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# Illicit Use of Buprenorphine in a Community Sample of Young Adult Non-Medical Users of Pharmaceutical Opioids

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## Abstract

**BACKGROUND—**There is growing evidence about illicit use of buprenorphine in the U.S. The study aims to: 1) identify prevalence and predictors of illicit buprenorphine use in a community sample of 396 young adult (18-23 years old) non-medical users of pharmaceutical opioids; 2) describe knowledge, attitudes and behaviors linked to illicit buprenorphine use as reported by a qualitative sub-sample (n=51).

**METHODS—**Participants were recruited using respondent-driven sampling. Qualitative interview participants were selected from the larger sample. The sample (n=396) was 54% male and 50% white; 7.8% reported lifetime illicit use of buprenorphine.

**RESULTS—**Logistic regression analysis results indicate that white ethnicity, intranasal inhalation of pharmaceutical opioids, symptoms of opioid dependence, and a greater number of pharmaceutical opioids used in lifetime were statistically significant predictors of illicit buprenorphine use. Qualitative interviews revealed that buprenorphine was more commonly used by more experienced users who were introduced to it by their "junkie friends." Those who used buprenorphine to self-medicate withdrawal referred to it as a "miracle pill." When used to get high, reported experiences ranged from "the best high ever" to "puking for days." Participants reported using buprenorphine/naloxone orally or by intranasal inhalation. Injection of buprenorphine without naloxone was also reported.

**CONCLUSION—**Our findings suggest that illicit buprenorphine use is gaining ground primarily among whites and those who are more advanced in their drug use careers. Continued monitoring is needed to better understand evolving patterns and trends of illicit buprenorphine use.

### Keywords

buprenorphine; pharmaceutical opioid abuse; young adults; qualitative methods; mixed methods



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## 1. Introduction

Approved in late 2002 by the U.S. Food and Drug Administration for the treatment of opioid addiction, buprenorphine and buprenorphine/naloxone are controlled substances that can be prescribed for the treatment of opioid addiction by a licensed physician in an office-based setting. Numerous trials have established buprenorphine's utility in the treatment of opioid dependence (Johnson et al., 1995; Johnson et al., 2000; Amass et al., 2004; Ling et al., 2005), and its use in substance abuse treatment has been rapidly increasing (DEA, 2011, February; Yokell et al., 2011). Although years of clinical research and post-marketing data show that buprenorphine misuse carries lower risk of serious side effects compared to other opioids (Bridge et al., 2003), cases of buprenorphine abuse and related morbidity and mortality (including adverse events linked to injection and unintentional overdoses) have been documented in many countries around the world (Chowdhury and Chowdhury, 1990; Tracqui et al., 1998a; Tracqui et al., 1998b; Agar et al., 2001; Vidal-Trecan et al., 2003; Jenkinson et al., 2005; Schifano et al., 2005; Parfitt, 2006; Bruce et al., 2008; Yokell et al., 2011). There is growing evidence that these products are being diverted in the U.S. (Cicero et al., 2007; Smith et al., 2007; Dasgupta et al., 2010; Maxwell and McCance-Katz, 2010; Johanson et al., 2011). For example, between 2003 and 2009, the number of buprenorphine items seized by law enforcement and analyzed at the forensic labs in the U.S. increased from 21 to 8,172 (Office of Diversion Control, 2009). According to the Drug Abuse Warning Network, the estimated number of emergency department visits related to the nonmedical use of buprenorphine increased from 4,440 in 2006 to 14, 266 in 2009 (DAWN, 2009). However, very few published studies have reported on the characteristics, knowledge, and behaviors of individuals involved in the illicit use of buprenorphine in the U.S., and most previous studies were conducted with opioid-dependent individuals, heroin users, and/or those recruited at treatment centers (Cicero et al., 2007; Gwin Mitchell et al., 2009; Monte et al., 2009; Schuman-Olivier et al., 2010; Bazazi et al., 2011; Johanson et al., 2011).

This study is unique in that it reports on the illicit use of buprenorphine among a community-recruited sample of young adults who were not involved with heroin or injection drug use, nor dependent on pharmaceutical opioids. The study used a mixed-methods approach to: 1) identify the lifetime prevalence and predictors of illicit buprenorphine use in a community sample of 396 young adult non-medical users of pharmaceutical opioids; and 2) describe the knowledge, attitudes and behaviors linked to illicit buprenorphine use as reported by the qualitative sub-sample (n=51).

## 2. Methods

Collection and analysis of qualitative and quantitative data followed a concurrent (parallel) mixed methods design (Tashakkori and Teddlie, 2003; Creswell et al., 2004). This methodological approach allowed triangulation and complementary use of qualitative and quantitative findings to ensure a more comprehensive description of illicit buprenorphine use among young, non-dependent users of pharmaceutical opioids.

### 2.1. Quantitative data collection and analysis

Between April 2009 and May 2010, 396 young adults were recruited to participate in the natural history study on trajectories of illicit pharmaceutical opioid use. The overall purpose of the study was to identify characteristics of participants who transition to pharmaceutical opioid dependence, and/or heroin use. A respondent-driven sampling plan was used to recruit participants (Heckathorn, 1997; Heckathorn, 2002). To generate the sample, 47 initial recruits ("seeds") were recruited via the personal networks of research staff and study consultants, newspaper ads, flyers and referrals from ineligible individuals. Each participant was allowed to recruit up to three individuals and received a compensation of $15 dollars for

an eligible recruit. More information on the sampling methodology is available elsewhere (Daniulaityte et al., In Press). To be eligible, participants had to: 1) be 18–23 years old; 2) reside in the Columbus, Ohio, area (Franklin, Fairfield, and Delaware counties); 3) self-report non-medical use of pharmaceutical opioids on at least 5 occasions in the past 90 days (this threshold was chosen to select individuals who displayed some consistency in their illicit use of pharmaceutical opioids, and was based on our prior research (Daniulaityte et al., 2006) on patterns of illicit pharmaceutical opioid use among young adults); 4) show no lifetime dependence on opioids based on DSM-IV criteria (those who met 3 or more criteria for dependence within any 12-month period were ineligible; those who met 3 or more dependence criteria that were not clustered in a 12-month period were eligible); 5) have no history of heroin use or drug injection; 6) not be engaged in a formal drug abuse treatment program in the last 30 days; 7) intend to use non-prescribed pharmaceutical opioids again (intention to use was assessed by asking if they planned to use “pain pills” again to get high or to treat themselves); and 8) not currently be awaiting trial or have pending criminal charges. Informed consent was obtained from all participants following a protocol that was approved by Wright State University’s Institutional Review Board (IRB).

Interviews were conducted in private project offices. Baseline structured interviews ranged from 1.5 to 2.5 hours and included sections of Diagnostic Interview Schedule-IV (CDIS) (Robins et al., 2002) and other questions on drug use practices, health and pain issues, and developmental milestones. The questionnaire was largely interviewer-administered in a face-to-face session, but also contained short segments administered via audio computer-assisted self-interview (ACASI) methods. Participants were compensated $50 for the baseline assessment and $10 for transportation.

Statistical analysis was conducted using SPSS. Based on prior empirical research on non-medical use of specific pharmaceutical opioids (Sees et al., 2005; Smith et al., 2007; Martins et al., 2009), the following variables were selected for inclusion in the logistic regression analysis to identify predictors of non-medical buprenorphine use: gender, ethnicity, and variables related to illicit use of other pharmaceutical opioids, including duration of use, method of administration, abuse disorder, symptoms of dependence, and the total number of illicit pharmaceutical opioids (other than buprenorphine) used in lifetime.

### 2.2. Qualitative data collection and analysis

The qualitative sub-sample consisted of 51 individuals, who were selected to represent a wide range of drug use experiences and socio-demographic backgrounds. Upon completing a structured interview, each interviewer wrote-up an interview summary that highlighted socio-demographic characteristics, major life events and drug use practices of each of the interviewee. These summaries then were used to select potential qualitative interview participants. To gain a better understanding about changes in pharmaceutical opioid use over time, 20 individuals (out of 51) were also interviewed in the first round of follow-up qualitative interviews conducted about 12 to 18 months after the baseline structured assessment. Since our design is an on-going natural history study, additional qualitative follow-up interviews will be conducted between 24 and 36 months after baseline assessment. Using summaries of structured follow-up interviews completed by project interviewers, qualitative follow-up interview participants were selected to represent diverse patterns of pharmaceutical opioid use and changing trajectories. The qualitative interviews used a life-history format and consisted of open-ended questions designed to gain an insider’s perspective on a range of salient issues, including drug use history and non-medical use of pharmaceutical opioids. The interview protocol was informed by previous ethnographic research (Carlson, 1999; Daniulaityte et al., 2006; Daniulaityte et al., 2007), and pilot-tested with key informants. Follow-up qualitative interviews focused on changes in life circumstances and patterns of pharmaceutical opioid and other drug use.

All interviews were audio-recorded after administering an informed consent approved by Wright State University's Institutional Review Board, and transcribed verbatim. The qualitative data analysis involved three overlapping stages: 1) development of a coding scheme by reading and re-reading the text; 2) consistent application of codes to the entire body of the text, ensuring that the meaning of the data is not lost; and 3) an interpretation and analysis phase that aimed to establish a pattern for the whole by relating the codes to one another. The process of qualitative coding entailed elements of both deductive and inductive approaches (Miles and Huberman, 1994; LeCompte and Schensul, 1999). A deductive analysis uses a pre-determined conceptual framework to organize data and define codes. An inductive analysis, which is also referred to as "open coding" (Strauss and Corbin, 1990), moves from the specific to the general (bottom-up approach) and allows one to examine phenomena within their own context rather than from a predetermined conceptual basis. NVivo software (QSR International, 2002) was used to assist with qualitative data coding and analysis. All names used in this paper are pseudonyms.

## 3. Results

### 3.1 Quantitative data

Demographic and selected drug use characteristics are presented in Table 1. The sample was almost 50% white and about 54% male. About 56% of the sample reported illicit pharmaceutical opioid use on 2 or more days per week in the past 6 months, and about 17% reported intranasal inhalation as the most common method of administration (Table 1). Immediate release oxycodone products and hydrocodone were the most commonly used pharmaceutical opioids, while illicit use of oxycodone, extended release, was reported by 44.4% of participants (Table 2). Lifetime illicit use of buprenorphine (primarily buprenorphine/naloxone) was reported by 31 (7.8%) participants (Table 2). Logistic regression analysis results (Table 3) indicate that white ethnicity, intranasal inhalation of pharmaceutical opioids, symptoms of opioid dependence, and a greater number of illicit pharmaceutical opioids used in one's lifetime were statistically significant predictors of illicit buprenorphine use. Gender, duration of illicit pharmaceutical opioid use, and lifetime opioid abuse disorder had no relationship with the odds of illicit buprenorphine use.

### 3.2 Qualitative interview data

**3.2.1Who are buprenorphine users?—**About 53% of the qualitative participants were male, and about 67% were white. Their reported frequency of "pain pill" use ranged from once a month to near daily use. About half of the qualitative participants had never heard of buprenorphine, and the majority of them had very limited experiences with other psychoactive substances. Twenty participants reported illicit use of buprenorphine/naloxone, and three of them also had used buprenorphine. Those who reported illicit buprenorphine use typically had much more extensive involvement with pharmaceutical opioids and other drugs, and were more open to experiment with new drugs. For example, "Ned" (white male, 19), who had used buprenorphine on several occasions, described his drug use history: "I tried like a whole bunch of different stuff, pretty much if it was offered to me, I wouldn't turn it down so different types of pills, different uppers and downers like, benzos and different stuff like that, I would take 'em if they were offered to me…" These individuals not only had extensive personal histories of drug use, but they were also exposed to social networks where illicit "pain pill" use was rather prevalent, and addiction to "pain pills" and/or heroin was reportedly common.

Consistent with quantitative findings, those who had used buprenorphine were also predominantly white (19 out of 20). In general, African American participants had much more limited exposure to different types of pharmaceutical opioids and other drugs. Some

described “pain pill” popularity among African Americans as an emerging trend. For example, “Mark” (male of mixed ethnicity, 23) explained:

> I feel like they’re [pain pills] getting really bad [among African Americans], ’cause now like one of my black cousins uses ‘em like every day. Another black friend that I have I found out he uses ‘em every day…Pain pills are seen as a white thing, especially around my black friends. They think that that’s a white person thing… But, now I think it’s changing…

Potentially, because illicit use of pharmaceutical opioids has been viewed as a more recent phenomenon among African Americans as compared to Whites, African American users are probably also less likely to be exposed to the social networks of more advanced pharmaceutical opioid users.

**3.2.2. Knowledge about buprenorphine—**Among qualitative participants, buprenorphine-containing products were typically associated with heroin and pharmaceutical opioid addiction. As such, they were considered very powerful drugs, much more risky than immediate release oxycodone or hydrocodone, and comparable in their “intensity” and risk to methadone. Some individuals were also aware of its use for the purpose of intoxication. For example, “Alan” (white male, 22) explained, “I’ve seen it being sold; my buddy was prescribed it to kill the side effects of withdrawal from heroin. And, I know people who have been taking it in quantity and they get messed up.”

However, at the time of their first use, the majority had very limited knowledge about buprenorphine. Some were only told that it would work as any other “pain pill,” and they had no idea it was used to treat opioid dependence. “Ned” (white male, 19) shared his experiences:

> I had taken it when I was 17… like I hadn’t heard anything about Suboxone or anything. Just some dude, just like, “I got these things called “Subs,” you want any?” I was like, “Subs?” And he was like, “Yeah”. And I was like, “I don’t know, tell me more about it.” And he was like “Okay, well Suboxone… you only want to take a little bit… “And like I didn’t know anything about it until… it was just a couple months ago when actually one of my friends was talking like, “Yeah I’m thinking about getting a Suboxone thing for my heroin,” and I was like, “What?! Suboxone? I’ve done Suboxone!” And I had no idea until then that Suboxone was actually used for that, and I was like, well no wonder I only had to take a little bit of this pill…

**3.2.3. Street availability, sources, and prices—**The majority reported that buprenorphine was harder to come by compared to more commonly used pharmaceutical opioids, such as immediate release oxycodone or hydrocodone-containing products. Most individuals agreed that 8 milligram tablets containing buprenorphine with naloxone were the most commonly diverted buprenorphine product. They were typically referred to as “Subs” or “Bupes.” Buprenorphine without naloxone was much less available. Several individuals felt that the popularity of buprenorphine and demand for it has been rising. For example, “Amanda” (white female, 23) indicated, “Actually they’re getting more common because people are trying to get off of Percocets and stuff, so everybody’s trying to find Suboxone…” .

The majority reported getting buprenorphine from friends or acquaintances who were addicted to pharmaceutical opioids or heroin. For example, “Barry” (white male, 21) noted, “The only time I’ve ever really gotten it is if I’m hanging out with one of my junkie friends…. they always seem to have those to take away their withdrawals and shit like that.”

Overall, buprenorphine availability was tied to the networks of users that received legitimate prescriptions for them. “Amanda” explained, “I got them from a girl who actually was prescribed to them because she was really bad on Percocets and like was withdrawing from them and stuff.” However, several participants reported getting buprenorphine from their “regular” pharmaceutical opioid dealers. At a follow-up interview, “Amisha” (African American female, 25) explained how she got introduced to buprenorphine: “The person I called to get Percocet didn’t have any; they told me they had those [Suboxone], and those just get you high like Percocet. So I tried one, and didn’t like it.”

The reported street value of buprenorphine tablets varied greatly. Some indicated that they got them for free, at least initially. Others reported prices ranging from $6-$10 up to $15-$20 per 8 milligram tablet of buprenorphine with naloxone. Even the latter price was viewed as a “good deal” by some who were spending much more for their daily dose of other “pain pills.” For example, “Brittney” (white female, 20) explained, “I was paying like $10-$15 [per Suboxone pill], and the Oxys [OxyContin] like the milligram that I was using, the 80 were usually like $70, so it was like way cheaper…. And Suboxone lasted a long time, it lasted probably 6 hours. And I wasn’t even doing a whole one, so.”

**3.2.4. Use to get high—**About half of those who reported illicit use of buprenorphine indicated that they took it to “get high.” For example, “Trevor” (white male, 21) explained, “I had a friend that I was getting stuff [pain pills] from, and he said he didn’t have any, but he said he had a Suboxone I could try. And I guess it was pretty much to get high.” The reported effects and experiences varied widely. Some participants noted that the high they got from taking buprenorphine was very intense, enjoyable, and long lasting. For example, “Trevor” noted, “I remember it got me pretty messed up and…. I just remember I took it at night and woke up the next morning and was still high from it.” “Heather” (white female, 20) shared her experiences:

> I just started feeling tingly and so high like, higher than any weed has ever made me or anything… I felt great, I was like wow, alright, it really made my body feel good. And like twenty minutes later I got incredibly, incredibly sick for all day. But then a couple days later I was like, “Can I have another half of that pill?” And I don’t know why I did it to myself, probably just because of that 20 minutes, I liked that high.

In contrast, others were disappointed by its effects. For example, “Hailey” (white female, 20) noted, “I took a quarter of one [Suboxone, 8 mg] one time, but it didn’t do anything for me. Like somebody said that it does the same thing [as oxycodone] but it doesn’t.” “Mike” (white male, 21) also explained, “I took it to get high, and I didn’t get high, and then I tried to take [other pain] pills to get high and it didn’t work. So, the way that I took it, it didn’t work for me….”

Some individuals believed that one has to inhale buprenorphine intranasally to “get high,” and/or to have low tolerance to opiates to be able to feel its intoxicating effects. For example, “Barry” (white male, 21) remarked, “If you take ‘em you can get high, but I think my tolerance may be just a little too high to take Suboxone to get high, you know.”

**3.2.5. Use to self-medicate—**About half of the illicit buprenorphine users reported using the drug to self-medicate withdrawal symptoms. Although the participants had to be non-dependent on opiates when they entered the study, some of them had at least one symptom of dependence (Table 1). Further, since some of the qualitative interviews were conducted several months after the baseline assessment, some individuals might have developed opioid dependence.

For some, buprenorphine served as an occasional replacement of their preferred opiates. They used it when they could not find other "pain pills" or did not have money for their daily dose. For example, "Martha" (white female, 20) at a follow-up interview indicated, "I mean I don't prefer to [use Suboxone], but if I can't get any money, then yeah that's what I do." Similarly, "Alan," who used at least 60 milligrams of oxycodone per day, which amounted to almost $60, also explained, "When I couldn't get the Percocets, or I didn't have enough money [to buy Percocets], if I had like 10 bucks, I'd be like, I could suffer, or I could go get Subutex and Suboxone."

In contrast, others reported using buprenorphine to make more profound changes in their drug use behavior—to either reduce their illicit pain pill use or quit altogether. For example, "Jason" (white male, 20) explained, "Pretty much I went from the Percocets to the Suboxone, it wasn't like, 'Oh here's a Suboxone, go get high on it.' It was more of a, 'Okay this is going to help me stay away from the pain pills.'" "Mike," who at follow-up reported regular use of buprenorphine, commented: "I'm just trying to stay away from it [Percocet], period. I just eat Suboxone 'cause it doesn't necessarily give me a buzz, but it helps with the mental state, you know, it helps me feel regular and it's not like I'm taking it to get high."

Some of these individuals contemplated going to a substance abuse treatment program, but viewed self-medication with street buprenorphine as a better alternative for several reasons: 1) the high cost of buprenorphine-based treatment at primary care; 2) the waiting lists at publically-funded facilities; or 3) because of the stigma and disclosure issues surrounding drug use and drug treatment services. For example, "Amy" (white female, 22), who used buprenorphine for 4 days to quit her daily Percocet habit, explained:

> I thought like if I couldn't do it myself, then I would go [to treatment]. But I wanted to try to do it myself because at first I didn't want my family to know that I was on them [pain pills]. So, if I could get off of them without making it obvious like, by going to treatment and stuff, then I would.

Although there was little consensus regarding the effects of buprenorphine in terms of getting high, its effectiveness in controlling withdrawal symptoms was largely uncontested. "Jason" explained, "I swear the first time I took it, it feels like I've never been addicted to the pain pills, ever, you know? I just had energy, but I wasn't high off of them, I felt alright." Similarly, "Amy" referred to it as a "miracle pill" because "it saves lives, like gets people off of prescription pills."

Several individuals, who used buprenorphine to self-medicate withdrawal, still felt its intoxicating effects. At a follow-up interview, "Alan" (white male, 24) described the feeling he got when he used buprenorphine to control withdrawal: "Then all of a sudden a big wave of, I guess you could say, intoxication swept over me, it kind of made me sick a little bit, you know. But, yeah, it was weird. I wasn't really expecting it out of that [Suboxone]… ." "Britney" also explained, "I used it to try and stop my withdrawals… It wasn't so bad, but I was abusing it. I was snorting Suboxone which is not the way you're supposed to take it. But it did help my withdrawals, but I was high."

**3.2.6. Patterns of use—**Those who reported buprenorphine use for the purpose of "getting high" typically used it on very few occasions. Their use was limited for several different reasons. First, the street availability of buprenorphine products was rather limited, compared to many other pharmaceutical opioids. Further, some individuals did not get the euphoric effects they expected. Others, on the contrary, felt that the high was too intense or too long. For example, "Bob" (white male, 19) said, "I didn't like it, I don't like anything that lasts that long. I don't like drugs that last more than 4 or 5 hours, I don't like being messed up all that long. I like to be back to reality…" Finally, some complained about

unpleasant side effects, especially nausea and vomiting. For example, “Jared” (white male, 23) explained, “I’ve done that Suboxone once. Horrible. That was worse than the OC [OxyContin]. I just puked my brains, I was puking, puking…. I’ve got sent home from work, I was puking for honestly 2 to 3 days straight. Just from a little tiny thing. It’s just disgusting.”

In contrast, those who used buprenorphine to self-medicate withdrawal reported more regular patterns of use. For example, “Martha,” (white female, 21) who at a follow-up interview felt she was getting addicted to “pain pills,” reported buprenorphine use on at least 30 occasions. Similarly, “Jason” (white male, 20) reported using it a few times per week when he tried to reduce his use of other pharmaceutical opioids.

The majority reported oral use of buprenorphine, although some were not aware that they needed to dissolve the tablet under the tongue for proper absorption, and just “popped” the pill. A few reported that they snorted crushed buprenorphine tablets. For example, “Brittney” (white female, 20) explained why she decided to inhale it: “It’s just the way I always did my pills and Oxys, and I think a part of me was almost addicted to snorting something ….” Two other participants reported that they injected buprenorphine without naloxone. Both of them had transitioned to heroin use soon after their baseline assessment, and were daily heroin injectors at the time they used buprenorphine for injection. “Sonny” (white male, 20) explained why he preferred injection to oral administration of buprenorpine:

> Subutex doesn’t get you high, you just kind of feel well, you take one and you kind of like, alright I’m not high but I’m okay, like I’m not thinking about heroin…. There’s that feeling plus like actually going through the process of cooking it up and like it just helps like mentally, and you feel it come on like more like a wall, more like a rush. You just kind of feel wellness kind of come over you. But if I just like took it orally, I wouldn’t really notice that as much.

Both of these participants were also aware of ways to inject buprenorphine/naloxone tablets, but it required extensive preparation because of added naloxone. Thus, they preferred to use buprenorphine tablets that did not contain naloxone. They were harder to find “on the streets,” but very easy to prepare for injection use. “Sonny” explained:

> You need to like use a lot of water, you need to mash it [Suboxone] up, you need to make it really hot and then you try and get it out of the chalk, and then you’re like having a hunt for like two full syringes of it to go into you, it’s just like a real process…. Subutex just dissolves right up, like you put a little bit in, stir it up, and it’s good.

The majority used only a part of an 8 milligram tablet per administration. For example, “Ned” (white male, 19) explained, “I would only have to take like a little corner bit of the pill, and it would just like totally get me like messed…” “Amanda” (white female, 23) also indicated, “Yeah, like a quarter of it would last me all day because I don’t really need them that much. So one whole pill would probably last me like 4 days.” Some expressed a belief that buprenorphine doses prescribed by physicians were too high for most patients who needed much lower amounts to control their withdrawal symptoms. Kate (white female, 20) explained, “Some guy told us that the amount that they prescribe you, you actually need to eat half of it for it to keep you like well and not get sick.”

## 4. Discussion

This study uses quantitative and qualitative data to describe characteristics as well as knowledge, attitudes and behaviors associated with illicit buprenorphine use among young

adult, non-medical users of pharmaceutical opioids. The results have several limitations. First, participants were recruited in one metropolitan area in the midwestern United States. Second, the study relies on participants' self-reports of their non-medical drug use. Although the quality of such data is not without problems, there is evidence to suggest that such reports often have good validity and reliability (Adair et al., 1995; Darke, 1998). Third, although use of a mixed-methods approach enhanced the study by providing a broader and more comprehensive description of the phenomenon of illicit buprenorphine use, it is important to note that although the quantitative sample included only non-dependent pharmaceutical opioid users, some qualitative interview participants might have been dependent on opioids since qualitative interviews were conducted at various times after the baseline assessment. Nevertheless, the study results can help inform drug use epidemiology as well as future interventions and policy.

The current study recruited a community sample of young adult, pharmaceutical opioids users who were non-dependent on opioids at baseline. The prevalence rate of lifetime illicit use of buprenorphine was 7.8% in our sample, which is significantly lower than that observed in prior U.S.-based studies conducted with opioid-dependent individuals, recruited at treatment centers. For example, among 129 individuals seeking outpatient-based treatment with buprenorphine, 49% reported illicit buprenorphine use in the past 90 days (Schuman-Olivier et al., 2010). Another study reported past 30 day rates of illicit buprenorphine use ranging between 20% and 25% among treatment seekers recruited from 100 substance abuse treatment programs from around the county (Cicero et al., 2007). Although our study participants had fewer experiences with illicit use of buprenorphine, the study adds important information to the growing body of literature on illicit buprenorphine use and increasing heterogeneity of the user population. Further, young adults as well as those who are non-dependent users represent the larger proportion of the overall population of illicit users of pharmaceutical opioids in the U.S. (SAMHSA, 2010).

According to the quantitative findings, buprenorphine use is more common among pharmaceutical opioid users who have used a greater number of different types of pharmaceutical opioids and preferred intranasal inhalation over oral administration. Similarly, qualitative data suggest that buprenorphine users had more extensive drug use histories and were more inclined to try new drugs. Quantitative findings also indicate that the odds of illicit buprenorphine use were significantly greater among Whites. Prior studies have shown that among adolescents and young adults, whites typically report a broader range of illicit drugs and higher levels of use compared to African Americans (Bachman et al., 1991; Gil et al., 2002; Turner and Gil, 2002; Wallace et al., 2002), and thus are more likely to play a role of "trend-setters." On the other hand, qualitative data suggest that illicit use of pharmaceutical opioids was viewed as a rather recent trend among African Americans, compared to whites. As a result, African American participants may have been exposed to fewer individuals in their social environment who were heavily involved in pharmaceutical opioid abuse and addiction, and thus their access to illicit buprenorphine may have been more limited, compared to whites.

According to qualitative findings, buprenorphine was used either to self-medicate withdrawal symptoms or to get high. Most prior U.S.-based studies have shown that self-medication of withdrawal symptoms was the predominant motive of illicit buprenorphine use (Gwin Mitchell et al., 2009; Monte et al, 2009; Schuman-Olivier et al., 2010), while use to attain euphoric effects was reported less frequently, and was more common among non-injecting, as opposed to injecting, opioid users (Bazazi et al., 2011). Our qualitative findings suggesting self-medication as one of the key motives for illicit buprenorphine use are consistent with quantitative results showing a link between opioid dependence symptoms and a greater likelihood of illicit buprenorphine use.

Some qualitative interview participants who reported buprenorphine use for the purpose of self-medication claimed that it helped them reduce their pharmaceutical opioid use and bring back “order” and “control” into their lives. However, it may also have delayed their attempts to seek professional services. Conversely, illicit use of buprenorphine may be an initial step toward seeking substance abuse treatment. It is not known if some people may cease illicit use of pharmaceutical opioids and/or maintain long-term recovery from opioid addiction through self-medication with buprenorphine.

Qualitative data provided information about the sources of illicit buprenorphine. Similar to prior research (Cicero et al., 2007; Monte et al., 2009), our study participants reported that access to illicit buprenorphine was typically linked to the social networks of addicted opioid users who received legitimate prescriptions for buprenorphine. A few qualitative participants reported obtaining buprenorphine through “regular” dealers of pharmaceutical opioids. Prior studies conducted with heroin users and/or opioid dependent individuals at treatment centers also noted that dealers of heroin and other illegal drugs were a source of illicit buprenorphine, although these reports were far less common (Cicero et al., 2007; Monte et al., 2009; Bazazi et al., 2011). Our findings highlight the growing empirical evidence about the need to modify and/or enhance education, monitoring, and dispensing practices of buprenorphine prescribers (Lofwall et al., 2011).

This study is among the very few published reports to describe intranasal inhalation and injection use of buprenorphine-containing products in the U.S. Although these reports were obtained from a qualitative sample, and thus cannot be generalized to a broader population of non-medical buprenorphine users, they are significant, and warrant future monitoring since injection and/or intranasal inhalation have become frequently reported methods of buprenorphine administration among illicit users in Australia, Finland, France and other countries (Vidal-Trecan et al., 2003; Horyniak et al., 2011; Yokell et al., 2011).

In their 2001 study, Agar and colleagues asked, “Does buprenorphine possibly have a future in the U.S. street markets?” They answered: “Possibly, without a doubt; probably, it depends” (Agar et al., 2001). Our study clearly indicates that non-medical use of buprenorphine has found a niche in the streets among illicit users of pharmaceutical opioids. These findings support prior studies conducted with different populations of illicit drug users regarding a growing trend of illicit buprenorphine use in the U.S. (Cicero et al., 2007; Dasgupta et al., 2010; Maxwell and McCance-Katz, 2010). Those who reported buprenorphine use for the purpose of self-medication, were fairly adamant about its positive effects, referred to it as a “miracle pill,” and maintained fairly regular patterns of use. In contrast, those who used it to “get high,” reported varying experiences, and their use of buprenorphine was rather limited due to poor access and, in some cases, unpleasant side effects. Given the increases in opioid dependence in the United States, it is likely that self-medication use of buprenorphine will also increase. However, it is also possible, that as street availability as well as “street knowledge” about buprenorphine use, dosing and administration become more common, its use to “get high” might also increase. Continued monitoring and research with a broader range of illicit pharmaceutical opioid users are needed to better understand evolving patterns and trends of illicit buprenorphine use.

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**Table 1**

Characteristics of the study participants, N=396.

| Participant Characteristics | n | (%) |
|---|---|---|
| Gender | | |
| Men | 216 | 54.5% |
| Women | 180 | 45.5% |
| Ethnicity | | |
| White | 197 | 49.7% |
| African American | 175 | 44.2% |
| Other | 24 | 6.0% |
| Age | | |
| 18-20 | 164 | 41.0% |
| 21–23 | 236 | 59.0% |
| Opioid abuse (lifetime) | 65 | 26.4% |
| Dependence criteria (lifetime) | | |
| 0 | 120 | 30.3% |
| 1 | 125 | 31.6% |
| 2 | 102 | 25.8% |
| 3 or more | 49 | 22.4% |
| Most common method of pharm. opioid administration (past 6 months) | | |
| Oral | 328 | 83.0% |
| Intranasal inhalation | 66 | 16.7% |
| Other (excluding injection) | 1 | 0.3% |
| Duration of illicit pharmaceutical opioid use in years, (Mean, Std.) | 4.1 (2.07) | |
| Frequency of illicit pharmaceutical opioid use in the past 6 months | | |
| Less than 1 day per month | 9 | 2.3% |
| 1-3 days per month | 99 | 25.0% |
| 1 day per week | 67 | 16.9% |
| 2 days per week | 126 | 31.8% |
| 3-5 days per week | 95 | 24.0% |
| 6-7 days per week | 0 | 0 |
| Average number of days used illicit pharmaceutical opioids in the past month (Mean, Std) | 8.2 (6.3) | |
| Average number of pharmaceutical opioid tablets used per day (Mean, Std) | 2.2 (0.4) | |

**Table 2**

Lifetime illicit use of pharmaceutical opioids, N=396.

| Lifetime Illicit Use of Pharmaceutical Opioids | n | % |
|---|---|---|
| Oxycodone, immediate release (Percocet®, Percodan®, Roxicet®, etc.) | 384 | 97.0 |
| Oxycodone, extended release (OxyContin®) | 176 | 44.4 |
| Hydrocodone (Vicodin®, Lorcet®, Lortab®, Tussinex®, etc.) | 371 | 93.7 |
| Codeine (Tylenol 2, 3) | 214 | 54.0 |
| Morphine (MS Contin®, Kadian®, etc.) | 62 | 15.7 |
| Methadone (Mathadose®, etc.) | 51 | 12.9 |
| Hydromorphone (Dilaudid®) | 42 | 10.6 |
| Buprenorphine/naloxone (Suboxone®) | 31 | 7.8 |
| Buprenorphine (Subutex®) | 3 | 0.8 |
| Fentanyl (Duragesic® patches, Actiq® lollipops) | 19 | 4.8 |
| Oxymorphone (Opana®) | 8 | 2.0 |

## Table 3

Logistic regression analysis: Predictors of lifetime illicit use of buprenorphine.

| Variable | Odds ratio | 95% CI | p value |
|---|---|---|---|
| Male vs. female | 0.71 | 0.29-1.71 | 0.44 |
| **White vs. "Other"** | **19.73** | **2.45-159.04** | **0.005** |
| Duration of illicit pharmaceutical opioid use (years) | 1.08 | 0.87-1.35 | 0.49 |
| **Pharmaceutical opioid administration, snorting vs. oral (past 6 months)** | **3.78** | **1.54-9.25** | **0.004** |
| Opioid abuse disorder (lifetime) | 0.58 | 0.19-1.79 | 0.35 |
| **Symptoms of opioid dependence (3 or more vs. 2 or less)** | **3.48** | **1.13-10.67** | **0.029** |
| **Number of different types of illicit pharmaceutical opioids used in lifetime** | **1.38** | **1.07-1.78** | **0.012** |

Hosmer-Lemeshow test: $X^2$ **=7.39, df=8, p=0.49**