

Childhood Factors that Precede Drug Injection: Is there a Link?

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Abstract Examination of childhood risk factors for injection drug use may provide clues as to why people progress to injection drug use and it can promote identification of at-risk youth. We surveyed current injection drug users (IDUs) and individuals who never injected drugs (non-IDUs), recruited through street outreach and snowball sampling in Denver, CO. Between March 2000 and October 2003, 601 subjects (339 IDUs and 262 non-IDUs) participated in structured interviews. We examined self-reported factors in childhood that may have been influential in whether one progressed to drug injection later in life. These indicators included age at drug and alcohol initiation, childhood risk behavior, parental monitoring, family stability, and other family problems. Differences between IDUs and non-IDUs were assessed using unadjusted tests and logistic regression. Results of the data analysis indicated that IDUs were significantly younger when they first used both alcohol and marijuana, they reported higher childhood risk behavior scores, and they had less parental monitoring and less family stability as children than non-IDUs. This research may assist clinicians in defining factors that put youth at risk for problems associated with injection drug use.

Keywords Injection drug use · Risk behavior · Parental influence · Prevention · Family

Injection drug use remains an important national problem due to the health risks it presents to users as well as risks and costs to society on the whole. One study estimated that illicit drug abuse cost society almost \$98 billion in 1992 in the form of health care, substance abuse treatment and prevention, societal costs such as crime and welfare, and costs associated with loss of job wages and productivity (NIDA, 2005a). In 2004, over half of high school seniors

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polled reported some illicit drug use in the past year, and almost a quarter reported illicit drug use in the past 30 days (NIDA, 2005b). The Colorado Alcohol and Drug Abuse Division (ADAD) estimated that there were between 15,000 and 18,000 current IDUs in Colorado through June 2003, 60% of whom lived in the Denver area (CDPHE, 2005). According to ADAD, 2485 IDUs were admitted to drug abuse treatment programs in the state in 2004, half of whom were opiate injectors (CDPHE, 2005). The pathway to injection drug use often begins from early childhood and is affected by myriad factors. While indicators or predictors that may predispose a youth to later drug use have been identified, it is important that researchers continue to examine factors that may work together to put someone at higher risk, given that young people are still transitioning into this dangerous lifestyle.

Much research has indicated that earlier age of first alcohol or drug use is a strong predictor for progression into further drug use (Anthony & Petronis, 1995; Clark, Cornelius, Kirisci, & Tarter, 2005; Greydanus & Patel, 2005; Hawkins, Catalano, & Miller, 1992; Kandel & Yamaguchi, 1993). The idea that alcohol or marijuana acts as a “gateway” to further drug use is a theory that has been examined in the literature (Greydanus & Patel, 2005; Kandel & Logan, 1984). Children who are exposed to alcohol or marijuana at a young age may also be exposed to other factors that could act in combination to put them at risk for drug use. For example, the family environment has been shown to have a great influence on substance use and risk-taking behaviors (Dinwiddie, Reich, & Cloninger, 1992; Greydanus & Patel, 2005; Nurco, Kinlock, O’Gracy, & Hanlon, 1998; Rounsaville et al., 1991; Weinberg, Rahdert, Colliver, & Glantz, 1998). Parental monitoring can be a protective factor in preventing or delaying drug use in adolescents through mediating or moderating exposure to drugs (Greydanus & Patel, 2005; Knight, Broome, Cross, & Simpson, 1998; Kosterman, Hawkins, Guo, Catalano, & Abbott, 2000). Poor parental monitoring is associated with drug use initiation at an earlier age (less than 15), which is implicated in later drug use (Chilcoat & Anthony, 1996; Hawkins et al., 1992; Steinberg, Fletcher, & Darling, 1994). Poor parenting also influences childhood conduct disorders, which may then lead to further juvenile behavior (Knight, Cross, Giles-Sims, & Simpson, 1995; Patterson, DeBaryshe, & Ramsey, 1989). Problematic parental drug and alcohol use also influences adolescent and later drug use and could be related to poor parental monitoring (Chassin, Rogosch, & Barrera, 1991; Hawkins et al., 1992; Kandel & Andrews, 1987; Rounsaville et al., 1991; Suh, Mandell, Latkin, & Kim, 1997). Offspring of opiate or cocaine-addicted mothers have higher rates of substance use (Weissman et al., 1999), and parental alcoholism influences children’s drug use (Chassin, Pitts, DeLucia, & Todd, 1999). Adolescents with one or more parents who use drugs are more likely to use drugs themselves (McDermott, 1984). Family support or stability has also been observed to be an important factor in reducing or avoiding drug use (Hawkins et al., 1992; Whitbeck, 1999; Wills, Vaccaro, & McNamara, 1992). Recent research has shown that poor family functioning predicts substance use and that better family functioning predicts resiliency (Rosenblum et al., 2005).

We examined factors in early life that could affect later drug use among injection drug users (IDUs) and non-IDUs in Denver, Colorado. Factors related to age, family and to the individual were assessed to determine why some people become IDUs and what protects others. This is important scientifically for researchers seeking to understand the genesis of drug use behavior, and clinically, as clinicians seek new ways of intervening to limit the emergence of drug injection in successive generations of young people. While other studies have examined these issues among drug users in treatment, there has been little research on childhood behaviors of out-of-treatment IDUs. Furthermore, most research has not compared an IDU group with non-IDUs.

Methods

Recruitment and sampling

In order to maximize our ability to find IDUs and demographically similar non-IDUs, a targeted sampling plan was developed to identify census areas where drug use was prevalent (Thompson & Collins, 2002; Watters & Biernacki, 1989). Targeted sampling offers a way to estimate hidden populations and also makes the sample more representative. Drug use indicators such as treatment admissions, drug-related arrests, HIV/AIDS cases and observational data were used to develop quotas that guided recruitment in each census area. Subjects were recruited through street outreach and snowball sampling in Denver, Colorado from March 2000 through October 2003 (Wiebel, 1993). Snowball sampling is a method by which eligible participants refer other potential study subjects and is an effective sampling method for hidden populations (Heckathorn, 1997; Heimer et al., 2002; Magnani, Sabin, Saidel, & Heckathorn, 2005). Because both IDUs and non-IDUs were eligible, the incentive to lie about one's drug use was minimized. An average of 20 subjects were recruited each month over 30 months to participate in structured interviews ($N = 601$).

Eligibility

Participants were required to be 18 years of age or older and competent to provide informed consent. Outreach workers approached potential participants and explained the study to them. Next, eligibility questions were asked and if were considered eligible, individuals were scheduled for an appointment at the research site for final screening. Participants had to provide a positive urinalysis test, report injecting heroin, cocaine or methamphetamines at least 3 days a week every week in the prior 6 months and had to self-identify as IDUs. Additionally, injection drug use was verified through examination by the interviewer of venipuncture marks ("tracks"). Non-IDUs had to have a negative urinalysis test, report having never injected drugs or smoked crack cocaine in their lives and not be dependent on alcohol. Alcohol dependence was confirmed by positive responses on at least 3 out of the 4 CAGE questions for alcohol dependence (Mayfield, McLeod, & Hall, 1974). CAGE is an acronym for the screening questions: have you Cut Back on drinking, have you been Annoyed by comments from others about drinking, have you felt Guilty about drinking, have you needed an Eye-opener.

Eligible subjects were compensated \$20 for their time. Before enrolling in the study, all participants read and signed a consent form stating that they understood the aims of the study, why they were being asked to participate, and that participation was voluntary. The consent form was approved by the Colorado Multiple Institutional Review Board (COMIRB). Due to the sensitive nature of the data, such as criminal behaviors, a Federal Certificate of Confidentiality was obtained for this research. Free HIV, hepatitis B and C and syphilis testing and counseling were available to all participants.

Data collection procedures

Structured interviews

All subjects were administered a structured interview questionnaire by a trained interviewer. The interview was conducted using audio-enhanced computer-assisted interviewing (ACASI), a computerized interviewing method that allowed the subject to use headphones

and a touch screen to self-administer sensitive questions surrounding sexual activity and drug use. Urinalysis testing was conducted prior to the interview. Interviews took 1¹/₂–2 h to administer in a private office.

Measures

The batteries of questions in each questionnaire included a modified version of the Risk Behavior Assessment (RBA), an instrument developed by a grantee consortium of NIDA (Needle et al., 1995; Weatherby et al., 1994). The RBA collects information about subject demographics, including gender, race/ethnicity, age, educational attainment, monthly income, living arrangements and employment status. The RBA also served as the basis for assessing age of initiation into marijuana and alcohol use. Subjects were asked if they had ever used alcohol and marijuana. Those who responded affirmatively were then asked how old they were the first time they used each substance. Reported age of first alcohol use ranged from 1 to 28 years old ($M = 12.88$, $sd = 4.34$) and age of first marijuana use ranged from 3 to 50 years old ($M = 14.68$, $sd = 4.48$).

The childhood-risk taking measure was constructed from nine questions developed for this study asking about the frequency of engaging in various risk behaviors before the age of 19. Those behaviors included dangerous dares, stealing/shoplifting, sneaking out of the house at night, vandalizing property, purposely making parents angry and skipping school/work. Subjects indicated how often they engaged in this behavior before the age of 19. Responses were coded along a 0–3 scale and summed across the nine questions. The resulting scale had a score range of 0–27 ($M = 10.62$, $sd = 5.84$). Higher scores reflect more frequent risk-taking behavior during childhood. The internal consistency reliability (Cronbach's alpha) was calculated as 0.85.

The measure of parental monitoring was adapted from parent/child questionnaires for at-risk youth (Olson, 1986). It included eight questions that asked subjects to rate the degree to which their parents were aware of and involved in their day-to-day activities when they were growing up. Questions included "How often did your parents know whom you were with when you were away from home?" and "How often was one of your parents available to do things with you?" Response categories included never, rarely, sometimes, often and always. Responses were coded along a 0–4 scale and averaged across the eight questions ($M = 2.41$, $sd = 0.88$). Higher scores reflect greater parental monitoring in the family of origin. The internal consistency coefficient was $\alpha = .86$.

Family stability was assessed using a modified version of FACES II (Olson, 1986). Our modified measure included nine statements such as, "My family members were supportive of each other during difficult times," and "It was hard to know what the rules were in my family." Subjects used a 1–5 scale ranging from never, rarely, sometimes, often and always to characterize their families of origin. Scores were averaged across the nine questions. Questions were reverse coded where necessary so that higher scores reflected greater stability in the family of origin. The scale mean and standard deviation was $M = 3.48$ and $sd = 0.84$, respectively. Internal consistency reliability was $\alpha = .85$.

Exposure to substance abuse and psychological problems in the family of origin were assessed by asking subjects whether their mothers, fathers, siblings, grandparents and aunts and uncles had a "significant" drinking problem, drug problem or psychological problem—regardless of whether that problem was ever treated. We created composite measures by summing the number of family members that subjects identified as having each problem. "Don't know" and "not applicable" (e.g., if a subject did not have any aunts or uncles) responses were treated as "no" responses, which represent the minimum effects of such

exposures. Subjects' knowledge about substance abuse and psychological problems was better for first-degree relatives than for second-degree relatives (e.g., grandparents, aunts and uncles. The number of family members reported to have a serious alcohol problem ranged from 0–13 ($M = 3.15, sd = 2.54$). Number of family members with a serious drug problem ranged from 0–10 ($M = 1.44, sd = 1.82$) and the number of family members with a serious psychological problem ranged from 0–12 ($M = 1.55, sd = 2.13$).

Analyses

A series of analyses were conducted to evaluate differences between groups (IDUs vs. non-IDUs) on the previously described measures of alcohol and drug initiation, childhood risk-taking behavior, parental monitoring, family stability and exposure to serious alcohol, drug and psychological problems in the family of origin. Measures that were not normally distributed were either log transformed prior to analysis or subjected to nonparametric tests.

Chi-square and *t*-tests were conducted to assess group differences in socio-demographic characteristics such as gender, race/ethnicity, age, marital status, monthly income and employment status. Monthly income was calculated as the sum of income from all legal sources, including jobs, unemployment compensation, social security, welfare, alimony, family and friends, and the legal sale of personal goods. In addition, multivariate analyses were conducted in order to identify unique predictors of group membership from all of the measures that were significant in univariate analyses. Forward stepwise multiple logistic regression was used to predict membership in the IDU vs. non-user groups. Forward stepwise logistic regression evaluates each measure for entry into a model that also adjusts for key demographic variables. The most significant candidate is entered into the model at each step and variables already in the model are tested for possible removal based on the likelihood-ratio criterion. The final model results when no more variables meet the criteria for entry or removal. In all analyses statistical significance was set at $p < 0.01$.

Results

A total of 601 subjects participated in the study. Of these, 339 (56%) were IDUs and 262 (44%) were non-IDUs. The socio-demographic characteristics of study subjects, are shown in Table 1. Nearly 70% of the total sample was male and just over 63% was White. The average age was 36.6 years old. Almost 20% had not completed high school and the average monthly income from legal sources was approximately \$920.00. Only ten percent of subjects were married. Nearly 40% reported being homeless and over one-third (33%) said they were unemployed. Table 1 also shows the results of statistical tests comparing IDUs with non-IDUs. IDUs were significantly more likely than non-IDUs to be male and White and were also more likely to be homeless and to be unemployed.

Examination of the results in Table 1 shows that IDUs were significantly younger than non-IDUs when they used alcohol and marijuana for the first time. On average, IDUs first used alcohol more than two years earlier than non-IDUs and first used marijuana/hashish approximately three and one-half years earlier. IDUs also reported engaging in significantly more risk-taking behavior during childhood compared to non-IDUs, and they scored significantly lower on measures of parental monitoring and family stability in their families of origin. In addition, IDUs reported approximately twice as many family members (e.g., parents, siblings, aunts, uncles, grandparents) with significant alcohol, drug and psychological problems as did non-IDUs.

Table 1 Demographic characteristics of IDUs and non-IDUs in Denver, CO

	Total (N = 601)	IDUs (n = 339)	Non-IDUs (n = 262)	Test Statistic; p-value
Gender				
Male %	68.4	73.2	62.2	$\chi^2(1) = 8.2, p < .005$
Race/Ethnicity				
White %	63.3	68.5	56.5	$\chi^2(1) = 9.2, p < .003$
Age (years) M (sd)	36.6 (11.8)	37.2 (10.7)	36.0 (13.1)	$t(496.1) = -1.2, ns$
Education				
Less than high school %	18.8	22.4	14.1	$\chi^2(1) = 6.6, ns$
Legal Income (\$) M (sd)	919.8 (1719.4)	892.8 (1918.0)	956.2 (1410.5)	$U = 36351.5, ns$
Marital status				
Married %	10.1	8.3	12.6	$\chi^2(1) = 3.0, ns$
Living arrangements				
Homeless %	39.1	46.6	29.4	$\chi^2(1) = 18.4, p < .0005$
Employment				
Unemployed %	32.6	40.1	22.9	$\chi^2(1) = 19.9, p < .0005$
Age of Initiation				
Age first alcohol use ^a (sd)	11.9 (3.74)	14.4 (4.80)	6.31	<.0001
Age first marijuana use ^{b,c} (sd)	13.6 (3.51)	17.2 (5.35)	8.23	<.0001
Childhood risk				
Risk behavior score (sd)		13.02 (5.53)	7.47 (4.64)	$t = -13.37, < .0001$
Family history				
Parental monitoring		2.19 (0.83)	2.70 (0.87)	$t = 7.41, < .0001$
Family stability		3.33 (0.80)	3.66 (0.85)	$t = 4.83, < .0001$
# Family members w/alcohol problems ^c		3.78(2.67)	2.32 (2.09)	$t = -7.37, < .0001$
# Family members w/drug problems ^c		1.86 (2.02)	0.90 (1.33)	$t = -7.06, < .0001$
# Family members w/psychological problems ^c		1.90 (2.41)	1.10 (1.59)	$t = -4.40, < .0001$

^aN = 526.

^bN = 478.

^cScores were log transformed prior to analysis.

Table 2 Results of multiple logistic regression analyses predicting injection drug use ($N = 523$)

Step entered	Variable entered	$-2 \log L^a$	Incremental significance	B (SE) for final model	Adjusted OR (95% CI)—final model
1	Childhood risk score	583.7	< .0005	.157(.024)	1.17 (1.12–1.23)
2	Family members with alcohol problems	566.2	< .0005	.192 (.049)	1.21 (1.10–1.33)
3	Age 1st alcohol use	558.9	< .0005	– .069 (.026)	0.93 (.89–.98)

^a $-2 \log L$ = negative log likelihood value for each model multiplied by 2.

All study measures showing significant group differences in univariate analyses were entered as candidates into a stepwise logistic regression analysis predicting IDU vs. non-IDU status. The analysis was based on 523 (87%) of the 601 study subjects with non-missing data on all variables in the model. Most of the excluded cases had missing data on age of first alcohol use because they reported never having used alcohol. Age of first marijuana use was excluded from the analysis because it resulted in a substantial proportion of missing data for those who never used marijuana.

Table 2 shows odds ratios adjusted for gender, race/ethnicity and all other variables in the model, as well as 95% confidence intervals for the significant predictors in this model. After adjusting, childhood risk-taking behavior, the number of family members with alcohol problems, and the age of first alcohol use emerged as significant, unique predictors of IDU status. Note that when an analysis was run on the subset of participants who had used marijuana, the resulting logistic regression model included the same variables as presented in Table 2, except that ‘age of first marijuana use’ was significant and ‘age of first alcohol use’ was not (results not shown).

Discussion

The results suggest that factors from childhood may differentiate IDUs from non-IDUs. According to users surveyed here, having family members with alcohol problems and trying alcohol at an early age are associated with being an IDU. Early age of onset of alcohol and drug use has been associated with later injection drug use in other research as well. (Anthony & Petronis, 1995; Dinwiddie et al., 1992). This is interesting to contemplate, as the alcohol literature tells us that clearly there is a genetic basis for alcoholism (Johnson & Leff, 1999) and the data presented here show an association between alcohol and injection drug use. Is the child or the environment that one lives in to blame? Age at initiation is an important factor in drug and alcohol use and may relate to the family environment in that initiation into alcohol and drugs is often through a family member such as an older sibling, uncle, or parent. Also, because of low parental monitoring and involvement, the environment in which a child lives may permit earlier initiation to occur.

The other variable we found to be associated with being an IDU was the childhood risk score. This variable was a summed composite of responses to questions about risky behavior engaged in during childhood. It included dangerous dares, stealing/shoplifting, sneaking out of the house at night, riding with a reckless driver, intentionally hurting oneself, vandalizing property, purposely making parents angry and skipping school or work. Our findings indicate

that this measure has the potential to be a useful tool for identifying youth at-risk for injection drug use. Further research is needed to determine if it is a reliable predictor of such behavior. If so, it could be very valuable in allowing us to intervene with youth most at-risk, prior to their engaging in injection drug use, and perhaps that behavior could be avoided.

Family factors figure prominently in drug use initiation and beyond (Duncan, Duncan, Biglan, & Ary, 1998; Kandel, 1982; Kumpfer & Turner, 1991). The importance of family in later drug use cannot be underestimated. The factors associated with being an IDU such as childhood riskiness, early initiation into alcohol use, and having more family members with alcohol problems, can all be closely tied into factors such as family stability and monitoring. Often, in a home where alcohol and/or drugs are abused, there is little parental monitoring, which allows more riskiness to occur and also permits experimentation of alcohol and drugs due to the lack of monitoring. Problematic parental drug and alcohol use has also been found to be related to drug use in children (Chassin et al., 1999; Hawkins et al., 1992; Kandel, 1982; McDermott, 1984; Weissman et al., 1999).

Our findings confirm these earlier studies, showing that IDUs report more family members with drug, alcohol and psychological problems than those who do not become IDUs. This is closely linked to parental monitoring and family stability, as often parents with many substance and psychological problems also have trouble monitoring and being a stable force for their children. In univariate comparisons, this study found that parental monitoring and family stability were possible protectors from getting involved in injection drug use, whereas alcohol and drug use in the family of origin appeared to be risk factors or even predictors of later injection drug use.

The role of parental monitoring is important in the upbringing and socialization of children, which in turn may lead to prosocial or deviant behavior (Johnson & Leff, 1999; Macoby, 1992). In fact, research has found that the disruption in family life and dysfunctionality in children that parental alcoholism produces may lead to substance use, including injection drug use (Johnson & Leff, 1999). The findings from this study offer support for other research suggesting that non-IDUs come from families with less dysfunction and more parental monitoring.

There are limitations to our findings. The recruitment of the study population used a targeted sampling plan, an approach that is less rigorous than a random sample. However, prior research has supported it as an appropriate technique for IDU recruitment (Booth, 1995; Watters & Biernacki, 1989). Generalizeability, however, is not assured for all populations of IDUs due to the lack of randomness in sampling procedures. Despite our efforts to recruit a demographically similar non-IDU sample, more IDUs were white males and more non-IDUs were non-white females. Other, possibly unavoidable differences included more homelessness and more unemployment among the IDU sample. Future studies might better match IDUs and non-IDU subjects and perhaps employ a social network sampling design whereby they are matched for analysis.

Another limitation is that subjects were asked to report on events that may have occurred a long time ago, leading to the possibility of recall error. One study followed drug users over a ten-year period, however, and found that opiate and cocaine injectors showed stable reporting patterns (82–86% agreement) over time (Shillington, Cottler, Mager, & Compton, 1995). All risk-related behaviors and background information collected were based on self-report, which could lead subjects to respond with socially desirable answers (Latkin, Vlahov, & Anthony, 1993). Having respondents use ACASI minimized this bias, as this method of interviewing has been shown to encourage more accurate reporting of HIV risk behavior, as well as to increase reporting of drug use (Des Jarlais et al., 1999; Lessler, Caspar, Penne, & Barker, 2000; Turner et al., 1998).

Research has also shown that drug users are comfortable using the computer for interviewing and possess the requisite skills to complete the interview using a touch screen and audio enhancement (Williams, Freeman, Bowen, & Saunders, 1998). Additionally, self-report has been found to produce valid data for research among IDUs (Booth & Koester, 1996). To improve the validity in drug use reporting, drug use was confirmed by urinalysis. Finally, the non-drug using participants could have potentially been former users. However, careful screening for eligibility prior to the interview was conducted to minimize this possibility.

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