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Educational attainment and prescription drug misuse: The importance of push and pull factors for dropping out

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Abstract

Purpose: Young adults who do not complete high school are at increased risk for substance use and offending behavior. A limitation of this research is that dropouts are often treated as a homogeneous group, which ignores the various push (e.g., academic failure or disciplinary problems) and pull (e.g., family responsibility or economic need) factors for leaving school.

Methods: The current study relies on multiple years of data from the National Survey on Drug Use and Health (2009–2014) and examines several dependent variables, including prevalence of prescription drug misuse, frequent prescription drug misuse, and prescription drug-related substance use disorder symptoms. We assess the importance of push and pull factors for dropping out, and compare dropouts to respondents who completed school.

Results: Multivariable logistic regression analyses produce two important findings. First, push factors increase the risk of various types of prescription drug misuse compared to pull factors. Additionally, respondents who attend college are at a decreased risk for various types of prescription opioid and sedative/tranquilizer misuse and disorder.

Discussion: The current research identifies important differences in prescription drug misuse and disorders among dropouts based on the reason they left school. Additionally, college attendance appears to be a strong protective factor.

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Keywords

prescription drug misuse; educational attainment; dropout; opioid; benzodiazepine

1. Introduction

In the late 1990s and early 2000s there was a shift in patterns of drug use in the United States, as the prevalence of prescription drug misuse began to increase dramatically (Center for Behavioral Health Statistics and Quality, 2015a; Johnston et al., 2019). Prescription drug misuse, or PDM, is generally defined as the use of a prescription drug that has not been prescribed (i.e., nonmedical misuse) or the use of a prescription drug in a manner inconsistent with recommendations from a doctor (i.e., medical misuse). While the prevalence of PDM began to level off and even decline after about 2005 another more serious problem has emerged. The U.S. is in the midst of a major public health crisis related to drug overdose deaths. Between 1999 and 2017, 702,568 people died from a drug overdose in the U.S. (Scholl et al., 2019). While recent spikes in overdose deaths have been largely attributable to drugs such as fentanyl and heroin, prescription drugs such as opioids and benzodiazepines are a significant part of the ongoing crisis, accounting for roughly 33% of the 70,237 overdose deaths in 2017 (Scholl et al., 2019).

Over the past ten years PDM has received much research attention (Compton et al., 2015; DuPont, 2010; McCabe et al., 2014; Nargiso et al., 2015; Young et al., 2012). With a long interest in substance use, PDM has not been ignored by criminologists. A number of studies have assessed the characteristics and correlates of PDM in justice-involved populations (Bi-Mohammed et al., 2017; Fearn et al., 2016; Hall et al., 2016; Knighton et al. 2018). Additionally, research has established that prescription drug misuse increases the likelihood of offending behavior (Bouvier et al., 2018; Ford and Wright, 2017; Rigg and Monnat, 2015; Vaughn et al. 2012).

A number of studies rely on criminological theories to understand prescription drug misuse. Consistent with both social control theory (Hirschi, 1969) and the work of Sampson and Laub (1993), research identifies that weak social bonds increase the risk for PDM (Dollar and Hendrix, 2015; Ford, 2009). A number of studies recognize the significance of peer influence (Ford, 2008; Higgins et al., 2009; Peralta and Steele, 2010), providing support for social learning theory (Akers, 1985). Additional research establishes evidence supportive of both general strain theory (Agnew, 1992) and general theory of crime (Gottfredson & Hirschi, 1993), as experiencing strain or having low self-control increases the likelihood of PDM (Ford & Blumenstein, 2013; Ford & Schroeder, 2009; Holtfreter et al., 2015). While most of the research focuses on individual differences, one study related to social disorganization theory (Shaw & McKay 1942), found that perceived neighborhood levels of social disorganization and social capital were significantly associated with PDM (Ford, Sacra, & Yohros 2017).

1.1. Educational Attainment and Prescription Drug Misuse

Educational attainment has long been of interest to criminologists (Hirschfield, 2018). Research clearly shows that adults who have not finished high school are at risk for a number of negative outcomes, including offending and substance use (Campbell, 2015; Maynard et al., 2015; Townsend, Flisher, & King 2007; Vaughn et al., 2014). High school dropouts are overrepresented in incarcerated populations in the U.S., as data from the most recent National Inmate Survey shows that 56.7% of inmates have less than a high school degree (Bureau of Justice Statistics, 2013). More recent research has identified a significant relationship between PDM and educational attainment among young adults (Martins et al. 2015; McCabe et al., 2018; Schepis et al., 2018a).

While a number of studies on PDM include a measure of educational attainment as a control or covariate, only a handful of studies have explicitly examined the association between educational attainment and PDM. The highest prevalence of prescription opioid and sedative/tranquilizer misuse and PDM-related substance use disorder symptoms (SUDs) are among high school dropouts and young adults who are not in school (Martins et al., 2015; McCabe et al., 2018; Schepis et al., 2018a). On the other hand, young adults who are in school have higher rates of prescription stimulant misuse (Ford & Pomykacz, 2016; Martins et al. 2015; McCabe et al. 2018). This aberration is likely due to the popularity of prescription stimulants, as a study aid, among high school and college students (Arria et al., 2018; Teter et al., 2018). It is important to point out that research among college students shows prescription stimulant misuse is associated with lower GPA and students who report misuse are less likely to graduate compared to those who do not report misuse (Arria et al. 2017; Arria et al. 2013; Ford & Schroder 2009).

1.2. Reasons for Dropping Out

The finding that high school dropouts are at increased risk for PDM and PDM-related SUDs is not surprising, but an important gap in the literature remains. While education has been an important social institution in the field of criminology, the empirical evidence on the association between dropping out and delinquent/criminal offending remains equivocal. One possible explanation for this is the tendency to treat high school dropouts as a homogeneous group, which ignores the fact that people drop out of school for various reasons (Bridgeland et al., 2006; Boylan & Renzulli, 2017; Dupere et al., 2015).

While dropping out of school is often viewed as a long-term process, it is also marked by various push and pull factors that increase risk for leaving school (Bradley & Renzulli, 2011; Boylan & Renzulli, 2017). Push factors are generally viewed as occurring within the context of school and include poor grades, conflict with teachers, and disciplinary problems (Fine, 1986; Jordan et al., 1996; Stearns and Glennie, 2006). These factors are important because they discourage students, who then begin to withdraw from the school-related activities (Lan & Lanthier, 2003). Factors that pull adolescents from school often include family or financial responsibilities, which make it difficult for them to remain in school (Jordan et al., 1996; McNeal, 1997; Stearns & Glennie, 2006). Pull factors increase the likelihood of dropping out because they compete with a students' commitment to educational pursuits and involve a cost-benefit analysis.

Treating dropouts as a homogeneous group likely masks some of the variation in the association between dropping out and substance use. The outcomes associated with dropping out because of push factors (e.g., disciplinary problems) are likely different from the outcomes associated with dropping out due to pull factors (e.g., to enter into full-time employment). Some criminological research has examined if reasons for dropping out condition the relationship between educational attainment and crime and deviance, with mixed results.

Examining data from the National Longitudinal Survey of Youth (NLSY), Jarjoura (1993) found that dropping out to get married, pregnancy, or because one disliked school was associated with increased violent behavior, while dropping out due to a dislike of school was associated with theft and selling drugs. In a follow up study Jarjoura (1996) examined the importance of socioeconomic status and found that dropping out for school or personal reasons was associated with violence (for upper class but not lower class respondents) and dropping out for economic reasons was negatively associated with offending (for lower class but not upper class juveniles). Building on this research, Sweeten et al. (2009) examined the association between dropping out and delinquent involvement using data from the NLSY. Findings showed that dropping out for economic reasons (a pull factor) was associated with decreased involvement in delinquency, while dropping out for school-related reasons (a push factor) was associated with increased involvement in delinquency.

2. The Present Study

The current research assesses the relationship between educational attainment and prescription drug misuse, with two questions in mind. First, we focus on dropouts and determine if prescription drug misuse varies based on the reason why someone dropped out of school. We distinguish dropouts based on various push and pull factors and expect those who dropped out due to push factors (e.g., academic failure or disciplinary problems) to have higher rates of prescription drug misuse than those who dropped out due to pull factors (e.g., family responsibilities or economic need). Second, we examine how prescription drug misuse among dropouts compares to young adults who have graduated from high school. We divide high school graduates into two groups based on whether or not they continued their education beyond high school. The prevalence and negative outcomes associated with prescription drug misuse makes this research important, as identifying risk factors are critical in developing meaningful interventions. To examine these questions we use data from the National Survey on Drug Use and Health, a leading source of epidemiological data on substance use, particularly PDM in the United States.

3. Methods

3.1. Data

The National Survey on Drug Use and Health (NSDUH) dates back to the 1970s and has a target population of civilians 12 years and older that are not institutionalized. The sample is based on an independent, multistage area probability sample for each of the 50 states and the District of Columbia. Data was collected from respondents using a combination of computer-assisted face-to-face interviewing and computer-assisted self-interviewing by a

trained interviewer in the respondent private residence. For the current study, we combined multiple years of NSDUH data, from 2009 to 2014. During this period, the weighted screening and interview response rates were consistently above 80% and 70% respectively. We are unable to use more recent data from the NSDUH as the survey item used to assess reasons for dropping out of school was removed in 2015. Further information regarding the methodology of the NSDUH are available elsewhere (Center for Behavioral Health Statistics and Quality, 2015b).

Combining multiple years of NSDUH data together is a common practice (Cepeda-Benito et al. 2018; Chawla et al. 2018; DeLisi et al., 2015; Vaughn et al., 2019), and we do so for a number of reasons. First, the survey item used to assess reasons for dropping out was only asked to respondents under the age of 26 who were not in school and had not graduated from high school, only 1,291 respondents in the 2014 survey. Additionally, we separate respondents into five groups based on their reason for leaving school, discussed in detail later on. Second, we are interested in several measures of PDM that are reported by only a small percentage of the sample. Finally, given various social and developmental differences between adolescents and young adults, we decided to focus only on respondents ages 18 to 25, giving us a total sample of 99,257 respondents from the combined six years of NSDUH data. This includes 11,938 respondents who are dropouts and 87,319 who graduated from high school or earned a GED.

3.2. Measures

3.2.1. Prescription Drug Misuse—We included several measures associated with prescription drug misuse (PDM) in the past year. PDM was defined as the use of prescription drug that had not been prescribed to the respondent or that they took only for the experience or feeling caused by the prescription drug. First, we utilized a measure of *PDM* in the past year and include the misuse of any prescription drugs and the misuse of separate classes of prescription drugs (i.e., opioids, stimulants, and sedatives/tranquilizers). Second, we included a measure of *frequent PDM* in the past year. Consistent with prior research we created a dichotomous variable to capture respondents who reported PDM on 10 or more occasions of in the past year, as this is associated with an increased risk of substance use disorder symptoms (Schepis & Krishnan-Sarin 2008). Again, we looked at any PDM and also prescription opioids, stimulants, and sedatives/tranquilizers separately. Finally, we included a measure of *PDM-related SUDs* that captured substance use disorder symptoms associated with prescription drugs. The NSDUH included items to measure both abuse and dependence based on DSM-IV criteria. For the current research, we defined PDM-related SUDs as a respondent who had reported at least one symptom in the past year. We included a measure of any PDM-related SUDs, and separate measures for prescription opioid, stimulant, and sedative/tranquilizer SUDs.

3.2.2. Educational Attainment—Respondents in the NSDUH under the age of 26 who had not received a high school diploma were asked to identify the single reason which best described why they left school before receiving a high school degree. To do this they were shown a list of 15 reasons for leaving, with a category “other” providing the opportunity to write in a reason. We used this item to separate respondents into different groups based on

the reasons they provided for dropping out of school that were associated with various push and pull factors.

We included two groups that dropped out due to *push factors*. First, some respondents dropped out for school-related reasons, as they stated that school was boring, were getting bad grades, were not learning anything, or were treated badly at school. Second, respondents also dropped out for behavioral reasons, they had been expelled from a school, often got into trouble, or they used, or sold drugs at school.

We included three groups that dropped out due to *pull factors*. First, some respondents identified personal reasons, such as getting pregnant or getting someone pregnant, having responsibilities at home, or got married or moved in with a partner. Second, other respondents said that they dropped out due to economic issues, this includes the need to get a job or having to work longer hours. Finally, a number of respondents reported other reasons for dropping out, including that they moved to the U.S. from another country or that they became ill.

For comparative purposes, we also included respondents who reported that they had graduated from high school. To account for the impact of continuing education beyond high school we separate these respondents into two groups. The first group included high school graduates who did not continue their education after graduation. The second group included respondents who attended college after graduation, including those who had graduated from college. College students and graduates were combined because of their similar substance use patterns, with significant differences from young adults not in college (Arria, Caldeira, Allen, et al., 2017; Schepis et al., 2018a).

3.2.3. Controls—We included a number of controls for demographic characteristics in the multivariate models. These included respondent's age, sex, race/ethnicity, total family income, and geographic residence. In addition to these demographic characteristics we also control for behaviors that may have contributed to dropping out of school, including a measure of any illicit drug use, including prescription drug misuse, prior to turning 18 years old and a measure of lifetime arrest. To account for more contemporaneous factors that may contribute to prescription drug misuse during young adulthood we included measures of risk propensity and self-reported offending. We combined two survey items to create a measure of risk propensity. Respondents were asked "how often do you get a real kick out of doing things that are a little dangerous" and "how often do you like to test yourself doing something a little risky?" The response set for both items ranged from 1 = never to 4 = always. We also included three separate measures of self-reported offending behavior during the past twelve months. Respondents were asked "how many times have you sold illegal drugs", "how many times have you stolen or tried to steal anything worth more than \$50", and "how many times have you attacked someone with the intent to seriously hurt them?" All three self-reported offending measures were coded 1 = 0 times, 2 = 1 or 2 times, 3 = 3 to 5 times, 4 = 6 to 9 times, and 5 = 10 or more times.

3.3. Analytical Strategy

To begin we estimated several weighted cross-tabulations to estimate prevalence and 95% confidence intervals of the various PDM measures by educational attainment, with *p*-values Bonferroni corrected for multiple comparisons. When the Rao-Scott chi-square test (Rao & Scott 1984) was significant, post-hoc pairwise comparisons using design-based multivariable logistic regression was employed adjusting for age, sex, race/ethnicity, total family income, and geographical residence. We estimated two sets of post-hoc comparisons, the first accounted for behaviors that may have contributed to dropping out of school during adolescence (i.e., drug use prior to age 18 and lifetime arrest history), while the second included more contemporaneous factors (i.e., risk propensity and self-reported offending behaviors) that are likely associated with drug use during young adulthood. In order to take into account the complex multistage sampling design of the NSDUH, analyses were conducted using the SVYSET and SVY commands in STATA 15.0. These commands allowed STATA to consider survey design effects, including stratification and weight variables and the primary sampling unit, when estimating test statistics.

4. Results

Sample characteristics, weighted proportions and means, for all measures are shown in Table 1. Roughly 12%, 11,938, of the respondents had not completed high school. This included respondents who dropped out due to push factors related to school ($n = 3,785$) and behavioral ($n = 1,879$) problems. A number of respondents also identified pull factors such as personal ($n = 3,566$), economic ($n = 1,658$), or other ($n = 1,050$) problems. The majority of respondents who graduated from high school continued their education ($n = 51,215$), while 36,104 did not continue after high school graduation.

Table 1 also shows the prevalence of prescription drug misuse, frequent PDM, and PDM-related SUDs. Slightly more than 13% of respondents reported any PDM, with 9.89% reporting opioid misuse, 5.09% sedative/tranquilizer misuse, and 3.77% stimulant misuse. Nearly 8% of respondents reported frequent PDM, including 5.59% reporting frequent opioid misuse, 2.63% frequent sedative/tranquilizer misuse, and 1.89% reporting frequent stimulant misuse. Finally, slightly more than 4% of respondents reported any PDM-related SUDs, while 3.13% reported opioid-related SUDs, 1.25% reported stimulant-related SUDs, and 0.98% reported sedative/tranquilizer-related SUDs.

4.1. First Post-hoc Comparison

4.1.1 Educational Attainment and Prescription Drug Misuse—Table 2 shows the prevalence of prescription drug misuse and 95% confidence interval based on educational attainment. The post-hoc comparisons using multivariable logistic regression identified a number of significant differences, supplemental tables are included that show the adjusted odds ratios associated with this analysis. To frame these results, we first discuss differences between dropouts and then compare dropouts to high school graduates. With regard to *any PDM*, respondents who dropped out due to school-related reasons were at increased risk compared to those who dropped out for personal reasons. Respondents who dropped out for school-related reasons were also at increased risk for *opioid misuse* compared to those who

dropped out for behavioral or personal reasons. The odds of *stimulant misuse* were increased among those who dropped out for school or behavioral reasons compared to those who dropped out for economic reasons. Finally, respondents who dropped out for school or behavioral reasons were at increased risk for *sedative/tranquilizer misuse* compared to those who dropped out for other reasons.

Next we compared differences in PDM between dropouts and graduates. Respondents who had been to college were at increased risk for *any PDM* compared to those who dropped out for behavioral, personal, or “other” reasons. High school graduates who did not go on to college were at increased risk for *any PDM* compared to those who dropped out for personal reasons. Respondents who dropped out for school reasons were at increased risk for *opioid misuse* compared to high school graduates who continued on to college. College students/graduates were increased risk for *stimulant misuse* compared to all groups of dropouts, while high school graduates were at increased risk compared to those who dropped out due to economic factors. Finally, respondents who were high school graduates or went to college were at increased risk for *sedative/tranquilizer misuse* compared to respondents who dropped out for “other” reasons.

The findings from these post-hoc comparisons underscore the importance of accounting for other factors in the multivariable logistic regression models. In looking at the prevalence of any PDM you can see that 12.47% of college respondents reported any misuse compared to 21.03% of respondents who dropped out due to behavioral reasons. However, the multivariable logistic regression analysis indicates that college graduates are at increased risk for any PDM compared to behavioral dropouts. This is due to the inclusion of prior substance use and arrest history in the regression model, as the finding is reversed without those measures in the model.

4.1.2. Educational Attainment and Frequent Prescription Drug Misuse—Table 3 includes the results for frequent prescription drug misuse, or 10 or more instances of misuse in the past year. The post-hoc comparisons using multivariable logistic regression found significant difference between dropouts for only one class of prescription drug. The odds of frequent *stimulant misuse* were decreased among respondents who dropped out for economic reasons compared to all other groups of dropouts.

Comparing dropouts to respondents who completed high school shows a number of significant differences. Respondents who dropped out for school, behavioral, or personal reasons were all at increased risk for *any frequent PDM* compared to those who went to college. All groups of dropouts were at increased risk of frequent *opioid misuse* compared to those who went to or graduated from college. Conversely, respondents who went to college were at increased risk for frequent *stimulant misuse* compared to those who dropped out for school, personal, or economic reasons. While high school graduates were at increased risk for frequent *stimulant misuse* compared to those who dropped out for economic reasons. Finally, respondents who dropped out for school, behavioral, personal, or economic reasons were all at increased risk for frequent *sedative/tranquilizer misuse* compared to those who went to college.

4.1.3. Educational Attainment and Prescription Drug-related Substance Use Disorder Symptoms—Table 4 shows differences in PDM-related SUDs based on educational attainment. Multivariable logistic regression analysis only identified one significant difference between dropouts. Respondents who dropped out for school reasons were at increased risk for prescription *opioid-related* SUDs compared to those who dropped out due to behavioral reasons.

A number of significant differences between dropouts and high school graduates were found. With regard to *any* PDM-related SUDs, respondents who dropped out for school reasons were at increased risk compared to those who went to college. All groups of dropouts were at increased risk for prescription *opioid-related* SUDs compared to respondents who went to college. While, respondents who attended or graduated from college were at increased risk for prescription *stimulant-related* SUDs compared to those who dropped out for school, personal, or economic reasons. Finally, respondents who had dropped out for school reasons were at increased risk for prescription *sedative/tranquilizer-related* SUDs compared to those who went to college.

4.2. Second Post-hoc Comparison

4.2.1 Prescription Drug Misuse - Contemporaneous Factors—This second set of post-hoc comparisons focuses on accounting for risk propensity and offending behaviors during young adulthood, which may account for the association between educational attainment and prescription drug misuse. These results are also shown in tables 2–4 and are labeled “second post-hoc comparison.” This analysis showed that respondents who dropped out for school-related reasons were at increased risk for *any PDM* compared to respondents who dropped out due to personal, economic, or “other” reasons; *opioid misuse* compared to respondents who dropped out due to personal reasons; *stimulant misuse* compared to respondents who dropped out due to economic reasons; and *sedative/tranquilizer misuse* compared to respondents who dropped out due to behavioral, economic, or “other” reasons. In addition, respondents who dropped out due to economic reasons were at decreased risk of *stimulant misuse* compared to those who dropped out due to school, behavioral, or personal reasons.

The second post-hoc analysis also identified several significant differences between dropouts and high school graduates. Respondents who went to or graduated from college were at decreased risk of *any PDM* compared to school, behavioral, and personal dropouts; *opioid misuse* compared to all groups of dropouts; and *sedative/tranquilizer misuse* compared to school and personal dropouts. Conversely, college students/graduates were at increased risk of *misuse* compared to respondents who dropped out due to personal or economic reasons. High school graduates who did not go to college were also at a decreased risk for *any PDM*, *opioid misuse*, and *sedative/tranquilizer misuse* compared to respondents who dropped out due to school-related reasons. Finally, respondents who dropped out for economic reasons were at decreased risk for *stimulant misuse* than high school graduates.

4.2.2. Frequent Prescription Drug Misuse - Contemporaneous Factors— Respondents who dropped out for economic reasons were at decreased risk for frequent

stimulant misuse compared to all other groups of dropouts. With regard to frequent *sedative/tranquilizer misuse* respondents who dropped out due to school-related reasons were at increased risk compared to economic and “other” dropouts, while those who dropped out due to personal reasons were at increased risk compare to those who dropped out for “other” reasons.

Respondents who attended or graduated from college were at decreased risk for all types of frequent prescription drug misuse. The lone exception was that there was no significant relationship for frequent *sedative/tranquilizer misuse* between “other” and college. High school graduates who did not attend college were also at decreased risk for any frequent prescription drug misuse compared to school, behavioral, or personal dropouts; frequent *opioid misuse* compared to school, behavioral, personal, or other dropouts; and frequent *sedative/tranquilizer misuse* compared to school and personal dropouts. Finally, respondents who dropped out due to economic reasons were less likely to report frequent *stimulant misuse* compared to both groups of high school graduates.

4.2.3. Prescription Drug-related Substance Use Disorder Symptoms - Contemporaneous Factors—

The final set of analyses showed that respondents who dropped out for school-related reasons were at increased risk for *any PDM-related SUDs* and *opioid-related SUDs* compared to respondents who dropped out for behavioral reasons.

College students/graduates were at decreased risk for *any PDM-related SUDs* and *opioid-related SUDs* compared to all groups of dropouts. Additionally, college students/graduates were at a decreased risk for *sedative/tranquilizer-related SUDs* compared to respondents who dropped out for school, behavioral, or personal reasons. Finally, high school graduates who did not attend college were at decreased risk for *any PDM-related SUDs*, *opioid-related SUDs*, and *sedative/tranquilizer-related SUDs* compared to respondents who dropped out for school reasons, as well as being less likely to report opioid-related SUDs compared to those who dropped out due to personal reasons.

5. Discussion

One of the most pressing social problems and public health issues in the U.S. today is drug overdose deaths. In order to address this issue, research on risk factors associated with substance use is essential. Extant research highlights educational attainment and shows that high school dropouts are at increased risk for substance use, including prescription drug misuse. However, this research fails to recognize that dropouts are a heterogeneous population, as people leave school for a myriad of reasons. Prior research suggests that the association between dropping out and delinquency/crime may be conditioned by the reason a person drops out, given different push and pull factors. The current research uses data from a nationally representative study, to address this gap in the literature by examining the relationship between reasons for dropping out of school and prescription drug misuse among young adults.

5.1. Reasons for Dropping Out

The current research identifies important variation in PDM among dropouts, as reasons for dropping out appears to be important. In general, the two post-hoc comparisons that utilized multivariate logistic regression showed significant differences in PDM, frequent PDM, and PDM-related related SUDs among different groups of high school dropouts. Respondents who dropped out of school due to *push factors* were at increased risk compared to those who dropped out due to *pull factors*. These findings highlighted two important groups of dropouts, as respondents who dropped out for school-related reasons (a push factor) were generally at increased risk for various types of PDM compared to other dropouts. Conversely, respondents who dropped out of school for economic reasons (a pull factor) were generally at a decreased risk for various types of PDM, especially stimulant misuse, compared to other groups of dropouts.

While dropping out of high school is generally associated with an increased risk for deviance and crime, this may not occur if dropping out is associated with a shift in ones future orientation that aligns with a positive self-concept. Sweeten et al. (2009) argued that students who dropped out to pursue conventional adult social roles (e.g., marriage and employment) had a positive self-concept and would be less likely to engage in delinquency. While not finishing high school is an unconventional act, doing so to pursue conventional adult social roles should result in less delinquency. This occurs because delinquent behavior is inconsistent with this new identity and involvement in conventional adult social roles leads to strong social bonds (Hirschi, 1969; Sampson and Laub, 1993). On the other hand, people who drop out for school or behavioral reasons are unlikely to pursue conventional adult social roles, resulting in a move away from sources of social control and increased time socializing with peers in unstructured activities (Haynie and Osgood, 2005; Osgood and Anderson, 2004). For these reasons, dropping out for academic or behavioral problems is likely to lead to opportunities for delinquency and crime.

Research has also assessed the relationship between future orientation and substance use, including PDM, among adolescents and young adults (Barnett et al. 2013; McKay et al. 2013; Steiger et al. 2017). This research generally considers three separate elements of one's future orientation. First, a future orientation involves planning and striving toward future goal, and results in goal-oriented actions (Zimbardo & Boyd 1999). Second, a future orientation involves understanding how current actions are linked to future goals (Strathman et al. 1994). While delinquent behavior, such as drug use, may be fun during adolescence, it may also be a risk for future conventional goals. Third, positive future expectations involve the likelihood of achieving future goals and provide a vision of what one's life could be like (Dubow et al. 2001). Thus, individuals are likely to engage in behavior that aligns with their future vision of their life.

5.2. Dropouts vs. Graduates

The multivariable logistic regression analysis also identified a number of significant differences between dropouts and respondents who completed high school. These findings highlight the significance of a college education, as there were only a few significant differences between dropouts and high school graduates that did not go on to college. For

the most part, respondents who either attended or graduated from college were at decreased risk for various forms of PDM compared to most groups of high school dropouts. The “protective” effect of a college education was more pronounced for more serious forms of PDM, frequent PDM and PDM-related SUDs. The lone exception to this was that the first set of post-hoc analyses, controlling for prior drug use and lifetime arrest history, showed that college students/graduates were at increased risk for stimulant misuse. However, this significant relationship did not emerge in the second set of post-hoc analyses that controlled for contemporaneous factors. Finally, while there were some significant differences between respondents who graduated from high school (not attending college) and high school dropouts, by and large there were no significant differences between these groups.

The finding that a college education is linked to less drug use is consistent with research that links a college education with better physical and mental health outcomes. Recently, Mirowsky and Ross (2015) argued that higher education provides access to various resources that make it possible to override the default American lifestyle. Additional research suggests that education is linked to better health outcomes because of the link between socioeconomic status and health (Ross and Mirowsky, 2010). Increased education is associated with greater financial resources, which are generally viewed as a fundamental cause of health outcomes (Link and Phelan, 2000). The fact that people with more education are generally healthier is also important because a number of studies have linked prescription drug misuse to poor physical or mental health (Han et al., 2017; Schepis et al., 2018b). Finally, it also may be possible that dropouts may have higher rates of prescription drug misuse because they have increased access to prescription medications. In addition to higher prevalence rates of misuse, recent research also suggests that high school dropouts have higher prevalence rates of prescription drug use (Schepis et al. 2018a).

5.3. Limitations

While the National Survey on Drug Use and Health (NSDUH) is one of the most widely used epidemiological studies to assess substance use, a few limitations are worth noting. First, the NSDUH is a cross-sectional study, which makes it problematic to infer any causal relationships. While the goal of the current research was not to identify the causal sequence of the dropout-substance use relationship, longitudinal data would permit a more precise assessment of this relationship. Second, self-selection bias is present as many potential respondents declined to participate in the study. In the six years of NSDUH data we used response rates were as low as 70%. Additionally, the NSDUH sampling frame does not include individuals who are incarcerated or homeless. This is problematic given there are elevated rates of substance use in these populations and dropout is also a risk factor for incarceration (Bureau of Justice Statistics, 2013; Fearn et al. 2016; Greene et al. 1997). The NSDUH is representative of the non-institutionalized population of the U.S., and therefore should only be generalized to that population. Third, the data were collected via self-report so self-report bias may also be an issue. Research indicates that self-reported substance use data are reliable and valid (Johnston et al. 1985; O’Malley et al. 1983). The NSDUH methodology also takes several steps to address self-report bias, including but not limited to, collecting data via ACASI methods, including pictures and trade/generic names for prescription drugs (Center for Behavioral Health Statistics and Quality 2015b). Finally,

students may have multiple reasons for dropping out of school and it was not possible to measure possible overlapping reasons as the NSDUH asks respondents to identify only one reason for dropping out.

5.4. Implications

The current investigation illuminates several implications for both criminologists and practitioners associated with criminal justice systems. Disentangling push and pull factors, with respect to educational attainment and PDM, provides insights into specific proximal dynamics that shape deleterious behaviors among young adults. While criminological literature has focused overwhelmingly on describing neighborhood characteristics that drive social disorganization, our study demonstrates that school, economic and familial dynamics may serve as more proximate factors shaping PDM. Although dropping out can structure deleterious behaviors, our findings indicate that dropping out does not always reinforce associations with PDM. Thus, practitioners interested in identifying appropriate rehabilitative support services should ensure that programmatic activities distinguish motivating factors that fuel dropout statuses. Interventions aimed at minimizing substance misuse resulting from educational risk among young adults have centered on altering school contexts that may increase educational risk. However, our findings suggest that screening and interventions should consider dynamics beyond school contexts that shape educational risk and substance use behaviors. Furthermore, criminal justice practitioners deploying interventions to improve health and decrease substance use with the aim of minimizing dropout, might seek to mitigate more immediate and proximal factors across the service continuum; especially with specific focus on social determinants and collective population health.

5.5. Conclusion

In sum, findings from the current research vertically extend existing knowledge by identifying the importance of reasons for dropping out and associations with various types of PDM. The research highlights the importance of identifying dropouts as a heterogeneous population and that dropping out due to pull factors may be connected with a positive sense of a future self and therefore less substance use. While dropping out of school is an unconventional act, doing so to pursue conventional adult social roles such as family and work provides opportunities to develop strong social bonds that reduce the likelihood of PDM. Additionally, knowing that those who dropout for push factors are at increased risk for PDM has important implications for prevention and intervention programs. Finally, the findings highlight the importance of college attendance as a protective factor.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Dropping out of school due to push factors increases risk of prescription drug misuse
- Dropping out of school due to pull factors decreases risk of prescription drug misuse
- A college education is a protective factor for prescription drug misuse

Table 1:

Sample Characteristics (N = 99,257)

Measure	Coding	Weighted Proportion/Mean
Educational Attainment	Dropout – Push Factor	
	School(n = 3,785)	3.42%
	Behavioral (n = 1,879)	1.74%
	Dropout – Pull Factor	
	Personal (n = 3,566)	3.07%
	Economic (n = 1,658)	1.59%
	Other (n= 1,050)	0.99%
	Completed High School	
	Did not continue schooling (n = 36,104)	34.53%
	Continued schooling (n = 51,215)	54.66%
Prescription Drug Misuse	Any Prescription Drug	13.34%
	Opioid	9.89%
	Stimulant	3.77%
	Sedative/Tranquilizer	5.09%
Frequent PDM (10+)	Any Prescription Drug	7.61%
	Opioid	5.59%
	Stimulant	1.89%
	Sedative/Tranquilizer	2.63%
Prescription Drug-Related	Any Prescription Drug	4.28%
Substance Use Disorder Symptoms	Opioid	3.13%
	Stimulant	1.25%
	Sedative/Tranquilizer	0.98%
Drug use prior to age 18	Yes	40.48%
Lifetime Arrest	Yes	17.42%
Risk Propensity	2 (never) to 8 (always)	4.01 (mean)
Drug Offending	1 (0 times) to 5 (10+ times)	1.12 (mean)
Property Offending	1 (0 times) to 5 (10+ times)	1.04 (mean)
Violent Offending	1 (0 times) to 5 (10+ times)	1.05 (mean)
Age	18 to 25 years old	21.64 (mean)
Sex	Male	49.60%
Race/Ethnicity	White	58.36%
	Black or African American	13.87%
	Native American / Alaskan Native	0.63%
	Hawaiian Native / Pacific Islander	0.43%
	Asian	5.12%
	More than one race	1.89%
	Hispanic	19.70%
	Total Family Income	1 (<\$ 10,000) to 7 (>\$75,000)
Geographic Residence	Large Metro	53.87%

Measure	Coding	Weighted Proportion/Mean
	Small Metro	31.73%
	Non-metro	14.40%

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Table 2:

Prevalence of prescription drug misuse (1 or more occasions) by educational attainment

	Any PDM	Opioids	Stimulants	Sed/Tranq
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Dropout				
Push Factors				
School ^(a)	18.74% (16.80, 20.85)	15.82% (14.06, 17.75)	3.85% (3.11, 4.75)	7.99% (6.84, 9.32)
Behavioral ^(b)	21.03% (18.54, 23.75)	17.37% (15.27, 19.70)	5.66% (4.08, 7.80)	8.83% (7.31, 10.62)
Pull Factors				
Personal ^(c)	13.48% (12.00, 15.11)	10.94% (9.59, 12.46)	2.87% (2.17, 3.78)	5.54% (4.58, 6.68)
Economic ^(d)	12.00% (10.07, 14.25)	10.39% (8.56, 12.56)	1.57% (1.03, 2.40)	4.45% (3.41, 5.78)
Other ^(e)	9.79% (7.64, 12.48)	8.79% (6.68, 11.49)	2.03% (1.25, 3.29)	2.71% (1.79, 4.08)
Completed HS				
High School ^(f)	14.12% (13.59, 14.66)	11.47% (10.98, 11.98)	3.13% (2.90, 3.38)	5.61% (5.25, 5.99)
College ^(g)	12.47% (12.11, 12.85)	8.33% (8.03, 8.63)	4.30% (4.05, 4.56)	4.55% (4.34, 4.77)
First Post-hoc Comparison	a, f > c g > b, c, e, f	a > b, c, g f > g	a, b, f, > d g > a-f	a, b, f, g > e
Second Post-hoc Comparison	a > c, d, e, f, g b, c, f > g	a > c, f, g b, c, d, e > g	a, b, c, f, g > d g > c, f	a > b, d, e, f, g c > e, g f > g

- The results of 4 separate cross-tabulations are shown in the table, with prevalence of prescription drug misuse and 95% confidence intervals.
- All pairwise comparisons were Bonferroni-corrected for multiple comparisons, with comparisons only noted when they differ at p -level of < **0.0083** (or, 0.05/6).
- The first post-hoc comparisons were based on logistic regression models adjusted for **prior drug use, lifetime arrest**, age, sex, race/ethnicity, total family income, and geographic residence.
- The second post-hoc comparisons were based on logistic regression models adjusted for **risk propensity, self-reported offending**, age, sex, race/ethnicity, total family income, and geographic residence.
- Educational attainment: push factors include school (e.g., school was boring), behavioral (e.g., often got into trouble); pull factors include personal (e.g., had responsibilities at home), economic (e.g., needed to get a job), and other (e.g., became ill); high school (did not continue education beyond high school); college (currently in college or college graduate)

Table 3:

Prevalence of frequent prescription drug misuse (10+ occasions) by educational attainment

	Any PDM	Opioids	Stimulants	Sed/Tranq
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Dropout				
Push Factors				
School ^(a)	13.38% (11.79, 15.14)	11.30% (9.88, 12.89)	2.11% (1.53, 2.88)	5.26% (4.21, 6.55)
Behavioral ^(b)	16.74% (14.58, 19.16)	13.33% (11.44, 15.49)	4.22% (2.82, 6.28)	5.97% (4.85, 7.34)
Pull Factors				
Personal ^(c)	10.35% (9.03, 11.83)	8.34% (7.13, 9.75)	1.98% (1.37, 2.86)	4.21% (3.34, 5.28)
Economic ^(d)	8.68% (6.98, 10.76)	7.66% (6.00, 9.71)	0.55% (0.30, 1.01)	3.10% (2.24, 4.27)
Other ^(e)	7.82% (5.89, 10.30)	7.31% (5.40, 9.82)	1.55% (0.88, 2.71)	1.82% (1.02, 3.22)
Completed HS				
High School ^(f)	9.19% (8.70, 9.71)	7.37% (6.93, 7.84)	1.77% (1.61, 1.95)	3.39% (3.11, 3.69)
College ^(g)	5.86% (5.75, 6.17)	3.72% (3.50, 3.94)	1.94% (1.78, 2.12)	1.84% (1.69, 2.01)
First Post-hoc Comparison	a, b, c, f > g	a, b, c, de, f > g	a, b, c, e, f, g > d g > a, c, d, f	a, b, c, d, f > g
Second Post-hoc Comparison	a, b, c > f a, b, c, d, e, f > g	a, b, c, e, > f a, b, c, de, f > g	a, b, c, e, f, g > d g > f	a > d, e, f c > e, f a, b, c, d, f > g

- The results of 4 separate cross-tabulations are shown in the table, with prevalence of frequent prescription drug misuse and 95% confidence intervals.
- All pairwise comparisons were Bonferroni-corrected for multiple comparisons, with comparisons only noted when they differ at p -level of **< 0.0083** (or, 0.05/6).
- The first post-hoc comparisons were based on logistic regression models adjusted for **prior drug use, lifetime arrest**, age, sex, race/ethnicity, total family income, and geographic residence.
- The second post-hoc comparisons were based on logistic regression models adjusted for **risk propensity, self-reported offending**, age, sex, race/ethnicity, total family income, and geographic residence.

Educational attainment: push factors include school (e.g., school was boring), behavioral (e.g., often got into trouble); pull factors include personal (e.g., had responsibilities at home), economic (e.g., needed to get a job), and other (e.g., became ill); high school (did not continue education beyond high school); college (currently in college or college graduate)

Table 4:

Prevalence of PDM-related substance use disorder symptoms by educational attainment

	Any PDM	Opioids	Stimulants	Sed/Tranq
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Dropout				
Push Factors				
School ^(a)	7.59% (6.50, 8.84)	6.40% (5.35, 7.64)	1.28% (0.88, 1.84)	2.00% (1.45, 2.74)
Behavioral ^(b)	9.17% (7.58, 11.04)	7.04% (5.89, 8.39)	2.91% (1.73, 4.85)	2.52% (1.68, 3.76)
Pull Factors				
Personal ^(c)	5.37% (4.41, 6.51)	4.50% (3.67, 5.49)	1.11% (0.74, 1.66)	1.58% (1.10, 2.27)
Economic ^(d)	4.51% (3.23, 6.24)	4.03% (2.83, 5.71)	0.68% (0.35, 1.28)	0.89% (0.49, 1.63)
Other ^(e)	4.14% (2.84, 5.98)	3.85% (2.59, 5.67)	0.63% (0.26, 1.51)	0.97% (0.44, 2.17)
Completed HS				
High School ^(f)	5.13% (4.78, 5.51)	4.06% (3.75, 4.39)	1.20% (1.04, 1.39)	1.23% (1.07, 1.41)
College ^(g)	3.35% (3.15, 3.56)	2.12% (1.95, 2.31)	1.27% (1.17, 1.39)	0.70% (0.60, 0.81)
First Post-hoc Comparison	a, f > g	a > b a-f > g	g > a, c, d, f	a, f > g
Second Post-hoc Comparison	a > b, f, g b, c, d, e, f > g	a > b, f, g c > f b, c, d, e, f, > g	no significant differences	a > f, g b, c, f > g

- The results of 4 separate cross-tabulations are shown in the table, with prevalence of PDM-related substance use disorder symptoms and 95% confidence intervals.
- All pairwise comparisons were Bonferroni-corrected for multiple comparisons, with comparisons only noted when they differ at p -level of < **0.0083** (or, 0.05/6).
- The first post-hoc comparisons were based on logistic regression models adjusted for **prior drug use, lifetime arrest**, age, sex, race/ethnicity, total family income, and geographic residence.
- The second post-hoc comparisons were based on logistic regression models adjusted for **risk propensity, self-reported offending**, age, sex, race/ethnicity, total family income, and geographic residence.
- Educational attainment: push factors include school (e.g., school was boring), behavioral (e.g., often got into trouble); pull factors include personal (e.g., had responsibilities at home), economic (e.g., needed to get a job), and other (e.g., became ill); high school (did not continue education beyond high school); college (currently in college or college graduate)