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Prior experience with non-prescribed buprenorphine: Role in treatment entry and retention

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Abstract

Buprenorphine availability continues to expand as an effective treatment for opioid dependence, but increases in availability have also been accompanied by increases in non-prescribed use of the medication. Utilizing data from a randomized clinical trial, this mixed-method study examines associations between use of non-prescribed buprenorphine and subsequent treatment entry and retention. Quantitative analyses (*N*=300 African American buprenorphine patients) found that patients with prior use of non-prescribed buprenorphine had significantly higher odds of remaining in treatment through 6 months than patients who were naïve to the medication upon treatment entry. Qualitative data, collected from a subsample of participants (*n*=20), identified three thematic explanations for this phenomenon: 1) perceived effectiveness of the medication; 2) cost of obtaining prescription buprenorphine compared to purchasing non-prescribed medication; and 3) convenience of obtaining the medication via daily-dosing or by prescription compared to non-prescribed buprenorphine. These findings suggest a dynamic relationship between non-prescribed buprenorphine use and treatment that indicates potential directions for future research into positive and negative consequences of buprenorphine diversion.

Keywords

Buprenorphine; Buprenorphine diversion; Treatment retention; Opioid dependence

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1.0 Introduction

Buprenorphine is an effective treatment for opioid dependence (Amass et al., 2004; Gibson, Doran, Bell, Ryan, & Lintzeris, 2003; Johnson, Jaffe, & Fudala, 1992; Mattick, Kimber, Breen, & Davoli, 2008) whose use has seen rapid expansion in the U.S. over the last decade, including a four-fold rise in the distribution of buprenorphine units to pharmacies, and a five-fold rise in individuals receiving buprenorphine prescriptions from physicians (Lofwall & Walsh, 2014). This increase in the number of opioid-dependent individuals engaged in treatment has been associated with public health benefits such as reductions in heroin overdose deaths (Auriacombe, Fatseas, Dubernet, Daulouede, & Tignol, 2004; Schwartz et al., 2013), safer injection practices and lower rates of high-risk HIV activity (Kumar et al., 2000; Sullivan et al., 2008), and decreases in the amount of heroin and other non-prescribed opioids used by patients (Mattick et al., 2008; Woody et al., 2008).

However, the increase in availability of buprenorphine treatment has been accompanied by increased buprenorphine diversion (Bazazi, Yokell, Fu, Rich, & Zaller, 2011; Genberg et al., 2013; Lee, Klein-Schwartz, Welsh, & Doyon, 2013; Schuman-Olivier et al., 2010; Soyka, 2014; Yokell, Zaller, Green, & Rich, 2011), and related medical problems associated with its misuse (Auriacombe et al., 2004; Cicero, Surratt, & Inciardi, 2007; Daniulaityte, Falck, & Carlson, 2012; Ho, Ho, & Mak, 2009). Prior research identified that many opioid-dependent individuals who use diverted or “street buprenorphine” do so primarily for the purpose of self-medicating their withdrawal symptoms, and not to “get high” (Bazazi et al., 2011; Genberg et al., 2013; Hakansson, Medvedeo, Andersson, & Berglund, 2007; Mitchell et al., 2009; Monte, Mandell, Wilford, Tennyson, & Boyer, 2009; Schuman-Olivier et al., 2010). Other reasons cited for both diversion and misuse among buprenorphine patients include: peer pressure; helping a friend or family member who is going through opioid withdrawal; making money; habitual using behaviors; perceived under-dosing of the medication; and relieving negative emotional states, such as pain, anxiety, or depression (Lofwall & Walsh, 2014).

The use of non-prescribed buprenorphine can lead to complications, such as negative drug interactions, pediatric exposure, and death (Boyer, McCance-Katz, & Marcus, 2010; Lofwall & Walsh, 2014; Martin & Rocque, 2011; Pedapati & Bateman, 2011). However, some research suggests that there may also be associated benefits, including improved buprenorphine treatment retention for patients who have used non-prescribed buprenorphine prior to entering treatment (Cunningham, Roose, Starrels, Giovanniello, & Sohler, 2013; Yokell et al., 2011). One study found that patients who used non-prescribed buprenorphine prior to opioid-agonist treatment entry had improved rates of treatment retention after 12 months and abstinence from other illicit drugs after 6 months (Alford et al., 2011). Additionally, patients with prescribed and non-prescribed buprenorphine use prior to entering opioid-agonist treatment also exhibited fewer induction complications compared to buprenorphine-naïve patients (Whitley et al., 2010).

Understanding *how* prior non-prescribed buprenorphine use shapes current treatment choices and experiences has important clinical and public health implications. This mixed-methods

analysis examines prior experience with non-prescribed (i.e., “diverted”) buprenorphine among African-American men and women receiving buprenorphine treatment, and its impact on both treatment entry and treatment retention issues. This data was not previously reported in the parent study publications (Mitchell et al., 2013).

2.0 Methods

2.1 Parent Study

This mixed-methods study is a secondary analysis from a randomized clinical trial of counseling intensity conducted with 300 African American buprenorphine patients in two outpatient programs in Baltimore, Maryland. At the time of the study, subsidized buprenorphine was available through public funding in the outpatient treatment program system in Maryland. In these programs, buprenorphine was generally administered directly to patients during the first day of treatment, and in rare cases, patients received their initial dose on the second day of intake. Once patients were stabilized on a maintenance dose, they were able to receive an increasing amount of buprenorphine for self-administration outside the program (i.e., at home). These participants were covered by insurance with little or no co-payment for buprenorphine. The parent study found no significant differences in treatment retention, drug use, or functioning between standard outpatient and intensive outpatient levels of care (Mitchell et al., 2013).

Participants in the parent study completed structured, face-to-face interviews with a trained research interviewer at baseline, 3-, and 6-month follow-up. The 6-month follow-up rate was 93%. Based on searches of public databases, a number of participants lost-to-follow-up were found to be incarcerated. The parent study was approved by the Friends Research Institute’s Institutional Review Board (IRB) and the Sheppard Pratt IRB (parent organization of one of the study sites) for the protection of human subjects. All participants provided informed consent. A Federal Certificate of Confidentiality was obtained for the study.

2.1.1. Participants

2.1.1.1 Quantitative Sample: Participants in the parent study were African American adults newly-admitted to buprenorphine treatment at one of the participating treatment programs (*N*=300). The quantitative sample’s mean age was 46 years (*SD*=6.45) and 38% were female. Of the total sample, 51% reported having been in buprenorphine treatment, and 40% reported having been in methadone treatment, prior to the current treatment episode.

2.1.1.2 Qualitative Interview Sample: Semi-structured qualitative interviews were conducted with a subsample of 20 trial participants at the 3-month follow-up time-point using a purposive sampling strategy to ensure representation based on assigned study condition, demographics, and treatment retention status. Interviews were digitally recorded, professionally transcribed, and checked for accuracy.

2.1.2 Measurement of Prior Buprenorphine Experience—As part of the baseline assessment, all 300 trial participants completed a study-specific questionnaire that included several items about prior use of buprenorphine, including specific questions about prior buprenorphine treatment (“*Have you been in buprenorphine treatment before?”*); lifetime

use of non-prescribed buprenorphine (“*Have you ever taken buprenorphine that was not prescribed to you* [for example, that you bought on the street or that someone gave to you]?”); extent of exposure to non-prescribed buprenorphine (“*How many different times have you taken buprenorphine that was not prescribed to you?” [response options: once or twice, 3–5 times, 6–10 times, 11–15 times, or more than 15 times]*); and, recent use of non-prescribed buprenorphine just prior to treatment entry (“*Have you taken buprenorphine that was not prescribed to you [for example, that you bought on the street or that someone gave to you] in the last 30 days?).* Treatment retention at 6 months (either in the original program or at another provider) was assessed using a combination of self-report and clinic records, with the few participants who were lost to follow-up classified as being “out-of-treatment.”

2.1.3 Semi-structured Interviews—Semi-structured interviews were conducted with patients to elucidate an understanding of patients’ reasons for entering treatment, experiences while in treatment, and perspectives toward incorporating buprenorphine into their recovery. Patients were asked about their previous use of prescribed and non-prescribed buprenorphine (“*Have you tried buprenorphine before entering the program at* [Treatment Center]*? If so, where* (e.g., in a clinic, private doc, on the street)*?*”), drawing subsequent thematic conclusions directly from these patient narratives.

2.2 Analysis

2.2.1 Quantitative Analysis—Prior use of non-prescribed buprenorphine and prior buprenorphine treatment experience were characterized using descriptive statistics and cross-tabulations, with association tested by the likelihood ratio χ^2 test of independence. We then fit a series of logistic regression models to examine the association between prior use of non-prescribed buprenorphine (no vs. yes) and treatment retention at 6 months (in treatment vs. out of treatment). The binary variable of prior non-prescribed buprenorphine use was selected as the predictor of interest due to its ease of interpretation and its alignment with prior buprenorphine treatment experience, which was also asked as a binary variable in a lifetime time frame.

The relationship between prior non-prescribed buprenorphine and 6-month treatment retention was first examined using an unadjusted logistic regression model. To disentangle experiences with prescribed versus non-prescribed buprenorphine and their respective ability to prospectively predict treatment retention, a second model was fit that also included the second binary predictor variable of prior buprenorphine treatment. A final model was fit with both of these predictors, as well as additional controls for a small number of common potential confounds. These control variables included patient demographic characteristics of gender and age, clinic site (because of the potential for retention differences across sites and differential access to non-prescribed buprenorphine in the neighborhoods from which the sites’ respective patient populations were drawn), and co-occurring cocaine use at baseline (because of its known negative association with retention in buprenorphine treatment; Gryczynski et al., 2013).

2.2.2. Qualitative Analysis—The narrative text of the qualitative data was coded and analyzed through an inductive process, allowing themes and support to emerge directly from

the interview data. An initial coding process was conducted to synthesize thematic and conceptual areas largely targeted by the interview guide. A subsequent coding phase allowed qualitative researchers to identify relationships between the codes generated during the initial coding process and develop emergent themes related to patients' previous experiences with non-prescribed buprenorphine and their reasons for entering buprenorphine treatment. These emergent themes were discussed among the qualitative researchers, and differences were reconciled to ensure procedural and substantive reliability and validity.

3.0 Results

3.1 Prior Experience with Non-Prescribed Buprenorphine

Nearly one third of respondents reported using non-prescribed buprenorphine fewer than five times. Among those participants who reported prior use of non-prescribed buprenorphine, 63.6% reported doing so within the past 30 days (45.3% of the full sample).

In contrast, 51% of the sample reported prior buprenorphine treatment. A crosstabulation of prior buprenorphine treatment experience and prior use of non-prescribed buprenorphine is shown in Table 1. There was a significant association between these two variables ($p = .012$), such that participants with prior treatment experience were more likely to also report prior use of illicit buprenorphine. Nearly 40% of the sample reported both prior buprenorphine treatment and non-prescribed buprenorphine use, while 17.3% reported being completely naïve to the medication.

3.2 Non-Prescribed Use of Buprenorphine and Subsequent Treatment Entry

In the qualitative interview sample, most (n=15) of the respondents indicated they had access to and purchased non-prescribed buprenorphine prior to starting treatment. The participants reported that experience with non-prescribed buprenorphine increased their willingness to enter treatment based on three factors: 1) perceived effectiveness of the medication; 2) cost of obtaining prescription buprenorphine compared to purchasing non-prescribed medication; and 3) convenience of obtaining the medication via daily-dosing or by prescription compared to non-prescribed buprenorphine.

3.2.1 Perceived Effectiveness of Buprenorphine—Many of the respondents in this sample noted that their prior buprenorphine use helped confirm the efficacy of the medication, which enabled them to confidently enroll in a buprenorphine treatment program. Before being introduced to buprenorphine on the street, the respondents reported having absolutely no information about buprenorphine. However, through street-level dealers or associations within their social networks, the buprenorphine patients in this sample learned about buprenorphine, how it is ingested, and how opioid-dependent individuals in their community perceived its effectiveness. As one respondent noted,

INTERVIEWER: How did you know to try buprenorphine?

RESPONDENT: Because of the people that was on the street.

INTERVIEWER: Oh, they told you what it would do?

RESPONDENT: They told me how it would do it. And had I tried it, just like I tried to go in an alley and buy dope and coke. I tried that the same way.

Several respondents also noted that their perceptions of buprenorphine's effectiveness were directly tied to their decision *not* to purchase heroin in the community. In many areas of Baltimore, the respondents noted that the quality of heroin available to them had significantly declined in recent years, generally using the term "garbage" to describe it. When they did possess enough money to purchase a few "bags" of street-level heroin, they were skeptical about the quality of the product they would receive. When buprenorphine became available as an option to purchase, many of the respondents noted that they chose to purchase buprenorphine over heroin because they were "guaranteed" of the results it would physiologically produce.

INTERVIEWER: What makes…you decide to use the buprenorphine or the heroin? What is that choice like?

RESPONDENT: Confusing, it's confusing because I know that the dope is not the way [it was], it's not helping me neither and then I'm still trying to- "[Look], I need some bups. Could you go out there and get me some?" And he would go get some because the dope don't be holding me. And I got tired of… balancing back and forth, back and forth until I get a good bag of the dope.

INTERVIEWER: Oh, yeah, because it can be garbage.

RESPONDENT: Yeah, that's the hit. Until I get a good bag and then I'll step from that [heroin]. And I'm back on the bupes, if the dope ain't good and I'm like, "[Then I need some bups]," I'm not going [nowhere else] and look for nothing. You know where to go to the person and get them, and take it from there.

As another respondent echoes,

RESPONDENT: Well the thing is is that, see it's a difference. A lot of people ask this question, they say, "Well you go on the street and you buy buprenorphine and why is it?" Now I would prefer the dope over bup, but the thing is is that a reason a lot of people do it, one thing about buprenorphine it's a guaranteed feeling.

INTERVIEWER: That's right. You know the product right. It's a very true product.

RESPONDENT: It's like you know you're going to, you know you're not getting any garbage. You know this a hold you for a minute

As both respondents suggest, the general consensus on the street was that the purpose of using non-prescribed buprenorphine was to avoid withdrawal symptoms. None of the respondents mentioned seeking or using buprenorphine with the intention of "getting high;" and, in fact, made a clear distinction between seeking heroin to get "high" and seeking buprenorphine to stop "physical pain," "not be sick that day," or "hold" them until they were able to acquirequality heroin.

INTERVIEWER: Did you try to get high or did you try not to get high?

RESPONDENT: No, it don't make you high. It makes you not go through physical pain. That's the whole thing. You know, people don't want to feel the physical pain from using it. You know that's the whole catch…

Another respondent notes,

INTERVIEWER: How did you physically react, the first time you tried it?

RESPONDENT: Ah, it stopped me from feeling sick. It stopped me from having withdrawals.

INTERVIEWER: Um hum.

RESPONDENT: And I felt a lot better

Ultimately, respondents chose to use non-prescribed buprenorphine over low-quality heroin to stabilize their opioid dependence. Through this initial dosing experience, patients realized the efficacy of buprenorphine for relieving withdrawal symptoms; and when these users decided to enter a treatment program, they were readily open to the idea of using buprenorphine as part of their overall treatment plan.

INTERVIEWER: What made you decide on buprenorphine treatment?

RESPONDENT: Well, I was buying it on the streets and I seen that it helped. It had me normal, whereas I didn't have to go out and buy heroin or anything like that and I wasn't sick. And so, I said I was getting in the program.

3.2.2 Financial Incentive to Buprenorphine Treatment—In addition to respondents with opioid use disorders experiencing the efficacy of buprenorphine through non-prescribed medication, these same respondents also mentioned a notable financial incentive for enrolling in a buprenorphine treatment program over continuing to purchase medication on the street. Several of the respondents talked openly with the interviewer about street-level pricing of buprenorphine, mentioning that an 8mg dose of buprenorphine in sublingual tablet or film form cost approximately five dollars in the city at that time.

INTERVIEWER: If you were going to sell your medication on the street, how much would you sell the medication for?

RESPONDENT: Well they sell the medication on the [street], you see, it's a difference from here in Baltimore. Now [suppose] dose is $10. You go on the street you can get a bupe for five. [Outside the city] it's going to run you $15 to $20 bucks.

However, due to the availability of Medicaid and Medicaid-based coverage for substance abuse treatment (including medication-assisted treatments) in Baltimore, once enrolled in a treatment program, these respondents reported paying between $3.00–$7.50 for a two-week supply of buprenorphine. Because many individuals in this sample mentioned sustaining their dependence without withdrawal symptoms on 8mg/day, continuing to purchase non-prescribed buprenorphine on the street would cost them around $70.00 every two weeks. Although this amount is much higher than the $3.00–$7.50 for a two-week prescription, it is still considerably lower than these same respondents reported spending on heroin during a

similar time period. One respondent recalls choosing to purchase buprenorphine instead of heroin because of this substantial price difference:

> RESPONDENT: Well looking at friends [I: Okay, so you know other people who are on it.] and other people that was using it and then gradually buying it on the street and using it… But that was just because my money would be low and I know that I could get a bupe, and I could break it in a couple of different pieces and it would help me get to my paycheck.
>
> INTERVIEWER: Okay so it's just to stretch you out. [R: Right.] Just stretch out when you're needing, just to stretch out.
>
> RESPONDENT: My money wouldn't last. So I know if I, pay day's on Friday, it's Tuesday. I buy a bup, okay that a get me through Tuesday, Wednesday, maybe Thursday something new might arrive.

In their rationales for entering a buprenorphine program, respondents frequently noted that this kind of decision-making was a first step to considering treatment enrollment. Once they became aware of how to access prescribed buprenorphine, and learned how much it cost to obtain a two-week prescription with Medicaid-based subsidies, respondents noted that they might as well consider a treatment program. Although they did not necessarily come into treatment committed to full recovery, the financial incentives for enrollment were enticing enough for respondents to consider treatment options. When asked about the decision to enter treatment after a period of purchasing non-prescribed buprenorphine, one respondent mentioned,

> RESPONDENT: It's $5. [I: Five dollars.] And sometimes it's ten but they ask for $5. So I said Mmm-mmm [negative]. I'm a start saving me some money. And then somebody told me about this program. I said well I'm a try my hand at that. I didn't have no insurance 'cause I thought you needed insurance to get up in here either or if you got it, you can get them if you don't they help you get your stuff.

Another respondent who had previously been purchasing non-prescribed buprenorphine on the streets added,

> RESPONDENT: Yes, yes. And I felt like I was spending money on the streets so I felt like I'll go get on the program… If you put, I guess all of it works, if you put a effort into making it work.

3.3.3 Convenience of a Buprenorphine Treatment Program—Although perceived effectiveness and financial incentives were the two predominant themes to emerge from these interviews, the convenience of accessing prescribed buprenorphine was also an important reason respondents enrolled in a treatment program. Many of the respondents began the interview by discussing their motivations for enrolling in a treatment program, often citing their exasperation with the lifestyle and demand of seeking drugs on the street. Although buprenorphine provided a cheaper alternative to heroin that would maintain their dependence for a prolonged period of time, these individuals were still forced to go into the streets to seek out their daily dose of buprenorphine. When this respondent considered the

decision to enroll in treatment instead of continuing to purchase non-prescribed buprenorphine, he explained,

> RESPONDENT: Yeah, I had just wanted something ‘cause it was cold and I didn’t want to have to get out and try to buy no bups or whatever.

Another respondent remembered,

> RESPONDENT: But I was thinking to myself anyway, I was tired. I was just getting tired, you know. And I knew that I didn’t want to take no methadone because I seen the results of my friends from taking Methadone. And so, I thought I’d give that buphomorphine a try. And if you let it work, it works.
>
> INTERVIEWER: Have you tried it before, like out in the community?
>
> RESPONDENT: Yeah, I have. I have brought it off the streets.

Once successfully enrolled in the treatment program, respondents became even more aware of, and satisfied with, the convenience of obtaining a prescription for buprenorphine. Not only did the treatment programs in this study offer group and individual counseling sessions, as well as medical care onsite, they also had the patient prescription faxed directly to the pharmacy or handed the written prescription to the patient. This level of convenience often led to patients’ continued engagement and participation in treatment.

> INTERVIEWER: So she faxes it straight there?
>
> RESPONDENT: Right there. By the time you get out of group and you go down there you get the same bus, the xxx bus, it take me right there. So it’s on the line it’s just up the street it’s just on [Avenue] where [Fast Food Restaurant] at and catch the bus on down… And you get off and you go in there and you tell them your name and a lot of times it a be already ready and whatever your co-payment is. I pay $3 for mine.

The reduced anxiety over seeking out buprenorphine in the streets was a major consideration among these patients who enrolled in a buprenorphine program. They often noted that even though they were attempting to treat themselves with non-prescribed buprenorphine, having to purchase non-prescribed buprenorphine from street-level dealers often led to relapsing on heroin. Some of the respondents in this sample also noted a concern about continuing to purchase non-prescribed buprenorphine resulting in incarceration, either from an initial criminal charge or a violation of probation.

> RESPONDENT: So I would buy them off the street people were selling them. Then I started doing them daily. Then I say, “Well this is no better than chasing dope, so I’m going to go sign up for a legit program,” ‘cause I was going to jail getting locked up trying to buy them off the street. And I decided to come here… and I’ve been coming here ever since, getting the Suboxone ‘cause I like the way they work. And I don’t have the urge to do no dope. I haven’t used since I’ve been here. And so far so good.

3.2 Prior Non-Prescribed Buprenorphine Use as a Prospective Predictor of Treatment Retention

Table 2 shows the results of the logistic regression analyses predicting 6-month retention in treatment using as the primary predictor variable prior experience with non-prescribed buprenorphine. The unadjusted model (Model 1) indicated a strong association, wherein participants with prior non-prescribed buprenorphine experience had significantly higher odds of remaining in treatment through 6 months (OR=2.02; p=.007). Adjusting for prior buprenorphine treatment did not attenuate this relationship (Model 2), and prior buprenorphine treatment itself was not a significant predictor of subsequent retention (p=. 80), above and beyond prior non-prescribed buprenorphine experience. Controlling for potential confounds of gender, age, site, and baseline cocaine use (Model 3) likewise did not attenuate the relationship between prior use of non-prescribed buprenorphine and retention in treatment (OR=2.09; p= .007).

4.0 Discussion

This mixed-methods study indicates that experience with non-prescribed buprenorphine may increase the likelihood of entering treatment and is associated with improved treatment retention. Qualitative interview findings pointed to three factors underlying the role of experience with non-prescribed buprenorphine in facilitating treatment entry decisions. Respondents in this sample noted that using non-prescribed buprenorphine in the community helped establish their perception of buprenorphine as an effective medication for treating their opioid dependence. Consistent with previous research (Bazazi et al., 2011; Hakansson et al., 2007), participants noted that non-prescribed buprenorphine was more likely to be used for therapeutic purposes, such as preventing the user from experiencing withdrawal symptoms, rather than experiencing euphoria. Poor quality heroin was one of the primary incentives to using an initial dose of non-prescribed buprenorphine.

Participants also reported that it was less expensive to enroll in buprenorphine treatment than continue purchasing non-prescribed buprenorphine or heroin on the street, and thus appeared to be making a rational economic decision to enter treatment based on the financial reality, rather than viewing it solely as a need for treatment. Behavioral economists consider this interplay between economic principles and behavior change of critical importance to understanding and promoting sustainable interventions (W. K. Bickel, Green, & Vuchinich, 1995; Camerer, 1999; Mace & Critchfield, 2010; Reed, Niileksela, & Kaplan, 2013). Those researchers that have applied the concepts of behavioral economics to understanding substance abuse promote their use in future studies (Warren K. Bickel, Jarmolowicz, Mueller, & Gatchalian, 2011; Heinz, Lilje, Kassel, & de Wit, 2012).

Finally, enrolling and continuing to engage in a buprenorphine treatment program offered respondents greater convenience than purchasing non-prescribed buprenorphine. Participants used a similar decision-making approach when deciding to enroll in and comply with the conditions of a treatment program in order to obtain a prescription for buprenorphine. Treatment providers and policy makers may benefit from continuing to focus on streamlining buprenorphine referral and enrollment to maintain this level of patient convenience, as well as minimizing possible barriers to patients' daily treatment access.

Our findings show that not only can the use of non-prescribed buprenorphine act as a "bridge to treatment" for this type of population in a treatment rich community, but it also appears to be a predictor of treatment retention under such conditions. Patients who used non-prescribed buprenorphine were considerably more likely to remain in treatment over the course of 6 months compared to those without such experience. This relationship was robust in the face of potential confounds, including prior buprenorphine treatment experience. This is an interesting finding, considering that our earlier attempts to predict treatment retention in this sample had limited success. For example, our prior research found that treatment retention was not associated with intensity of services (Mitchell et al., 2013), or even how long patients themselves intended to remain in treatment when first admitted (Gryczynski et al., 2014).

As buprenorphine treatment becomes more widely available, clinicians will be inevitably faced with new patients who are not naïve to the medication, even though they may be naïve to treatment. Concerns that patients who used non-prescribed buprenorphine prior to entering treatment may have difficulty "sticking with the program" are not supported by the findings of this study. In our population, we found that patients were actually more likely to remain in treatment than those who had never taken non-prescribed buprenorphine, and their experiences with the medication may have prompted them to seek care. One concern that this research does not address, but that requires further study, is whether patients with a history of non-prescribed buprenorphine use are themselves more likely to divert their medication. Indeed, it is possible that retention in treatment would be high for chronic diverters if they come to rely on selling their medication as a major source of income. Further supporting the issue, a recent study by Johnson and Richert (2015) found that a vast majority of the buprenorphine patients in their sample considered buprenorphine diversion as mostly positive (84%) and morally right (77%), especially in relation to sharing their medication with friends suffering withdrawal symptoms (Johnson & Richert). However, it is important to emphasize that we have no data on that particular phenomenon, and only speculate regarding ideas for future research in this area.

In light of sustained concern over methadone "diversion," attention has been paid to the consequences of buprenorphine diversion (Havnes, Clausen, & Middelthon, 2013; Lavonas et al., 2014; Richert & Johnson, 2013). Future research should continue to explore the unintended consequences that accompany the availability of this relatively new medication, positive as well as negative, so that a balanced understanding can be achieved.

4.1 Limitations

This secondary analysis has some limitations. Since the patient population in the parent study was restricted to African American buprenorphine patients in a single city in the US being treated in two publicly-funded treatment centers, findings may not generalize to other ethnic groups, patients of other socio-economic status, other countries, or physician office-based treatments. The present study findings may also not generalize to other locations, both nationally and internationally, in which subsidized buprenorphine is not available, where buprenorphine is primarily available only by prescription, or under direct observation in opioid treatment programs.

The parent study may have also included self-selection bias that could explain the statistical significance found with regards to treatment retention, given that individuals who have experience with non-prescribed buprenorphine may have already determined that they like the effects of the medication well enough to enter a formal treatment program, and know what to expect with regard to buprenorphine's intended effects as well as side-effects. Additionally, predicting treatment retention in the quantitative analysis was limited to only 6-months after baseline.

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Highlights

- Paper examines associations between non-prescribed buprenorphine use and treatment entry and retention
- Patients with prior non-prescribed buprenorphine use had significantly higher odds of remaining in treatment
- Qualitative thematic explanations for this outcome include treatment and medication effectiveness, cost, and convenience

Table 1

The relationship between prior experience with prescribed buprenorphine and non-prescribed buprenorphine use (*N*=300)

		Prior Non-prescribed Buprenorphine Use	
		No	**Yes**
Prior Prescribed Buprenorphine	**No**	52 (17.3)	95 (31.7)
	Yes	34 (11.3)	119 (39.7)

Note: Table shows cell frequencies. Percent of the total sample is in parentheses. Likelihood Ratio χ^2(df=1, N=300) = 6.37; p=.012

Table 2

Results for logistic regression models predicting 6-month treatment retention (*N*=300).

	Model 1	Model 2	Model 3
	***OR* (*95% CI*)**	***AOR* (*95% CI*)**	***AOR* (*95% CI*)**
Prior illicit buprenorphine (Reference = no)	2.02 (1.22–3.35) *p*=.017	2.00 (1.20 – 3.34) *p*= .008	2.09 (1.23, 3.56) *p*= .007
Prior buprenorphine treatment (Reference = no)		1.06 (.67 – 1.70) *p*= .80	1.03 (.62, 1.69) *p*=.92
Gender (Reference = female)			.93 (.57, 1.52) *p*=.78
Age (in years)			1.00 (.97, 1.04) *p*=.90
Clinic Site (Reference = Site 1)			.97 (.59, 1.61) *p*=.91
Co-occurring cocaine use [a] (Reference = no)			.48 (.29, .80) *p*=.004

Notes. OR = Odds Ratio; *CI* = Confidence Interval; AOR = Adjusted Odds Ratio (adjusted for the other effects in the model)

[a] Co-occurring cocaine use at baseline measured by self-reported use in the past 30 days or a cocaine-positive urine test (yes; or otherwise, no).