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Mental health of heroin users with differing injection drug use histories: A non-treatment sample of Mexican American young adult men

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Abstract

Background—While the comorbidity of mental health and injecting heroin has been documented, current research is limited by describing the mental health of people who inject drugs without a comparison group and by the lack of research on nontreatment samples in the United States, particularly among Hispanics. The purpose of this study was to examine the association of injecting history (never, former, occasional, and daily) and multiple outcomes of global and mental health using a sample of U.S.-based Latinos not currently in treatment.

Methods—Data are from a sample of street-recruited Mexican American young adult men (n=275) in San Antonio, TX. Multiple logistic regression and structural equation modeling were used.

Results—Overall 54% of men reported lifetime injecting drug use (20.7% former users, 11.1% occasional users, and 21.9% daily users). We found varying prevalence rates of global and mental health status among different histories of injecting. After covariate adjustment, daily injecting remained strongly associated with all four outcomes: perceived poor health status (AOR = 4.39; p 0.001), psychological distress (AOR = 2.78; p 0.05), depression (AOR = 4.37; p 0.001), and suicidal ideation (OR = 4.75; p 0.001). Acculturation, gang membership, and incarceration history also emerged as important factors.

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Contributors

KM Nowotny was responsible for the analysis and contributed to all sections of the paper. T Perdue was responsible for the developing the background and framing for the paper. A Cepeda and A Valdez contributed to the overall conceptualization of the study, interpretation of the findings, and development of the discussion. All authors approved of the final manuscript before the submission.

Author Disclosures

Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest

Conclusion—This study provides new information about the relationship between mental health and injecting heroin use. Findings support the need to consider mental health states among people who inject drugs, and to examine varying histories of injecting with socially and culturally relevant factors.

Keywords

injecting drug use (IDU); people who inject drugs (PWID); mental health; depression; psychological distress; suicide; Mexican-American; Latino men

1.0 Introduction

The comorbidity of mental health and heroin use has been documented. People who use heroin have higher rates of depression (Darke et al., 2009; Teesson et al., 2005), suicide attempts (Darke et al., 2007; Darke et al., 2009; Sordo et al., 2012), and other disorders (Brooner et al., 1997; Darke et al., 1994; Darke and Ross, 1997; Mackesy-Amity et al., 2012). Much of this research, however, has involved individuals in substance abuse treatment (e.g., Chen et al., 2010; Darke et al., 2007; Darke et al., 2009; Darke et al., 2015; Fortier et al., 2017; Frischknecht et al., 2011; Golden et al., 2005; Lévesque et al., 2014; Pilowky et al., 2011; Sordo et al., 2012; Teesson et al., 2005; Treméau et al., 2008; Yen et al., 2011). These data may not provide an accurate portrait of this population because individuals with more severe mental health symptomology may be more likely to seek substance abuse treatment, which may explain the higher rates of negative mental health outcomes among study participants recruited from treatment settings (Mackesy-Amity et al., 2012).

A handful of studies have described the mental health of people who inject drugs (PWID) and are not in treatment in settings outside of the United States. This research has documented high levels of psychological distress (Scott et al., 2016), associations between internalized stigma and depression (Cama et al., 2016), and relationships between dependence on opioids and psychological distress (Smirnov et al., 2016) among Australian PWID, and increased suicidal ideation with symptoms of depression and anxiety (Armstrong et al., 2014; Armstrong et al., 2013) among PWID from India. This research on mental health and heroin use has generally included only PWID, and studies including both people who do and do not inject drugs did not involve comparisons between groups regarding mental health outcomes (e.g., Chen et al., 2010; Darke et al., 2007; Darke et al., 2009; Darke et al., 2015; Sordo et al., 2012; Teesson et al., 2005; Treméau et al., 2008; Yen et al., 2011). A limited number of studies compared mental health outcomes for people who do and do not inject drugs in Ireland (Golden et al., 2005) and Canada (Lévesque et al., 2014), but no identified studies to our knowledge have compared different injecting histories such as occasional, daily, and former use.

In the United States, research with non-treatment-based samples has begun to describe the mental health of PWID. A study of participants in a syringe exchange program found that more than 50% had a mental health disorder not related to substance use (Kidorf et al., 2004). In a more recent study with PWID, rates of major depression and antisocial and

borderline personality disorders were higher among young PWID than the general population, but were less prevalent compared to samples recruited from treatment settings (Mackesy-Amiti et al., 2012). Although these studies suggest an association between injecting drug use and mental health, it remains unclear how the findings pertain to the U.S. Hispanic population, because the participants were primarily White (Mackesy-Amiti et al., 2012) and African American (Kidorf et al., 2004). One longitudinal study of street-recruited Mexican American noninjecting heroin users found that depression was the strongest indicator of risk of transitioning to injecting drug use (Cepeda et al., 2012). A second analysis using the same data found that higher levels of family and cultural stressors are associated with negative mental health outcomes (Saint Onge et al., 2013).

In sum, current research on mental health among PWID has been limited by describing mental health without a comparison to persons who do not inject drugs, and by the lack of research on non-treatment samples in the United States, particularly among Hispanics. Therefore, the objective of this study was to examine the association of injecting history (never, former, occasional, and daily) and multiple outcomes of global and mental health (general health status, psychological distress, depression, and suicidal ideation) using a sample of U.S.-based Latinos not currently in treatment. Given the recruitment strategy, the study also explored the association of incarceration, gang membership, and acculturation with mental health.

Incarcerated persons have an increased prevalence of mental illness (Fazel et al., 2016). This is in large part due to the criminalization of mental illness¹; however, incarceration experiences can have lasting negative effects on mental health that may affect successful reintegration into the community (Schnittker et al., 2012). Similarly, adolescent gang membership has been linked with health issues, including drug abuse, in adulthood (Gilman et al., 2014). Less is known about the association between current gang membership and mental health disorders among adults. This is important because Hispanics are overrepresented in gangs and may have a longer duration of gang membership compared to other race/ethnic groups (Pyrooz et al., 2013; Egley et al., 2006). A study in the United Kingdom found that traumatic exposures and violence related to gang involvement was associated with an elevated prevalence of mental disorders (Coid et al., 2013). However, similar to incarceration, it is unclear whether gang membership negatively impacts the mental health of gang members or whether individuals with pre-existing mental health disorders may be more likely to join gangs (Wood and Dennard, 2017).

Research on the association between acculturation and mental health outcomes provides contradictory findings, which may be a function of how acculturation is operationalized within studies (Lara et al., 2005). Some research shows that less acculturated persons are at greater risk for negative mental health outcomes because of increased stress from recent migration compared to those who are more acculturated (Franzini and Fernandez-Esquer, 2004; Koneru et al., 2007). For example, in a study of Mexican American who use non-injecting heroin, those who formerly injected heroin were less likely to be acculturated (e.g.,

¹The criminalization of mental illness refers to the overrepresentation of persons with mental illness in correctional facilities after the deinstitutionalization of psychiatric hospitals (Slate et al., 2013).

more Mexican oriented) compared to those who never injected heroin (Valdez et al., 2007). However, the strongest research evidence has indicated that those who are more acculturated have poorer mental health compared to recent immigrants because of the increased interaction with mainstream society and the longer-term exposure to discrimination in the United States. (Alegria et al., 2008; Cook et al., 2000; Perez et al., 2009; Vega et al., 1998).

In this study we ask, is injecting heroin use associated with mental health, broadly defined, independent of incarceration, gang membership, and acculturation? We hypothesize that there will be a health-gradient whereby persons who do not inject drugs will have the lowest prevalence rates and PWID daily will have the highest prevalence rates. We expect that due to the high-risk nature of the sample, these men will have overall higher rates of poor mental health than national samples of Mexican Americans. Finally, we predict that men with more extensive incarceration and gang membership histories will report higher rates of poor mental health and that Mexican or Mexican American cultural orientation will be protective.

2.0 Material and Methods

We used data from a longitudinal mixed-methods cohort study of Mexican American young adult men who were gang affiliated as adolescents in San Antonio, Texas (United States). The San Antonio population is more than 1 million, of which more than 50% is of Mexican descent (U.S. Census Bureau, 2010). San Antonio is among the top 10 cities with the largest number of people living in distressed zip codes and has the highest level of spatial inequality between zip codes (Economic Innovation Group 2016). Heroin has historically been consumed by Mexican Americans living in impoverished and economically and racially segregated neighborhoods in San Antonio (Desmond and Maddux, 1984; Valdez and Cepeda, 2008; Valdez et al., 2011). This context has given rise to a vibrant drug market, making marginalized and drug-using populations more susceptible to arrest, incarceration, and gang involvement (Cepeda et al., 2015; Valdez and Cepeda, 2008).

The original (baseline) study, conducted from 1996–1998, surveyed 160 Mexican American male adolescents. A multistage stratified design was applied to select a random sample that was representative of 404 known Mexican American gang members in this specific urban geographic area. This study focused primarily on how peer, school, and family attachment influence violence, drug use, and criminal behavior among these youth through the administration of in-depth qualitative interviews and structured survey questionnaires. A detailed description of the baseline sampling design has been presented elsewhere (Peterson and Valdez, 2005; Yin et al., 1996).

The follow-up study, conducted from 2009–2012, relocated 94.7% of men from the original sample. Of those located, 83.2% were successfully enrolled, for a final follow-up rate of 78.8% ($n = 119$). Sixteen men declined to participate in the follow-up study, six men were deceased, and two men were in federal prison. Subjects in Bexar County Jail or Texas Department of Criminal Justice were successfully enrolled in the study. An additional 156 men were recruited from the original sampling frame for a final sample size of 275. The follow-up interview consisted of administration of a standardized questionnaire including

the Natural History Interview (Hser et al., 2001; Hser et al., 2007), collection of biological data, and qualitative interviews. The goal of the follow-up study was to examine the long-term health and social consequences of youth gang membership and to characterize different drug use trajectories. The data for the current analysis come from standardized scales, incarceration history questionnaire, and comprehensive drug history questionnaire.

Both studies were funded by the National Institute on Drug Abuse and study protocols were approved by university institutional review boards and executive services at the Texas Department of Criminal Justice.

2.1 Measures

Mental health measures included global well-being, psychological distress, depression, and suicidal ideation. Global well-being was assessed as self-reported health. This was measured using a standard 4-point self-rated health question: “How would you describe your health status? Would you say it is ... excellent, good, fair, or poor?” These categories were collapsed into a binary indicator of poor health (*poor or fair*) versus good health (*good or excellent*). Psychological distress was a global measure assessed using the Brief Symptom Inventory (Derogatis and Melisaratos, 1983), a 53-item self-report inventory in which participants rate the extent to which they have been bothered (0 = *not at all* to 4 = *extremely*) by various symptoms in the past week ($\alpha = .98$). The global severity index was measured as the total symptomatology divided by the number of items (53). A cutoff of 63 was used to indicate psychological distress. Depression was measured using the eight-item version of the Center for Epidemiological Studies Depression Scale ($\alpha = .93$), which measures depressive symptomatology not a clinical diagnosis of depression (Radloff, 1977). Suicidal ideation was indicated by a positive response to at least one of four questions asked in the General Health Questionnaire (Goldberg and Hiller, 1979): have you recently “found that the idea of taking your own life kept coming into your mind”; “found yourself wishing you were dead and away from it all”; “thought of the possibility that you might make away with yourself”; and “felt that life isn’t worth living.”

Injecting history was composed of four categories: no injecting (i.e., never injected drugs), former injecting (i.e., have not injected in the past year), occasional injecting (i.e., reported injecting in the past year between once a month and 4 to 6 times a week), and daily injecting (i.e., about once a day to 10 or more times a day, almost every day). Measures of daily marijuana use (at least once daily on most days during the past year) and cocaine use (any use during the past year) were included as control variables.

Current prison gang membership was defined as self-identifying as a member of a Texas-based adult prison gang. The men in this study were recruited during adolescence because of their youth street gang membership. Given the differences in gang structures between adolescent and adult gangs (Valdez, 2005), we included this measure of continued gang involvement. Total years of incarceration was calculated as the total time spent imprisoned across incarceration episodes (up to 10 episodes lasting 30 days or longer) as reported during an incarceration history questionnaire. This measure represents total lifetime exposure to jail and prison conditions. The total number of incarceration episodes was also included (nine men reported being incarcerated for all 10 potential incarceration episodes).

The Acculturation Rating Scale for Mexican Americans-II was used to measure positive and negative concepts of identity through assessing integration, assimilation, separation, and marginalization (Cuellar et al., 1995). This 30-item scale includes a 13-item Anglo orientation subscale ($\alpha = .78$) and a 17-item Mexican orientation subscale ($\alpha = .86$). These subscales measure acceptance of Anglo and Mexican or Mexican American culture and provide an overall score on a scale of Very Mexican Oriented ($n = 2$), Mexican Oriented to Approximately Balanced Bicultural ($n = 114$), Slightly Anglo Oriented Bicultural ($n = 117$), Strongly Anglo Oriented Bicultural ($n = 14$), and very assimilated ($n = 1$). Given that the majority of the sample fell into two acculturation categories, a sum score of Mexican orientation ($\bar{x} = 44.5$; $SD = 12.4$; $95\% \text{ interval} = 24 \text{ to } 66$; $median = 43.0$) was included in the analysis instead of the categorical acculturation variable.

Demographic control variables included age (continuous), and dichotomous measures of currently married or cohabitating, living with biological children², high school graduate, and currently employed.

2.2 Analysis

Descriptive statistics were presented for the raw data. Patterns of missingness were examined and 66.9% of cases were complete and 30.6% were missing just one item. Four items had missing data: self-reported health ($n = 245$), age ($n = 273$), Mexican orientation ($n = 272$), and prison gang membership ($n = 268$). Self-reported health was examined further and no significant patterns emerged; therefore, missingness was assumed to be completely at random. Multiple imputation with chained equations was used to estimate the missing data, using 100 iterations to compute 10 complete datasets in Stata 14.³ Separate multivariate logistic regression models were estimated across the imputed datasets for each of the four outcomes. Finally, a structural equation model was estimated with the computed datasets. This analysis included four models estimated simultaneously, each controlling for the full vector of covariates.

3.0 Results

Overall, the men in this study did not report good health (Table 1). Almost half reported poor health on a global measure of well-being, one quarter were classified as having psychological distress, and about one-third met criteria for depression and suicidal ideation. More than half of the men had engaged in injecting heroin use: 20.7% were former users, 11.1% were occasional users, and 21.9% were daily users. About one quarter used marijuana daily and 35.3% had used cocaine in the past year. On average, the men were 31.5 years of age ($SD = 2.9$; $95\% \text{ interval} = 27 \text{ to } 39$; $median = 31.0$). These men have extensive incarceration histories, despite their young age. On average, the lifetime exposure to correctional facilities is 5.33 years ($SD = 4.5$; $95\% \text{ interval} = 0.0 \text{ to } 18.4$; $median = 4.1$). The average number of incarceration episodes lasting 30 days or longer was 4.1 ($SD = 2.6$; 95%

²Almost all of the men in this study are fathers. We have found living with biological children to be a protective factor.

³The multivariate analysis was conducted using listwise deletion and similar results were found for daily IDU: poor health ($n = 234$, $AOR = 4.38$, $p = .001$); psychological distress ($n = 262$, $AOR = 2.94$, $p = .01$); depression ($n = 262$, $AOR = 4.32$, $p = .001$); and suicidal ideation ($n = 262$, $AOR = 4.62$, $p = .001$).

interval = 0 to 10; *median* = 4.0). At the time of the follow-up study, 36.9% were members of organized adult prison gangs.

There were strong associations ($p < .001$) between global and mental health and injecting history (Table 2).⁴ In general, men who did not inject heroin and who formerly injected heroin reported similar health profiles, with former users having slightly lower prevalence rates of health problems. On the other hand, men who occasionally injected heroin and injected heroin daily tended to have worse health, with daily injecting linked to somewhat worse health. For example, the prevalence of poor health ranged from 39.5% for men with no injecting history to 66.7% for men who inject daily ($p < .001$). With regard to psychological distress, former injecting (14.3%) was associated with the lowest prevalence, whereas occasional injecting (43.3%) was linked to the highest prevalence ($p < .001$). The number of psychological distress symptoms endorsed was also examined. Men reporting occasional use and daily use endorsed about 30 of 53 symptoms. Depression showed a similar pattern, with between 55% and 60% percent of those reporting current injecting practices meeting the suggested threshold for depression. Current injecting use was also associated with about twice as high depressive symptomatology compared to former and never injecting use. Finally, although the rates of suicidal ideation are alarming for all four groups, men who reported injecting daily reported the highest rate (64.4%) followed by men who reported injecting occasionally (46.7%).

After covariate adjustment (Table 3), daily injecting remained strongly associated with all four outcomes as indicated by the large adjusted odds ratios (AOR) for poor health ($AOR = 4.39, p < .001$), psychological distress ($AOR = 2.78, p < .05$), depression ($AOR = 4.37, p < .001$), and suicidal ideation ($AOR = 4.75, p < .001$). Men who reported occasionally injecting drugs had higher odds of reporting poor health ($AOR = 2.84, p < .05$), psychological distress ($AOR = 3.76, p < .05$), and depression ($AOR = 3.77, p < .01$) compared to those with no history of injecting. A small number of discernable patterns emerged across models with regard to the covariates. First, years spent incarcerated was associated with significantly lower odds of poor health, psychological distress, and depression. Second, prison gang membership was associated with significantly higher odds of psychological distress and suicidal ideation. Third, Mexican orientation was associated with lower odds of poor health, depression, and suicidal ideation.

Figure 1 indicates that the strongest association occurred between injecting drug use and depression, followed closely by suicidal ideation. For example, the standardized coefficient for depression was 0.29 for men who reported injecting occasionally and 0.32 for men who reported injecting daily. Because the outcomes were strongly correlated, as seen in Table 4, the covariances between the error terms were included since they may have come from a common source. Indeed, all of the covariances were statistically significant.

⁴Bivariate analysis between the other drug use variables (past year cocaine use and daily marijuana use) and global and mental health did not reveal any significant associations. Table available upon request.

4.0 Discussion

About half of the men in this study have injected heroin. Given this high rate, as expected we found this group to have higher negative outcomes than the U.S. Hispanic population and the general U.S. population. In our sample, participants who engaged in occasional and daily use had higher rates of poor global and mental health compared to those with former and no use.

Forty-six percent of the men in our study reported being in poor health, with 66.7% of men who inject heroin daily reporting poor health. In comparison, an analysis using the National Health and Nutrition Examination Survey found that 13.6% of Hispanics and 11.8% of non-Hispanics (regardless of race) reported fair or poor health (Borell and Dallo, 2008). This is significant given the strong association of self-rated health with morbidity and mortality (Franks et al., 2003; Idler and Angel, 1990; Jylhä, 2009).

This study also found high levels of psychological distress, with a prevalence of 24.7% overall and substantive variations (14.3% to 43.3%) across injecting history. Data from the National Health Interview Survey indicated that 3.8% of the overall Hispanic population, compared to 3.3% of non-Hispanic Whites and 3.7% of non-Hispanic Blacks, report psychological distress (Weissman et al., 2015). Although psychological distress had the weakest association with injecting heroin use, it was still statistically and substantially significant for occasional and daily use.

Depression and suicidal ideation had the strongest association with injecting heroin. Findings from one of the largest studies of Hispanic groups in the United States found a 27% overall prevalence rate of depression among all Hispanic groups (22.3% among Mexican Americans) and a prevalence rate of 20.7% among Hispanic men (Wassertheil-Smoller et al., 2014). Although the overall Hispanic suicide rate (5.85) is lower than the U.S. rate (12.08), suicide is the third leading cause of death for Hispanic men between the ages of 15 and 34 (CDC, 2010; SPRC, 2013). The Mexican American men in our study reported a prevalence rate of 36% for both depression and suicidal ideation, overall. Participants who engaged in daily heroin use reported higher rates of 37.3% and 64.4%, respectively.

Although we found higher rates of poor global and mental health among different histories of injecting heroin use, it is important to note that our overall sample had more detrimental self-reported health status compared to the general population. Thus, the men who inject drugs appear to be doubly disadvantaged—in the absence of injecting heroin, they would still have poorer health than the average Mexican American population. Additionally, the strong associations of injecting heroin with global and mental health outcomes remained even when controlling for demographic and other socially and culturally relevant factors. Yet many of the demographic factors did not have a direct association with mental health. This may be because in this context, neighborhood factors (e.g., poverty, segregation, mass incarceration) exert such a strong influence that individual differences become less important (Sampson and Wilson, 1995). It is also possible that these demographic variables represent crude measures of individual differences, especially given the demographic homogeneity of the sample.

Instead, the socially and culturally relevant factors were strongly associated. For example, exposure to jail and prison conditions appeared to have a positive association with mental health. Contrary to our hypothesis grounded in research using national samples (e.g., Schnittker and John, 2007; Schnittker et al., 2012), the apparent health benefit of incarceration may be associated with the fact that incarceration periods for these men contribute to a reduction in stressful everyday socioeconomic experiences and circumstances (e.g., finding a job, paying bills, family strains) (Cepeda et al., 2016; Cepeda et al., 2015; Thomas et al., 2016). Additionally, the most often cited mechanism for the negative effect of incarceration on mental health is stigma following release (Schnittker 2007; Massoglia and Pridemore, 2015). Given the criminalized neighborhood context in which these men live including intergenerational gang membership and drug use, incarceration may have less of a stigmatizing influence (Cepeda et al., 2015; Cepeda et al., 2016). This finding may also be associated with access to health services while incarcerated that are not available to men in their community (Nowotny, 2016). Continued gang involvement, on the other hand, was associated with higher levels of psychological distress and suicidal ideation. This finding points toward the need for more research on health consequences among adult gang members who maintain their affiliation for longer periods of time (Egley and McDaniel, 2012; Pyrooz, 2014; Watkins and Moule, 2014). The average length of gang membership in this sample is longer than has been previously documented (Cepeda et al., 2016).

Finally, this study found Mexican or Mexican American orientation to be a protective factor for mental health. Heroin use is part of the cultural context for Mexican Americans living in certain neighborhoods of San Antonio and is connected with the historic segregation and structure of vice districts in the region (Valdez and Cepeda, 2008). For some families in these communities, heroin use is an intergenerational occurrence that results in specific family social process readjustments (social and economic support, housing, etc.) necessary to minimize the consequences of heroin use (e.g., incarceration, overdoses, etc.) (Cepeda et al., 2015). Although strongly identifying with the cultural norms of heroin use may promote and facilitate initiation of opiate use, Hispanic youth who identify more with mainstream American culture also face risks because they often depart from protective cultural norms (Castro et al., 2007). This needs to be interpreted with caution, however, given the limited variation in acculturation status found among this sample.

There are additional limitations that need to be considered. First, the generalizability and interpretability of these data are limited until comparable investigations are done with similar populations. Second, it is possible that the analysis suffers from “researcher degrees of freedom”, meaning that analytical decisions made by the authors resulted in a false positive (Simmons et al., 2011). To minimize this limitation we conducted robustness checks and found stable results. Additionally, these data are not able to examine issues related to time-order regarding mental health and injecting heroin. This limits our ability to make causal statements. Future analyses will focus on more nuanced trajectories of heroin use and the association with health outcomes.

5.0 Conclusion

This study documented high rates of poor mental health among Mexican American young adult men who were affiliated with youth street gangs during adolescence and the increasing mental health costs for men who inject drugs and join adult gangs. By documenting the relationship between injecting heroin and mental health in an understudied group with public health relevance, we strengthened our understanding of this complex comorbidity. Considering the potential impact of community risk factors on substance use, structural-level neighborhood interventions should be considered when developing prevention and intervention programs. Evidence-based community programs, such as Communities That Care, can mobilize surrounding stakeholders to identify specific risk and protective factors in the local community to reduce youth initiation of substance use and other delinquent behaviors (Hawkins et al., 2008; Rhew et al., 2016). For individuals involved in the criminal justice system, community reintegration is needed following incarceration for the establishment of social and, in particular, economic capital in the community and prevention of continued participation in underground drug markets or gang activity. Restorative reentry, which reconnects formerly incarcerated individuals with their community prior to and after release from prison to build social capital, may produce better long-term outcomes at the individual and community levels (Settles, 2009). Finally, to address disparities in treatment for Mexican Americans (Alvarez et al., 2007; Guerrero et al., 2013), community mental health services need to be accessible and culturally competent for a range of comorbid substance use and mental health conditions.'

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Highlights

- Co-morbidity varied across injection drug use (IDU) history compared to non-injection
- Daily and occasional injecting associated with psychological distress, depression
- Daily injecting associated with suicidal ideation
- Acculturation, gang membership, incarceration are also important for mental health

Figure 1.

Results of Structural Equation Model Regressing Injecting Drug Use History (IDU) on Multiple Global and Mental Health Outcomes (n=275)

Note: Reference category is “Non-IDU”. Standardized coefficients, error variance, and covariance presented. Only significant pathways shown. All four models control for age, married/cohabitating, live with biological children, high school graduate, employed, Mexican orientation, prison gang membership, years incarcerated, incarceration episodes (30+ days), daily marijuana use, and past year cocaine use.

*p .05; **p .01; ***p .001

Table 1

Descriptive Statistics for Study Variables (n=275)

	n	%/Mean
Global & Mental Health		
Poor Health	112	45.7
Psychological Distress	68	24.7
Depression	98	35.6
Suicidal Ideation	99	36.0
Injecting Drug Use (IDU) History		
Non-IDU	125	46.3
Former IDU	56	20.7
Occasional IDU	30	11.1
Daily IDU	59	21.9
Age (Mean)		31.5
Married/Cohabiting	116	42.2
Live with Biological Children	81	29.5
High School Graduate	94	34.2
Employed	107	38.9
Mexican Orientation (Mean)		44.5
Prison Gang Member	99	36.9
Years Incarcerated (Mean)		5.3
Incarceration Episodes (30+ Days) (Mean)		4.1
Daily Marijuana Use	65	23.6
Past Year Cocaine Use	97	35.3

Note: n may not total to 275 within each variable due to missing cases.

Table 2

Global and Mental Health Status across Injecting Drug Use (IDU) History

	Non-IDU (n=125)		Former IDU (n=56)		Occasional IDU (n=30)		Daily IDU (n=59)		
	Mean(se) ^a / % ^b		Mean(se) ^a / % ^b		Mean(se) ^a / % ^b		Mean(se) ^a / % ^b		p
Poor Health	39.5		33.3		58.3		66.7		***
Psychological Distress Severity (0 to 53)	18.18 (1.29)		19.25 (1.76)		30.20 (3.26)		30.75 (1.94)		***
Psychological Distress	16.8		14.3		43.3		37.3		***
Depressive Symptomatology (0 to 24)	4.50 (.49)		4.23 (.69)		8.27 (1.23)		9.69 (.96)		***
Depression	25.6		17.9		56.7		59.3		***
Suicidal Ideation	24.0		23.2		46.7		64.4		***

^a Oneway ANOVA;^b Chi square test;

p .001

Table 3

Results from Multivariate Logistic Regression (n = 275)

	Model 1: Poor Health				Model 2: Psychological Distress ¹				Model 3: Depression ¹				Model 4: Suicidal Ideation			
	OR	P	CI-	CI+	OR	P	CI-	CI+	OR	P	CI-	CI+	OR	P	CI-	CI+
IDU History (Non-IDU Ref.)																
Former IDU	1.21		0.57	2.58	0.89		0.35	2.26	0.81		0.35	1.88	0.92		0.40	2.11
Occasional IDU	2.84	*	1.06	7.59	3.76	**	1.49	9.51	3.77	**	1.53	9.25	2.45		0.95	6.30
Daily IDU	4.39	***	1.89	10.19	2.78	*	1.25	6.19	4.37	***	2.04	9.36	4.75	***	2.14	10.51
Age	0.99		0.90	1.10	0.98		0.88	1.09	0.91		0.82	1.01	0.99		0.90	1.10
Married/Cohabiting	1.03		0.54	1.95	1.40		0.71	2.78	0.55		0.29	1.05	1.36		0.69	2.68
Live with Biological Children	0.85		0.44	1.64	0.73		0.34	1.56	0.71		0.36	1.44	1.00		0.49	2.07
High School Graduate	1.10		0.60	2.03	0.90		0.45	1.80	1.08		0.57	2.05	0.73		0.37	1.42
Employed	1.02		0.54	1.92	0.95		0.47	1.91	0.82		0.43	1.55	0.44	**	0.22	0.89
Mexican Orientation	0.97	*	0.95	1.00	0.98		0.95	1.01	0.97	*	0.95	1.00	0.94	***	0.91	0.97
Prison Gang Member	1.08		0.52	2.22	2.87	**	1.32	6.24	1.86		0.89	3.88	2.63	**	1.27	5.56
Years Incarcerated	0.90	*	0.82	0.98	0.92	*	0.84	1.00	0.91	*	0.84	0.99	1.03		0.94	1.12
Incarceration Episodes (30+ days)	0.92		0.81	1.05	1.01		0.88	1.17	1.02		0.90	1.16	0.98		0.85	1.12
Current Daily Marijuana User	0.53		0.27	1.02	1.16		0.55	2.41	1.33		0.68	2.62	1.41		0.70	2.84
Current Cocaine Use	1.38		0.77	2.47	1.13		0.58	2.19	1.17		0.63	2.16	0.75		0.39	1.43

OR=Odds Ratio; CI=Lower Bound of 95% Confidence Interval; CI+=Upper Bound of 95% Confidence Interval;

* p .05;

** p .01;

*** p .001

¹Negative binomial models were estimated for psychological distress severity and depressive symptomatology. Similar results were found: psychological distress occasional IDU incident rate ratio (IRR) = 1.57, p .01 and daily IDU IRR = 1.59, p .001; depressive symptomatology occasional IDU IRR = 1.69, p .05 and daily IDU IRR = 1.93, p .001. Structural equation models (SEM) were also estimated that included both a measurement model for the mental health outcome with constrained reliability and a structural model regressing the latent variable on study covariates (Westfall & Yarkoni, 2016). The coefficient in the psychological distress SEM for occasional IDU is 0.37 (p .001) and for daily IDU it is 0.34 (p .001). The SEM coefficients from the depression model are 0.36 (p .01) for occasional IDU and 0.50 (p .001) for daily IDU.

Table 4

Correlations between Global and Mental Health Outcomes

	1	2	3	4
1 Poor Health	1.00			
2 Psychological Distress	0.21 (0.04)	*** 1.00		
3 Depression	0.25 (0.06)	*** 0.67 (0.45)	*** 1.00	
4 Suicidal Ideation	0.21 (0.04)	*** 0.48 (0.23)	*** 0.44 (0.19)	*** 1.00

Note: Correlation coefficient (*r*) calculated using Cramer's V. Effect size (*r*²) in parentheses.

p .001