



The relationship between diversion-related attitudes and sharing and selling buprenorphine[☆]



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ABSTRACT

Objective: Buprenorphine medication-assisted treatment (B-MAT) is an efficacious and popular outpatient treatment for opioid use disorder. However, the likelihood of buprenorphine diversion is a public health concern. We examined the relationship between attitudes toward diversion as predictors of both sharing and selling buprenorphine.

Method: Participants ($n = 476$) were patients undergoing short-term inpatient opioid detoxification. Multinomial logistic regression was used to estimate the adjusted association of sharing and selling buprenorphine with demographics, substance use behaviors, and attitudes toward sharing and selling buprenorphine.

Results: Among the two hundred persons who had ever been prescribed buprenorphine (73.4% male, 89% heroin users), 50.5% reported they had shared buprenorphine and 28.0% reported they had sold buprenorphine. Controlling for other covariates, the odds of sharing buprenorphine were 3.17 (95% CI 1.21; 8.32) times higher for persons who agreed that it was “right to share buprenorphine with dope sick friends” than for those who did not agree with this attitude. Attitudes toward selling (OR 2.92; 95% CI 1.35; 6.21) and sharing (OR 4.12; 95% CI 1.64; 10.32) buprenorphine were the only significant correlates of selling, with the odds of selling exponentially greater among persons with favorable attitudes toward sharing or selling buprenorphine.

Conclusions: Although considered diversion, sharing B-MAT is normative among B-MAT patients. Assessing B-MAT patients’ attitudes about diversion may help identify patients requiring enhanced oversight, education, or intervention aimed at modifying attitudes to reduce their likelihood to share or sell buprenorphine.

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1. Introduction

Buprenorphine-based medication-assisted treatment (B-MAT) is a recommended long-term recovery strategy for persons with opioid use disorder (Volkow, Frieden, Hyde & Cha, 2014). However, legitimate concerns about the risk for diversion, or the “unauthorized rerouting or misappropriation of prescription medication to someone other than for whom it was intended” (Lofwall & Walsh, 2014), undermine the application of B-MAT. Particularly considering the recent two-year, \$1 billion federal allocation to expand MAT for opioid use disorders (Office of the Press Secretary, The White House, 2016), identifying factors associated with diversion and related risk outcomes is warranted.

1.1. Buprenorphine diversion

Outpatient B-MAT is increasingly available and is effective in preventing relapse, emergency department admissions and overdose, and improving the likelihood for long-term recovery (for review see Mattick, Mattick, Breen, Kimber and Davoli, 2014; Parran et al., 2010). While the ease of self-administration and sublingual formulation of buprenorphine enhance the feasibility of B-MAT approaches, they also increase the likelihood for diversion—prevalence rates for buprenorphine diversion are exponentially higher than those for methadone diversion (Winstock and Lea, 2010; Winstock, Lea & Sheridan, 2008; Johnson & Richert, 2015a). From just 2006 to 2009, B-MAT patients reporting buprenorphine diversion nearly doubled and emergency department visits attributed to buprenorphine abuse more than tripled (Mattick, Mattick, Breen, Kimber and Davoli, 2014). The proliferation of buprenorphine and new modes of non-medical administration (e.g., injection) have contributed to an increase in buprenorphine-related consequences, including overdose (Lee, Klein-Schwartz, Welsh and Doyon, 2013; Bretteville-Jensen, Lillehagen, Gjersing and Andreas,

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2015). Given that the growing availability of B-MAT is projected to coincide with increasing buprenorphine misuse and diversion, explicating the role of B-MAT patients' attitudes regarding diversion behaviors may point toward promising avenues for prevention efforts.

1.2. Diversion-related attitudes and behaviors

Although the relationship between attitudes toward substance use and substance use behaviors is well-established (e.g., Hohman, Crano, Siegel & Alvaro, 2014; Simons & Carey, 2000), little is known about the relationship between diversion-related attitudes and behavior. The theory of planned behavior (TPB; Ajzen, 1991, 2011), which posits that attitudinal valence toward a specific behavior contributes to one's likelihood to engage in that behavior, is an important framework for better understanding opioid use disorder. For instance, TPB has been used to study treatment intentions following drug detoxification (Kelly, Frank, McCarthy and Crowe, 2011), injection drug use (IDU) behaviors (Jozaghi & Carleton, 2015), and heroin use (Liu, Li, Lu, Liu and Zhang, 1979). In the one known study to examine the relationship between diversion-related attitudes and behavior, Johnson and Richert (2015b) found that MAT patients agreeing, relative to those not agreeing, that it is "right to share medication with a dope sick friend" were more likely to report diverting buprenorphine or methadone during current treatment, even after controlling for current drug use and other social and environmental factors. However, these same attitudes were not associated with past month diversion, and attitudes that illicit medication saves lives did not predict diversion behaviors. These inconsistent results necessitate further investigation into the association between diversion-related attitudes and behaviors.

1.3. Motives for diverting

The limited research examining the diversion of opioid replacement treatment medication has suggested both monetary and altruistic motivations. Fountain and colleagues (2010) found that methadone users most often sold their prescribed medication for profit that, in turn, would be used to obtain other desired illicit or prescription medication. In contrast, in a study of 886 methadone users (Duffy & Baldwin, 2012), 13% reported giving away and only 5% reported selling their methadone in the past year; and among those reporting past year methadone diversion, 80% reported altruistic reasons (e.g., helping another substance user out) and 46% reported monetary reasons (buying or trading for other drugs, buying other items) (Duffy & Mackridge, 2014). Among 88 IDUs who reported removing at least a portion of supervised doses of opioid replacement medication in the past six months, one in three reported doing so to help a friend in withdrawal and one in ten to sell (Larance et al. 2011). In sum, research points to both altruistic and monetary motives for diversion and calls for additional research on motives for buprenorphine diversion (Lofwall & Walsh, 2014).

1.4. Study aims and hypotheses

In the current study, we advance knowledge about diversion-related attitudes and behaviors in several ways. First, unlike existing studies that have merged methadone and buprenorphine diversion, our focus on buprenorphine allows for targeted analysis and implications. Second, no study to date has examined attitudes regarding diversion-related to sharing and to selling independently. This distinction is important because individuals' attitudes about sharing and selling buprenorphine may differ substantially. For example, selling prescribed buprenorphine for profit is more likely to be viewed as exploitative and immoral (Johnson & Richert, 2014), while sharing one's medication with friends in need (e.g., medicating a friend's withdrawal symptoms) tends to be viewed more favorably by both patients and treatment providers (Johnson & Richert, 2014). Moreover, while reasons for sharing buprenorphine may be driven by attitudes about helping others, selling

buprenorphine may be more tied to one's financial needs or desire to use profits to acquire a preferred illicit opioid (Lofwall & Walsh 2014). In this study, we controlled for individual-level factors associated with buprenorphine diversion, including current illicit drug use (Johnson & Richert, 2015ab) and IDU (Winstock, Lea & Sheridan, 2008). We also controlled for gender and age, although demographic factors have not emerged as significant predictors of diversion behaviors (Johnson & Richert, 2015a; Winstock, Lea & Sheridan, 2008).

We hypothesized that more positive attitudes toward sharing buprenorphine would predict greater likelihood for sharing buprenorphine, and stronger beliefs about selling buprenorphine would predict selling buprenorphine. We expected attitudes to remain significantly associated after controlling for known predictors of buprenorphine diversion. We hypothesized that IDU history (a marker of opioid use severity) would be associated with sharing and selling buprenorphine, and that economic deprivation would be associated with selling, but not sharing buprenorphine.

2. Method

2.1. Recruitment

Between December 2015 and August 2016, consecutive persons seeking inpatient opioid detoxification were approached at the time of admission to Stanley Street Treatment and Resources, Inc. (SSTAR) in Fall River, Massachusetts to participate in a survey research study. SSTAR's detoxification program provides evaluation and withdrawal management using a methadone taper protocol, individual and group counseling, and aftercare case management, and has a mean length-of-stay of 4.9 days.

Of patients admitted to SSTAR during the recruitment period, 497 were opioid users who were 18 years or older, English-speaking, and able to provide informed consent as approved by the Butler Hospital Institutional Review Board. Twenty-three refused study participation or were discharged before staff could interview them. The remaining 476 persons completed a non-incentivized, face-to-face interview administered by non-treating research staff over the course of approximately 15 min. Two hundred persons reported a history of having been prescribed buprenorphine.

2.2. Measures

In addition to age, sex, race/ethnicity, age of opioid use initiation, and prior detox experience, the following variables were assessed.

2.2.1. Injection drug use

Participants were asked if they had injected drugs (yes or no) in the past 30 days.

2.2.2. Economic deprivation

Four items (i.e., inability to afford food, housing, utilities, and medications) were assessed to measure difficulties meeting basic economic needs in the past year (see Berkowitz et al., 2015). Participants reporting any affirmative responses (59.5%; i.e., responding "yes" on yes/no response options) were coded as reporting economic deprivation.

2.2.3. Attitudes toward sharing and selling buprenorphine

Attitudes were assessed using items from Johnson & Richert's (2015b) study. Participants were asked how much they agree or disagree with the statement, "It's the right thing to do to share your buprenorphine with a friend who is dope sick" using a five-point Likert scale (strongly disagree to strongly agree). Participants reporting agreement (i.e., strongly agree or agree) were coded as having positive attitudes toward buprenorphine sharing. Attitudes about buprenorphine selling was measured using the statement, "Buying or selling

buprenorphine on the street saves lives” using the same Likert scale. Participants reporting agreement were defined as having positive attitudes toward buprenorphine selling.

2.2.4. Buprenorphine diversion

Respondents were asked “have you ever given buprenorphine you had been prescribed to a friend who was dope sick?” Respondents were also asked, “have you ever sold the buprenorphine you were prescribed?” For each question, response options were “yes” and “no” and those answering yes were defined as having shared or sold buprenorphine, respectively. The response variable was coded as neither sold nor shared (0); shared but not sold (1); and sold, which includes persons who both sold and shared (2).

2.2.5. Reasons for sharing or selling buprenorphine

Participants reporting diversion were asked if they had sold, shared or exchanged their buprenorphine for the following reasons: “to help a friend,” “I needed the money,” “I didn’t need the whole dose,” and “I didn’t use the whole dose.” Participants responded yes or no to each non-mutually exclusive reason.

2.3. Analysis plan

We report descriptive statistics to summarize the characteristics of the sample. We used multinomial logistic regression to estimate the adjusted association of sharing and selling buprenorphine with background characteristics, indicators of substance use behaviors and history of prior detox, and attitudes toward sharing and selling buprenorphine. In this analysis, neither selling nor sharing was the defined as the reference category. We report odds-ratios, 95% CI interval estimates, and test statistics for each association. For nominally significant ($p < 0.05$) associations we report the Holm-Bonferroni (Holm, 1979) corrected p -value to adjust for multiple comparisons. We also conducted auxiliary analyses describing reasons why participants had diverted buprenorphine. Finally, we compared the attitudes of persons who had been prescribed and never been prescribed buprenorphine toward sharing and selling buprenorphine.

3. Results

Participants who had ever been prescribed buprenorphine averaged 33.5 (± 8.18) years of age and 73.4% were male (Table 1). Most participants were White (87.5%), 3.5% were Black, 9.0% identified other or mixed racial backgrounds, and 7.5% reported Hispanic ethnicity. About 59.5% of the participants endorsed at least 1 of 4 economic hardships. The mean age of initiating opioid use was 21.0 (± 5.84). Nine in ten persons (90.5%) reported a prior history of detoxification, 89.0% said heroin was the drug for which they were currently in detoxification, and 76.5% had recently injected drugs. Recent use of cocaine was reported by 43.0% of participants. Forty-four (22.0%) participants agreed or strongly agreed that it is right to share buprenorphine with a dope sick friend, and 75 (37.5%) agreed or strongly agreed that buying or selling buprenorphine on the street saves lives. One hundred four (52.0%) participants didn’t agree with either sharing or buying/selling; 21 (10.5%) agreed that it was alright to share but not sell; 52 (26.0%) had a positive attitude toward buying/selling, but not sharing; and 23 (11.5%) had a positive attitude toward both sharing and buying/selling. One hundred one (50.5%) participants reported they had shared buprenorphine and 56 (28.0%) reported they had sold buprenorphine. Ninety-three (46.5%) had neither sold nor shared, 6 (3.0%) had sold but not shared, 51 (25.5%) had shared but not sold, and 50 (25.0%) had both shared and sold buprenorphine on the street.

Sharing buprenorphine was not associated significantly with demographic characteristics, economic deprivation, age of initiating opiate use, or any of the indicators of substance use behaviors (Table 2). Controlling for other covariates included in the model, the expected odds of sharing buprenorphine vs neither sharing nor selling was about 3.17 (95% CI 1.21; 8.32, $p = 0.019$) times higher for persons who agreed

Table 1
Background characteristics ($n = 200$).

	n (%)	Mean (\pm SD)	Median	Range
Age		33.5 (± 8.18)	32	20–61
Gender (male)	146 (73.4%)			
Race				
White	175 (87.5%)			
Black	7 (3.5%)			
Other	18 (9.0%)			
Ethnicity (Hispanic)	15 (7.5%)			
Economic deprivation (yes)	119 (59.5%)			
Age initiated opiate use		21.0 (± 5.84)	20	12–45
Prior detox (yes)	181 (90.5%)			
Heroin detox (yes)	178 (89.0%)			
Recent IDU (yes)	153 (76.5%)			
Recent cocaine use (yes)	86 (43.0%)			
Positive attitudes toward sharing	44 (22.0%)			
Positive attitudes toward buying/selling	75 (37.5%)			
Attitudes toward sharing & buying/selling				
Positive toward neither	104 (52.0%)			
Positive toward sharing only	21 (10.5%)			
Positive toward buying/selling only	52 (26.0%)			
Positive toward both	23 (11.5%)			
Shared buprenorphine (yes)	101 (50.5%)			
Sold buprenorphine (yes)	56 (28.0%)			
Shared/sold buprenorphine				
Neither	93 (46.5%)			
Shared only	51 (25.5%)			
Sold only	6 (3.0%)			
Shared and sold	50 (25.0%)			

that it was right to share buprenorphine with dope sick friends than for those who did not express agreement with this attitude. Persons who agreed that it was right to share were also significantly more likely (OR = 4.12, 95% CI 1.64; 10.32, $p = 0.003$) to have sold buprenorphine vs neither sharing nor selling than those who did not agree that it was right to share. Persons who agreed that it was right to sell buprenorphine were significantly more likely to report they had sold (OR = 2.92, 95% CI 1.35; 6.21, $p = 0.005$). Attitudes toward selling were not associated significantly associated with the likelihood of reporting prior sharing behavior.

Participants were also asked about reasons they had sold or shared buprenorphine (not mutually exclusive). Of the 107 participants who reported ever diverting buprenorphine, 63 (58.9%) reported they had done so to help a friend or partner, 61 (57.0%) because they needed the money, 29 (27.1%) because they didn’t need the whole dose, and 63 (58.9%) reported they didn’t want to use the whole dose because they wanted to get high. All subjects endorsed at least one of the above reasons, and 53 (49.5%) endorsed multiple reasons. Among sellers ($n = 56$), 21 (37.5%) reported they had sold buprenorphine often or very often.

We conducted auxiliary analysis using the full cohort ($n = 476$) comparing attitudes toward sharing and selling between persons who had ($n = 200$) and had not ($n = 276$) previously been prescribed buprenorphine. Differences were small and not statistically significant ($\chi^2 = 0.40$, $p = 0.719$) with respect to attitudes toward sharing; rates of endorsing sharing buprenorphine with a dope sick friend were 22.0% and 18.8% among persons with and without a history of buprenorphine prescription, respectively. Differences were statistically

Table 2
Multinomial logistic regression model estimating the adjusted association of background characteristics and attitudes toward sharing and selling on diversion behaviors ($n = 200$).

	Shared vs none		Sold vs none	
	OR (95% CI)	z ($p=$)	OR (95% CI)	z ($p=$)
Age	1.01 (0.96; 1.07)	0.47 (0.640)	0.99 (0.95; 1.05)	−0.06 (0.950)
Gender	0.90 (0.38; 2.15)	−0.23 (0.820)	0.98 (0.42; 2.30)	−0.04 (0.965)
Race (White)	1.48 (0.42; 4.24)	0.60 (0.548)	2.98 (0.78; 11.31)	1.61 (0.108)
Ethnicity (Hispanic)	0.14 (0.01; 1.50)	−1.62 (0.105)	1.20 (0.26; 5.60)	0.24 (0.814)
Economic deprivation (yes)	1.97 (0.91; 4.25)	1.71 (0.086)	1.29 (0.60; 2.76)	0.65 (0.515)
Age initiated opiate use	1.02 (0.94; 1.09)	0.41 (0.681)	0.95 (0.88; 1.03)	−1.17 (0.246)
Prior detox (yes)	0.38 (0.12; 1.29)	−1.55 (0.121)	1.25 (0.27; 5.69)	0.29 (0.773)
Heroin detox (yes)	0.87 (0.24; 3.15)	−0.21 (0.831)	1.29 (0.33; 5.02)	0.37 (0.711)
Recent IDU (yes)	0.85 (0.31; 2.29)	−0.33 (0.742)	0.58 (0.22; 1.53)	−1.10 (0.273)
Recent cocaine Use (yes)	0.85 (0.40; 1.80)	−0.43 (0.666)	0.93 (0.44; 1.97)	−0.19 (0.849)
Attitudes toward sharing	3.17 (1.21; 8.32)	2.35 (0.019)	4.12 (1.64; 10.32)	3.02 (0.003)
Attitudes toward selling	1.38 (0.63; 3.01)	0.80 (0.422)	2.92 (1.35; 6.21)	2.79 (0.005)

significant ($\chi^2 = 6.94, p = 0.008$) with respect to attitudes toward selling, however. Persons with a history of buprenorphine prescription (37.5%) were more likely to agree or strongly agree that buying or selling buprenorphine on the street saves lives than those who had never been prescribed buprenorphine (26.2%).

4. Discussion

The current findings support hypotheses that attitudes toward buprenorphine diversion play a significant role in patients' likelihood to share or sell buprenorphine. The robust association between sharing-related and selling-related attitudes and respective diversion behaviors, over and above known predictors of diversion, supports theories of planned behavior (Ajzen, 1991, 2011) and empirical findings (Johnson and Richert, 2015b) showing that attitudes about diversion is a fundamental predictor of subsequent engagement in diversion behavior, even if illicit. Assessing B-MAT patients' diversion-related attitudes may help clinicians identify patients susceptible to diversion and intervene to modify attitudes. Attitudes are considered malleable and can be changed by introducing new salient beliefs or changing existing ones (Fishbein & Ajzen, 1975). Intervention approaches aimed at changing attitudes commonly disseminate information consistent with healthy attitudes, present messages high in affect or emotion, and link current attitudes with past behaviors (Zanna & Rempel, 1988). In the case of illicit diversion, the personalized discussion of healthy (legal) behaviors may include education about diversion-related laws and penalties. Of note, although considered diversion, sharing buprenorphine is normative in this cohort. Still, although a majority of respondents had shared buprenorphine, less than one-quarter agreed that it is right to share buprenorphine. This discrepancy points to social factors, such as peer pressure (Lofwall & Walsh, 2014), that may influence one's decision to share their prescribed buprenorphine despite contradictory beliefs.

Surprisingly, economic deprivation was not associated with an increased likelihood of having sold buprenorphine. It is possible that individuals facing financial hardship have much to lose if criminally prosecuted for diversion or if they relapse due to cutting their prescribed dosage of buprenorphine. Statistical variability needed for analyses may also have been restricted due to a relatively small sample size, relatively high levels of economic deprivation in this population, and prolonged addiction in the current sample. Additional research using large, representative samples is warranted.

One in three diverters in this sample reported ever selling buprenorphine for money, and one-third of these participants reported doing so often or very often. These findings indicate that physicians' primary concern that patients may sell their medication (Albright, Ciaverelli, Essex, Tkacz and Ruetsch, 2010) appears to be valid. Screening patients for positive attitudes toward diversion may be an efficient approach for identifying and intervening with those patients most likely to divert. Patients at risk for diversion may require additional education

about diversion-related risks as well as enhanced oversight to ensure proper use of prescribed medication. In the meantime, increased monitoring (e.g., prescription limitations, regular urine drug testing, and in office pill counting; Center for Substance Abuse Treatment, 2012; Li, Shorter & Kosten, 2016; Lofwall, Wunsch & Walsh, 2010) and improved technologies (e.g., take-home electronic buprenorphine dispensers, state prescription monitoring; Lofwall & Walsh, 2014; Uosukainen, Pentikainen & Tacke, 2013) may limit diversion.

Interventions should also recognize that intentions—a proximal predictor of behavior—

for diverting buprenorphine may vary considerably. For example, sharers may anticipate a quid pro quo arrangement in which their sharing will be reciprocated in the future while others may share altruistically, believing that they are helping a friend in need (e.g., Duffy & Baldwin, 2012). In this light, sharing buprenorphine may have a public health benefit by reducing the number of injection use episodes—and concomitant risk of infectious complications—or preventing the discomfort of opiate withdrawal for those who don't have access to treatment. Consistent with past research, participants reporting diversion cited many reasons for diverting buprenorphine: altruistic motives, financial reasons, and reasons related to one's own addiction (i.e., personal desire to get high) were each endorsed by nearly one-third of the sample. Findings thus point to the need for intervention messaging that accounts for patients' unique intentions for sharing buprenorphine.

In contrast to research that has highlighted the high prevalence of diversion among IDUs (Lofwall & Walsh, 2014) and polydrug users (Fountain, Strang, Gossop, Farrell and Griffiths, 2000), current cocaine use and IDU were not associated with reported diversion in this study. These findings in conjunction with research showing that the vast majority of diverters are prescribed and using the medication themselves (Davis & Johnson, 2008) indicate that diversion-related awareness campaigns broadly targeted at B-MAT recipients may be effective.

4.1. Limitations

Several limitations of the current study should be noted. First, data are cross-sectional, which restricts making causal assertions. Consistent with the theory of false-consensus (Ross, Greene & House, 1977), it is possible that participants who divert buprenorphine develop beliefs and attitudes accordant with their behavior, and therefore prospective studies are needed to illuminate causal processes. Second, our reliance on patient self-reports of illicit behaviors (e.g., diversion, current drug use behaviors) may have led to underreporting. Third, study variables were assessed using a range of assessment time frames (e.g., past 30 day IDU, past year economic deprivation, lifetime diversion). However, we believe the assessed timeframes enabled us to adequately examine predictors of diversion history, controlling for current drug use behaviors and relatively established financial hardship. Fourth, although theoretical and empirical models regard intentions to engage

in a behavior as an integral mediator of the relationship between attitudes and behavioral engagement (Ajzen, 1988, 2011; for meta-analysis see Kim & Hunter, 1993), the current study did not assess participants' intentions to divert. Future studies that examine the role of intentions in the diversion-related attitudes-behavior relationship may more fully inform directions for intervention. Fifth, we were unable to distinguish whether patients had received buprenorphine or the buprenorphine/naloxone (i.e., Suboxone) formulation while undergoing B-MAT. Due to lower street price and greater risk if injected (Alho, Sinclair, Vuori & Holopainen, 2007), buprenorphine/naloxone is less likely to be misused or diverted than buprenorphine alone (Degenhardt et al., 2009; Larance et al., 2011). Still, we have no reason to expect that attitudes contributing to the likelihood to divert medication should differ by type of medication. Respondents were also not asked to provide reasons for diverting beyond the four options provided; consequently, our insight into reasons for diverting is somewhat limited. Finally, our sample was relatively small and presented with a particularly high-risk profile (e.g., economically deprived, long-term addiction). Therefore, additional studies using large, representative samples are warranted.

5. Conclusions

The opioid pandemic has led to increased availability of B-MAT as a preventive treatment, but B-MAT may be underutilized, in part due to concerns about buprenorphine diversion. The current study advances the understanding of factors that contribute to buprenorphine diversion to inform clinical approaches aimed at identifying and treating B-MAT patients at risk for diverting prescribed medication. Diversion-related attitudes emerged as a critical contributing factor in both sharing and selling buprenorphine and thus point to educational and intervention efforts designed to modify attitudes aimed at preventing buprenorphine diversion. Novel formulations of buprenorphine, such as an implantable or long-acting injection, will likely lower the risk of diversion compared to the daily dosing currently in practice.

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