug use; personality disorder; depression; HIV risk behavior

Young people who inject drugs (PWID) frequently experience mental health problems, including mood, anxiety, and personality disorders, as well as alcohol and other substance use disorders (Brooner, et al., 1997; Callaly, et al., 2001; Kessler, 2004; Kessler, et al., 2005; Mackesy-Amiti, et al., 2012; Mason, et al., 1998; Teesson, et al., 2005). A number of studies with methadone maintenance or other drug treatment patients (Camacho, et al., 1996; Kleinman, et al., 1994; Malow, et al., 1992; Metzger, et al., 1991; Perdue, et al., 2003; Pilowsky, et al., 2011; Woody, et al., 1997), and drug users not in treatment (Johnson, et al., 2003; Johnson, et al., 2002; Simpson, et al., 1993; Strathdee, et al., 1997), including syringe exchange program participants (Kidorf, et al., 2010), have found that symptoms of psychological distress or dysfunction, particularly symptoms of depression, are associated with injection risk behavior, including sharing syringes and other equipment, number of sharing partners, sharing with strangers, and sharing with a person known to be HIV-positive.

Psychiatric disorders may interfere with the ability of PWID to avoid behavior that places them at risk for acquisition of HIV and HCV, for various reasons. Negative affect associated with depression or anxiety may reduce perceived self-efficacy (behavioral control) for avoiding sharing syringes (Ajzen, 2002; Bandura, 1990, 1994), while feelings of hopelessness may decrease motivation to engage in harm reduction (W. A. Fisher, et al., 2003).

Antisocial personality disorder (ASPD) is common among drug users (Compton, et al., 2005; Compton, et al., 2000), and a few studies have found that it is associated with sharing of syringes and other injection equipment among people who inject heroin or cocaine (Brooner, et al., 1990; Compton, et al., 1995; Gill, et al., 1992). Borderline personality disorder (BPD) has also been associated with drug use, and was associated with injection risk behavior in an Australian study of heroin users (Darke, et al., 2004). However, the relationship between BPD and injection risk behavior has not been studied in an American sample. ASPD and BPD may affect behavior due to their association with impulsivity (Fossati, et al., 2004; Teese & Bradley, 2008), and emotional dysregulation may be implicated in associations between BPD and risky behavior (Carpenter & Trull, 2013; Crowell, et al., 2009; Linehan, 1993). In addition, ASPD may be associated with subjective norms that promote risky behavior (J. D. Fisher & Fisher, 1992; W. A. Fisher, et al., 1995).

Previous studies of the associations between psychiatric or mental health problems and risky injection behavior have often used samples drawn from drug treatment (e.g. methadone maintenance) or criminal justice settings, limiting the generalizability of the findings. Other studies used only brief screening measures of psychiatric problems or distress rather than clinical assessments with specific diagnoses. The current study examined associations between psychiatric disorders and injection risk behavior in a sample of young PWID recruited through street outreach and respondent-driven sampling, using DSM-IV diagnoses

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obtained in semi-structured clinical interviews that distinguished between primary and substance-induced disorders.

A better understanding of the relationship between psychiatric problems and risk behavior can contribute to the improvement of HIV/HCV prevention efforts. Education through outreach and improved access to sterile syringes have greatly reduced HIV incidence among PWID; further gains may be achieved by addressing the factors that continue to contribute to increased risk. Treatment providers should also be aware of the need to address HIV/HCV risk with clients, and can benefit from knowing what type of psychiatric problems increase risk. Different disorders may affect HIV/HCV risk behavior for various reasons, requiring distinct intervention approaches.

Methods

Details of the study procedures have been described previously (Mackesy-Amiti, et al., 2012). All study procedures were approved by the Institutional Review Board of the University of Illinois at Chicago. The study was conducted at two field sites of the Community Outreach Intervention Projects in West and Northwest Side neighborhoods in Chicago. These sites provide a variety of services including HIV testing and counseling, hepatitis (HBV and HCV) testing, substance abuse treatment referrals, and needle exchange. The neighborhood populations are largely Black and Latino, however young White suburban drug users come to these neighborhoods to buy drugs.

Sample recruitment

Participants were eligible for the study if they had injected drugs at least once in the past 30 days, and were age 18 to 25. Current injection was verified by trained counselors who inspected for injection stigmata, and age was verified with a driver's license or state identification card. Study participants were recruited using outreach and respondent driven sampling (RDS) methods (Heckathorn, 1997; Heckathorn et al., 2002). Initial participants were recruited by outreach workers at the two field sites. After completing their interview, these participants were given up to four coupons to recruit other young injection drug users, serving as “seeds” for the RDS chains. Participants received compensation for each coupon that was brought in by a person eligible to participate in the study. Compensation began at $15 and was later increased to $20 in an effort to increase recruitment. Participants who distributed coupons had to return to the field site to receive compensation, and were paid $10-$15 for the coupon review session, independent of compensation for coupons redeemed. Those who successfully recruited eligible potential participants, and returned to the field site for a coupon review, were given additional coupons. Lost coupons were replaced upon request, and the original coupons voided. Because recruitment chains tended to be short and many seeds were not productive, outreach workers also continued to recruit participants directly throughout the study.

Procedures

After screening for eligibility and completing informed consent procedures, participants completed a brief computer-based questionnaire to capture information related to RDS,

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including the size and composition of their injection drug-using network, and the nature of their relationship with their recruiter. Participants then completed an extensive audio computer-assisted self-interview (ACASI) to assess socio-demographic and family background, drug use, injection risk behavior, sexual risk behavior, recent mental health and substance use treatment service use, HIV and hepatitis testing, HIV/hepatitis knowledge, attitudes regarding and subjective norms for HIV risk behavior, and self-efficacy for sex- and injection-related HIV risk reduction behaviors.

Following the ACASI, a trained interviewer administered the Psychiatric Research Interview for Substance and Mental Disorders (PRISM, version 6). On request, or if no interviewer was immediately available, participants were allowed to make an appointment to return for the PRISM interview within two weeks. Participants were compensated for completing the interviews. Compensation was initially set at $50 and was later increased to $75 due to the demanding nature of the PRISM interview.

Measures

Psychiatric Diagnoses—The PRISM is a semi-structured clinical interview that provides diagnoses based on DSM-IV criteria, and is specifically designed to differentiate between the expected effects of intoxication and withdrawal, and between primary (independent) and substance-induced psychiatric disorders (Caton, et al., 2005; Hasin, et al., 2006; Hasin, et al., 1996). For both substance use and psychiatric disorders, diagnoses were made using two time frames: “past year” (criteria were met within the past 12 months) and “lifetime” (criteria were met within or prior to the past 12 months). In the present study, we examined the effects of primary major depression (PMD), substance-induced major depression (SIMD), post-traumatic stress disorder (PTSD), other anxiety disorder (generalized anxiety disorder, panic disorder, agoraphobia, social phobia, specific phobia), childhood conduct disorder, anti-social personality disorder (ASPD), and borderline personality disorder (BPD).

Injection Risk Behavior—Questions assessing injection risk behavior were adapted from the NIDA Risk Behavior Assessment (RBA) (National Institute on Drug Abuse, 1993; Needle, et al., 1995). Questions included past six-month relative frequency of sharing syringes, cookers, cotton filters, and rinse water, and the number of people sharing a syringe with the respondent. Relative frequencies of sharing were measured on a 7-point Likert-type scale, labeled from “always” to “never,” with “about half the time” as the midpoint. Based on these measures, we created a 3-category measure to indicate whether a participant had used a shared syringe in the past six months, used shared cookers, cotton and/or rinse water but not syringes, or had not shared any syringes or other injection equipment.

Statistical Analysis

Analyses were conducted in Stata, version 12 (StataCorp, 2011). We computed RDS weights for individuals using the user-written -*rds*- program for Stata (Schonlau & Liebau, 2012), and conducted weighted multinomial logistic regressions predicting syringe and equipment sharing from psychiatric diagnosis, adjusting for gender, age, race/ethnicity (Hispanic, non-Hispanic Black/Other, vs. non-Hispanic White), and sexual orientation (non-

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heterosexual vs. heterosexual). We also tested gender by diagnosis interaction effects to determine whether a stratified analysis would be more appropriate, using a cutoff p-value < 0.10. The individualized weights adjust for individual degree (network size) and differential recruitment by categories of the dependent variable (Heckathorn, 2007).

Results

Of 652 individuals screened for eligibility, 645 were eligible and 612 consented to participate. One interview was discontinued due to the subject's difficulty in responding accurately, and one ACASI file was lost due to a computer malfunction. Forty percent of enrolled participants were recruited through outreach, while 60% were recruited through RDS. RDS recruits were on average younger than participants recruited by outreach (mean age 21.9 vs. 22.6) and had injected an average of 2.9 years versus 3.9 years ($t = 4.75$, $p < .001$). They were also less likely to report being homeless in the past six months (18% vs. 27%, $Chi2 = 6.32$, $p = .012$), and injecting daily (44% vs. 59%, $Chi2 = 13.06$, $p < .001$). The two groups did not differ on race/ethnicity, residence (Chicago vs. not Chicago), or employment status. Participants recruited by outreach were more likely to be female (44% vs. 34%, $Chi2 = 6.55$, $p = .011$), reflecting our efforts to reach more female injectors.

Forty participants did not complete a PRISM interview due to scheduling difficulties or failure to return for an appointment. PRISM non-completers were older than PRISM completers (23 vs. 22, t (df 608) = 2.44, $p = .015$), but did not differ on gender, race/ethnicity, residence, employment, homelessness, injection frequency, or syringe and equipment sharing. Fifty-one participants (9%) completed the PRISM interview at least one day after the ACASI, most (n=43) within one week. Six participants missed their initial appointments and completed the interview more than 3 weeks after the ACASI. The average time to administer the PRISM was 78 minutes; 92% of interviews were completed within 2 hours.

The final sample included 353 men and 217 women, ages 18 to 25. Characteristics of the sample are shown in Table 1. Most participants were non-Hispanic White (77%), and resided outside the city of Chicago (72%), reflecting the demographic shift in injection drug use over recent decades (Broz & Ouellet, 2008; Cooper, et al., 2008). Four male participants reported being HIV positive, and 3.5% of participants reported hepatitis C. Thirteen percent of participants knew someone who had HIV, and 26% knew someone with HCV. The RDS analysis showed that both network size (degree) and homophily (within-group recruitment) varied across categories of the dependent variable. Participants who did not share equipment or syringes had smaller networks (mean = 5.2) compared to those who shared equipment only (mean = 7.4) or syringes (mean = 8.0). In addition, participants who shared syringes were more likely to recruit and be recruited by other participants who shared syringes.

The prevalence of lifetime and past year psychiatric disorders in this sample were reported previously (Mackesy-Amiti, et al., 2012). Briefly, the prevalence of past year major depressive disorder was estimated at 18.6% for men and 24% for women, in contrast to 7.86% and 14.16% for 18-29 year-old White men and women in the National Epidemiological Survey on Alcohol and Related Conditions (NESARC) (Compton, et al.,

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2006). The estimated prevalence of ASPD in this sample was 23% among men and 17% among women, compared to 6.2% among 18-29 year-old men and women in the NESARC (Grant, et al., 2004), and the estimated prevalence of borderline personality disorder was 19.5% for men and 25% for women, compared to 9.3% among men and women 20-29 years old in NESARC, Wave 2 (Grant, et al., 2008). Anxiety disorders had an estimated lifetime prevalence of 10% for men and 26% for women, similar to rates found in the general population for this age group.

Psychiatric disorders were more prevalent among women, with the exception of childhood conduct disorder and antisocial personality disorder. There was significant comorbidity of psychiatric disorders, particularly for borderline personality disorder with ASPD (Mantel-Haenzel pooled odds ratio OR_{MH} = 3.71, 95% *CI* 2.42 - 5.67), lifetime PMD (OR_{MH} = 6.13, 95% *CI* 3.67 - 10.27), lifetime SIMD (OR_{MH} = 6.05, 95% *CI* 3.95 - 9.28), and past year SIMD (OR_{MH} = 5.50, 95% *CI* 3.56 - 8.50). Lifetime PTSD was associated with lifetime SIMD for women only (*OR* = 8.32, 95% *CI* 3.47 - 21.29), while past year PTSD and SIMD were significantly comorbid for both genders (OR_{MH} = 3.82, 95% *CI* 1.97 - 7.41). ASPD was not associated with primary depression, but was modestly correlated with substance-induced depression (lifetime OR_{MH} = 2.08, 95% *CI* 1.39 - 3.12, past year OR_{MH} = 2.07, 95% *CI* 1.36 - 3.16).

The unweighted proportions of men and women meeting the criteria for affective, anxiety, and personality disorders within syringe and equipment sharing categories are shown in Table 2. Two men were missing syringe and equipment sharing information and therefore are not included in the analysis. In a multinomial regression model including only demographic covariates as predictors, only sexual orientation was associated with syringe-sharing (relative risk ratio (*RRR*) = 2.66, 95% *CI* 1.09 - 6.49) and none of the covariates were significantly associated with equipment-sharing only. None of the gender by diagnosis interaction effects reached the level that would warrant stratified analysis.

Table 3 shows the relative risk ratios, 95% confidence intervals, and *p*-values for each psychiatric variable adjusted for covariates. The relative risk of syringe-sharing compared to no sharing was over three times greater for individuals who met the criteria for SIMD ever, over six times greater for those who were diagnosed with SIMD in the past year, and four times greater for those who met the criteria for BPD. The relative risk of equipment-sharing was also significantly greater for individuals who met the criteria for SIMD in the past year. Using the Benjamini-Hochberg method (Benjamini & Hochberg, 1995) to control the false discovery rate for multiple comparisons, these three associations are significant at $p < .001$. Primary major depression, ASPD, and anxiety disorders other than PTSD had slightly elevated risk ratios but these effects did not reach statistical significance after adjusting for multiple comparisons.

Discussion

This study extends previous findings of associations between injection risk behavior and mental health problems. We found significant associations between injection risk behavior and substance-induced major depression and borderline personality disorder among young

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people who inject drugs. Individuals with these disorders were three to six times more likely than those without to have engaged in risky injection behavior. This is the first U.S. study to demonstrate an association between borderline personality disorder and injection risk behavior. Primary major depression, anxiety disorders, and antisocial personality disorder, on the other hand, did not have significant associations with syringe and equipment sharing. The weak effects observed for some disorders may be due to comorbidity with BPD or SIMD. In unweighted analyses, ASPD was associated with syringe-sharing among men only. However, as in the Australian study (Darke, et al., 2007; Darke, et al., 2004) the effect of ASPD was attenuated when adjusted for borderline personality disorder (analysis not shown). Previous studies that linked injection risk with ASPD did not assess BPD, which is frequently comorbid with ASPD, potentially producing spurious associations between ASPD and risk behavior.

Emotion dysregulation is a common feature of psychiatric disorders. In particular, it is a defining feature of borderline personality disorder (American Psychiatric Association, 1994; Carpenter & Trull, 2013; Crowell, et al., 2009; Linehan, 1993), and is implicated in major depressive disorder (Gross & Muñoz, 1995; Kennedy, et al., 2006). Emotion dysregulation includes heightened emotional reactivity, high levels of negative affect, and inadequate and maladaptive emotion regulation strategies (Carpenter & Trull, 2013), leading to dysfunctional response patterns, such as self-injury (e.g. cutting), during emotionally challenging events (Crowell, et al., 2009). Deficits in emotion regulation may make it difficult to avoid risk and engage in harm reduction (e.g. delaying injection to obtain a clean syringe) when an individual is experiencing negative emotions, including states precipitated by withdrawal.

Apart from emotion regulation, a high level of negative affect in itself may lead to more risky behavior through effects on perceived self-efficacy (Ajzen, 2002; Bandura, 1990, 1994) or motivation to engage in harm reduction (W. A. Fisher, et al., 2003). While it is a safe assumption that personality disorders precede injection risk, the temporal relationship between SIMD and injection risk remains unknown. It could also be that risk-prone PWID are more susceptible to SIMD. The absence of an effect for past year PMD raises questions about the role of negative affect. However, there were relatively few cases of past year PMD (Mackesy-Amiti, et al., 2012), and so less power to detect an effect.

Some limitations of the study have been previously reported, including difficulty in recruiting the sample (Mackesy-Amiti, et al., 2012). As a result, the sample may not be representative of the population of young PWID. Nevertheless, comparisons between participants recruited by RDS versus outreach indicated that RDS helped us to reach younger, less marginalized PWID with shorter injection histories and less frequent injection. In spite of the difficulties we encountered, RDS is a useful tool for connecting with those PWID who are less likely to come into contact with outreach workers.

There are also limitations associated with the PRISM interview. Participants often had difficulty recalling past feelings and behaviors. However, previous research suggests that recall errors are most likely to involve less severe symptoms and behaviors (Fendrich &

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Mackesy-Amiti, 2000; Fendrich & Warner, 1994). We also note that this was a cross-sectional study and therefore causality cannot be inferred from the findings.

In this paper, we used a rather simplified measure of injection risk, ignoring the information on frequency of sharing syringes and other injection equipment. We felt that it was important to distinguish between syringe sharing and equipment sharing without syringe sharing. It may be that the associations are driven by individuals who share syringes and other equipment frequently, and that low frequency sharing is not associated with psychiatric disorders. A previous (unweighted) analysis using latent classes indicated that SIMD and BPD were associated with increased probability of a behavior class characterized by low or high frequency syringe sharing combined with high frequency of equipment sharing (Mackesy-Amiti, et al., 2013).

This study calls attention to the need for community-based HIV/HCV prevention efforts that consider the effects of psychiatric problems on injection risk behavior. Among young people who inject primarily heroin, substance-induced depression and borderline personality disorder are important risk factors. Additional research is needed to understand the effects of SIMD and BPD on risk behavior, and to inform intervention strategies.

Conclusions

Major depression, borderline personality disorder, and anti-social personality disorder are common among young people who inject drugs. Substance-induced depression and borderline personality disorder were associated with risky injection behavior in this sample, while primary major depression, anxiety disorders, and anti-social personality disorder did not appear to be related to syringe and equipment sharing. Interventions that focus on emotion regulation may be appropriate for this segment of the population of PWID.

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Table 1

Characteristics of the Sample (N=570)

	N	%
Sex		
Male	353	62%
Female	217	38%
Sexual Orientation		
Heterosexual	483	85%
Bisexual	52	9%
Homosexual	17	3%
Unidentified	12	2%
Race/Ethnicity		
White, Non-Hispanic	441	77%
Hispanic	80	14%
Other, Non-Hispanic[a]	48	8%
Residence		
Chicago	160	28%
Outside of Chicago	410	72%
Employment		
Employed full or part-time	169	30%
In school	25	4%
Unemployed	370	65%
Psychiatric treatment, ever		
None	289	51%
Drug related	118	21%
Not drug related	163	29%
Injection equipment sharing		
No sharing	120	21%
Equipment only	207	36%
Syringe sharing	241	42%
Age *Mean (Std. Dev.)*	22.2 (2.1)	

[a]Includes Asian, Pacific Islander, Native American, Black/African-American, mixed race, and unidentified race

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Table 2

Prevalence of psychiatric disorders by syringe & equipment sharing categories, unweighted

	Men (N = 351)			Women (N = 217)		
	No sharing	Equipment only	Syringe sharing	No sharing	Equipment only	Syringe sharing
N	**85**	**133**	**133**	**35**	**74**	**108**
Primary Major Depression - Ever	0.035	0.090	0.128	0.143	0.176	0.269
Primary Major Depression - Past Year	0.024	0.023	0.030	0.029	0.041	0.093
Substance-Induced Major Depression - Ever	0.165	0.180	0.331	0.171	0.351	0.417
Substance-Induced Major Depression - Past Year	0.118	0.165	0.263	0.057	0.311	0.370
Post-traumatic Stress Disorder - Ever	0.071	0.060	0.045	0.171	0.149	0.185
Post-traumatic Stress Disorder - Past Year	0.047	0.030	0.038	0.171	0.095	0.139
Any other primary anxiety disorder - Ever	0.024	0.068	0.083	0.143	0.135	0.194
Any other primary anxiety disorder - Past Year	0.012	0.045	0.068	0.114	0.108	0.139
Borderline Personality Disorder	0.082	0.158	0.293	0.200	0.230	0.343
Childhood Conduct Disorder	0.118	0.120	0.195	0.143	0.108	0.139
Antisocial Personality Disorder	0.212	0.256	0.398	0.257	0.176	0.250

Note: Syringe sharing = using a syringe that was previously used by someone else; Equipment = cookers, cottons, rinse water

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Psychol Addict Behav. Author manuscript; available in PMC 2015 December 01.

Table 3

Multinomial regressions of injection equipment sharing on lifetime and past year psychiatric disorders, RDS weighted

	Model Chi2		Syringe sharing				Equipment only			
	Wald	p	RRR[a]	95% Conf. Int.		p	RRR	95% Conf. Int.		p
Primary Major Depression - Ever	21.95	0.038	3.01	1.14	7.91	0.026	2.10	0.73	5.99	0.167
Primary Major Depression - Past Year	18.02	0.115	3.32	0.73	15.06	0.121	2.15	0.38	12.28	0.388
Substance-Induced Major Depression - Ever	**34.42**	**0.001**	**3.78**	**1.93**	**7.42**	**0.000**	1.61	0.80	3.27	0.183
Substance-Induced Major Depression - Past Year	**44.65**	**< .001**	**6.81**	**3.13**	**14.81**	**0.000**	**3.03**	**1.34**	**6.85**	**0.008**
Post-traumatic Stress Disorder - Ever	17.66	0.126	1.68	0.59	4.83	0.335	1.08	0.38	3.07	0.878
Post-traumatic Stress Disorder - Past Year	16.52	0.169	0.91	0.32	2.59	0.867	0.73	0.22	2.35	0.595
Any other anxiety disorder - Ever	18.94	0.090	3.08	1.03	9.22	0.044	2.31	0.79	6.80	0.128
Any other anxiety disorder - Past Year	17.95	0.117	3.23	0.86	12.07	0.082	2.24	0.63	7.98	0.215
Childhood Conduct Disorder	16.58	0.166	1.70	0.66	4.38	0.276	1.26	0.50	3.17	0.626
Antisocial Personality Disorder	18.96	0.090	2.03	0.98	4.19	0.055	1.25	0.62	2.55	0.532
Borderline Personality Disorder	**31.66**	**0.002**	**4.13**	**1.91**	**8.92**	**0.000**	1.76	0.79	3.92	0.164

[a]Relative Risk Ratio, adjusted for age, sex, sexual orientation, and race/ethnicity; reference class is No Sharing