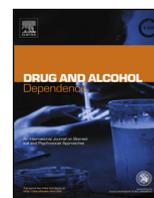




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# Changing patterns of first injection across key periods of the French Harm Reduction Policy: *PrimInject*, a cross sectional analysis

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### ARTICLE INFO

#### Article history:

Received 23 November 2012  
Received in revised form 18 April 2013  
Accepted 18 April 2013  
Available online xxx

#### Keywords:

Injection drug users  
First injection episode  
Internet study  
France  
Buprenorphine  
Drugs uses

### ABSTRACT

**Background:** Monitoring of emerging modes of drug consumption in France has identified new patterns of injection among youths with diverse social backgrounds, which may explain the persistence of high rates of hepatitis C virus infection. The circumstances surrounding the first injection have been poorly documented in the group of heavy drug users and in the context of the French opioid substitution treatment (OST) policy that provides expanded access to high-dosage buprenorphine (BHD)

**Methods:** An Internet survey (*Priminject*) was conducted from October 2010 to March 2011 with French drug users. Four time periods were compared based on critical dates throughout the implementation of the Harm Reduction Policy in France.

**Results:** Compared with drug users who injected for the first time prior to 1995, the aspects of drug use for users who recently injected for the first time were as follows: (1) experimentation with miscellaneous drugs before the first injection; (2) an older age at the time of first injection; (3) heroin as the drug of choice for an individual's first injection, notwithstanding the increased usage of stimulant drugs; (4) BHD did not appear to be a pathway to injection; and (5) an increased number of users who injected their first time alone, without the help or presence of another individual.

**Conclusion:** The *PrimInject* study showed that there is a group of injection drug users that is larger than the group of injection drug users observed in previous studies; therefore, it is necessary to diversify programs to reach the entire spectrum of high-risk users.

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## 1. Introduction

Since 2003, new diagnoses of HIV infection among drug users in France accounted for 2–3% of total cases, which amounts to approximately 70 cases per year (Le Vu et al., 2010). The prevalence rate decreased from 20% in the early 1990s to less than 10% in 2008 (Institut National de la Santé et de la Recherche Médicale – INSERM, 2010). These changes followed the introduction of free access to syringes in pharmacies (1987) and the implementation of syringe exchange programs, low-threshold services (1990), and opiate substitution treatments (1995). The hepatitis C virus (HCV) prevalence

rate has remained very high (73%), however, and is not decreasing (Jauffret-Roustide et al., 2006). After a period of declining heroin use at the turn of the 21st century (Bello et al., 2004; Micallef et al., 2004; Palle et al., 2003), heroin has become more available (Cadet-Tairou et al., 2010), and the number of reported fatal overdoses has increased since 2004 (Centres d'Evaluation et d'Information sur la Pharmacodépendance – CEIP/ Décès en Relation avec l'Abus de Médicaments et de Substances – DRAMES, 2011).

While injection drug use has continuously decreased in France (INSERM, 2010), field observations (Cadet-Tairou et al., 2010) have reflected the emergence of new groups of injection drug users and new patterns of substance abuse. Aside from underprivileged youths, new consumers belonging to diverse social backgrounds, such as users at rave/dance parties, use a wide spectrum of substances (hallucinogens, amphetamines, synthetic products, and cocaine and its derivatives), as observed by the network reporting emerging trends of drug use (Cadet-Tairou et al., 2008; Girard and

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Boscher, 2009). Heroin and other opiates, including opiate medicine (morphine–sulfate and high-dose buprenorphine (BHD)), are used occasionally or alternatively with other substances for their relaxing effects. Injection is one aspect of this behavior (Guichard et al., 2004, 2006; Toufik et al., 2008).

Therefore, the current harm reduction strategies may not be reaching these new groups of injectors and may thus lead to a higher prevalence of HVC, which is often acquired shortly after initiation into injection (Hagan et al., 2004; Maher et al., 2006, 2007; Roy et al., 2009; van den Berg et al., 2007; Bravo et al., 2012).

Circumstances leading to injection in the new groups of injectors have not been well documented because the majority of studies have focused on the trajectory of long-term drug users, often the most marginalized, who are mainly recruited through drug dependence clinics or injection drug user networks (Crofts et al., 1996; Doherty et al., 2000; Frajzyngier et al., 2007; Fuller et al., 2003; Goldsamt et al., 2010; Hadland et al., 2010; Kerr et al., 2007; Lankenau et al., 2010; Roy et al., 2003; Vidal-Trecañ et al., 2002). The context of initiation for those who have injected only a few times or over a short period of time during their lifetime has been poorly described.

To document the profile of new injectors, the *PrimInject* study was launched using the Internet to reach current or former injectors and obtain descriptions of their circumstances, behaviors, and exposure to blood-borne infections at initiation into injection drug use. The first injection is a particularly significant, generally unplanned event for individuals who are poorly informed regarding the techniques and risks of injecting (Doherty et al., 2000; Frajzyngier et al., 2007; Varescon et al., 2000).

Long before 1995, buprenorphine in its analgesic form was used by injection drug users in France as a prescribed drug and as a street drug. In 1995, BHD was approved as an opiate substitution treatment to be prescribed by general practitioners (GPs) and delivered in community pharmacies for a maximum four-week period to allow a rapid scaling up of substitution therapy. Methadone was only available from drug treatment clinics with more restrictive regulations and was usually delivered without direct supervision after the initiation period. Since then, researchers have observed the transition to the street market and injection of tablets (Guichard et al., 2003, 2006). Fieldworkers have repeatedly reported on the use of buprenorphine in individuals who have not used heroin previously, but the frequency of buprenorphine use has never been measured, even though it is a critical issue in implementing substitution treatment. Because the French regulation of substitution treatment is flexible, assessment of the role of buprenorphine in the initiation of injection is relevant to document the initiation process.

The present paper focuses on the history of drug use and context of initiation among *PrimInject* respondents and emphasizes the period of initiation that corresponds with turning points in French drug policy over the last 30 years.

## 2. Methods

### 2.1. Population and design

An advisory committee including professionals working in outreach programs, members of drug user organizations, and health administrations was set up to supervise the design of, promotion of, and tools used in the *PrimInject* study. Because the objective was to reach a socially diverse population of young people who recently started to inject drugs or who administered injections to themselves even once or a few times, the electronic music scene was especially considered. Indeed, field workers providing harm reduction services during electronic festivals are used to distribute syringes and injection equipment to festival participants and have reported an emerging use of injection in that population (Girard and Boscher, 2009). This population, which is young, is not disadvantaged, and uses a wide variety of drugs during festivals, was targeted by using electronic music channels. The Internet is the main communication channel for youths and individuals participating in the electronic music scene and is considered effective to reach this small and hidden population (Velter, 2011; Frippiat and Marquis, 2010), especially young drug users,

and to capture ex-drug users or individuals who had only had sporadic experiences of drug injection. Use of the Internet also limits the selection effects of treatment or harm reduction services that often overrepresent the most marginalized population or the most severe substance use profiles.

The promotion messages invited people to share their first injection experience by using an explicit URL [www.shoot-premierefois.com](http://www.shoot-premierefois.com). Various banners and prints using the party scene visual codes were first made available on selected websites and then through a large range of harm reduction programs and services (e.g., GPs, drug dependence clinics, community pharmacies, syringe exchange programs, and spaces for youth intervention) throughout the study period. Specific attention was given to outreach services, many of which were contacted individually to provide information about the study objectives and assurance of confidentiality. Some of these services provided an Internet option for individuals to fill out the questionnaire.

Data collection took place from October 2010 to March 2011. Anyone could fill out the questionnaire, regardless of whether they had injected. Respondents who had never injected were directed toward a short version of the questionnaire that explored their attitudes and opinions of drug injection. There were no lower or upper age limits for opening the questionnaire. However, respondents under 15 years of age were redirected toward the end of the questionnaire after they documented their age.

### 2.2. Questionnaire and variables of interest

The questionnaire was developed and pretested by injection drug users. It covered current social status (e.g., level of education and employment), history of legal and illegal substance use, and the circumstances surrounding one's first injection. An answer was required for each question (blank responses were not allowed).

The variables of interest included the history of drug use before injection (use and age at first use of cannabis, ecstasy, cocaine, amphetamines, methamphetamine, ketamine, heroin, high-dose buprenorphine, methadone, other opiates, and hallucinogens), year and place of the first injection (home or another private place, squat, street, outdoor location, and van/car), being alone at the time of first injection or not, injecting oneself or being assisted, the type of substances used, and the length of time (years, months, or days) between first use of the drug and injection. History of injection from initiation was documented with two variables: the total lifetime number of injections (only once, 2 to 5 times, 6 to 10 times, 11 times or more) and number of injections during the last month.

### 2.3. Data analysis

All participants who reported lifetime drug injection were included in the analysis. Respondents were categorized according to the time of their first injection. Cut-off values were defined based on key developments in the French Harm Reduction policy: (a) the period preceding the implementation of harm reduction policies (before 1987: no harm reduction); (b) the over-the-counter sale of syringes to drug users in pharmacies (starting in 1987: free access to syringes) and availability of sterile injection equipment through different facilities; (c) the 1996–2005 period, which is characterized by the implementation of substitution treatment (labeled as the Substitution era); and (d) the 2006–2010 period, which represents contemporary initiations (within five years of data collection, recent period) that are of particular interest for the current situation. In 2004 and 2005, the legal framework of harm reduction was reinforced by approval in the Public Health code as a pillar of French drug policy, and the components included as part of the harm reduction programs were detailed (decree of April 15, 2005).

Mean, median, and proportion calculations were conducted for the whole sample and then for each group classified according to initiation of injection. Period comparisons were based on chi-square test and Fisher exact test for categorical variables and on variance analysis for the continuous variables. Trend tests were conducted using logistic regressions for proportions by dividing the time of initiation of injection in four categories, and trend tests were conducted using linear regressions for the means.

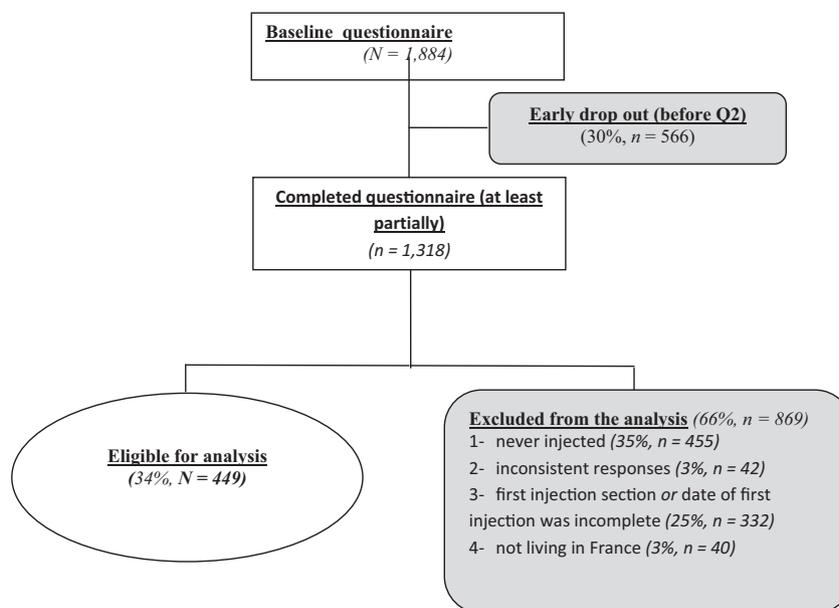
### 2.4. Ethical issues

Data collection was approved by the French individual data protection authority (CNIL), and safeguards on confidentiality protection, anonymity of responses, and nonregistration of IP addresses were clearly stated on the home page of the survey.

## 3. Results

### 3.1. Subjects

Among the 1884 individuals who connected to the *PrimInject* URL, 1318 (70%) started to fill the questionnaire. Among these individuals, 325 (25%) stopped answering questions before reaching the end of the section of the questionnaire that concerned the first injection and were removed, and 42 (3%) provided inconsistent answers. Most of these individuals discontinued completion



**Fig. 1.** Flow chart of data cleaning and exclusion criteria from the analysis.

or disconnected at the very beginning of the questionnaire, in the general information section. The individuals who dropped out were younger than those who continued (27.6 vs. 29.7,  $p < 0.01$ ) and were more often students. Among the 951 respondents, 455 never injected (48%), 40 were living abroad (4%), and seven did not report the year of first injection. In total, 449 individuals were included in the final analysis (Fig. 1).

More than one-third of these respondents (36%) reported being introduced to the survey by outreach services, and 34% accessed the survey by surfing the Internet (through the banners of the associations' websites). Of the respondents who accessed the survey through the Internet, 49% found the survey through the forum of a drug user self-support group. The remaining respondents received the information from treatment centers and health professionals working with drug users (drug dependence clinics, hospitals, and GPs). The youngest respondents (less than 25 years) (44%), students (82%), and respondents who had graduated from high school (46%) more often accessed the survey by surfing the internet ( $p < 0.001$ ), whereas men (41%), respondents aged more than 25 years (43%), respondents who had not graduated from high school (45%), and

unemployed individuals (47%) were more likely to be recruited in harm reduction services ( $p < 0.001$ ).

Of the 449 respondents, 64% were males, and 36% were females (Table 1). At the time of data collection, the mean age was 31.7 years old (range, 15–62); 36% of subjects were employed, 48% were unemployed, and 16% were students. Employment status reflected the respondents' ages, but the percentage of unemployment was over 50% in the group who started injecting before 2005.

Regarding the period of first injection, 71 individuals first injected before 1987; 68, during the “free syringe access” period (1988–1995); 157, during the “substitution” period; and 153, during the last five-year period.

Of the 407 individuals who answered the question on their current injecting behavior, 57% had injected in the last 30 days; current injection was more frequent in cases where the first injection was recent (19%, 44%, 64%, and 73% for the periods before 1987, 1987–1995, 1996–2005, and 2006–2010, respectively). At the time of data collection, 16% of recent injection initiates had injected only once, 20% had injected 2 to 10 times, and 63% had injected more than 10 times (vs. 6%, 7%, and 87%, respectively, of users who

**Table 1**  
Gender, age, education, and employment status at the time of data collection according to the period of initiation.

	Before harm reduction (before 1987) <i>n</i> = 71 (16%)	Free access to syringes (1988–1995) <i>n</i> = 68 (15%)	Substitution era (1996–2005) <i>n</i> = 157 (35%)	Recent period (2006–2010) <i>n</i> = 153 (34%)	<i>p</i> value
<b>Gender</b>					ns
Men	63%	59%	64%	67%	
Women	37%	41%	36%	33%	
<b>Mean Age (SD), years</b>	48(5)	39(4)	28(6)	24(6)	***
<b>Education</b>					*
<High school graduation	65%	63%	59%	48%	
High school graduation	8%	16%	16%	26%	
>High school graduation	27%	21%	25%	26%	
<b>Employment</b>					***
Employed	48%	45%	33%	29%	
Unemployed	52%	51%	53%	39%	
Students	0%	4%	14%	32%	

ns, nonsignificant.

\*  $p < 0.05$ .

\*\*\*  $p < 0.001$ .

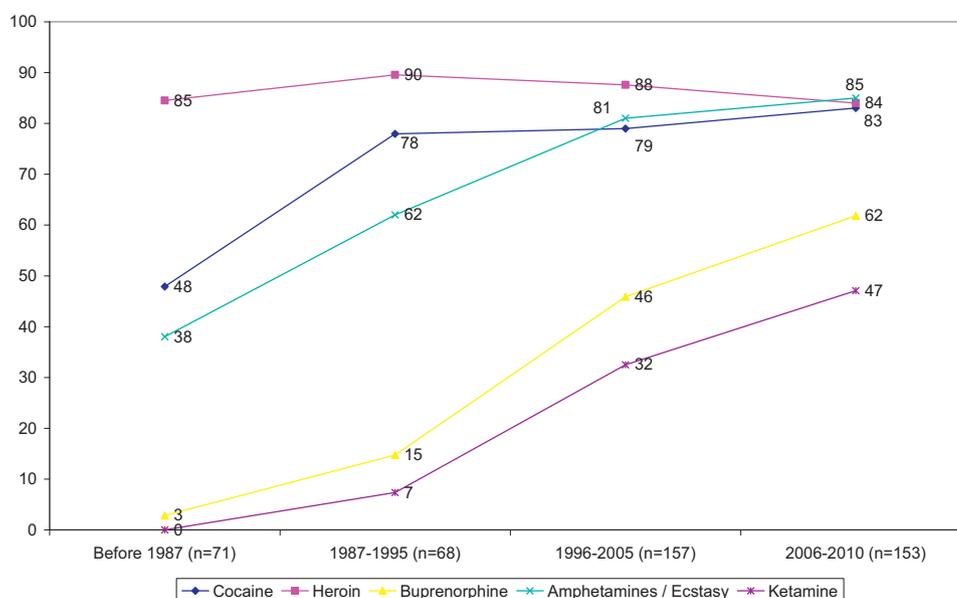


Fig. 2. Substance use prior to injection (% per period) according to the period of initiation.

were initiated into injection in 1987 or earlier; 7%, 4%, and 88%, respectively, for the 1988–1995 group of injectors; and 5%, 4%, and 90%, respectively, for the 1996–2005 group,  $p < 0.001$ ).

### 3.2. Substance use prior to injection according to the period of first injection

Heroin use before one's first injection was reported by 84% to 90% of respondents, with no significant trend over time (Fig. 2). The use of cocaine and other stimulant drugs was more frequently reported in the 1988–1995 group and increased according to the period of initiation ( $p < 0.001$ ; 83% in the 2006–2010 group vs. 48% in the prior to 1987 group for cocaine). The fraction of injectors who had used amphetamines/ecstasy prior to injecting ranged from 38% in the prior to 1987 user group to 85% among recent initiates (2006–2010). Buprenorphine was used prior to injection by 3%, 15%, 46%, and 62% of respondents ( $p < 0.001$ ) in groups that had initiated injection prior to 1987, in 1987–1995, in 1996–2005 or in 2006–2010, respectively.

On average, the initiation of heroin use occurred at 19 years, with no variation across periods, whereas the reported age at the time of initiation for other substances was lower in the recent periods observed. Buprenorphine use in all groups was initiated at a later age than heroin. In the two last groups, i.e., starting from 1996, the first use of cocaine and amphetamines/ecstasy was reported to be earlier than the first use of heroin (Table 2).

### 3.3. Characteristics and context surrounding the first injection

The median age at the time of first injection was slightly different depending on initiation period, with median ages of 18, 20, 19, and 21 years for groups that experienced the first injection prior

to 1987, in 1987–1995, in 1996–2005, and in 2006–2010, respectively (Table 3), whereas 36%, 51%, 47% and 68% experienced their first injection at age 20 or older, respectively. The first injection and first use of the substance were simultaneous in 46% of respondents whose first injection occurred prior to 1987 and in 15% of respondents whose first injection was between 2006 and 2010. The time elapsed between the first use of the substance and actual injection was two years or more for 3% of the users who injected for the first time before 1987 and for 38% of those who started injecting in the most recent period. Heroin was the most commonly used substance during the first injection for all four groups, but the percentage of heroin as the first injected substance decreased over time from 76% prior to 1987 to 56% in the most recent period. Buprenorphine was not used for first injections prior to 1987 but was used by 6 to 10% of users in later periods without any increasing trend. Of the respondents who reported their first injection in 1996 or later, 16% injected cocaine (Fig. 3). Most respondents who reported to the use of cocaine at first injection had previously used it (89%); this proportion was 80%, 78%, 70%, and 53% for buprenorphine, heroin, other substances, and other opiates, respectively.

Most respondents reported having injected for the first time at home, in someone else's place or in another private place. In total, 21% to 37% of first injections occurred in outdoor places, with little variation over time.

The first injection was usually performed in the presence of other individuals, but administering the first injection alone was more common among recent injectors (30% for the 2006–2010 user group vs. 3%, 9%, and 18% for the groups that first experience injection prior to 1987, in 1987–1995, and in 1996–2005). The percentage of first injections performed by another person decreased from 87% in the oldest group to 50% in the group injecting for the first time in 2006 or later ( $p < 0.001$ ).

Table 2  
Mean ages at initiation for the different substances used prior to injection according to the period of initiation.

	Before harm reduction (years, n)	Free access to syringes (years, n)	Substitution era (years, n)	Recent period (years, n)	p value
Cocaine	20.8 (n = 63)	19.7 (n = 63)	17.7 (n = 139)	18.4 (n = 129)	<0.001
Heroin	19.1 (n = 67)	18.8 (n = 62)	18.2 (n = 143)	19.1 (n = 128)	0.965
Buprenorphine	33.1 (n = 42)	25.0 (n = 57)	20.7 (n = 130)	21.1 (n = 105)	<0.001
Amphetamine/ecstasy	21.3 (n = 55)	20.7 (n = 58)	17.2 (n = 137)	17.3 (n = 133)	<0.001
Ketamine	30.0 (n = 10)	25.3 (n = 24)	19.5 (n = 78)	20.2 (n = 82)	<0.001

**Table 3**  
Summary table of respondent characteristics during their first injection and the circumstances of their first injection according to various periods.

	Before harm reduction (before 1987) n = 71 (16%)	Free access to syringes (1988–1995) n = 68 (15%)	Substitution era (1996–2005) n = 157 (35%)	Recent period (2006–2010) n = 153 (34%)	p value
<b>Age at first injection (median), years</b>	18	20	19	21	
<b>Age at first injection</b>					
Before 16	10%	6%	16%	7%	<0.001
16–17	23%	24%	15%	15%	
18–19	31%	19%	22%	10%	
20–24	28%	35%	30%	40%	
25 and older	8%	16%	17%	28%	
<b>Time between first use and injection</b>					
Never used before	46%	25%	19%	15%	<0.001
<i>Among those who used it before injection</i>					
Less than one year	64%	44%	40%	29%	
One or two years	30%	28%	34%	26%	
More than two years	6%	28%	26%	45%	
<b>Place of first injection</b>					
Home, hotel	79%	69%	63%	69%	0.312
Squat, abandoned site	7%	15%	16%	10%	
Street, park, public toilets, etc.	3%	8%	12%	7%	
Van, car, tent	8%	7%	6%	9%	
Other places	3%	1%	3%	5%	
<b>Context of injection</b>					
Alone	3%	9%	18%	30%	<0.001
Not alone, but injected by him/herself	10%	21%	24%	20%	
Injected by another person	87%	71%	59%	50%	

#### 4. Discussion

The *PrimInject* study sought to identify the population most vulnerable to the risks of injection drug use by focusing on the first injection to find individuals with single episodes of injection, along with people who have begun long-term intravenous drug use. The *PrimInject* study was performed within the context of changing trends in substance use, drug policy, and drug supply. To our knowledge, *PrimInject* was the first study to describe the profiles of first injectors and the circumstances surrounding the first injection over time. This study was also the first study on this topic completed through an Internet survey. Another analysis of risky behaviors (e.g., sharing of syringes and equipment at first injection) will be presented in another paper under submission.

The primary finding was that the first injection tends to occur at a later stage in the drug-using careers of individuals in the most recent period observed. This delay between substance use and injection of that substance is related to an earlier and more diversified use of substances. Heroin continues to play an important role in the initiation into injection, as its use preceded injection and the age at the time of initiation remained constant across various periods observed. In contrast, among recent initiates, the use of cocaine and other stimulants is more prominent. In this group, the use of stimulants preceded the use of heroin, and stimulants became for this generation the second most-injected substances during injection initiation. Although buprenorphine is widely used among young injected drug users, it is not frequently used in the initiation into injection and its use remains stable through time. Another difference between groups involved the greater number of individuals in the most recent period of initiation who performed their first injection alone. A large number of first injections took place outdoors in places with poor sanitary conditions.

The age at the time of first injection was older among recent injection initiates, and the recent first injectors had a longer and more diverse history of substance abuse. The duration of substance abuse before the first injection increased from four to eight years in the oldest and youngest users, respectively. The increase in the number of substances used prior to the first injection may reflect changes in drug supplies (Cadet-Tairou et al., 2010), leading to a larger variety of drug use than that found in the 1980s; this change

could explain the delay between substance use and initiation into injection.

Despite the “generational” differences that were observed, heroin remains the most frequently injected substance during injection initiation, although the most common heroin format in France is powder, and the age at first use was the same across periods. Thus, heroin appears to be associated with injecting behavior, although observations suggest a long-term decrease in heroin use and injection practices (INSERM, 2010).

Additionally, the *PrimInject* results underline the increasing use of cocaine and other stimulant drugs over time in France (OFDT, 2012a). These findings reflect changes in the illegal drug market and confirm the increasing prevalence of stimulant drug use all over Europe (OEDT, 2012; EMCDDA, 2013). Early onset of the use of cocaine and other stimulant drugs and the increasing role of these drugs at first injection are particularly worrisome as cocaine injection behavior is demonstrated to be associated with higher drug use practices (Bourgois and Bruneau, 2000; Patrick et al., 2001; Tyndall et al., 2003; Roy et al., 2013), which increases the probability of HIV and HCV transmission, especially during the sensitive injection initiation period. Given the wide availability of stimulant drugs in the European illegal drug market and their increasing role in drug abuse and maintenance treatment (Guichard et al., 2006; Carrieri et al., 2003), the risks associated with the use of cocaine and other stimulants (e.g., through equipment sharing) at the time of first injection deserve further investigation and reaffirm the need of new harm reduction tools for cocaine injectors.

The *PrimInject* data show that BHD use has grown over time. The French system for drug substitution or maintenance treatment, which was established in 1996, differs from methadone clinics in other countries with regard to strictness, as there are more than 140,000 individuals who are currently treated with opiod substitution treatment in France, most of whom receive BHD (OFDT, 2012b). The wide availability of BHD from GPs fueled by flexible regulations for prescription and delivery has suddenly and completely changed the substitution experience for French users, thus exacerbating the risk of misuse of this substitution drug and diversion to the black market. French policy has shown positive outcomes, particularly the decrease of injection practices (Duburcq et al., 2000; Bilal et al., 2003; Carrieri et al., 2003;

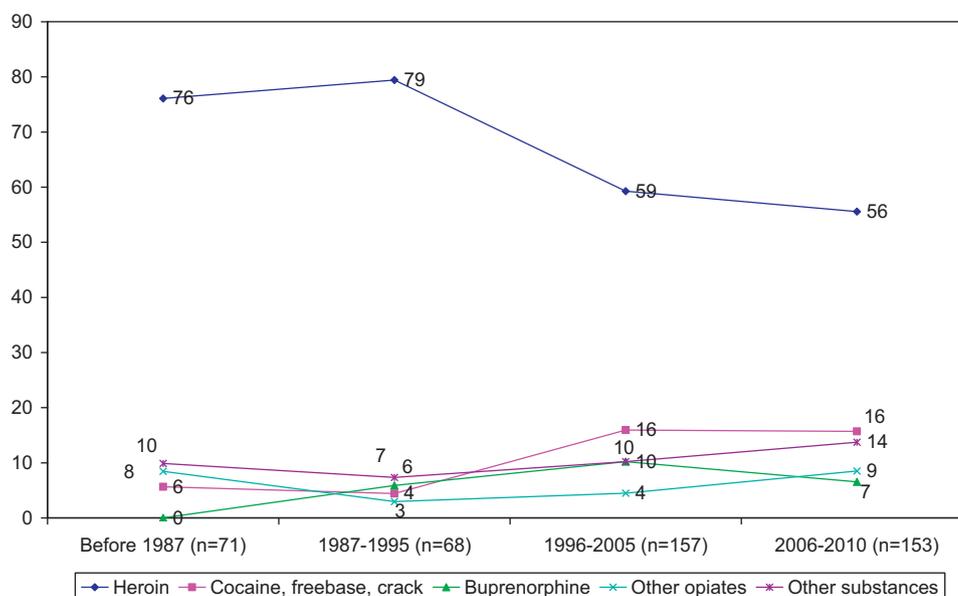


Fig. 3. Substance used at first injection (% per period) according to the period of initiation.

Costes et al., 2004; INSERM, 2010), but researchers have observed that BHD is still widely used among French drug users, regardless of whether they are treated (Lalande and Grelet, 2001; Escots and Fahet, 2004; Guichard, 2005; Langlois, 2011). BHD has also been shown to be injected among French users with injection rates ranging from 12% to 55% (Bry, 1998; Guichard et al., 2001; Perdrieau et al., 1999; Duburcq et al., 2000; Fhima et al., 2001; Roux et al., 2008; Carrieri et al., 2003; Guichard et al., 2003), depending on how injection frequency was defined and the way that data were collected. Despite these practices, the results of *PrimInject* show that BHD is not frequently used during the first injection, and its usage remains stable through time despite the large and increasing volume of individuals receiving BHD (20,000 individuals in 1996, 70,000 in 2000, 90,000 in 2006, and 100,000 in 2009, including those using two generic forms introduced since 2006; <http://www.ofdt.fr/BDD.len/seristat/00028.xhtml>). This finding may have implications for the drug policy of countries that hesitate to introduce buprenorphine as maintenance treatment because they believe that diversion can facilitate initiation of injection. The data show that expanded access to buprenorphine and diversion to the black market does not imply that buprenorphine use spreads among youths, and buprenorphine does not appear to be a pathway to injection. However, the questionnaire in the present study only addressed the user's practice and focused on the first injection, i.e., the main objective of the study; other behavior such as treatment-seeking or supply on the street market were not addressed.

The percentage of new injectors injecting alone or without any help from another individual is higher among recent initiates. In total, 87% of the oldest group respondents reported receiving an injection from another person, which is consistent with earlier findings for long-term drug users in France (Vidal-Trecan et al., 2002). In recent studies, the percentage of individuals performing the first injection alone ranged from 8% to 26% (Goldsamt et al., 2010; Hadland et al., 2010; Lankenau et al., 2010; Novelli et al., 2005). One must consider the deep social transformations in France to understand these new patterns of initiation into injection. In a recent paper, Rhodes and colleagues (2011) analyzed the modes and practices of drug use, suggesting that initiation into injection is an identity-building process that must find meaning in the deepest transformations of "individualizing" postmodern societies before it can be negotiated and manifested in the everyday life of users.

Moreover, in France, the spread of substitution drug treatments on the illegal drug market and the increased availability of substances that can be used in many different manners have contributed to the decline in injection rates. Simultaneously, the availability of clean syringes (sales of syringes and Steribox in pharmacies, on the Internet and from distributing machines) and Internet directions on how to inject may have led to the development of unassisted first injections and self-organizing for more private use.

The hypothesis of more individualized drug use resulting from societal changes supports the relevance of recruiting through the Internet to access subgroups of hidden users not reached through other modes of recruitment (drug user networks, drug clinics, or recruitment in outdoor drug scenes). Until recently, the first injection was largely perceived as an event occurring in the social lives of users, performed by somebody else, usually involving other individuals and rarely done in isolation.

To acquire information concerning users' first injections, *PrimInject* reached a diverse population with respect to social status (45% were employed or university students), age (36% were 25 years old or younger), past and present drug use patterns, and frequency of drug use (43% were current injectors, 10% injected only once, and another 10% had injected less than 10 times). The purpose of this study was to portray the whole spectrum of current injection drug users, including those individuals who have a very short history of drug injection. Comparisons across different periods allow the understanding of the phenomena underlying injection behavior, but such comparisons should be made with caution because of the potential for participation bias. Participation was biased first by premature mortality resulting from AIDS and fatal overdoses among drug users who began injection during the 1980s and 1990s. Second, individuals who have stopped using drugs may predominantly be found the eldest group, who are less likely to use the Internet and may not have seen the banners. Finally, it is likely that individuals from the eldest group who participated in the survey had a less severe addiction. This last factor must be kept in perspective because in the oldest group (who had a median age of 48 years), 81% were no longer injecting substances. Additionally, memory biases cannot be excluded for the oldest initiates.

Conversely, recent injectors are more likely to use the Internet and attend social events or services where the *PrimInject* information was promoted. The main strength of the *PrimInject* study

was that it reached a diverse sample of respondents rather than the older injection drug users described in surveys conducted in harm reduction services or healthcare facilities. The specific features identified for recent injectors may have been derived from participation bias, but they allow us to document a larger injecting population and changes in drug use patterns. This survey mode and its focus on the electronic scene may have biased recruitment with less success in reaching the most marginalized injectors, who may have had a different pattern of initiation. However, a sizeable proportion (one-third) of the sample was recruited through outreach teams, outside the internet channel. In such a hard-to-reach population, the *Priminject* study does not claim to be statistically representative; rather, it covers a spectrum of users broader than that usually described. Finally, the findings of the *Priminject* study are consistent with observed trends in substance use and illegal drug markets in France (Cadet-Tairou et al., 2010).

## 5. Conclusion

The results of the *Priminject* study suggest that injecting is only one of many features of contemporary multiple substance use. The findings also brought to light the existence of a population that was exposed to injection outside of existing outreach programs and initiated injection when older, with a diversified experience of drug use in circumstances not reached by existing out-reach programs. These findings suggest the need to strengthen and diversify the range of preventive strategies to target groups and individuals at risk of injecting drugs, including a peer approach to reach new injectors injecting alone. In the context of HIV and HCV transmission among injecting drug users, the rising issue of cocaine use at first injection and the associated risks imply an urgent need for innovative programs to decrease the risk of blood-borne infections. Finally, given international drug policy debates regarding access to buprenorphine in countries requiring opioid maintenance treatments for HIV and the risk of misuse, the *Priminject* study shows that expanded access to buprenorphine does not facilitate the initiation of injection using this medication.

## Role of funding source

Nothing declared.

## Contributors

AG designed the study, supervised the design of the questionnaire and data collection, wrote and revised the manuscript. RG contributed to the design of the questionnaire, conducted the data analysis, to the analysis and to the results section, and revised the manuscript. DM contributed to the design of the questionnaire, conducted internet data collection and supervised the communication surrounding the study. FB contributed to the design of the questionnaire, data analysis and the method section and revised the manuscript. PA contributed to the design of the study, managed or negotiated agreements from regulatory authorities and revised the final version of the manuscript. FL supervised the design of the study, contributed to the data analysis, wrote and revised the manuscript. ER contributed to the design of the questionnaire, managed the literature searches and summaries of previous related work, supervised the data analysis, wrote and revised the manuscript. All authors contributed to and approved the final manuscript.

## Conflict of interest

The authors declare that they have no competing interests.

## Acknowledgements

This work was supported by the National Institute of Prevention and Health Education (INPES). The authors thank all the persons who agreed to participate in the study. Special thanks to all the outreach teams, medical staff, drug user organizations and health administrations who accepted to publicize the survey. The authors thank the Advisory Board: Y. Ansellem-Mainguy, P. Arwidson, F. Beck, A. Cadet-Tairou, P. Chappard, JM. Costes, JM. Delile, JM. Fournes, A. Guichard, R. Guignard, M. Jauffret-Roustide, S. Karon, F. Lert, F. Olivet, B. Reiller, E. Roy, A. Vitiello.

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