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THE FIRST INJECTION EVENT: DIFFERENCES AMONG HEROIN, METHAMPHETAMINE, COCAINE, AND KETAMINE INITIATES

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Abstract

This article describes how the drug type injected at the first injection event is related to characteristics of the initiate, risk behaviors at initiation, and future drug-using trajectories. A diverse sample (n=222) of young injection drug users (IDUs) were recruited from public settings in New York, New Orleans, and Los Angeles during 2004 and 2005. The sample was between 16 and 29 years old, and had injected ketamine at least once in the preceding two years. Interview data was analyzed both quantitatively and qualitatively. Young IDUs initiated with four primary drug types: heroin (48.6%), methamphetamine (20.3%), ketamine (17.1%), and cocaine (14%). Several variables evidenced statistically significant relationships with drug type: age at injection initiation, level of education, region of initiation, setting, mode of administration, patterns of self-injection, number of drugs ever injected, current housing status, and their hepatitis C virus (HCV) status. Qualitative analyses revealed that rationale for injection initiation and subjective experiences at first injection differed by drug type.

INTRODUCTION

Initiation into injection drug use is a critical event in the life history of a young drug user since transitioning to injection as a mode of administration increases risk for HIV, hepatitis C virus (HCV), drug dependence, overdose, and other types of bacterial or viral infections (Centers for Disease Control, 1998; Fennema, Ameijden, Hoek, & Coutinho, 1997; Sherman, Cheng, & Kral, 2007). Risk factors for initiation, such as age, and risk behaviors at initiation, such as paraphernalia sharing, have been investigated in previous studies of young injection drug users (IDUs) (Crofts, Louie, Rosenthal, & Jolley, 1996; Fuller et al., 2002; Roy et al., 2003; Sanchez, Chitwood, & Koo, 2006). These studies are noteworthy, since understanding risk factors for initiation and risk behaviors at initiation are relevant for prevention and intervention efforts, particularly among young IDUs.

The drug type injected at initiation, such as heroin, cocaine, methamphetamine, or ketamine, has received less research attention, and studies reporting on drug type have often yielded limited findings. For instance, when comparing young IDUs who initiated with heroin versus amphetamine no differences were found by age at initiation, rationale for injecting, the proportion of who planned their first injection, or the proportion of who self-injected (Crofts et al., 1996). Comparing young IDUs who initiated with heroin versus cocaine, heroin initiates were more likely to have a close friend or sex partner perform the injection (Roy, Haley, Leclerc, Cedras, & Boivin, 2002). Additionally, half of heroin initiates had never used the drug prior to injecting it compared to less than one quarter of cocaine initiates. Comparing young IDUs who initiated with ketamine versus heroin or cocaine, ketamine initiates typically initiated at a later age and were less likely to transition to injecting other drugs, such as heroin or cocaine (Lankenau & Clatts, 2004). Overall, the lack of research examining the relationship between drug type at initiation and other outcomes may be attributed to the fact that a majority of studies examining risk behaviors among

newly-initiated IDUs are dominated by heroin initiates (e.g., Novelli, Sherman, Havens, Strathdee, & Sapun, 2005; Roy et al., 2003) or do not report drug type used (Fuller et al., 2005).

Relationships between drug type and particular injection practices, risk behaviors, and negative health outcomes, however, have been reported in other studies that do not focus on injection initiation. For example, cocaine injectors have been found to inject with riskier social networks (De, Cox, Boivin, Platt, & Jolly, 2007). Injecting crack cocaine often requires the use of lemon juice, vinegar, or ascorbic acid, which carries specific risks for vein damage (Lankenau, Clatts, Goldsamt, & Welle, 2004; Rhodes et al., 2007). Heroin may be injected differently depending upon drug form (e.g., tar versus powder), which is associated with varying risks for HIV (Clatts et al., 2000). Injecting methamphetamine has been associated with elevated sexual risk-taking, particularly among men who have sex with men (Shoptaw & Reback, 2007). Ketamine is often injected intramuscularly and is associated with distinctive risks due to the use of multi-dose pharmaceutical vials, which are prone to sharing during injection events (Lankenau, 2006). The diversity and significance of these findings—often related to negative health outcomes occurring years after injection initiation—suggests that studying drug type at initiation may inform broader patterns of risk behaviors among young IDUs.

Given the potential significance associated with drug type at injection initiation, a sample of young IDUs who initiated with heroin, methamphetamine, ketamine, or cocaine was analyzed to address a series of research questions. The first set of questions was analyzed quantitatively:

1. Is there a relationship between first drug injected and demographic characteristics at initiation?
2. Is there a relationship between first drug injected and injection practices at initiation?
3. Is there a relationship between first drug injected and drug using careers following initiation?

The second set of questions was analyzed qualitatively:

1. How do rationales for injection initiation differ by first drug injected?
2. How do experiences at injection initiation differ by first drug injected?

METHODS

DESIGN

A multi-site study was undertaken in 2004 to describe risk behaviors and patterns of drug use among young IDUs with a recent history of injecting ketamine (a dissociative anesthetic that became increasingly popular as a drug of abuse in the United States in the late 1990s) (Lankenau, 2006). The resulting study produced a series of findings on patterns of ketamine initiation, experiential elements of ketamine injection, and characteristics of ketamine injectors (Lankenau, 2006; Lankenau et al., 2007a; Lankenau, Sanders, Hathazi, & Jackson Bloom, 2008a). Further analysis revealed that study subjects exhibited other significant risk behaviors beyond injecting ketamine that were relevant to youth more broadly, such as homelessness, sexual health, crime, polydrug use, and prescription drug misuse (Hathazi, Lankenau, Sanders, & Jackson Bloom, 2009; Lankenau et al., 2007b; Lankenau et al., 2008a; Lankenau et al., 2008b; Sanders, Lankenau, Jackson Bloom, & Hathazi, in press; Sanders, Lankenau, Jackson Bloom, & Hathazi, 2008a; Sanders, Lankenau, Jackson Bloom, & Hathazi, 2008b). Subsequent analysis also revealed that subjects had a diverse history of

injection use. A majority had initiated with drugs other than ketamine, such as heroin, methamphetamine, and cocaine, which was regarded as a fortuitous opportunity to study the first injection event.

Findings are based upon 222 cross-sectional interviews with young IDUs recruited in New York ($n=48$), New Orleans ($n=83$), and Los Angeles ($n=91$) between 2004 and 2006. IDUs were recruited in public locations in each city, such as parks and street settings, using a combination of targeted sampling (Watters & Biernacki, 1989), which focuses sampling on designated neighborhoods and venues known to contain the desired population. Chain referral sampling (Biernacki, & Waldorf, 1981; Penrod, Preston, Cain, & Starks, 2003), which utilizes the personal network of a recruited subject to enroll more subjects was also used. In New York, young IDUs were recruited within Manhattan's East Village between April and August 2004. In New Orleans, subjects were recruited primarily within the French Quarter between March 2004 and May 2006. In Los Angeles, IDUs were recruited in Venice, Santa Monica, and Hollywood between January 2005 and June 2006. Interviews were conducted on laptop computers in outdoor settings, such as along park benches, or indoor locations, such as cafes or fast-food restaurants. IDUs were recruited and interviewed by ethnographers in each site (one in New York, one in New Orleans, and two in Los Angeles).

Study eligibility was dependent upon meeting two enrollment criteria: aged between 16 and 29 years old, and injected ketamine at least once within the past two years. These criteria were selected to enroll a sample of young IDUs who could describe recent ketamine injection events and provide a demographic group of IDUs at risk for negative health outcomes associated with ketamine use (Lankenau & Clatts, 2004). During recruitment, a series of screening questions focusing on age, health behaviors, recent drug use, and history of homelessness were asked in order to mask the true enrollment criteria. Prior to beginning an interview, subjects were offered a description of the study, were encouraged to ask questions about participation, and signed an informed consent document. Subjects received a \$20 cash payment in Los Angeles and New York, and a \$20 drug store voucher in New Orleans as well as referral information for syringe exchanges, drop-in centers, HIV/HCV testing, and drug treatment options. All study procedures were approved by the Institutional Review Boards of participating institutions in Los Angeles, New Orleans, and New York.

MEASURES

The instrument for this study was developed by the research team and consisted of both open and closed-ended questions that were programmed using Questionnaire Development Software. Data for this analysis were drawn from three separate interview modules that focused on injection initiation, drug-use history, and demographics. First, subjects were asked a series of closed-ended questions with coded responses about the first injection event, such as "What was the first drug you ever injected?" (heroin, cocaine, ketamine...), "Had you ever used that drug before injecting that first time?" (yes/no), "Did you plan on doing the injection before you arrived at the setting?" (yes/no), "Who injected you that first time?" (self, friend/acquaintance, girlfriend/boyfriend, stranger), "During that injection did you pull drugs from the same cooker or vial, or did everyone pull drugs from separate vials or cookers?" (same/separate.) Subjects were also asked open-ended questions about the first injection event, such as "Did you ever have a chance to inject that drug on an earlier occasion but refused?", "Why did you inject that first time?", "How did that first injection make you feel?", and "What town or city were you in the first time you injected?" A "region" variable with the values of New England/Mid-Atlantic, South, Midwest, and West was devised based upon responses to the town/city question. Second, subjects were presented with a series of closed-ended questions about their history of use of 18 drugs, such

as heroin, cocaine, methamphetamine, and ketamine, and asked to, “Tell me all the ways you’ve used ...” (smoked/swallowed/sniffed/IV/IM/subcutaneous). Subjects were also presented with a list of 18 drugs and asked, “Out of all the drugs that were discussed, including ketamine, what is your “drug of choice”? Finally, subjects were asked a series of closed-ended questions with coded responses concerning demographic characteristics, such as educational achievement, employment history, history of drug treatment, history of criminal justice involvement, and HIV/HCV testing. All interviews were digitally recorded and subsequently transcribed so that responses to open-ended questions could be coded during qualitative analysis.

ANALYSIS

All 222 interviews were analyzed both quantitatively and qualitatively. Quantitative data were converted into descriptive statistics, such as means, medians, and frequencies, using SPSS. Differences in demographics, characteristics of the first injection episode, and drug using histories following initiation by drug type were assessed using chi-square tests, and t-tests were used to test for differences in mean age. Post-hoc, pairwise comparisons were then made between the four initiation groups using a Bonferroni corrected p-value to examine between-group differences. Statistically significant results are reported at the .05, .01, and .001 levels.

Qualitative data were analyzed using a “two level” coding scheme (Miles, & Huberman, 1994). A “first level” set of *a priori* codes focused on open-ended questions within the interview transcript concerning pre-injection attitudes, rationale for the first injection, experience of the first injection, and post-injection attitudes. A “second level” set of codes based on theoretical models of injection initiation and emergent themes within the qualitative data included: different rationales for initiating (curiosity, escalating drug use, superiority of injection, active and passive peer influence, self-medication, hopelessness, lowered inhibitions), characteristics of the experience (positive, negative, ambiguous, disappointed), and indicators of post-injection attitudes (favorable [continued], unfavorable [did not continue, ambiguous, concern about consequences]). A final set of analyses refined first and second level codes, and made comparisons between drug types. All qualitative analyses were conducted using Atlas.ti.

RESULTS

DEMOGRAPHIC CHARACTERISTICS

IDUs initiated with four primary drug types at the first injection event: heroin ($n=108$; 48.6%), methamphetamine ($n=45$; 20.3%), ketamine ($n=38$; 17.1%), or cocaine ($n=31$; 14%). Excluded from analysis were 21 IDUs who initiated with other substances, such as prescription drugs, hallucinogens, and alcohol. Table 1 describes the sample demographics and various health histories by drug injected at initiation. Overall, the mean age at enrollment was 22.3 years old, subjects were primarily male, white, and heterosexual. A majority had histories of mental health care, HIV or HCV testing, and most were not employed full or part-time. No significant differences were found among these variables by drug type. Significant differences were found, however, between ketamine initiates and other initiates on six other variables. Age at injection initiation differed by drug type: ketamine initiates started their injection career at 18.8 years old compared to cocaine (16.4), methamphetamine (16.2), and heroin (15.9) initiates ($p<.001$). Education differed by drug type: 76.3% of ketamine initiates graduated from high-school or obtained a GED compared to 44.4% of methamphetamine initiates ($p<.01$). Current homeless status differed by drug type: 62.1% of ketamine initiates were homeless compared to 92.6% of cocaine initiates ($p<.05$). However, the likelihood of being a homeless traveler, that is, regularly

moving from city to city in search of drugs, work, and adventure (Lankenau et al., 2008b), did not differ by drug type. Reporting a history of drug treatment differed significantly by drug type: 31.6% of ketamine initiates indicated a history of drug treatment compared to 60.2% of heroin initiates ($p<.05$). History of arrest differed by drug type: 81.6% of ketamine initiates had a history of arrest compared to 97.8% of methamphetamine initiates ($p<.05$). Though, no differences were found by jail or prison history. Finally, HCV status differed significant by drug type: 5.3% of ketamine initiates reported being HCV positive compared to 28.9% of methamphetamine initiates ($p<.05$).

CHARACTERISTICS OF THE FIRST INJECTION EVENT

Table 2 describes the characteristics of the first injection event by drug injected at initiation. Overall, a minority of IDUs planned their first injection, most initiated in groups of two injectors or more, most had used other drugs prior to the initiation event, few acquired the syringe themselves at initiation, and sharing injection paraphernalia, such as cookers, vials, or cotton (but not syringes) was common. No statistically significant differences by drug type were found among these variables. Significant differences were found, however, among seven other variables. Region of initiation differed by drug type: 36.2% of heroin initiations occurred in the Northeast/Mid-Atlantic region compared to 2.3% of methamphetamine initiations ($p<.001$), 48.3% of cocaine initiations happened in the South compared to heroin (19%) and methamphetamine (13.6%) initiations ($p<.01$), and 79.5% of methamphetamine initiations occurred in the West compared to heroin (36.2%), ketamine (32.4%), and cocaine (20.7%) ($p<.001$). Injection event settings differed by drug type: 33.3% of heroin initiates initiated outside compared to 7.9% of ketamine initiates ($p<.05$), and 73.7% of ketamine initiates initiated in private settings compared to 48.1% of heroin and 37.8% of methamphetamine initiates ($p<.01$). History of using the index drug prior to the event differed by drug type: 54.6% of heroin initiates never used heroin prior to injection initiation compared to cocaine (25.8%), ketamine (21.1%), and methamphetamine (15.6%) initiates use of those index drugs ($p<.001$). Payment for drugs differed by drug type: 54.6% of heroin initiates paid for drugs at initiation compared to methamphetamine (28.9%) and ketamine (18.4%) initiates ($p<.001$). Mode of administration differed by drug type: 34.2% of ketamine initiates injected intravenously compared to cocaine (100%), methamphetamine (95.6%), and heroin (95.4%) initiates ($p<.001$). Conversely, 65.8% of ketamine initiates injected intramuscularly compared to heroin (4.6%), methamphetamine (4.4%), and cocaine (0%) initiates ($p<.001$). Concerning who administered the injection, 44.7% of ketamine initiates self-injected compared to 21.3% of heroin initiates ($p<.05$). Regarding number of injections at initiation, 35.4% of cocaine initiates injected three more times compared to methamphetamine (13.3%), ketamine (10.5%), and heroin (3.7%) initiates ($p<.001$).

RATIONALES FOR INJECTION INITIATION

Five primary rationales for initiating injection drug use were identified qualitatively: curiosity, peer influence, the efficiency of injection as a mode of administration, self-medication, and lowered inhibitions. IDUs rarely limited their reasoning to a single rationale. Rather, two or more rationales were often discussed. In certain cases, rationales for initiation differed by drug type.

Curiosity was a commonly reported reason for initiating, and was discussed by all types. Curiosity was described both in terms of seeking a new experience and wanting to compare injection with more familiar modes of administration, such as snorting or smoking the drug. Though half of heroin initiates reported never having used the drug via other modes prior to injecting it, curiosity about comparing injection to those other modes appeared more pronounced among heroin initiates. This heroin initiate indicated that his initiation occurred, in part, due to curiosity and being in the right setting:

I was just getting curious about it and I'd been thinking about it for a while. And then we were staying in a squat that was supposed to be a shooting gallery, and we were the only two people that didn't use. And we were both curious and if there was a time, that's the people to do it with. I'll learn from them.

Peer influences at the first injection event were both passive and active. Passive forms were reported across all drug types. Some reported having been exposed to injection by friends and family members. Others simply stated that, "everyone was doing it." One methamphetamine initiate said:

Just watching the other people do it, there's something about it that makes you want to try it—when you watch other people do it.

Active or coercive peer influences included being obliged either by friends or family members to inject the first time. Some methamphetamine and cocaine initiates reported receiving the drug for free on the condition that they injected it. For example, a methamphetamine initiate said:

I wanted to get high and I'd done drugs before, but if I wanted to get high at that point in time, I had to shoot it. That's the only way they'd [friends] give it to me for free.

The efficiency of injection as a better or more practical mode of administration was mentioned by all types of initiates. The economic rationale of getting the "biggest bang for the buck" was also described by every type, but heroin initiates in particular. Additionally, heroin, cocaine, and methamphetamine initiates (but not ketamine initiates) cited tolerance due to escalating drug use, a desire to "get high instead of well," or to "get a bigger rush" as reasons for initiating injection. This heroin initiate summarized several reasons for why injection seemed like a better option:

I already had a habit going on because I snorted. I was already at a three bag tolerance each time to get high, and I wanted to get high, and I thought it was a waste of dope. It's more efficient if you shoot up, it's supposed to be like one of the most euphoric feelings you ever feel, and it costs less.

Discovering the advantages of injection also occurred in the midst of confronting practical difficulties, such as having black tar heroin or liquid ketamine that could not be snorted, or not having a pipe to smoke methamphetamine. In these instances, deciding to inject was a kind of improvisation to overcome problems related to drug form or drug paraphernalia.

Forms of self-medication were cited as a reason for initiating injection particularly among methamphetamine and heroin initiates. Respondents sought to medicate psychological symptoms, such as depression, or to alleviate physical pain, such as back pain or toothaches. This methamphetamine initiate started injecting to block out difficulties in her life:

I had been going through a lot. I'd been recently raped...I was freaking out about that. I had to go to trial. I really was just looking to escape from reality. I didn't want to kill myself, I just wanted to not be thinking about the things that were going through my head all the time. So it was really just looking for a way to get away without permanently leaving this world.

Similarly, feelings of hopelessness as a rationale for injecting were more typically expressed by heroin initiates, who described having nothing to live for, not caring about anything, or feeling self-destructive:

Because I ran away from home and I had nothing else to live for. I didn't realize then that it [injecting heroin] would trap me, but I didn't care at the moment.

Lowered inhibitions toward needles due to polydrug use was uniquely described by ketamine initiates. For instance, this ketamine initiate described how combining ketamine and alcohol along with peer influences helped overcome his fear of using needles:

I was really drunk and I didn't like needles, but everybody else did it. And I had done a lot of K before, just snorted it, and then, you know, everybody else was doing it.

SUBJECTIVE EXPERIENCES AT INJECTION INITIATION

Subjective experiences during drug using events are impacted by the pharmacological properties of each drug as well as polydrug use, drug-using history, mode of administration, drug quality and quantity, features of the user group, and setting of the event (Grund, 2005; Lankenau et al., 2008a). Qualitative accounts of the subjective experiences surrounding the first injection event often differed by drug type, particularly whether the experience was viewed positively or negatively, which provided insights into subsequent drug-using careers.

A majority of heroin and methamphetamine initiates provided overwhelmingly positive descriptions of the first injection event, such as "blissful," "heavenly," and "euphoric." This heroin initiate, for instance, described how calm he felt:

Really good. Like I was on cloud nine. It totally relaxes your body—it's like a warm rush sensation that goes through your whole body. It's instant. Like the second it hits your vein it just goes. You could feel it going through your system. It's one of my favorite drugs.

This methamphetamine initiate was similarly positive though emphasized a different kind of "rush":

It was really hard to explain, but it was like the rush was really, really intense. Afterwards I couldn't shut up for three days. We sat and jabbered on about how cool it was.

Ketamine and cocaine initiates reported more bad or ambiguous experiences, such as unpleasant physical sensations, auditory hallucinations, and an uncomfortable intensity or "rush." Cocaine initiates who described a positive experience often reported engaging in several sequential injections to continue feeling the initial "rush." This ketamine initiate describes the ambiguous nature of his experience:

It was almost like smoking weed, but the intensity was like 10 times worse. Shit started moving. It was almost like I was on acid at the same time with alcohol and weed. But I liked it at first ... [The ketamine] had different effects. I felt nauseous. At times, I felt paranoid. I felt like I was on like 20 sacks of weed. I wanted to move, my brain wanted to do things, but my body wouldn't move. I felt scared.

Adverse experiences during the first injection event resulted in negative opinions toward injection for some. Unfavorable attitudes following adverse experiences were particularly evident among ketamine initiates, and several vowed never to inject again. Others—primarily ketamine initiates—worried about the consequences of injection and stopped injecting altogether or restricted injection drug use to one drug type.

In contrast, many participants—most frequently those who initiated with methamphetamine or heroin—described a new affinity for injecting. These individuals explicitly associated their positive attitude toward injection with the pleasurable experience of their first injection. For example, this cocaine initiate describes her attitude toward injection after initiating:

I was freebasing before I shot it. But once I shot up...anything else I do, smoking or snorting or whatever, it doesn't compare to shooting. And once I shot, it was all over with.

DRUG-USING CAREER TRAJECTORIES AFTER INITIATION

Table 3 presents characteristics of the drug-using career following initiation by drug type. Significant associations were found between drug type at initiation and the types of other drugs injected, the number of drugs injected, and the drug liked the most (i.e., current drug of choice). A minority of ketamine initiates injected other drugs following initiation, such as heroin, methamphetamine, or cocaine; whereas a majority of heroin, methamphetamine, and cocaine initiates injected a variety of drugs after initiation. For instance, 26.3% of ketamine initiates later injected heroin compared to cocaine (83.9%) and methamphetamine (80%) initiates ($p < .05$). Or, 18.4% of ketamine initiates later injected cocaine compared to heroin (82.4%) or methamphetamine (77.8%) initiates ($p < .05$). These findings on other types of drugs injected reflect the fact that most ketamine initiates injected relatively few other drugs following initiation. For instance, 21.1% of ketamine initiates injected four or more drugs compared to methamphetamine (84.4%), heroin (83.3%), and cocaine (77.4%) initiates ($p < .05$). Rather, 71.1% of ketamine initiates never injected another drug other than ketamine following injection initiation. It is worth noting, however, that since ketamine initiates started their injection career later than other initiates, they had fewer years to experiment with injection as a mode of administering drugs. Current drug of choice may reflect the extent that initiating injection drug use with a particular drug marked the beginning of a career with that drug. Current drug of choice was the same as the first drug injected among a majority of heroin initiates (59.3%) compared to methamphetamine (28.9%), ketamine (13.2%), and cocaine (9.7%) initiates ($p < .05$). Compared to IDUs initiating with other substances, heroin initiates may have discovered new or desirable properties of heroin at injection initiation, such as potency, euphoria, or duration, resulting in an extended affinity for heroin even after later experimenting with other drugs. Additionally, the addictive properties of heroin may have made these IDUs more susceptible to long-term heroin use compared to IDUs initiating with other drugs.

DISCUSSION

This study is one of the first to investigate the relationship between drug type and a variety of factors at the first injection event. Several important associations between drug type and other variables were found, which were often driven by differences among ketamine and other initiates (i.e., heroin, methamphetamine, or cocaine). These findings support previously reported qualitative and descriptive results (Lankenau & Clatts, 2002; Lankenau & Clatts, 2004; Lankenau et al., 2007a) indicating that ketamine initiates may be a particular type of IDU who is older, more educated, less likely to be currently homeless, less likely to have histories of drug treatment or arrest, and less likely to be HCV positive compared to other initiates. Additionally, ketamine injection initiation is a particular kind of event since ketamine is typically received for free and often injected intramuscularly by the initiate. The greater ease of injecting intramuscularly (and lower perception of stigma) is likely associated with the higher rates of self-injection among ketamine initiates. Ketamine initiation events commonly occurred in indoor private settings, such as apartments and houses, and rarely outside, such as in parks or streets, which could be attributed to the fact that fewer ketamine initiates were homeless and many were older at injection initiation. Also, relatively few events happened in bars, clubs, parties, or raves. Ketamine initiation was not linked to a particular region of the U.S., indicating general availability throughout the country. Following initiation, most ketamine initiates did not transition to injecting other drugs and few reported ketamine as their drug of choice. Overall, ketamine initiates were a

relatively lower risk subgroup of IDUs compared to heroin, methamphetamine, or cocaine initiates.

Demographic characteristics among heroin, methamphetamine, and cocaine initiates highlight several specific vulnerabilities: over 90% of cocaine initiates were currently homeless, nearly two-thirds of heroin initiates had a history of drug treatment, less than half of methamphetamine initiates graduated from high school, nearly 100% of methamphetamine initiates had a history of arrest, and nearly one-third of methamphetamine initiates self-reported being HCV positive. Notably, the mean age at injection initiation for heroin, methamphetamine, and cocaine equaled approximately 16 years old, which is considerably younger in some cases than the age of initiation reported in other studies on young IDUs (range equaled 18 to 23 years old) (Fuller et al., 2001; Frajzyngier, Neaigus, Gyarmathy, Miller, & Friedman, 2007; Novelli et al., 2005; Ompad et al., 2005; Roy et al., 2002).

The quantitative analysis of practices and risk behaviors during injection initiation revealed several significant differences among heroin, methamphetamine, and cocaine initiates. First, initiations in particular regions of the U.S. were linked to drug types: Northeast/Mid-Atlantic (heroin); South (cocaine); and West (methamphetamine), which reflect the primary drugs abused during the study period in each recruitment location and their adjacent cities: New York (heroin), New Orleans (cocaine), and Los Angeles (methamphetamine) (National Institute on Drug Abuse, 2006). These findings suggest that location or environment may be a significant factor in determining the first drug injected. Second, over half of heroin and methamphetamine initiation events occurred either outdoors, such as parks or streets, or in public or semi-private structures, such as public restrooms or squats, which reflect the young age and high-rates of homelessness among these initiates. Third, a majority of heroin initiates had never used heroin via another mode of administration prior to first injection. While similar results have been previously reported (Roy et al., 2002), this finding could be partially explained by drug form: Tar heroin, which is common in the Western U.S. (Ciccarone & Bourgois, 2003), and where over one-third of heroin initiates first injected, is less easily sniffed due to its hardened form (Harm Reduction Coalition, 2001), thereby making injection (or smoking) a more viable mode at initiation. Fourth, a majority of heroin initiates paid for heroin, which is often priced and packaged in a particular manner (Wendel & Curtis, 2000), whereas fewer methamphetamine initiates paid at initiation. Similarly, fewer ketamine initiates paid for ketamine, which is more freely available in certain settings, such as clubs, parties, or bars (Lankenau, 2006; Lankenau & Sanders, 2007; Lankenau et al., 2007a). Hence, drugs associated with a more commodified status (i.e., heroin) were more likely to be paid for by initiates. Fifth, cocaine initiates were more likely to inject three or more times at initiation compared to heroin, methamphetamine, and ketamine initiates. While the practice of multiple cocaine injections has been previously reported (Tyndall et al., 2003), it is notable that it occurred at initiation for over one-third of cocaine initiates, a finding that has implications for bloodborne pathogen risk at initiation. Injecting multiple times over the course of an injection event increases the risks sharing injection paraphernalia (Lankenau et al., 2004; Miller et al., 2006; Tyndall et al., 2003). Lastly, syringe sharing was low across all drug types, while sharing of other injection paraphernalia was high. No significant differences were reported by drug type. Importantly, sharing a syringe at initiation is associated with continued syringe sharing (Novelli et al., 2005), suggesting that risky injection practices established during the early stages of an injection career, such as sharing other injection paraphernalia, may persist without intervention.

The qualitative findings on rationale for first injection emphasized curiosity or peer influence rather than an escalating pattern of drug use or dependence, which is largely consistent with previous studies (Crofts et al., 1996; Frajzyngier et al., 2007; Roy et al.,

2002). Additionally, the qualitative findings presented specific differences between heroin, methamphetamine, and cocaine initiates as well as differences compared to ketamine initiates. Heroin initiates were more likely to describe a desire to compare injection to other modes of administration as well as a sense of hopelessness. Cocaine initiates were more likely to describe peer influence, which was sometimes described as explicitly coercive, whereas ketamine initiates depicted being given the drug for free and injecting in a more spontaneous manner. Lowered inhibitions among ketamine initiates as a result of sequential polydrug use (Lankenau & Clatts, 2005) appeared to contribute to a willingness to inject ketamine.

The qualitative data, which suggested that a positive experience at first injection established an expectation that injecting drugs would lead to future positive experiences (Lankenau et al., 2007a; Lankenau et al., 2008a), corroborated quantitative data on drug using careers following initiation. For instance, methamphetamine and heroin initiates, who provided overwhelmingly positive descriptions of their first injection event, were more likely than ketamine initiates to inject four or more different drugs in their lifetime. In contrast, more than two-thirds of ketamine initiates, who described the most negative experiences, did not inject any other type of drug after initiating injection. Lastly, heroin initiates were more likely to regard the first drug injected as their “drug of choice” compared to methamphetamine, ketamine, or cocaine initiates. Hence, a positive first experience injecting heroin—perhaps combined with the drug’s addictive properties—appeared to impact the desire to continue using heroin as well as experimenting with injecting other drugs.

Findings on drug using careers suggest that risk reduction programs could improve health outcomes among IDUs by targeting particular programs according to the first drug injected. Ketamine initiates, who infrequently transitioned into injecting other drugs and often injected intramuscularly, need information about minimizing risks associated with intramuscular injections and sharing vials of ketamine. Heroin, cocaine, and methamphetamine initiates, who are more likely to inject multiple drugs following initiation, need information about the risks associated with polydrug use. Additionally, heroin initiates, who are more likely to regard heroin as their drug of choice, should be targeted for opioid overdose prevention programs.

LIMITATIONS

While this study is one of the first to analyze the associations between drug type at initiation and user characteristics, event characteristics, risk behaviors, and drug using trajectories among young IDUs, there are several limitations. First, since data for this study were collected from young IDUs in three U.S. cities the ability to generalize findings to older IDUs, or those in other locations, may be limited. Perhaps more importantly, all subjects enrolled in the study had a history of injecting ketamine, which makes generalizing findings to a “typical” population of young IDUs more difficult. The ketamine injection enrollment criteria, however, unexpectedly resulted in a sample of IDUs with a diverse history of first drug injected, and made the preceding analysis possible. As the data suggest, this sample of young IDUs cannot be simply classified as “ketamine injectors” or “heroin injectors” given their wide-ranging history of injection drug use, which may point to an emerging practice of polydrug injection among young IDUs. Second, data may be subject to some degree of recall bias and/or response bias since some interviews were conducted several years after the first injection event. For instance, descriptions of injection initiation may have been influenced by injection practices, risk behaviors, and drug using experiences subsequent to injection initiation. Hence, it is likely that some descriptions of initiation events are “telescoped” to more recent events or are a composite of several injection experiences. Lastly, since all data are cross-sectional, causal relationships between drug type and risk

behaviors and/or trajectories cannot be established. Future studies should consider enrolling cohorts of young IDUs who have initiated with different drug types, and following them prospectively to understand causal relationships between drug type and trajectories.

CONCLUSIONS

This report provides support for the hypothesis that drug type at initiation is related to several features of the first injection event, such as demographic characteristics and risk behaviors, as well as drug using careers following injection initiation. Future studies of IDUs should include questions about drug type at injection initiation—a recommendation echoed by other recent research (Lloyd-Smith, Wood, Li, Montaner, & Kerr, 2009)—since drug type may predict particular risk behaviors or risk trajectories. As we have reported, initiating with particular drugs was related to specific kinds of behaviors and health outcomes, such as early age of injection initiation, injecting multiple drugs, becoming homeless, or being HCV positive. Risk reduction programs designed to minimize the harmful consequences of injection drug use may benefit from explicitly tailoring intervention messages according to drug type at initiation.

Biographies

Stephen E. Lankenau is an Associate Professor at Drexel University, School of Public Health, Department of Community Health and Prevention. Over the past 10 years, he has participated in several NIDA studies applying ethnographic methods to the study of HIV risk behaviors among hidden populations, high-risk youth, and out-of-treatment drug users.

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TABLE 1

Demographic Characteristics of Initiates by Drug Type (N=222)

	Total n=222	Heroin(1) n=108	Meth(2) n=45	Ketamine(3) n=38	Cocaine(4) n=31
Mean Age at Enrollment	22.3	22.4	22.5	21.6	22.3
Mean Age at Initiation **	16.5	15.9 ³	16.2 ³	18.8 ^{1,2,4}	16.4 ³
Male Gender	69.8%	69.4%	68.9%	68.4%	74.2%
Race and Ethnicity					
White/Caucasian	74.8%	79.6%	75.6%	71.1%	61.3%
Black/African American	0.5%	0%	2.2%	0%	0%
Hispanic/Latino	5.9%	4.6%	6.7%	2.6%	12.9%
Asian or Pacific Islander	0.5%	0.9%	0%	0%	0%
Native American	0.9%	1.9%	0%	0%	0%
Multiracial Background	17.6%	13.0%	15.6%	26.3%	25.8%
Sexual Identity					
Heterosexual	78.4%	79.6%	84.4%	76.3%	67.7%
Gay/Lesbian	1.8%	2.8%	0%	2.6%	0%
Bisexual	16.7%	16.7%	11.1%	13.2%	29.0%
Other/Undecided	4.6%	1.9%	6.7%	7.9%	6.5%
High School Graduate or GED *	61.3%	61.1%	44.4% ³	76.3% ²	67.7%
Homeless [†] *	79.9%	78.6%	87.2%	62.1% ⁴	92.6% ³
Homeless Traveler [†]	60.9%	64.3%	64.1%	37.9%	70.4%
Employed Full or Part Time	27.5%	33.3%	17.8%	34.2%	12.9%
History of Drug Treatment *	53.2%	60.2% ³	57.8%	31.6% ¹	48.4%
History of Mental Health Care	73.9%	70.4%	80.0%	71.1%	80.6%
Ever arrested *	91.9%	92.6%	97.8% ³	81.6% ²	93.5%
Ever in Jail	86.9%	88.9%	95.6%	73.7%	83.9%
Ever in Prison	15.3%	18.5%	15.6%	5.3%	16.1%
Tested for HIV	91.9%	92.6%	93.3%	84.2%	96.8%
HIV Positive ^{††}	0.5%	0.9%	0%	0%	0%
Tested for HCV	85.6%	87.0%	88.9%	76.3%	87.1%

	Total n=222	Heroin(1) n=108	Meth(2) n=45	Ketamine(3) n=38	Cocaine(4) n=31
HCV Positive ^{††*}	20.3%	23.1%	28.9% ³	5.3% ²	16.1%

[†] Excluded respondents recruited in New Orleans following Hurricane Katrina due to difficulties in defining homelessness under post-disaster housing conditions. Total *N* for these items is 179.

^{††} Self-reported

Results from post-hoc pairwise comparisons (using Bonferroni correction) are reported in superscripts, which refer to drug types (i.e., heroin [1], methamphetamine [2]), ketamine [3], and cocaine [4]. A superscript indicates a statistically significant difference between drug types.

*
p<.05

**
p<.01

TABLE 2

Practices and Risk Behaviors at Injection Initiation by Drug Type (*N*=222)

Region [†]	Total n=222	Heroin(1) n=108	Meth(2) n=45	Ketamine(3) n=38	Cocaine(4) n=31
NE/Mid-Atlantic ***	25.6%	36.2% ²	2.3% ¹	24.3%	24.1%
South **	23.3%	19.0% ⁴	13.6% ⁴	27.0%	48.3% ^{1,2}
Midwest	8.8%	8.6%	4.5%	16.2%	6.9%
West ***	42.3%	36.2% ²	79.5% ^{1,3,4}	32.4% ²	20.7% ²
Setting					
Outside **	26.1%	33.3% ³	28.9%	7.9% ¹	19.4%
Building (Public/Semi-Private)	21.6%	18.5%	33.3%	18.4%	19.4%
Building (Private) **	52.3%	48.1% ³	37.8% ³	73.7% ^{1,2}	61.3%
Other injectors					
0	4.5%	3.7%	6.7%	5.3%	3.2%
1	34.2%	38.0%	26.7%	31.6%	35.5%
2+	61.3%	58.3%	66.7%	63.2%	61.3%
Other Drug Use Prior	73.0%	66.7%	75.6%	81.6%	80.6%
Never Used Index Drug ***	36.9%	54.6% ^{2,3,4}	15.6% ¹	21.1% ¹	25.8% ¹
Planned to Inject	40.1%	46.3%	40.0%	28.9%	32.3%
Paid for Drug ***	40.5%	54.6% ^{2,3}	28.9% ¹	18.4% ¹	35.5%
Mode of Administration					
Intravenous ***	85.6%	95.4% ³	95.6% ³	34.2% ^{1,2,4}	100.0% ³
Intramuscular ***	14.4%	4.6% ³	4.4% ³	65.8% ^{1,2,4}	0% ³
Subcutaneous	0.9%	1.9%	0%	0%	0%
Drug Injection					
Self *	26.1%	21.3% ³	20.0%	44.7% ¹	29.0%
Friend/Acquaintance	61.3%	65.7%	64.4%	47.4%	58.1%
Girlfriend/Boyfriend	9.0%	11.1%	8.9%	5.3%	6.5%
Stranger	3.2%	1.9%	6.7%	2.6%	3.2%

	Total n=222	Heroin(1) n=108	Meth(2) n=45	Ketamine(3) n=38	Cocaine(4) n=31
Number of Injections ^{††}					
1	74.8%	75.9%	77.8%	81.6%	58.1%
2	14.0%	20.4%	8.9%	7.9%	6.5%
3+ ^{***}	10.8%	3.7% ⁴	13.3% ⁴	10.5% ⁴	35.4% ^{1,2,3}
Syringe Acquisition					
Self-Acquired	18.5%	20.5%	15.6%	15.9%	19.3%
Friend Acquired	69.8%	68.5%	71.2%	73.7%	67.8%
Stranger/DK	11.7%	11.1%	13.3%	10.5%	12.9%
Risk Behaviors					
Receptive Syringe Sharing	4.1%	3.7%	8.9%	0%	3.2%
Shared Works	63.5%	60.2%	57.1%	78.9%	64.5%

[†] Seven subjects injected outside the U.S.

^{††} One person N/A

Results from post-hoc pairwise comparisons (using Bonferroni correction) are reported in superscripts, which refer to drug types (i.e., heroin [1], methamphetamine [2], ketamine [3], and cocaine [4]). A superscript indicates a statistically significant difference between drug types.

* $p<.05$

** $p<.01$

*** $p<.001$

TABLE 3

Characteristics of Drug Using Career by Drug Type (N=222)

	Total n=222	Heroin(1) n=108	Meth(2) n=45	Ketamine(3) n=38	Cocaine(4) n=31
Drugs Injected Since Initiation					
Heroin *	81.1%	0%	80.0% ³	26.3% ^{2,4}	83.9% ³
Methamphetamine *	67.1%	71.3% ³	0%	18.4% ^{1,4}	64.5% ³
Ketamine	100%	100%	100%	0%	100%
Cocaine *	73.0%	82.4% ³	77.8% ³	18.4% ^{1,2}	0%
Other Drugs ^{*†}	70.7	79.6% ³	84.4% ³	26.3% ^{1,2,4}	74.2% ³
Number of Other Drugs Injected					
1 *	12.2%	0% ³	0% ³	71.1% ^{1,2,4}	0% ³
2	9.5%	10.2%	11.1%	5.3%	9.7%
3	6.3%	6.5%	4.4%	2.6%	12.9%
4+ *	72.1%	83.3% ³	84.4% ³	21.1% ^{1,2,4}	77.4% ³
Drug of Choice (DOC)					
Heroin *	59.3%	59.3% ^{2,3,4}	28.9% ¹	13.2% ¹	6.5% ¹
Methamphetamine *	13.1%	3.7% ^{2,4}	28.9% ¹	13.2%	22.6% ¹
Ketamine *	5.0%	5.6%	0% ³	13.2% ²	0%
Cocaine	5.0%	5.6%	2.2%	2.6%	9.7%
Other Drugs ^{*†}	49.5%	36.1% ^{3,4}	46.7% ³	76.3% ^{1,2}	67.7% ¹
DOC/Drug of Initiation Match *	38.3%	59.3% ^{2,3,4}	28.9% ¹	13.2% ¹	9.7% ¹

[†] Including Alcohol, Marijuana, Speedball, Crack, Ecstasy, LSD, PCP, Mushrooms, GHB and prescription drugs.

Results from post-hoc pairwise comparisons (using Bonferroni correction) are reported in superscripts, which refer to drug types (i.e., heroin [1], methamphetamine[2], Ketamine[3], cocaine[4]). A superscript indicated a statistically significant difference between drug types.

* $p < .05$