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## Characteristics of people who initiate injection drug use later in life

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### Abstract

**BACKGROUND**—Studies report that among people who inject drugs (PWID), approximately 1 in 7 initiated injection during their thirties or later (referred to hereafter as “late initiates”).

However, little is known about individuals who are late initiates. This study aims to describe characteristics of late initiates to drug injection and to examine how they differ from people who initiated drug injection prior to the age of 30 (“typical initiates”).

**METHODS**—We recruited 696 active PWID in Los Angeles and San Francisco, California between 2011 and 2013, using targeted sampling and street outreach methods. Participants completed personal interviews that covered items on demographics, drug use history and practices, injection initiation episode, HIV injection- and sex-related risk, health care utilization among others. We used bivariate and multivariate analyses to examine factors associated being a late initiate.

**RESULTS**—In our sample, 19% of participants who were 30 years or older were classified as late initiates. In multivariate analysis controlling for city, late initiates had higher odds of being female and African American, having been in treatment prior to initiation, initiating illicit drug use at an older age, and being assisted into injection by someone of the same age or younger. Late initiates had lower odds of frequent recent injection, and having a bipolar disorder diagnosis.

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**Contributors** Ricky Bluthenthal designed the study and undertook the statistical analysis. Sonya Arreola and Ricky Bluthenthal managed the literature searches, summaries of previous related work and wrote the first draft of the manuscript. Lynn Wenger managed the study protocol. All authors contributed to and have approved the final manuscript.

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**CONCLUSION**—Late initiates comprise a significant proportion of active PWIDs. More study on the health consequences of late initiation are needed as are interventions to prevent transition to drug injection among at-risk populations.

### Keywords

People who inject drugs; Injection drug users; Epidemiology; Substance Use; Aging; Injection initiation

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## 1. INTRODUCTION

### 1.1 Health risk of Injection Drug Use

Injection drug use remains an enduring public health problem in the United States. In the United States, injection drug use has been associated with a prevalent hepatitis C virus infections (Alter et al., 1999; Hagan et al., 2008); prevalent AIDS cases (15.9% among men and 26.3% among women) and new HIV infections (Centers for Disease Control and Prevention (CDC), 2012); deaths from overdose from use of street drugs or misuse of prescribed drugs (CDC, 2007); increased hospitalizations (White et al., 2011; Pfeiffer et al., 2011); soft-tissue infections (Binswanger et al., 2008); and elevated mortality (Goedert et al., 2001; Vlahov et al., 2008, 2004).

### 1.2. Age-related patterns of injection initiation

Because many of the health risks of injection occur rapidly after initiation, studies on injection initiation have focused on people who inject drugs (PWID) under 30 years of age (Abelson et al., 2006; Dunn et al., 2010; Feng et al., 2013; Frajzyngier et al., 2007; Fuller et al., 2001; Goldsamt et al., 2010; Lankenau et al., 2012, 2010; Mackesy-Amiti et al., 2013; Miller et al., 2011; Novelli et al., 2005; Parriott and Auerswald, 2009; Roy et al., 2011). This focus reflects the persistent observation that most PWIDs initiate drug injection in their late teens and early twenties. Indeed, observational epidemiological studies have consistently found the mean age of first injection to range from 19 to 22 (Broz et al., 2013; Carneiro et al., 1999; Chitwood et al., 2000; Des Jarlais et al., 1999). Thus, the focus on younger PWID seems appropriate.

However, there are several published studies that indicate that substantial proportions of active PWID actually initiated drug injection at older ages. Three studies from the 1990s found that new injectors (having initiated injection drug use within the last 6 years) had a mean age of first injection in the range of 25 to 30 (Carneiro et al., 1999; Chitwood et al., 2000; Des Jarlais et al., 1999). Unpublished data from the National Institute for Drug Abuse's (NIDA) 23-city Cooperative Agreement for AIDS Community-based Outreach/Intervention 1990s (Kral et al., 1998; Stephens et al., 2000), indicate that approximately 16% of PWIDs initiated drug injection at age 30 or later in this multi-site US study. Similarly, in a statewide sample of PWIDs in California, 17% initiated drug injection at age 30 or later (Bluthenthal et al., 2009; Kral et al., 2009). Finally, in a regional, longitudinal cross-sectional study of PWIDs in the San Francisco Bay area, the proportion of PWIDs who initiated injected at the age of 30 or older ranged from 10% to 20% between 1989 and 2005 (Kral et al., 2009).

PWID who initiate injection drug use at age thirty or later (hereafter referred to as “late initiates”), have received little research attention. Among published studies, there is only one quantitative study that compared older late initiates (initiators who were 40 years of age and older) to PWIDs who initiate prior to 40 (Carneiro et al., 1999). In that study, older initiators were found to have lower HIV seroprevalence, better syringe hygiene, and lower injection frequency. Aside from the different classification of older initiators, Carneiro and colleagues solely examined HIV-related variables. Other socio-demographic, health, and life histories factors that might distinguish late initiators from younger initiators were not considered. Another study from Australia focused on differences between what they called early onset initiates (ages 12 to 16) versus later onset initiates (ages 17 to 24; Abelson et al. 2006). That study did not consider any PWIDs over the age of 24. There is another set of studies that has considered older or aging PWIDs (Boeri et al., 2008; Boeri and Tyndall, 2012; Hartel et al., 2006; Rosen et al., 2011), but these studies do not address the specific characteristics, risk and needs of PWID who start injecting at older ages.

The health consequences of drug injection are many and severe, even for those who inject for only a short time. Efforts to prevent transition to drug injection are critically needed. Focusing on late injection initiates is one promising area for intervention. Late initiation itself is somewhat counter-initiative since these individuals have passed the highest-risk developmental stages (adolescence and early adulthood). As a consequence, their pathways to initiation, health risk, and recovery may differ significantly from ‘typical’ PWIDs who initiate injection during adolescence and early adulthood. Given this reasoning and the paucity of empirical research on this population, our goal in this paper is to describe characteristics of late initiates and to compare their injection initiation and other demographic and drug use characteristics to “typical initiates” (those who initiate before age 30).

## 2. METHODS

### 2.1. Procedures

We present data from a cross sectional study that used targeted sampling and community outreach methods (Bluthenthal and Watters, 1995; Watters and Biernacki, 1989) to identify and recruit PWIDs in Los Angeles and San Francisco, California. The overall goal was to conduct an exploratory qualitative and quantitative study of late initiation to injection drugs to better understand the circumstances, motivations, and social environments of injection initiation later in life (after turning 30 years old). Eligibility criteria for the study were being 18 years of age or older and having physical evidence of recent drug injection (at least one injection episode in the last 30 days and visible signs of recent venipuncture; Cagle et al., 2002). For this analysis, we only include participants aged 30 or older. After obtaining informed consent, risk behavior and demographic data were collected during a 30-minute computer assisted personal interview (QDS™, NOVA Research Company, Bethesda, Maryland, USA) involving a standardized questionnaire administered in a one-on-one interview session. Participants were paid \$20.00 for taking part in the study. The Institutional Review Boards at University of Southern California and at RTI International approved all study procedures.

## 2.2 Measures

A wide range of domains were measured in the survey including socio-demographic characteristics, family history of alcohol and drug use, injection initiation episode, history of injection and non-injection drugs including age at initiation and frequency of recent use, sexual behaviors and risk, health history including self-report of ever having been diagnosed with a mental health and experience with common PWID ailments such as overdose, abscesses, and STIs, utilization of preventive services, and food insecurity. Key variables considered by domain are described below.

**2.2.1. Socio-demographic measures**—included self-reported race/ethnicity (White, Black, Latino, Asian, Pacific Islander, Native American, Mixed and Other), gender (male, female, transgender), high school graduation or equivalent (yes or no), employment status (full, part-time, disabled, retired, student), income and income sources (paid employment, welfare, illegal sources among others), military service (yes or no), and history of gang involvement among other items. We also considered family history of alcohol and drug use and whether the participant had been a victim of sexual abuse (measured by reported sex with a person 5 years or older at the age of 15 or younger). To facilitate analysis, we grouped Asian American, Pacific Islanders, Native Americans, Mixed and Others into one group. We also had three transgendered participants, however, we dropped them from the analysis to facilitate examining gender differences in late and typical initiates.

**2.2.2. Injection initiation episode items**—were assessed including age at first injection, drug first injected (crack cocaine, powder cocaine, heroin, methamphetamine, prescription opiates, stimulants, sedatives or tranquilizers among others), whether the participant self-injected the first time and if they received assistance, characteristics of that person (gender, relative age, relationship to participant), and whether the first injected drug had been used through some other route of administration prior to injection (yes or no). We classified participants whose age at first injection was 30 years or older as “late initiates.” Those who first injected any drug prior to age 30 were classified as “typical initiates.”

**2.2.3. Comprehensive items of illicit drugs and nonmedical use of prescription drugs**—were asked. The following types of substances were assessed: crack cocaine, powder cocaine, heroin, methamphetamine prescription opiates, stimulants, sedatives or tranquilizers; speedball (heroin and cocaine mixed) and goofball (heroin and methamphetamine); and methadone, buprenorphine, and some other drug not mentioned. For each substance, participants provided age at first use, age at first injection, and times of injection and non-injection use in the last 30 days. We also assessed marijuana use, including age at first use and times used in the last 30 days. Alcohol quantity and frequency was collected by asking for number of days used alcohol in the last 30 days and number of standard drinks on a typical day. Binge drinking was assessed by asking for the most drinks consumed on any single day in the last 30 days.

**2.2.4. Health related items included**—recent HIV-related (and other blood borne infection-related) injection risk (distributive and receptive syringe sharing among others in last 30 days) and sex risk (number of sex partners, unprotected sex, any sex partner is an

injection drug user in last 6 months), any overdose or abscess in the last 6 months, need for and utilization of urgent (emergency), chronic, or dental care. Utilization of preventive health services (in the last 30 days) such as drug treatment (methadone detoxification, maintenance, outpatient, residential, and self-help), syringe exchange use and other syringe sources (including pharmacy, street purchase, and indirect exchange), and HIV and HCV testing was also collected.

### 2.3. Analysis

For this analysis, we excluded from the overall sample of 813 participants those who were 29 years of age or younger ( $n=83$ ), those reporting no drug injection in the last 30 days ( $n=32$ ), and those who were transgendered ( $n=3$ ), leaving us with an analytic sample of 696 participants. We conducted bivariate and multivariate analyses to determine factors associated with late initiation. We compared participants based on their injection drug initiation status (typical=initiation before age 30 vs. late=initiation at age 30 or older). All bivariate analyses tested differences used the chi-square test or Fisher's exact test, with  $p < 0.1$  as the criterion for statistical significance. Variables significant in bivariate analysis were examined for collinearity using a correlation matrix. Collinear variables with the strongest association with the dependent variable were examined in multivariate analysis. We only retained variables in the final multivariate model that were significant at the  $p < 0.05$  level. All statistics were computed using SPSS/PASW Statistics 18.0 (released July 30, 2009).

## 3. RESULTS

Overall, the analytic sample was racially and ethnically diverse, and educationally and economically disadvantaged. One third of participants were African American, 31% were White, and 25% were Hispanic. Over one-quarter were female. Monthly income was low with 80% of participants earning under \$1,350 per month, 63% were currently homeless, and 36% had not graduated from high school or its equivalent. The majority of participants were 50 years of age or older (56%), 14% were gay, lesbian, or bisexual, and 12% had served in the US armed forces.

In terms of drug use patterns, the mean age of first illicit drug use for the overall sample was 13.7 (Interquartile range [IQR] = 12, 15; standard deviation [SD] =4.60) with a median age of 13. The mean age of first injection drug use was 22.0 years old (IQR= 16, 26; SD=8.90) with a median age of 19. Nineteen percent of the participants were late initiates.

Bivariate analysis of continuous measures yielded several significant differences between late and type initiates. Mean age at first injection for typical initiates was 18.5 (SD=4.52) and 37.5 years old (SD=6.55;  $p < 0.001$ ) for late initiates. The mean age of first illicit drug use for typical initiates was 13.2 years old (SD=3.46) and for late initiates was 15.8 years old (SD=7.51;  $p < 0.001$ ). Time from first illicit drug use to first injection was significantly higher for late initiates (mean 21.7 years; SD=8.05) than for typical initiates (5.3 years; SD=4.42;  $p < 0.001$ )

Demographic and socioeconomic variables that differed between typical and late initiates include female gender, race, history of gang membership, history of childhood sexual abuse, and recruitment site (Table 1). Regarding first injection episode, late initiates were more likely to self-inject for their first injection, to be initiated by someone of the same age or younger, and to have prior use of the drug they first injected as compared to typical initiates. In terms of current drug use patterns, late initiates were less likely to report non-injection tranquilizer and methadone use. Late initiates were also less likely to report injection of 2 or more substances in the last 30 days. Of the health related variables, late initiates were less likely to report being diagnosed with bipolar disorder ever and to have overdosed in the last 6 months. While late initiates were more likely to report having been in drug treatment prior to injection, they were less likely to report ever having been in most types of drug treatment. Nonetheless, it is worth noting that late and typical initiates did not differ on history of family alcohol and drug use, most initiation injection episode variables, most recent drug preferences, and HIV risk behaviors or infection.

In multivariate analysis (Table 2), several factors were found to be independently associated with being a late initiator. Demographic differences observed between late and typical initiators include being female (Adjusted odds ratio [AOR]=2.59;  $p=0.0001$ ), being African American as compared to White (AOR=1.81;  $p=0.04$ ), and residing in Los Angeles as compared to San Francisco (AOR=2.23;  $p=0.001$ ). In terms of injection episode, late initiates had higher odds of being initiated by someone of the same age or younger (AOR=3.01;  $p=0.0001$ ) and to have used the drug they first injected by another route prior to first injection (AOR=2.59;  $p=0.0001$ ). In terms of health, late initiates had higher odds of reporting a treatment experience prior to first injection (AOR=2.37;  $p=0.003$ ) and lower odds of reporting diagnoses with bipolar disorder (AOR=0.45;  $p=0.02$ ). Lastly, late initiates were found to have lower odds of recent high frequency injection (3 or more injections per day; AOR=0.36;  $p=0.001$ ).

#### 4. DISCUSSION

We found that late onset of injection drug use represents a significant proportion of active PWID. This confirms unpublished results from other observational studies of PWID that have found similar proportions in the range of 15% to 20% of active PWID (Bluthenthal et al., 2009; Kral et al., 2009). The size and consistency of this finding underscores the need for more research on this population. At present, we are involved in analysis of qualitative data from 105 PWID, many of whom initiated drug injection during their thirties or later. Results from these analyses should provide further insight into this phenomenon and help identify levers for the potential prevention of this escalation of drug use.

The quantitative results for this study suggest that demographic factors, specifically being female or African American, may elevate risk of late drug injection initiation. Efforts to prevent late initiation should focus on non-injection drug using women and African Americans in their twenties or thirties appear warranted. In a study of the transition to drug injection, using a four session social learning based AIDS/drug injection prevention program or a control condition among 83 intranasal heroin users, drug injection during follow-up was associated with being in the control group (Des Jarlais et al., 1992). This finding suggests

that education is an important component of a possible harm reduction approach. Tailoring these education-based injection prevention programs for women and African Americans would be an important next step.

Our data also showed that the odds of non-injection drug use prior to injecting that same drug is higher among late initiates compared to typical initiates. This suggests that we need to increase drug injection initiation prevention efforts among people in their twenties and thirties who use illicit drugs via non-injectable routes of administration. For example, it would be important to work with people in their twenties and thirties who sniff heroin so that they do not initiate injection of heroin. This prevention work should include ways to prevent initiation of injection as a route of administration as well as educating about injection hygiene in case they were to begin injecting. That we also found that increased odds for treatment involvement prior to injection suggest that drug treatment programs may be promising venues in which to base injection initiation prevention programs as was demonstrated by Des Jarlais et al (1992).

For PWID who require assistance injecting for the first time, we have found a somewhat novel social context. Whereas many studies have found that older PWID are typically the initiator for younger (or typical) initiates (Fuller et al., 2003), for late initiates, injection facilitators were typically of the same age or younger. It appears clear that prevention efforts around injection initiation will need to be directed not merely at younger non-injection drug users.

Lastly, on many measures, we found no difference between late and typical initiates, including most measures of drug preference, health risk, and health outcomes. Late initiates do appear to have a less severe drug use pattern, as measured by injection frequency, and were later to initiate any illicit drug use. We also found that they had lower odds of reporting a diagnosis of bipolar disorder. Despite this, HIV prevalence was similar for both groups, as was injection-related HIV risk, meaning that HIV and HCV prevention efforts are just as important for late initiates as typical initiates.

Findings from this study should be viewed in the context of several potential limitations. Although the specific measures used in this study have been found to be valid and reliable among PWID in other research settings (Fisher et al., 2007; Needle et al., 1995; Weatherby et al., 1994), all data are potentially subject to self-report bias. Furthermore, the sample cannot claim to be representative of PWID in Los Angeles and San Francisco, and given the cross-sectional nature of the data, we are unable to determine causality. There may also be recall bias among PWID, although we have conducted reliability analyses comparing the quantitative and qualitative data and found acceptable levels of self-report consistency (Dyal et al., 2013).

This quantitative study helped to establish the prevalence of late initiation as well as certain risk factors associated with late initiation. This is an important first step in this line of research. Our ongoing qualitative data collection and analysis will likely be helpful in understanding the reasons why people initiate drug injection later in life. Understanding what distinguishes drug users who initiate drug injection later in life from those who initiate

drug injection as children or adolescents, is essential for developing appropriate harm reduction strategies that forestall or inhibit initiation of injection drug use. Future research efforts from this study will include qualitative data analysis and triangulation analysis of qualitative and quantitative data that will further elucidate the ways in which typical and late initiates differ on demographic characteristics, as well as their life trajectories, the circumstances that lead to injection, their motivations, and social environments of injection initiation. The present findings indicate that efforts to prevent people who use illicit drugs in their twenties and thirties from transitioning into injection drug use appear to be warranted.

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**Table 1**

Selected characteristics by injection initiation status among people who inject drugs (PWID) and are 30 years of age or older in Los Angeles and San Francisco, California (N=696)

Variable	Total (n=696) N (%)	Late Initiate (n=130) N (%)	Typical initiate (n=566) N (%)	P=
Female	178 (26%)	49 (38%)	129 (23%)	0.001
Age				ns
30 to 39	86 (12%)	13 (10%)	73 (13%)	
40–49	223 (32%)	42 (32%)	181 (32%)	
50 or more	387 (56%)	75 (58%)	312 (55%)	
Race				0.008
White	214 (31%)	28 (22%)	186 (33%)	
African American	229 (33%)	58 (45%)	171 (30%)	
Hispanic	174 (25%)	32 (25%)	142 (25%)	
All others	64 (11%)	11 (9%)	64 (11%)	
Born in the US				0.09
Yes	656 (94%)	118 (91%)	538 (95%)	
Recruitment Site				0.001
San Francisco	348 (50%)	47 (36%)	301 (53%)	
Los Angeles	348 (50%)	83 (64%)	265 (47%)	
Monthly income				ns
<\$1,351	563 (80%)	110 (85%)	453 (80%)	
\$1,351 plus	133 (20%)	20 (15%)	113 (20%)	
High school education or equivalent				ns
Yes	443 (64%)	90 (69%)	353 (62%)	
Homeless				ns
Yes	435 (63%)	83 (64%)	352 (62%)	
Ever in a gang (n=394)				0.01
Yes	92 (23%)	9 (12%)	83 (26%)	
Served in the US armed forces				ns
Yes	81 (12%)	16 (12%)	65 (12%)	
Gay, lesbian or bisexual				ns
Yes	95 (14%)	17 (13%)	78 (14%)	
Reported sex with an person 5 years of age or older prior to 16 <sup>th</sup> birthday -Yes				0.03
Yes	310 (45%)	47 (36%)	263 (47%)	
First injection initiator				0.10
Friend	375 (54%)	69 (53%)	306 (54%)	
Acquaintance	82 (12%)	12 (9%)	70 (12%)	
Spouse, main sex partner	57 (8%)	15 (12%)	42 (7%)	
Other family member	64 (9%)	4 (3%)	60 (11%)	
Criminal associate	17 (3%)	2 (2%)	15 (3%)	
Injected self	99 (14%)	27 (21%)	72 (13%)	
Relative age of initiator (N=594)				

Variable	Total (n=696) N (%)	Late Initiate (n=130) N (%)	Typical initiate (n=566) N (%)	P=
Same age or younger	178 (30%)	49 (49%)	129 (26%)	0.001
Older	416 (70%)	52 (51%)	364 (74%)	
Gender of initiation (n=589)				0.07
Male	468 (79%)	72 (71%)	396 (81%)	
Female	121 (21%)	29 (29%)	92 (19%)	
First drug injected				ns
Cocaine or crack	82 (12%)	11 (9%)	71 (13%)	
Heroin	438 (63%)	87 (67%)	351 (62%)	
Methamphetamine	143 (21%)	28 (22%)	115 (20%)	
Prescription drug	33 (5%)	4 (3%)	29 (5%)	
Source of drugs				ns
Gift	398 (57%)	74 (58%)	323 (57%)	
Bought it myself	261 (38%)	49 (38%)	212 (38%)	
Other	35 (5%)	5 (4%)	30 (5%)	
Drug used by other route before 1 <sup>st</sup> injection	328 (47%)	78 (60%)	250 (44%)	0.001
Non-injection drug use, last 30 days				
Crack cocaine	301 (43%)	58 (45%)	243 (43%)	ns
Powder cocaine	51 (7%)	8 (6%)	43 (8%)	ns
Methamphetamine	151 (22%)	28 (22%)	123 (22%)	ns
Heroin	95 (14%)	22 (17%)	73 (13%)	ns
Speedball (Heroin and cocaine)	20 (3%)	8 (6%)	12 (2%)	0.02
Goofball (heroin and meth)	14 (2%)	1 (1%)	13 (2%)	ns
Opiate prescription misuse	167 (24%)	30 (23%)	137 (24%)	ns
Tranquilizer prescription misuse	160 (23%)	20 (15%)	140 (25%)	0.02
Methadone prescription misuse	153 (22%)	20 (15%)	133 (24%)	0.05
Non-injection use of 2+ drugs, last 30 d				ns
Yes	268 (39%)	50 (39%)	218 (39%)	
Injected drug use, last 30 days				
Crack cocaine	66 (10%)	9 (7%)	57 (10%)	ns
Powder cocaine	78 (11%)	9 (7%)	69 (12%)	0.09
Methamphetamine	242 (35%)	41 (32%)	201 (36%)	ns
Heroin	555 (80%)	103 (79%)	453 (80%)	ns
Speedball (Heroin and cocaine)	121 (17%)	17 (13%)	104 (18%)	ns
Goofball (heroin and meth)	78 (11%)	9 (7%)	69 (12%)	0.09
Opiate prescription medication	80 (12%)	10 (8%)	70 (12%)	ns
Injected 2 or more drugs, last 30 days				0.03
Yes	255 (37%)	37 (29%)	218 (39%)	
Injection frequency, last 30 days				0.10
Less than once a day	331 (48%)	68 (52%)	263 (47%)	
Once or twice a day	181 (27%)	39 (30%)	152 (27%)	
Three times or more a day	174 (25%)	23 (18%)	151 (27%)	

Variable	Total (n=696) N (%)	Late Initiate (n=130) N (%)	Typical initiate (n=566) N (%)	P=
HIV positive				ns
Yes	52 (8%)	8 (7%)	44 (8%)	
Mental health diagnosis				
Depression – Yes	205 (30%)	33 (25%)	172 (30%)	ns
Bipolar disorder – Yes	125 (18%)	14 (11%)	111 (20%)	0.02
Schizophrenia – Yes	72 (10%)	10 (8%)	62 (11%)	ns
Post-traumatic disorder – Yes	61 (9%)	8 (6%)	53 (9%)	ns
Overdosed in the last 6 months				0.03
Yes	46 (6%)	3 (2%)	43 (8%)	
Syringe sharing, last 30 days				
Distributive – Yes	93 (13%)	19 (15%)	74 (13%)	ns
Receptive – Yes	90 (13%)	16 (12%)	74 (13%)	ns
Treatment prior to first injection				0.001
Yes	84 (17%)	28 (33%)	56 (13%)	
Any alcohol or drug treatment				0.04
Yes	511 (74%)	86 (66%)	425 (75%)	
Drug treatment ever				
Methadone Detoxification	319 (46%)	39 (30%)	280 (50%)	0.001
Methadone Maintenance	301 (43%)	36 (28%)	265 (47%)	0.001
Buprenorphine	48 (7%)	6 (5%)	42 (7%)	ns
Outpatient	220 (32%)	30 (23%)	190 (34%)	0.02
Self-help	361 (52%)	56 (43%)	305 (54%)	0.03

**Table 2**

Multivariate analysis of factors associated with Late Initiation (30 years or older) of Injection (N=696)

Variables	Adjusted Odds Ratio	95% Confidence Interval	P-value
Assisted in first injection by someone the same age or younger	3.01	1.94, 4.67	0.0001
Used first injected drug by other route prior to injection	2.59	1.65, 4.07	0.0001
Female	2.59	1.61, 4.17	0.0001
Drug treatment prior to first injection	2.37	1.33, 4.21	0.003
Race			
White	Referent		
African American	1.81	1.03, 3.19	0.04
Latino	1.23	0.63, 2.41	0.55
All others	0.92	0.41, 2.08	0.85
Age at first illicit drug use	1.11	1.05, 1.17	0.0001
Diagnosed with bipolar disorder	0.45	0.23, 0.85	0.02
30-day injection frequency			
Less than once a day	Referent		
Once or twice a day	0.76	0.46, 1.28	0.31
Three or more times a day	0.36	0.20, 0.66	0.001
Recruitment Site			
San Francisco	Referent		
Los Angeles	2.23	1.36, 3.66	0.001