

# PRESCRIPTION DRUG MISUSE AMONG ADOLESCENTS

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## ABSTRACT

MARTIN THOMAS HALL: Prescription Drug Misuse Among Adolescents  
(Under the direction of Matthew Owen Howard)

In spite of a growing body of knowledge of prescription drug misuse (PDM), several important gaps exist. This dissertation is comprised of three independent studies that advance knowledge of PDM among adolescents. **Study 1** aims to provide a review of the epidemiology of adolescent PDM and offer a theoretical explanation of the problem using anthropological, cognitive-affective, and interpersonal theories of substance use. This theoretical discussion is important given that unlike illicit drugs, prescription drugs, when prescribed by health care professionals, are legal, pervasive, and often medically beneficial. The theories discussed in Study 1 highlight the unique qualities of PDM compared to use of illicit drugs. **Study 2** aims to describe the prevalence and correlates of PDM and distinguish low- vs. high-frequency prescription drug misusers (PDMs) in a state population of youth in residential care for antisocial behavior ( $N = 723$ ). This is the first known study to investigate the prevalence and correlates of PDM among youth in institutional care. Findings indicate that adolescents in residential care for antisocial behavior have high rates of PDM and comorbid psychiatric and behavioral problems. Youth served in institutional settings should be routinely screened and treated for PDM and co-occurring disorders. **Study 3** used latent profile analysis (LPA) to identify subtypes of adolescent sedative/anxiolytic misusers ( $N = 247$ ). LPA yielded three classes of sedative/anxiolytic misusers with significant heterogeneity across measures of

psychiatric and behavioral problems. Class 1 (59.1%) was comprised of youth with significantly lower levels of currently distressing psychiatric symptoms, fewer lifetime traumatic experiences, less problematic substance use histories, less frequent antisocial behavior, and less impulsivity than youth in Classes 2 and 3. Class 2 (11.3%) youth had high levels of currently distressing psychiatric symptoms and more frequent antisocial behavior compared to youth in Classes 1 and 3. Class 3 (29.5%) youth evidenced levels of psychiatric and behavioral problems that were intermediate to those of Class 1 and 2 youth. Significant differences between classes were observed across a range of health, mental health, personality, and behavioral variables. Youth with comparatively high levels of anxiety and depression reported significantly more intensive sedative/anxiolytic misuse than their counterparts and may be at high risk for sedative/anxiolytic abuse and dependence.

To Susan, Harper, and our families, whose unwavering support made this possible.

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## CHAPTER 1

### PRESCRIPTION DRUG MISUSE AMONG ADOLESCENTS

*When you're stoned, you get paranoid and you have all those side effects and with hydrocodone you don't. You would be down and you wouldn't really care but you wouldn't have the side effects of paranoia or the munchies. You wouldn't have any of that but you would still be relaxed. You would be calm, you wouldn't have any pain, you wouldn't be thinking about problems and you wouldn't be thinking about school.*

- Female undergraduate, explaining her preference for prescription opioids over marijuana (Quintero, Peterson, & Young, 2006, p. 918)

Adolescence is a time of dramatic biological, cognitive, and social change (Berzonsky, 2000). The transition from childhood to adolescence is marked by increasing responsibility and independence, and is also a time when many adolescents initiate substance use (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Adolescent substance use is associated with a number of undesirable outcomes such as delinquency (D'Amico, Edelen, Miles, & Morral, 2008); unprotected sexual intercourse and pregnancy (Stueve & O'Donnell, 2005); suicide risk (Cho, Hallfors, & Iritani, 2007); and lower academic achievement (Ellickson, Tucker, Klein, & Saner, 2004). Longitudinal research has shown that substance use during adolescence increases risk of adult criminality (Stenbacka & Stattin, 2007); lower educational attainment and unemployment

(Rohde et al., 2007); and adult substance abuse, dependence, and psychiatric disorders (Brook, Brook, Zhang, Cohen, & Whiteman, 2002).

Whereas the prevalence of most illicit drug use has either plateaued or decreased in recent years, prescription drug misuse (PDM) has increased markedly (Colliver, Kroutil, Dai, & Gfroerer, 2006). A recent United Nations (U.N.) report speculated that rates of PDM might soon eclipse that of illicit drug use (U.N. International Narcotics Control Board, 2007). PDM occurs in all age categories, although misuse by adolescents is of particular concern because research has shown high rates of PDM among adolescents. For example, 1 in 10 adolescents reported misusing a prescription pain reliever in 2007 (Johnston et al., 2008). The two aims of this article are to (a) provide a review of the epidemiology of PDM among adolescents, and (b) offer a theoretical explanation of the problem. The unique qualities of prescription drugs (i.e., medically sanctioned, familiar, and often beneficial), as compared with illicit drugs, highlight the importance of a theoretical discussion on the issue of PDM.

The primary focus of this article is on PDM among adolescents age 18 years and younger. This population was targeted because these adolescents generally still live at home. Though adopting 18 years of age as the upper bound of this study is arbitrary from a biological standpoint, it is defensible from a social and cultural standpoint. High-school graduation, which typically occurs around 18 years of age, represents an important social marker in U.S. culture, and the behaviors, including substance use, of those transitioning out of high school are influenced by increased independence, less parental oversight, and new social networks (Maggs, 1997; Schulenburg & Maggs, 2002). Studies have shown that regardless of whether adolescents attended college, those who have transitioned out

of high school reported more substance use than their peers who remained in high school (White, Labouvie, & Papadaratsakis, 2005). Because this article focuses on adolescents 18 years and younger, the literature pertaining to late adolescence was not comprehensively reviewed, though a few studies with this population are cited for specific illustrative purposes.

### *Defining Prescription Drug Misuse*

The literature makes frequent use of several terms to describe the misuse of prescription drugs. Commonly used terms are *misuse*, *abuse*, *dependence*, and *addiction* (Compton & Volkow, 2006); *illicit use* and *medical use* (McCabe et al., 2005); *nonmedical use* (Herman-Stahl, Krebs, Kroutil, & Heller, 2006); and *extra-medical use* (Degenhardt, Chiu, Sampson, Kessler, & Anthony, 2007). In addition, adolescents who misuse these drugs have coined colloquial terms such as *pharming* (Levine, 2007). This article uses *prescription drug misuse* (PDM) to refer to the four subtypes of misuse: (a) use of a prescription drug *without a prescription* (i.e., obtained illegally or not prescribed for the user) that is motivated by experimentation or the desire for euphoria; (b) use of a *legitimately prescribed drug* (i.e., prescribed for the user) for experimentation or achieving euphoria; (c) use of a prescription drug *without a prescription* (i.e., obtained illegally or not prescribed for the user) that is motivated by a perceived physical or psychological need; and (d) use of a *legitimately prescribed drug* (i.e., prescribed for the user) in a way other than that intended by the prescriber to address the user's perceived physical or psychological need (Boyd & McCabe, 2008). In addition to acknowledging divergent motivations for PDM, Boyd and McCabe's (2008) definition captures the

continuum of PDM by accounting for infrequent or experimental use as well as more severe problems of abuse and dependence (American Psychiatric Association, 2000).

### Scope of the Problem

#### *Estimates*

Adolescents and young adults are the largest demographic segment of prescription drug misusers (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009). Opioid (e.g., OxyContin, Vicodin) misuse is second only to marijuana use in prevalence among high-school seniors (12<sup>th</sup> grade) (Johnston et al., 2008). Rates reported in the 2007 National Survey on Drug Use and Health (NSDUH) were similar to MTF estimates; 9.7% of adolescents ages 12 to 17 reported lifetime prescription opioid misuse (Substance Abuse and Mental Health Services Administration, 2009b). Reports of PDM show the lifetime prevalence of PDM for this age group is second only to that of 18 to 25 year olds, of whom 13% of males and 10% of females reported PDM. A sample of 1,086 students in Grades 7 through 12 in one Michigan school district reported a 16% lifetime prevalence of PDM (McCabe, Boyd, & Young, 2007).

Rates of PDM vary by race and gender. Among 12th grade students nationally, 12% of White students reported misusing a prescription opioid as compared to 3% of Black and 5% of Hispanic students (Johnston et al., 2008). Further, White students also reported higher misuse rates of prescription stimulants and CNS depressants, though differences among the racial groups were less extreme than for opioids. Early gender differences in PDM are seen in adolescent females who report slightly higher rates of PDM in the eighth grade than their male counterparts; however, by 12th grade, PDM among males either equals or surpasses that of their female counterparts (Johnston et al.,

2008). These gender differences are consistent with those for several illicit drugs, and are hypothesized to result from earlier maturation among girls than boys.

In 2006, 65,268 emergency department visits among persons 12 to 17 years of age involved the nonmedical use of pharmaceuticals (both prescription and nonprescription) (Substance Abuse and Mental Health Services Administration, 2008). This figure corresponds to an emergency department visit-rate of 256 visits per 100,000 youth. In 2004, over 15,000 adolescent suicide attempts involved use of prescription drugs (Crane, 2006). Over half of these drug-related suicide attempts involved use of a prescription pain medication, a higher percentage than for alcohol, marijuana, or other psychopharmacotherapeutic agents (e.g., antidepressants, antipsychotics, and anxiolytics).

#### *Correlation with Other Substance Use*

Analysis of data obtained from the National Survey on Drug Use and Health (NSDUH) showed adolescents' use of illicit drugs was the strongest correlate of prescription opioid misuse (Sung et al., 2005). The majority of adolescents who misused prescription opioids were polydrug users who shared demographic characteristics with adolescents who used only illicit drugs. Boyd, McCabe, and Teter (2006) reported similar findings in a survey of 1,017 adolescents in the Detroit metropolitan area. Boyd and colleagues found that, compared with other adolescents, youth who misused prescription opioids were eight times more likely to use illicit drugs and four times more likely to binge drink.

Similar findings have been reported for prescription stimulant (e.g., Ritalin) misuse. In a study assessing prescription stimulant misuse among middle- and high-

school students, McCabe and associates (2004) found that adolescents who misused prescription stimulants were much more likely to report binge drinking and use of tobacco, marijuana, and ecstasy than nonusers. However, a study using NSDUH data showed that although an adolescent's binge drinking did not predict prescription stimulant misuse, past use of marijuana and other illegal drugs was a predictor prescription stimulant misuse (Herman-Stahl et al., 2006).

Finally, McCabe and colleagues (2007) surveyed 1,086 secondary school students in the Detroit area about the use and misuse of four categories of prescription drugs: (a) sleeping medications, (b) sedative/anxiety medications, (c) stimulants, and (d) opioids. Findings revealed that for each of the four categories, misuse was associated with the use and abuse of other illicit drugs. McCabe, West, Morales, Cranford, and Boyd (2007) conducted one of the few studies investigating the effect of adolescent PDM on adult outcomes, and found PDM during early adolescence was a significant predictor of prescription drug abuse and dependence in adulthood. In summary, when adolescents who misuse prescription drugs are compared with peers who do not misuse these drugs, findings consistently demonstrate that PDM is a significant correlate of other substance use.

#### *Trends in Use by Specific Drug*

The Monitoring the Future (MTF) survey is a continuing national survey of American youth and young adults' behaviors, attitudes, and values (Johnston et al., 2008). Since its inception in 1975, the MTF has collected data on participants' prescription opioid use. Opium and codeine were the most prevalently used opioids in the early years of the study; while codeine remains one of the most frequently used opioids, it



has been surpassed by Vicodin (Johnston et al., 2008). After a gradual decline from the mid-1970s through the early 1990s, prescription opioid misuse increased sharply until the early 2000s. In 2002, when the MTF prescription opioid item was revised to include OxyContin, Vicodin, Percodan, and Dilaudid, prevalence estimates increased to the highest levels in MTF history. The use of prescription opioids has generally remained stable over the past five years. The use of Xanax, a benzodiazepine, which MTF began assessing in 2001, has overtaken Valium as the most frequently misused CNS depressant. In the early 2000s prescription opioids, tranquilizers, and stimulants stabilized and have remained so through 2007.

#### *Sources of Prescription Drugs for Misuse*

Peers and family members play an important role in PDM. The 2007 MTF survey reported that between 55% and 59% (depending on the prescription drug class misused) of respondents who reported PDM obtained the drugs from a friend or relative with no payment involved (Johnston et al., 2008). Purchasing prescription drugs from friends or family members was reported by 38% to 43% of respondents, whereas stealing drugs from family or friends was mentioned by 17% to 27% of respondents. Adolescents also misuse drugs that have been prescribed for their own medical conditions; 40% of those who misused opioids reported they obtained the drugs using a prescription issued in their name.

Recent research suggests that studies of prescription drug diversion should distinguish friends and relatives as sources of drugs. One study designed to assess motivation for prescription opioid misuse among undergraduate college students showed that opioid misusers who received the prescription drug from their parents did not

significantly differ from nonusers on measures of problematic alcohol use or other substance use (McCabe, Cranford, Boyd, & Teter, 2007). However, misusers who obtained prescription drugs solely from peers were much more likely to have additional alcohol and substance use problems. Knowing whether misusers received drugs from friends *or* relatives (or both) would provide researchers and treatment providers with key information that is currently missing from many studies assessing sources of diverted prescription drugs.

The Internet does not appear to be a major source of prescription drugs misused by adolescents. Only 2% to 3% of adolescents who misused a prescription drug reported obtaining the drugs via the Internet (Johnston et al., 2008). Nevertheless, there has been a marked increase in the number of Web sites selling prescription drugs, of which more than 80% do not require a prescription (NCASA, 2007). The U.S. General Accounting Office (2004) conducted an investigation of Internet pharmacies and procured 68 samples of 11 different drugs, most without a prescription. These drugs included several opioids, and originated from U.S. pharmacies and pharmacies in Canada, Mexico, Pakistan, Spain, and Thailand.

#### *Problems Created for Legitimate Pain Patients*

In addition to the risk PDM poses for individual misusers, PDM is increasingly creating hardships for patients with medical conditions that require powerful drugs. Zacny et al. (2003) asserted that an increasing number of physicians have *opiophobia*, which is hypervigilance regarding the prescribing of prescription opioids and unwarranted skepticism of patients with condition for which these drugs are indicated. In an effort not to be duped by drug-seeking patients, physicians may leave chronic pain

patients untreated or under-treated. In addition, patients who are prescribed powerful opioids may have difficulty getting the prescription filled because increasing numbers of pharmacies refuse to stock highly sought-after opioids due to fear of robbery (Conroy, 2001). This situation is especially prevalent in impoverished, inner-city, and minority neighborhoods (Green, Ndao-Brumblay, West, & Washington, 2005; Morrison, Wallenstein, Natale, Senzel, & Huang, 2000).

### Review of Existing Research

Research on PDM among adolescents has several strengths. Prevalence estimates provided by the MTF (Johnston et al., 2008) and NSDUH (SAMHSA, 2008) surveys provide a vital service for both policy makers and treatment providers. Policy decisions, such as determining funding priorities, are guided by assessments of the nature and size of particular drug problems in the national population. Drugs of abuse tend to fluctuate in popularity, and trend analyses provided by MTF and NSDUH provide valuable, current information to substance use prevention experts, treatment providers, and researchers. However, MTF and NSDUH are limited in important ways in regard to PDM. For example, to assess opioid misuse MTF uses the item, “What narcotics other than heroin have you taken during the last year without a doctor's orders?” (Johnston et al., 2008). However, this item fails to capture three types of misusers: (a) an individual who deliberately overuses a legitimately prescribed drug (i.e., prescribed to that user); (b) an individual who obtains prescriptions from several doctors simultaneously to take excessive amounts of a drug but, who technically is under a doctor's orders (also known as *doctor shopping*); and (c) an individual who uses a prescription drug beyond the time that it is necessary (e.g., using the drug months after surgery when there is no longer a

medical need). Thus, MTF fails to account for individuals who misuse prescription drugs they have been legally prescribed. As previously mentioned, 40% of adolescent opioid misusers identified by MTF reported obtaining the drug they misused via a prescription issued in their name (Johnston et al., 2008). Though the PDM items in the NSDUH questionnaire inquire about misuse of legally prescribed drugs, these items do not distinguish between medical and nonmedical PDM, making it impossible to discern the prevalence of each form of PDM.

To accurately measure any phenomenon, a consistent and accurate definition of the construct is critical. In the study of PDM, some definitions have potentially blurred the distinctions between two types of misuse that differ in an important way. As previously discussed, research has shown that prescription opioid misuse is often motivated by a desire to relieve pain (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Cranford, et al., 2007). Although this type of medical misuse is a cause for concern, it may constitute a fundamentally different behavior than the behaviors typically regarded as adolescent substance use. A comprehensive definition of PDM must include and distinguish between medical motives (e.g., pain relief, anxiety reduction) and motives related to experimentation, a desire for feelings of euphoria, and others.

Finally, existing PDM research is limited by research design. Nearly all PDM research is cross-sectional in nature and, thus, limits the ability of researchers to determine causality or understand the temporal sequencing of problems that are related to PDM. For example, prescription drug misusers frequently use other illicit substances (McCabe et al., 2005; Sung et al., 2005); however, cross-sectional research makes it difficult to determine whether PDM precedes or follows use of other illicit drugs.

Similarly, cross-sectional research limits researchers' ability to understand the course of PDM as the misuse transitions from experimental use to abuse and dependence. A second design problem associated with many PDM studies is sampling. Nearly all PDM research has taken place in schools or, to a lesser extent, in family homes. Such study designs omit incarcerated and institutionalized youth which are two segments of the adolescent population at high risk for substance use (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002).

#### Etiology of Prescription Drug Misuse: Theoretical Frameworks and Risk Factors

The following section offers an etiological explanation of PDM. First, literature from medical anthropology is used to provide a larger context of illness and treatment and how understandings of these issues relate to PDM. Following this discussion, cognitive-affective and interpersonal theories of substance use are applied to the problem.

##### *Anthropological Explanation of Prescription Drug Misuse*

The recent increase in PDM coincided with an increase in the numbers of prescriptions written. Between 1994 and 2005, the U.S. population grew 9% while the number of prescriptions increased by 71% (Kaiser Family Foundation, 2007), and the U.S. is by far the world's largest consumer of opioids (International Narcotics Control Board, 2004). What accounts for these prescribing trends? This section of the paper discusses how PDM fits into the larger context of illness and treatment.

To a varying extent, conceptualizations of illness are the product of culture. This is the concept that medical sociologists and anthropologists refer to when they describe *medicalization*, which was defined by Turner (2004) as the "social processes whereby social activities come under the control of medical institutions" (p. xiv). An increasing

range of human conditions and experiences have become medicalized, that is, moved from the social domain and treated as a medical problem. For example, Conrad (2007) has described the medicalization of the male aging process. A loss of testosterone, balding, and erectile dysfunction were historically seen as ordinary consequences of aging, whereas these occurrences are now regarded as medical problems with corresponding drug treatments. Although conditions are sometimes demedicalized (as was the case with homosexuality beginning in the 1970s), the general trend in contemporary society has been the expansion of medical jurisdiction (Conrad, 2007).

A range of explanations may be offered in response to a particular human problem or condition. These explanations may be social, physical, mental, or spiritual in nature. For instance, in different cultures the causes of schizophrenia have been attributed to past-life trauma (Brazil; Moreira-Almeida & Neto, 2005); demon possession (Australia; Hartog & Gow, 2005); and interpersonal stress (Japan and Taiwan; Kurumatani et al., 2004). However, most people in industrialized countries tend to favor biomedical explanations of human problems. The perceived etiology of these problems then dictates the course of treatment. If an individual manifests symptoms associated with schizophrenia, the preferred treatment (e.g., medication, talk therapy, religious rituals) is dependent on the understanding of etiology. With biological pathology perceived as the primary source of problems in industrialized countries, the corresponding treatment is often medications. Thus, industrialized countries are marked by an ever-increasing range of experiences that are defined as illnesses or disorders and an ever-increasing range of pharmaceutical responses to these conditions. The result is a “pill-popping culture” (National Center on Addiction and Substance Abuse, 2005), exemplified by aggressive

marketing of drugs to health care providers and the increasing use of direct marketing of prescription products to consumers. Oldani (2004), a former pharmaceutical company representative turned anthropologist, stated, "We are not simply all just potential patients. Today, we are increasingly all potential *consumers* of pharmaceuticals..."(p. 345).

The attraction to medicines lies not only in their promise of efficacy but also in their concreteness (van der Geest & Whyte, 1989). For the patient, a prescription for medicine represents a tangible response to their complaint. The patient's reported problems are thus validated by their doctor, and they are then entitled to the "privileges and roles reserved for the sick" (van der Geest, Whyte, & Hardon, 1996, p. 161). The benefits of medicines are not limited to the patient because the medical providers also benefit from the exchange. By writing a prescription, the provider has demonstrated his or her concern and effort to the patient. Both parties feel as though something has been "done." That is, the medical provider's need to give has been met as has the patient's need to receive (van der Geest et al., 1996). Figure 1.1 presents a graphic depiction of the relationship between the biomedical paradigm and prescription drug use, and summarizes the following points: (a) human conditions in industrialized countries are increasingly medicalized; (b) biological pathology is most often considered the source of problems; (c) biological pathology is primarily treated through medications; and (d) the transaction of medications from provider to patient provides perceived benefits to both parties, thus reinforcing their use. These four factors provide the context for the increasing utilization of prescription drugs, which has increased the market of available prescription drugs diverted for misuse.

### *Psychological and Sociological Theories of Adolescent Substance Use*

For reasons described in the preceding section, PDM is qualitatively different than other types of substance use. Therefore, theories commonly used to explain adolescent substance use may require new consideration. The two theories discussed in the following section, the theory of planned behavior (Ajzen, 1985) and social learning theory (Akers, 1992), have special relevance for understanding PDM. The focus on these two theories should not be interpreted as implying that other theories are unimportant to PDM. For example, intrapersonal theories of substance use, such as those emphasizing the implications of novelty-seeking personality traits for substance use (Cloninger, 1987), are important given that many adolescents who misuse prescription drugs are also polydrug users (Sung et al., 2005; McCabe, Boyd, et al., 2007). However, such theories are not considered here because they could be consistently applied across a number of drug categories, whereas the theory of planned behavior and social learning highlight the unique qualities of PDM.

### *Cognitive-Affective Theories of Experimental Substance Use*

Cognitions are the central component of cognitive-affective theories of substance use. Personality traits, such as novelty seeking, would be mediated by an individual's substance-specific expectations and beliefs. One particular example of a cognitive-affective theory of substance use is the theory of planned behavior (TPB; Ajzen, 1985). TPB posits that behavioral beliefs, normative beliefs, and control beliefs form an individual's intentions and actions (Ajzen, 1985). A behavioral belief represents an individual's understanding of the outcomes of a particular behavior. These beliefs determine an individual's attitude toward his or her behavior and whether the behavior



will have desirable or undesirable consequences. Behavioral beliefs influence and are influenced by an individual's normative beliefs, which are an individual's perceptions of how a behavior will be perceived by family, peers, and other important individuals. Normative beliefs determine subjective norms, the perceived pressure by key stakeholders about whether to engage in the behavior in question. Finally, control beliefs are an individual's understanding of the attributes necessary to perform the behavior. Individuals are described as having high perceived behavioral control if they believe they possess the required knowledge, skills, or abilities to carry out a certain behavior. These three factors, attitude, subjective norms, and perceived behavioral control, combine to form an individual's intention to engage in the behavior. The final construct preceding the successful completion of a behavior is actual behavioral control. Though intention may be strong, an individual's execution of the behavior ultimately rests on possessing the necessary knowledge and skills.

Several meta-analyses have provided support for the utility of TPB in predicting behavior across a range of domains (Armitage & Conner, 2001). In the context of substance use, TPB has been used to predict adolescent smoking behaviors (Maher & Rickwood, 1997) and alcohol consumption among early adolescents (Marcoux & Shope, 1997) and college students (Hutchings, Lac, & LaBrie, 2008). An application of TPB in the context of general adolescent substance use could be understood in the following way: potential substance users would (a) weigh the costs and benefits of engaging in use, (b) consider how such behavior would be viewed by key stakeholders such as peers and family, and (c) estimate their confidence about their ability to perform the identified behavior and achieve the desired outcome.

None of the existing research has specifically evaluated TPB in the context of PDM, though the theory seems to have face validity for the problem. Given the pervasiveness of beneficial prescription drug use, and that attitudes toward legitimate use in a medical context tend to be largely positive, it is reasonable that this tendency might favorably affect attitudes regarding misuse of these drugs. In addition, because these medications are known and trusted commodities, they are distinguished from other drugs of abuse that may seem more exotic and dangerous.

Perhaps the TPB construct of control beliefs is most important with regard to PDM. Consider the example of two frequently abused opiates: heroin and Vicodin. In the case of heroin, even when it is assumed that adolescents hold positive attitudes toward heroin use (e.g., fostered increased social capital among peers) and considered its use common among peers (subjective norms), adolescents may still be reluctant to use the drug if they believe themselves to have inadequate knowledge or skills. For example, an adolescent might have questions about how to clean or procure syringes, how much heroin to inject, and where in the body should the drug be injected. These questions regarding heroin use may challenge an individual's belief that he or she can use the drug successfully. Alternatively, the misuse of a prescription drug, such as Vicodin, is likely to present fewer challenges for an individual's control beliefs given the ease of use and availability of information. As with any other pill, Vicodin need only be swallowed, and unlike heroin, Vicodin comes with medically sanctioned dosage instructions. The threshold of knowledge and skill necessary to facilitate its use would be met by many adolescents. To illustrate this point, consider the following quote from a qualitative study of college-age prescription drug misusers (Quintero et al., 2006, p. 919):

To be honest, the reason I did prescription drugs was because it was an escape from doing illegal drugs. Illegal drugs are a lot harder to me. Those seem to have more of an effect. Are you going to overdose?...What's going to happen on this drug? And with illegal drugs you don't know. With a prescription drug, a doctor's not going to give you anything that's going to kill you, unless you take too much of it.

Criticisms of TPB are both empirical and theoretical in nature (Petraitis, Flay, & Miller, 1995). First, there is the issue of measurement. Many studies evaluating TPB are cross-sectional, making it difficult to differentiate whether beliefs and attitudes affect substance use; if substance use experience affects attitudes (i.e., positive experiences might increase favorable beliefs, attitudes, and self-efficacy regarding the drug); or whether beliefs, attitudes, and experiences affect each other in a reciprocal manner. Second, TPB stops short of explaining why some adolescents have preconceived positive expectations of substance use that precede their actual substance experience, as well as why some adolescents place great importance on social capital gained by using or not using substances.

#### *Social Learning Theories of Experimental Substance Use*

Social learning theory posits that an individual's likelihood of substance use is influenced by what has been learned from group norms at the family level, community level, and culture at large (Akers, 1992). This theory bears some similarity to TPB in that it holds cognitions influence substance use behavior. However, social learning theory goes further than TPB in that social learning theory seeks to explain the origins of cognitions. Individuals' cognitions regarding substance use are based on observation,

imitation, and social reinforcement (Petraitis et al., 1995). For example, adolescents raised by substance-using parents or peers learn both how to use (e.g., how to mix alcoholic drinks or smoke marijuana) as well what can be expected (e.g., euphoric feelings or social capital).

This type of learning through observation also applies to prescription drugs. Indeed, this exposure is greater than other types of substances because 9 out of 10 persons in the U.S. population have taken a prescription drug (National Center on Addiction and Substance Abuse, 2005), and prescriptions are now dispensed at a substantially greater rate than at any previous time in history (Zacny et al., 2003). The trend of increased prescription drug use is observable among adolescents as well. Between 1994 and 2001, prescriptions for adolescents increased 209% for stimulants and 385% for anxiolytics and sedatives (Thomas, Conrad, Casler, & Goodman, 2006). Further evidence of adolescents' increased exposure to prescription drugs is provided by a Michigan study in which 45% of students surveyed in a large school district reported having been prescribed opioids (Boyd et al., 2007). The pervasiveness of prescription drug use means that adolescents have ample opportunity to observe appropriate use in the context of daily living. The vast majority of these observations will consist of a neutral or positive outcome; therefore, what is learned through these observations is that prescription drugs are widespread, effective, and safe. Evidence in support of this argument can be found in the MTF study (Johnston et al., 2008). Findings from the 2007 MTF survey indicated that 28% of 12th grade students perceived high risk related to experimental use of CNS depressants as compared with 58% for heroin; 48% for phencyclidine (PCP); 45% for cocaine; and 37% for d-lysergic acid diethylamide (LSD).

As previously discussed, normative beliefs about the safe and appropriate use of prescription drugs may also affect normative beliefs about their misuse. An adolescent who has seen a family member or peer safely and appropriately use a prescription opioid may have difficulty differentiating that use from his or her own misuse.

Increased legitimate prescription drug use as well as increased PDM may also influence perceptions of misuse. For example, a recent study showed that college students overestimated prescription opioid and stimulant misuse to a significantly greater degree than they did for marijuana use (McCabe, 2008). McCabe (2008) described a possible cyclical relationship; perceived norms might predict PDM and subsequent actual PDM then affects perceived norms.

The theory of social learning is not without challenges (Petraitis et al., 1995). First, studies investigating social learning theory must address the time-order issue as it relates to the impact of peer substance use. For example, does peer involvement affect substance use, or is there a self-selection process whereby adolescents at risk for substance use cluster together? Similarly, social learning theory does not address an adolescent's motivation for associating with substance-using peers and, therefore, fails to address factors which facilitate entry into substance-using peer groups.

### *Summary and Analysis*

This article has reviewed theories representing anthropological, cognitive/affective, and interpersonal constructs in the context of adolescent PDM. Though not yet tested in the specific context of PDM, the usefulness of TPB and social learning in understanding other types of adolescent substance use provides face validity for this particular problem. The legality and pervasiveness of prescription drugs make

TBP and social learning theories particularly applicable to understanding misuse. Although both theories are limited in their explanations of substance use, when considered in tandem and in the context of medicalization, they provide a promising explanation of adolescent PDM. The three primary cognitions outlined in TPB, behavioral beliefs, normative beliefs, and control beliefs, could be influenced by social learning theory (i.e., an adolescent's cognitions, the origins of which are unaccounted for in TPB, may result from what is learned in families, among peers, and within the larger social context). Similarly, although limited, the TPB explanation of why adolescents associate with substance-using peers (i.e., because they hold favorable cognitions of substance use) complements social learning theory.

Notably, these theories are considered primarily to understand and explain PDM for reasons other than medical need. As discussed, research among adolescents and young adults has shown that PDM often results from perceived need. One study of high school students found that 69% of those who reported opioid misuse did so solely to relieve pain (Boyd et al., 2006). Similarly, pain relief was the most frequently cited motive among a sample of college-age prescription opioid misusers (McCabe, Cranford, et al., 2007). Although TPB and social learning theory would likely still be informative in understanding this form of PDM, their application would require a modification from that previously described.

### Implications and Conclusions

PDM is relatively common among adolescents. For this reason, substance use prevention programs should include content on PDM. One measurable outcome of such efforts would be changing cognitions adolescents have about risks associated with PDM.

Youth who misuse prescription drugs are likely to use a number of other substances (Sung et al., 2005), and those who progress from experimental substance use to problems of abuse and dependence with one particular substance are likely to be susceptible to problems with other substances (Young, Rhee, Stallings, Corley, & Hewitt, 2006). These points suggest that treatments should not be specific to PDM but should instead target broader problems of abuse, dependence, and related conditions. For example, if providers increase the use of buprenorphine for adolescents dependent on prescription opioids, that treatment should be offered in conjunction with evidence-based psychosocial treatments.

Given the dangers associated with PDM, medical practitioners, human services providers, and school staff should ensure that the adolescents they serve are routinely screened for PDM using a formal screening instrument. Clinical impressions, although valuable, are not sufficient; one recent study reported that pediatricians guided only by clinical impression failed to detect 76 of 86 (88%) cases of adolescent substance abuse or dependence (Wilson, Sherritt, Gates, & Knight, 2004). Improvements in screening and monitoring of patients, both adolescent and adult, are also a critical part of reducing prescription drug diversion. Part of this effort must occur in medical practices as well as in the training providers receive in medical and nursing schools. Studies have shown that medical training programs underemphasize the challenges of prescribing controlled substances and identifying diversion (National Center on Addiction and Substance Abuse, 2005). When PDM is identified, adolescents should be informed about the associated risks and referred for substance use treatment services.

## CHAPTER 2

### PRESCRIPTION DRUG MISUSE AMONG ANTISOCIAL YOUTH

Most epidemiological research examining adolescent prescription drug misuse (PDM<sup>1</sup>) has been conducted in schools, or to a lesser degree, in homes. School-based studies, such as the *Monitoring the Future* (MTF) (Johnston, O'Malley, Bachman, & Schulenberg, 2008) survey, omit populations of truant, dropout, homeless, and institutionalized youth. Neither MTF nor *National Survey on Drug Use and Health* (NSDUH) (Substance Abuse and Mental Health Services Administration, 2009b) include institutionalized youth, an adolescent subpopulation at presumably high risk for PDM (Howard, Balster, Cottler, Wu, & Vaughn, 2008; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002). This study is the first, to our knowledge, to investigate the prevalence and correlates of PDM among youth in institutional care. Specific aims of the study were to describe the prevalence and correlates of PDM and to characterize low vs. high frequency PDMs in a state population of youth in residential care for antisocial behavior.

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<sup>1</sup>Chapters 2 and 3 use the acronym *PDM* to signify *nonmedical prescription drug misuse* (i.e., any non-prescribed use of a prescription drug), which is distinguished from *medical prescription drug misuse* (i.e., the deliberate misuse of a legally prescribed prescription drug by the person for whom the prescription drug was written).



Although nonmedical PDM is a longstanding problem in the U.S., its significance as a public health issue has increased dramatically in recent years. Whereas use of most illicit drugs has plateaued or decreased since the early 1990s, PDM has increased markedly (Colliver, Kroutil, Dai, & Gfroerer, 2006). Adolescents and young adults are among the largest demographic subpopulations of nonmedical prescription drug misusers (PDMs) (Substance Abuse and Mental Health Services Administration, 2009). More than one-in-eleven (9.2%) 12<sup>th</sup> grade students reported prescription opioid misuse in the 2007 MTF national survey; misuse of prescription opioids was second only to marijuana use in the magnitude of its past-year prevalence of use (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Prevalence estimates of the 2007 NSDUH were similar to MTF estimates; 9.7% of adolescents ages 12 to 17 reported prescription opioid misuse (Substance Abuse and Mental Health Services Administration, 2009b).

An analysis of NSDUH data found illicit drug use to be the strongest correlate of prescription opioid misuse among adolescents (Sung, Richter, Vaughan, Johnson, & Thom, 2005). Similar findings were reported in a survey of 1017 adolescents residing in the Detroit metropolitan area (Boyd, McCabe, & Teter, 2006); prescription opioid misusers were eight and four times more likely, respectively, to use other illicit drugs and to binge drink than nonmisusers of prescription opioids. Misuse of non-opioid prescription drugs, such as sedatives and anxiolytics, is also associated with illicit drug use and substance-related problems (McCabe, Boyd, & Young, 2007). In summary, recent findings suggest that PDM is prevalent in the general U.S. adolescent population and that PDMs are significantly more likely than non-PDMs to use illicit drugs.

One of few studies to examine effects of adolescent PDM on adult outcomes found that early adolescent PDM was a significant predictor of PDM and abuse/dependence on prescription drugs in adulthood (McCabe, West, Morales, Cranford, & Boyd, 2007). Though there is limited research on the long-term consequences of adolescent PDM, adolescent substance use in general is associated with adverse outcomes, including lower academic achievement (Ellickson, Tucker, Klein, & Saner, 2004), delinquency (D'Amico, Edelen, Miles, & Morral, 2008), unprotected sexual intercourse and unplanned pregnancy (Stueve & O'Donnell, 2005), and suicide risk (Cho, Hallfors, & Iritani, 2007). Longitudinal research suggests that adolescent substance use also increases risk for criminality (Stenbacka & Stattin, 2007), unemployment (Rohde et al., 2007), substance use disorders and psychiatric dysfunction (Brook, Brook, Zhang, Cohen, & Whiteman, 2002) in adulthood.

## **Methods**

For a full description of the study sample, including recruitment and sampling methods and detailed information regarding study measures, see Howard, Balster, Cottler, Wu, and Vaughn (2008).

### *Study Sample*

The study sample was drawn from the 32 residential rehabilitation facilities of the Missouri Division of Youth Services (DYS), the legal guardian of youth ages 13-17 who are in residential care for antisocial behavior. The 723 youth who were interviewed constituted 97.7% of DYS residents at the time interviews were conducted. Thus, the present study is virtually a census of the population of DYS residents at the time the study was undertaken and a large, representative sample of DYS annual residents. The

DYS client population is representative of youth in residential care for antisocial behavior nationally with regard to age, gender and number of state youth in residential care per 100,000 adolescents (Sickmund, 2002).

Interviews were completed in 2003 and were 60-to-90 minutes in duration. Fifteen graduate students conducted the interviews after completing an intensive 1-day training session. An interview editor and the project principal investigator were on-site at each facility as youth were interviewed to minimize interviewer errors. Interviews were conducted in private areas where confidentiality was assured. Youth signed informed assent forms and were provided with \$10.00 for completing the interview. All youth were provided a description of their privacy rights, a copy of a Washington University brochure, “Your Privacy Matters...,” and a copy of the informed assent agreement. The informed assent form and interview protocol provided residents with detailed information about the study, their rights as human subjects, and the name and contact telephone number for a non-study or university-affiliated advocate whom they could call for more information about the study. DYS was the legal guardian of all youth and provided formal permission for youths to participate in the study. The informed consent and study protocols were approved by the Missouri DYS IRB, Washington University Human Studies Committee IRB, and federal Office of Human Research Protection, and was granted a Certificate of Confidentiality by the National Institute on Drug Abuse.

### *Measures*

*Demographic factors.* Gender, age (years), self-reported racial status (i.e., African American, White, Latino, Biracial, Other), grade (current or last completed), family

receipt of public assistance (yes or no), and urbanicity of family residence (i.e., urban, suburban, small town, rural) were recorded for each youth.

*Medical history.* Respondents indicated whether (yes or no) they had ever experienced each of eight medical conditions (e.g., a head injury that produced unconsciousness; were diagnosed by a psychiatrist or other physician with a mental disorder).

*Prescription drug misuse.* Items assessing PDM were adapted from the *Diagnostic Interview Schedule for DSM-IV* (DIS-IV) (Robins, Helzer, Croughan, & Ratcliff, 1981). Respondents were asked four questions about their use of prescription drugs that were *not* prescribed for them: 1) Have you ever used “other opiates” (e.g., methadone, morphine, OxyContin, Demerol, Vicodin)?; 2) Have you ever used barbiturates (e.g., Downers, Yellow, Reds, Blues, or Soapers)?; 3) Have you ever used tranquilizers (e.g., Valium, Librium, Xanax, Serax)?; and 4) Have you ever used prescription drugs without a prescription [if youth responded “yes” to this item, they were asked to name the prescription drugs they had misused and their responses were recorded verbatim]? Any youth reporting nonprescribed use of “other opiates,” barbiturates, or tranquilizers was classified as a lifetime prescription drug misuser. Youth who answered affirmatively to the fourth question listed above and who reported nonprescribed use of one or more prescription opioids, barbiturates, or tranquilizers were also classified as lifetime PDMs. For each of the four prescription drug misuse questions, youth reported whether or not they had ever used the specific class of prescription drugs (yes or no) and the total number of days in their lifetime during which they had misused that class of prescription drugs (i.e., < 5, 5-10, 11-99, ≥ 100).

*Other substance use.* Use of 14 additional categories of psychoactive substances was assessed: inhalants, heroin, cocaine/crack, speed, marijuana, hallucinogens, malt liquor, other alcohol, ecstasy (MDMA), GHB/GBL, cigarettes, cigars, oral tobacco, and PCP. Youth reported whether or not they had ever used each drug (yes or no) and the number of days of use of that drug in their lifetime ( $< 5$ , 5-10, 11-99,  $\geq 100$ ). Each youth was also characterized in terms of the total number of drug types they had used (range 1-14).

*Substance-related problems.* Lifetime substance-related problems were assessed with the 8-item Alcohol/Drug Use Scale of the *Massachusetts Youth Screening Instrument—2<sup>nd</sup> Version* (MAYSI-2) (Grisso & Barnum, 2000). Youth responded “yes” or “no” to questions assessing maladaptive substance-related behaviors (e.g., whether they had ever been so drunk or high they couldn’t remember what happened). Scores could range from 0 to 8 ( $\alpha = .83$ ).

*Suicidal ideation.* Youth completed the 5-item MAYSI-2 *Suicide Ideation* scale ( $\alpha = .91$ ). Youth responded “yes” or “no” to questions asking whether or not they had ever wished they were dead, felt like life was not worth living, or felt like hurting themselves.

*Lifetime trauma.* All respondents completed a 4-item *Traumatic Experiences* scale adapted from the MAYSI-2. Youth responded “yes” or “no” to items assessing history of specific traumatic experiences (e.g., have you ever seen someone severely injured or killed (in person-not in the movies or on TV?) ( $\alpha = .69$ ).

*Current psychiatric symptoms.* Respondents completed the *Brief Symptom Inventory* (BSI), consisting of 53 items assessing the extent to which youth were “bothered or disturbed” (0 = not at all; 4 = extremely) by a variety of thoughts or feelings

“over the last 7 days including today” (Derogatis, 1993). The BSI yields a global index of overall current psychiatric distress (possible range = 0 to 212,  $\alpha = .96$ ) and scores for 9 primary symptom dimensions: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism ( $\alpha$ 's = .70-.83).

*Antisocial traits.* Youth completed the *Antisocial Process Screening Device* (APSD) (Vitacco, Rogers, & Neumann, 2003), a 20-item scale assessing features of juvenile psychopathy. Respondents were asked to indicate to what extent each statement was true of them (0 = not at all true, 1 = sometimes true, 2 = definitely true). The ASPD total score as well as the Impulsivity ( $\alpha = .67$ ) and Narcissism ( $\alpha = .75$ ) subscales were used in this study. Study participants also completed the 56-item *Psychopathic Personality Inventory Short-Version* (PPI-SV) (Lilienfeld & Andrews, 1996). Youth were asked to decide to what extent each of the personality characteristics described in each statement were false or true as applied to them (1 = false, 2 = mostly false, 3 = mostly true, 4 = true). The PPI-SV yields a total score (possible range = 56 to 224,  $\alpha = .76$ ) and eight subscales: Machiavellian Egocentricity, Social Potency, Coldheartedness, Carefree Nonplanfulness, Fearlessness, Blame Externalization, Impulsive Nonconformity, and Stress Immunity ( $\alpha$ 's = .55-.73).

*Delinquent behavior.* The Self-Report of Delinquency (SRD) (Elliott, Huizinga, & Menard, 1989) was used to assess how many times in the year before they entered institutional care youth engaged in 7 nonviolent and 10 violent crimes. Responses could range from 0 (never) to 8 (2-3 times a day) for each item. Total SRD scale scores could range from 0 to 136, while the ranges of possible scores were 0-56 and 0-80 for the

nonviolent and violent offense subscales, respectively. Using the same response format, youth completed a 4-item Victimization Index (possible range = 0 to 32,  $\alpha = .76$ ) to assess frequency of personal experiences of criminal victimization (e.g., “were hit by someone trying to hurt you”) in the year prior to institutionalization. Youth also reported the ages at which they first committed a criminal offense and had contact with police, respectively.

### *Data Analysis*

The participation rate for this study was high and there were few missing data; most items were missing less than 1% of responses. In instances where case deletion results in the loss of a very small proportion of the overall sample, it is an appropriate approach to handling missing data (Schafer & Graham, 2002) and was utilized in reported analyses. Bivariate and adjusted comparisons of lifetime PDMs and non-PDMs were conducted using  $\chi^2$  and logistic regression for categorical variables and t-tests and multiple regression for continuous variables. Homogeneity of variance assumptions were tested and degrees of freedom adjusted as appropriate. Effect sizes were computed and presented as either odds ratios or Cohen’s *d* (Cohen et al., 2003). Multiple logistic regression analyses were used to identify correlates of PDM and to differentiate low (1 to 10 lifetime occasions of use,  $N = 143$ ) vs. high ( $\geq 11$  lifetime occasions of use,  $N = 162$ ) frequency PDMs.

## **Results**

*Sample characteristics.* Demographic features of the sample are presented in Table 2.1. The sample was composed largely of boys; nearly two-thirds were 15 or 16

years old. Subjects were ethnically diverse and a substantial minority (40.3%) reported that their families currently received public assistance.

*Prevalence of PDM.* Overall, 314 (43.4%) youth reported lifetime PDM. Prescription opioids, tranquilizers, and barbiturates were misused by 33.7%, 32.0%, and 11.2% of the sample, respectively. PDMs often misused multiple classes of prescription drugs. For example, 72.3% of tranquilizer misusers also misused prescription opioids. Of all PDMs, 40.1% misused a prescription drug from only one class, 43.0% misused drugs from two classes, and 16.9% misused drugs from all three prescription drug classes. Thus, a majority of PDMs were users of multiple classes of prescription drugs.

*Bivariate comparisons of PDMs and non-PDMs.* Space limitations preclude a complete presentation and discussion of bivariate comparisons of PDMs and non-PDMs; thus, only results of significant bivariate contrasts of PDMs and non-PDMs are presented in Table 2.2. However, nonsignificant findings not reported in Table 2.2 are available by request from the first author. PDM was significantly more prevalent among girls (54.3%) than boys (41.8%), but differences by gender across the three classes of prescription drugs with regard to mean age at first use or number of lifetime days of use were not significant. PDMs did not differ from non-PDMs with regard to proportions with families receiving welfare, but did differ significantly from non-PDMs across measures of age, gender, race, and urbanicity of family residence. PDMs were older and more likely to be girls, White, and reside in a small town than non-PDMs.

A significantly larger percentage of PDMs than non-PDMs sustained a head injury that resulted in loss of consciousness. Significantly more PDMs than non-PDMs had been diagnosed by a psychiatrist or other physician with a psychiatric disorder, and



PDMs evidenced significantly greater severity of current psychiatric symptoms on the BSI Global Severity Index and on eight of nine BSI subscales than non-PDMs. PDMs evidenced significantly greater antisociality on the APSD total score measure and impulsivity subscale compared to non-PDMs. Similarly, PDMs had significantly higher scores on the PPI total score measure of psychopathy as well as six of eight PPI subscales.

PDMs were significantly more likely than non-PDMs to have used all categories of psychoactive substances (complete findings available on request). Of variables examined in bivariate contrasts, mean lifetime number of drug types used evidenced the largest effect ( $d = 1.76$ ). In addition, PDMs reported more lifetime days of use than non-PDMs for marijuana [ $t(622) = -9.7, p < .001$ ], LSD [ $t(163) = -2.3, p < .05$ ], malt liquor [ $t(302) = -5.9, p < .001$ ], beer, wine, liquor [ $t(585) = -11.1, p < .001$ ], cigarettes [ $t(239) = 6.8, p < .001$ ], and cigars [ $t(289) = -4.4, p < .001$ ]. PDMs had significantly higher scores than non-PDMs on the MAYSI-2 subscales assessing lifetime number of alcohol and drug-related problems, suicide ideation, and traumatic experiences.

PDMs did not differ significantly from non-PDMs in the number of past-year violent crimes they committed, but did commit significantly more numerous past-year property crimes than non-PDMs. Also, the mean ages at commission of first crime and first contact with police were significantly younger for PDMs than non-PDMs.

*Multiple logistic regression analysis identifying correlates of PDM.* Variables were included in the logistic regression model identifying correlates of PDM based on prior findings in the PDM and general substance use literatures and results of bivariate analyses. A correlation matrix of continuous independent variables was examined for

evidence of multicollinearity, and none of the obtained Pearson Product-Moment correlations exceeded  $r = 0.5$ . The following independent variables were simultaneously entered into the multiple logistic regression model: gender (male = 1, female = 0), race (African American [reference group], White, Latino/Latina, Other), age (years), urbanicity of family residence (small town = 1, other areas = 0), history of mental illness (0 = no, 1 = yes), lifetime inhalant use (0 = no, 1 = yes), lifetime cocaine/crack use (0 = no, 1 = yes), lifetime marijuana use (0 = no, 1 = yes), lifetime LSD use (0 = no, 1 = yes), MAYSI-2 Substance-related problems scale, BSI-Global Severity Index, PPI-Carefree Nonplanfulness subscale, PPI-Fearlessness subscale, SRD-Property Crime subscale, APSD-Impulsivity subscale, MAYSI-2 Suicidal ideation subscale, and MAYSI-2 Traumatic Experiences subscale.

Model coefficients, statistical tests, odds ratios, and 95% confidence intervals for odds ratios are presented in Table 2.3. Seven covariates were significant at  $p < .05$ .

Compared to African Americans, youth identifying as White or other ethnicities were approximately three times as likely to report PDM. A one-year increase in age increased the odds of PDM by a factor of 1.6. The highest odds ratios for the model were observed for substance use variables. Marijuana users were nine times ( $OR = 9.2$ ) more likely than non-marijuana users to report PDM, whereas prior experiences with inhalants ( $OR = 2.8$ ) and LSD ( $OR = 4.3$ ), and an impulsive temperament ( $OR = 1.1$ ), were also significant risk factors for PDM.

*Bivariate comparisons of low- and high-frequency PDMs.* Detailed results of bivariate comparisons of low- and high-frequency PDMs, including statistical test results and effect sizes, are available on request from the first author. Low- and high-frequency

PDMs did not differ on any demographic variables other than racial status; African Americans were more likely to be low-frequency PDMs compared to youth of other races. High-frequency PDMs were significantly more likely than low-frequency PDMs to report having experienced a head injury that caused unconsciousness and to have been diagnosed with a psychiatric disorder. High-frequency PDMs also had significantly higher scores than low-frequency PDMs on the PPI total score measure, and PPI subscales assessing impulsive nonconformity and carefree nonplanfulness. Scores on the APSD impulsivity subscale, MAYSI-2 suicidal ideation and traumatic experiences scales, and Victimization Index were also significantly higher for high-frequency than low-frequency PDMs. High-frequency PDMs also had significantly higher scores on seven of nine BSI scales, committed significantly more past-year violent and property crimes, and evidenced an earlier onset of criminal behavior than low-frequency PDMs.

*Multiple logistic regression analysis discriminating high- vs. low-frequency PDMs.* Variables were included in the multiple logistic regression analysis distinguishing high- vs. low-frequency PDMs (low = 0, high = 1) if they were significantly associated with frequency of PDM in bivariate contrasts. If two variables were highly correlated and conceptually similar, one was excluded from the analysis. The following variables were simultaneously entered into the logistic regression model: race (African American [reference group], White, Latino/Latina, Other), history of head injury with loss of consciousness, BSI-Somatization and Anxiety subscales, MAYSI-2 Substance-Related Problems scale, APSD-Impulsivity subscale, PPI-Carefree Nonplanfulness subscale, SRD-Violent Offending and Property Crime subscales, victimization index, age at first crime, and MAYSI-2 Suicidal Ideation scale.

Results of the logistic regression analysis distinguishing high versus low-frequency PDMs are presented in Table 2.4. Greater temperamental impulsivity and more numerous lifetime substance-related problems were characteristic of high-frequency PDM. Extent of past-year criminal victimization approached statistical significance ( $p = .08$ ).

## **Discussion**

The lifetime prevalence of PDM in this state population of institutionalized youth was 43.4%; this PDM prevalence estimate is considerably higher than comparable estimates reported for the general U.S. adolescent population. Prevalence estimates for lifetime prescription opioid and tranquilizer misuse in this sample were nearly three times the lifetime use prevalence rates reported for adolescents in the *Monitoring the Future* study (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Further, a majority of youth reporting PDM had misused multiple classes of prescription drugs.

More than half (54.3%) of the girls interviewed in this study reported PDM, compared to 41.8% of boys. In 8<sup>th</sup> grade, girls in the general population report slightly higher rates of PDM than boys; however, by 12<sup>th</sup> grade, PDM among boys equals or surpasses that of girls (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Thus, it is possible that the higher rate of PDM among girls in this study is attributable to the average age of the sample. The scarcity of girls in this sample older than 16 prevented comparisons of younger and older youth. Future research should investigate PDM among older youth to discern whether the gender differences observed among antisocial youth in this study dissipate over time.

PDM was most prevalent among White (55.5%) and Latino (53.5%) youth. Although “only” 18.5% of African American youth reported PDM, this rate is notably higher than that reported for African American youth participating in 2007 *Monitoring the Future* survey (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Rates of lifetime prescription opioid misuse for 12<sup>th</sup> grade students participating in the 2007 MTF were 17% for Whites, 4% for African Americans, and 7% for Latinos. In this study of younger respondents, prescription opioid misuse was reported by 46% of Whites, 9% of African Americans and 43% of Latinos. Thus, differences between racial groups have been observed in the general U.S. adolescent population and in this study of high risk youth, although in absolute terms the rates are much higher among the high-risk youth studied in this investigation.

Youth from small towns were disproportionately more likely to report PDM. This finding is consistent with prior research reporting higher prevalence rates of Vicodin and OxyContin use in nonmetropolitan areas (McCabe, Boyd, & Teter, 2005). Prescription opioid misuse in the general U.S. adolescent population has leveled off in recent years, although the rate of misuse among adolescents living in nonmetropolitan areas has continued to rise (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Despite the increasing prevalence of PDM among urban and suburban youth, PDM remains a form of substance use that is disproportionally located in nonmetropolitan areas.

PDMs evidenced a number of serious medical, psychiatric, and behavioral problems, including more varied, frequent, and problematic psychoactive substance use, higher levels of distressing psychiatric symptoms, and significantly greater likelihood of diagnosis with mental illness. Traumatic life experiences, more extensive histories of

criminal victimization, and higher levels of suicidal ideation were also found disproportionately in PDMs. These findings raise the possibility that some PDM results from adolescents' efforts to self-medicate dysphoric or anxious mood states. Previous research has distinguished subgroups of PDMs based on motives for use (Boyd, McCabe, Cranford, & Young, 2006). Some nonmedical misusers of prescription drugs are motivated to self-medicate symptoms of psychiatric (e.g., anxiety) or medical (e.g., pain) problems, whereas others may be motivated by curiosity about drug effects or the desire to achieve euphoria. The high rates of PDM among youth in residential care may reflect efforts to self-medicate symptoms of anxiety and depression, a greater propensity to seek out euphoric experiences, or both. Future PDM research should examine reasons for use as prevention and intervention efforts in this area will likely require such information if they are to be optimally effective.

High-frequency PDMs represented an especially troubled group of adolescents. In comparison with low-frequency PDMs, high-frequency PDMs were more impulsive, committed more property and violent crimes, initiated criminal careers at an earlier average age, and were more likely to report a history of head injury, criminal victimization, traumatic life events, psychiatric disorder, and distressing psychiatric symptoms.

Consideration of motives for PDM (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Boyd, & Teter, 2009) may also provide a useful context for understanding frequency of PDM. High-frequency PDMs reported higher levels of physical and psychiatric problems that could lead to misuse of prescription opioids, benzodiazepines, and barbiturates. At the same time, impulsivity and substance-related problems were also

predictive of high-frequency PDM, suggesting that prescription drugs may represent just another type of substance abuse for these youth. Given that most PDMs report different motives for different episodes of misuse (McCabe, Boyd, & Teter, 2009), it seems likely that youth in this study may also have had varied intentions. These findings illustrate the importance of developing a more nuanced understanding of the etiology of PDM among various subpopulations of adolescents including those in different clinical and service settings.

Most research assessing the prevalence, correlates, and predictors of PDM has been conducted in schools and household settings. A key strength of this study is that it is among, if not the first to examine the epidemiology of PDM in a sample of high-risk youth in residential care. Other study strengths include the high participation rate and large sample size. This research has two limitations: (1) the study did not assess prescription stimulant misuse, and (2) PDM questions asked respondents whether they had used a prescription drug when it was not prescribed for them. This item structure may not have captured youth who misused their own legally prescribed prescription drugs. These two limitations (and the self-report nature of the drug use measures) may have resulted in an underestimation of the overall prevalence of PDM in this sample; that said, the prevalence rates identified were among the highest yet reported for any adolescent subpopulation and underscore the seriousness of the current PDM epidemic in the U.S.

## **CHAPTER 3**

### **SUBTYPES OF ADOLESCENT SEDATIVE/ANXIOLYTIC MISUSERS:**

#### **A LATENT PROFILE ANALYSIS**

##### **1. Introduction**

Prescription drug misuse (PDM<sup>1</sup>) is prevalent in the U.S. An estimated 6.4 million persons ages 12 and older reported past-month PDM in 2005 (Lessenger & Feinberg, 2008). Adolescents and young adults are the largest demographic subpopulation of nonmedical prescription drug misusers (PDMs) (Substance Abuse and Mental Health Services Administration, 2009). Sedative/anxiolytic misuse is among the most prevalent and consequential forms of adolescent PDM. In national surveys, 9.3% and 9.5% of 12<sup>th</sup> grade students report lifetime sedative and anxiolytic misuse, respectively (Johnston, O'Malley, Bachman, & Schulenberg, 2008). Increases in the prevalence of sedative/anxiolytic misuse may reflect increases in the number of prescriptions written for drugs in these classes. Between 1994 and 2001, there was a 385% increase in the number of sedative/anxiolytic prescriptions written for adolescents (Thomas, Conrad, Casler, & Goodman, 2006). Diversion of these agents is common and is a key factor in the growing misuse of drugs in these classes (Boyd, McCabe, Cranford, and Young, 2007; Johnston, O'Malley, Bachman, & Schulenberg, 2008).



Misuse of prescription sedatives or anxiolytics is highly correlated with illicit substance use among adolescents (Boyd, McCabe, & Teter, 2006; McCabe, Boyd, & Young, 2007; Sung et al., 2005). One of few studies to investigate effects of adolescent PDM on adult outcomes found that PDM in early adolescence was a significant predictor of PDM and dependence on prescription drugs in adulthood (McCabe, West, Morales, Cranford, & Boyd, 2007). Sedative/anxiolytic misuse can contribute to impaired judgment, impulsive or disinhibited behavior, substance dependence, and adverse medical outcomes such as respiratory depression and arrest (particularly in combination with alcohol) (National Institute on Drug Abuse, 2005). Long-term anxiolytic use may result in cognitive deficits that persist even when the drugs are discontinued (Stewart, 2005). Given the notable prevalence and seriously adverse consequences of prescription sedative/anxiolytic misuse, this study focused specifically on adolescent sedative/anxiolytic misusers.

Previous surveys of PDMs have identified categories of misusers based on motive(s) for use, route(s) of administration, and co-ingestion with alcohol (McCabe, Boyd, & Teter, 2009). Using these characteristics, three categories of misusers were established: *self-treatment misusers* who misuse prescription drugs to treat perceived medical or psychiatric problems, *recreational misusers* who misuse prescription drugs for experimental reasons or to achieve euphoria, and *mixed motive misusers* who report self-treatment and recreational motives for use on different occasions (McCabe, Boyd, & Teter, 2009). These subtypes of PDMs may differ in important ways. Compared to self-treatment opioid misusers, adolescent recreational and mixed-motive opioid misusers reported higher levels of marijuana use, alcohol abuse, binge drinking, and substance-

related problems (Boyd, McCabe, Cranford, & Young, 2006). Importantly, differences among subtypes vary depending on the prescription drug class misused. A study of PDM in an undergraduate sample showed that self-treatment misusers of hypnotics, sedatives/anxiolytics, and prescription stimulants reported more substance use and substance-related problems than nonusers of these agents (McCabe, Boyd, & Teter, 2009). Self-treating prescription opioid misusers, however, did not differ significantly from nonusers of prescription opioids with regard to substance use and substance-related problems. These findings suggest that there may be important, but largely unrecognized, differences between misusers of different classes of prescription drugs.

The primary aim of the research reported herein was to use latent profile analysis (LPA) to develop an empirically-based taxonomy of adolescent sedative/anxiolytic misusers. Prior empirical work in this area is limited to a small number of studies that differ from the present study in important ways. For example, in contrast to the school-based sample used by Boyd, McCabe, Cranford, and Young (2006), the sample used for these analyses consisted of youth in residential treatment for antisocial behavior. This group is at high-risk for substance use and co-morbid psychiatric disorders (Howard, Balster, Cottler, Wu, & Vaughn, 2008; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002), though no prior studies, to our knowledge, have specifically investigated PDM among delinquent or institutionalized youth populations. A second notable difference between previous studies of PDM subtypes and the present study involves the types of measures and analytic strategy employed. This study used a wide range of psychiatric, health, personality, and behavioral measures in conjunction with a person-centered analytic approach to identify classes of adolescent sedative/anxiolytic misusers. Given

these and other differences, this effort was exploratory in nature and the number and nature of potential PDM classes were not specified *a priori*.

Identifying subtypes of PDMs could be useful in future efforts to match specific prevention and treatment interventions to adolescent PDMs with different constellations of attributes. Malleable risk factors may differ among subtypes of adolescent PDMs; for example, prevention efforts for self-treatment misusers may emphasize mental health treatment, whereas prevention efforts for recreational misusers may resemble general substance use prevention activities. Additionally, a better understanding of subtypes of sedative/anxiolytic misusers may enable earlier identification of youth at risk for sedative/anxiolytic misuse, abuse, and dependence. Some youth may become dependent after using sedatives/anxiolytics primarily for self-treatment purposes, whereas for others, sedative/anxiolytic misuse may reflect a general substance use problem.

## **2. Methods**

### *2.1 Sample and procedures*

For a full description of the parent study from which the current sample is drawn, including recruitment and sampling methods, as well as detailed information about all measures, see Howard et al., 2008. The present study sample of sedative/anxiolytic misusers (N = 247) was drawn from a larger (N = 723) 2003 survey of youth in residential care for antisocial behavior in Missouri. The survey completed interviews with 97.7% of youth residing at the 32 residential facilities comprising the Missouri Division of Youth Services treatment system, making it a virtual census of the population of youth in state care for antisocial conduct at that time.

Fifteen graduate students conducted project interviews after completing an intensive 1-day training session. An interview editor and the project principal investigator were on-site at each facility as youth were interviewed to minimize interviewer errors. Interviews were 60-to-90 minutes in duration and were conducted in private areas where confidentiality was assured. Youth signed informed assent forms and were provided with \$10.00 for completing the interview. All youth were provided a description of their privacy rights, a copy of a Washington University brochure, “Your Privacy Matters...,” and a copy of the informed assent agreement. The informed assent form and interview protocol provided residents with detailed information about the study, their rights as human subjects, and the name and contact telephone number for a non-study or university-affiliated advocate whom they could call for more information about the study. The Missouri Division of Youth Services was the legal guardian of all youth and provided formal permission for residents to participate in the study. The informed consent and study protocols were approved by the Missouri DYS IRB, Washington University Human Studies Committee IRB, and federal Office of Human Research Protection, and were granted a Certificate of Confidentiality by the National Institute on Drug Abuse.

## *2.2 Measurement of sedative/anxiolytic misuse*

Items assessing sedative/anxiolytic misuse were adapted from the *Diagnostic Interview Schedule for DSM-IV* (DIS-IV) (Robins, Helzer, Croughan, & Ratcliff, 1981). Respondents were asked three questions about their use of sedatives and anxiolytics that were *not* prescribed for them: 1) Have you ever used barbiturates (e.g., Downers, Yellows, Reds, Blues, or Soapers)?; 2) Have you ever used tranquilizers (e.g., Valium,

Librium, Xanax, Serax)?; and 3) Have you ever used prescription drugs without a prescription? [If youth responded “yes” to this query, they were then asked to name the specific prescription drug(s) they had used and their responses were recorded verbatim]. Any youth reporting nonprescribed barbiturate or tranquilizer use was classified as a lifetime nonmedical prescription drug misuser. Additionally, youth who answered affirmatively to the third question listed above and who reported nonprescribed lifetime use of one or more prescription sedatives or anxiolytics were also classified as lifetime nonmedical prescription drug misuser. Overall, prescription anxiolytics and sedatives were misused by 32.0% and 11.2% of the larger sample, respectively. The majority of youth who reported sedative misuse also reported anxiolytic misuse; of the 80 sedative misusers, 64 (80%) reported anxiolytic misuse, indicating considerable overlap among the two categories of PDM. Combined, these items resulted in a total of 247 lifetime sedative/anxiolytic misusers.

### 2.3 Analysis

Latent profile analysis (LPA) was conducted with Mplus 4.2 (Muthen & Muthen, 2006) and used to identify subtypes of adolescent PDMs. LPA is an extension of latent class analysis (LCA) and is similar to other latent variable approaches such as factor analysis; all are methods of data reduction used to identify subgroups within a larger population (Muthen & Muthen, 2000). Whereas LCA uses only categorical variables to identify homogenous subgroups, LPA can also use continuous measures. Notably, LCA/LPA analyses classify individuals based on observed *indicator* variables. In LCA and LPA, an individual’s observed scores are considered indicators of a latent variable. As such, respondents’ observed data cluster with those of other respondents in the same

latent class and differ from those in other latent classes. Model building is conducted in a stepwise manner until an optimal model fit is achieved. As probability-based methods, LCA and LPA possess advantages over more rigid grouping methods such as cluster analysis, which rely on measures of distance between observations. As such, LCA and LPA allow researchers to know the probability of assignment to  $k$  latent classes for each respondent.

Although there is not a single measure of model fit for latent variable modeling, the Bayesian Information Criterion (BIC) is a commonly used and reliable measure (Nylund, Asparouhov, & Muthen, 2007). Lower BIC values represent better model fit. A second measure of model fit is the Lo-Mendell-Rubin (L-M-R) likelihood-ratio test statistic (Nylund et al., 2007). The L-M-R provides a significance test comparing a more complex model to a model with one less class. In this comparison, a nonsignificant L-M-R indicates that the more parsimonious model cannot be rejected. A third criterion for model fit is latent class probability (Muthen & Muthen, 2000). The latent class probability statistic represents the likelihood that subjects are consistently assigned to a particular class. Higher values represent better model fit; for example, a class probability value of .99 would indicate that a respondent's assignment to a particular class was consistent 99% of the time. Finally, entropy values range from zero to one and are estimated for each model. Values closer to one represent more accurate assignment to subgroups. The BIC value, L-M-R test, latent class probability estimates, and entropy were used to assess model fit. Further considerations relevant to model selection were the conceptual interpretability and parsimony of derived models.

2.3.1 *Measures used for latent profile modeling.* The nine variables presented in Table 3.1 were the indicators used for LPA modeling. Indicators one through four consisted of scores on the following *Brief Symptom Inventory* (BSI) subscales: Somatization, Depression, Anxiety, and Phobic Anxiety (Derogatis, 1993). For these subscales, youth were asked to what extent they were “bothered or disturbed” by a variety of thoughts or feelings “over the last 7 days including today.” Subscale items assessed psychiatric distress experienced in relation to each symptom domain. Symptoms of anxiety and depression may be associated with sedative/anxiolytic misuse as a form of self-treatment (Becker, Fiellin, & Desai, 2007). Youth who use these drugs experimentally, however, may report comparatively low scores on these scale items. Indicator five was the Traumatic Experiences scale of the *Massachusetts Youth Screening Instrument—2<sup>nd</sup> Version* (MAYSI-2; Grisso & Barnum, 2000). Traumatic experiences are included as an indicator variable because they reliably predict anxiety, depression, and other psychiatric problems (Copeland, Keeler, Angold, & Costello, 2007), which could lead to self-treatment with sedative/anxiolytic drugs. Indicators six and seven, the MAYSI-2 Alcohol/Drug Use scale and lifetime number of drug classes used, were selected because, unlike self-treatment misusers, recreational misusers have been found to have significantly higher levels of illicit substance use and substance-related problems (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Boyd, & Teter, 2009). Because previous studies with youth in this sample have shown high rates of comorbid substance use and psychiatric conditions (Howard et al., 2008), two additional indicators were included in an effort to further distinguish distinct classes of sedative/anxiolytic misusers. Indicator eight, the Self-Report of Delinquency (SRD; Elliott, Huizinga, & Menard,

1989), assessed how many times youth engaged in 7 nonviolent and 10 violent crimes in the year before they entered residential care. The final indicator was the Impulsivity subscale of the *Antisocial Process Screening Device* (APSD; Vitacco, Rogers, & Neumann, 2003). Delinquency and impulsivity are significantly correlated with substance use (D’Amico, Edelen, Miles, & Morral, 2008; Dawe & Loxton, 2004) and may represent additional domains that usefully discriminate between existing subtypes of sedative/anxiolytic misusers.

*2.3.2 Measures used to compare classes.* Classes identified using LPA were compared across demographic, health, mental health, substance use, personality, and criminological profiling measures. Demographic variables included gender, age (years), self-reported racial status (i.e., African American, White, Latino, Biracial, Other), grade (current or last completed), family receipt of public assistance (yes or no), and urbanicity of family residence (i.e., urban, suburban, small town, rural). Eight medical conditions (e.g., head injury producing unconsciousness; mental illness diagnosed by a psychiatrist or other physician) were assessed by asking respondents whether (yes or no) they had ever experienced each condition.

Frequency of substance use was assessed by asking youth the number of days of use in their lifetime for each of 15 categories of psychoactive substances (< 5, 5-10, 11-99, and  $\geq 100$ ). Classes were also compared using the 5-item MAYSI-2 *Suicide Ideation* scale ( $\alpha = .91$ ), assessing thoughts and feelings about suicide (e.g., “have you ever wished you were dead”). Current (i.e., past week) psychiatric symptoms were compared among classes using five BSI symptom subscales: Obsessive-Compulsive, Interpersonal Sensitivity, Hostility, Paranoid Ideation, and Psychoticism ( $\alpha$ ’s = .70-.83).



Antisocial traits were assessed among the classes using the 56-item *Psychopathic Personality Inventory Short-Version* (PPI-SV; Lilienfeld and Andrews, 1996). Youth were asked to decide to what extent each of the personality characteristics described in each statement were false or true as applied to them (1 = false, 2 = mostly false, 3 = mostly true, 4 = true). The PPI-SV yields a total score (possible range = 56 to 224,  $\alpha = .76$ ) and eight subscales: Machiavellian Egocentricity (e.g., “I am more important than most people”), Social Potency (e.g., “I am a good conversationalist”), Coldheartedness (e.g., “It bothers me greatly when I see someone crying”; reverse scored), Carefree Nonplanfulness (e.g., “I generally prefer to act first and think later”), Fearlessness (e.g., “I occasionally do something dangerous because someone has dared me to do it”), Blame Externalization (e.g., “A lot of people in my life have tried to stab me in the back”), Impulsive Nonconformity (e.g., “I’ve always considered myself to be something of a rebel”), and Stress Immunity (e.g., “I’m the kind of person who gets stressed out pretty easily”; reverse scored) ( $\alpha$ ’s = .55-.73). Study participants also completed the 7-item APSD Narcissism subscale ( $\alpha = .75$ ).

Classes were also compared using a 4-item Victimization Index (possible range = 0 to 32,  $\alpha = .76$ ) to assess frequency of personal experiences of criminal victimization (e.g., “were hit by someone trying to hurt you”) in the year prior to entering residential rehabilitation. Responses could range from 0 (never) to 8 (2-3 times a day) for each item. Youth also reported the ages at which they first committed a criminal offense and had contact with police.

### 3. Results

#### *3.1 Characteristics of adolescent sedative/anxiolytic misusers*

The predominantly male (83.8%) sample had a mean age of 15.8 years (S.D. = 1.1). Most youth were White (70.0%), followed by African American (13.8%), Latino (5.3%), and other ethnicities (10.9%). A majority of youth reported residing in nonmetropolitan areas prior to entering residential treatment (53.8% small town/rural vs. 46.2% urban/suburban).

#### *3.2 Latent profile analysis*

LPA models with two, three, and four classes were analyzed. Table 3.2 presents fit indices for the three models assessed. Using the criteria previously described, the three-class model was selected as the best fit to the data. The three-class model had a smaller BIC value than the two-class model and a statistically significant L-M-R test, indicating that the addition of a third class improved model fit compared to the two-class solution. Though the four-class solution had a lower BIC value and higher entropy score than the three-class model, it had slightly lower average class probability than the three-class model. Additionally, the four-class model yielded one class ( $N = 9$ ) that was too small to use in subsequent analyses of differences among latent classes. Finally, the L-M-R test of the four-class solution was nonsignificant, indicating that the addition of a fourth class did not significantly improve model fit over the three-class solution.

Table 3.3 provides mean comparisons across the nine indicator variables for the three derived latent classes. ANOVAs and Tamhane post-hoc tests reveal clear differences among the three classes. Class 1 was the largest (59.1%,  $n = 146$ ) group, consisting of youth with comparatively low levels of psychiatric distress, traumatic

experiences, substance use, antisocial behavior, and temperamental impulsivity. Class 2 was the smallest (11.3%,  $n = 28$ ) group and was comprised of youth distinguished primarily by high levels of distress due to somatization, depression, anxiety, and phobic anxiety symptoms in comparison with Classes 1 and 3. Class 3 (29.5%,  $n = 73$ ) consisted of youth with moderately elevated scores across the nine indicator variables. Though Classes 2 and 3 did not differ significantly on five of nine indicator variables, all three classes were clearly distinguished by scores on measures assessing current distress due to psychiatric symptoms. Figure 3.1 presents standardized means of the three classes across each indicator variable.

### *3.3 Comparisons of adolescent sedative/anxiolytic misuser latent classes*

The three latent classes of sedative/anxiolytic misusers were compared across demographic, physical/mental health, substance use, personality, and criminological measures. Results of these analyses are presented in Table 3.4. Due to space limitations, only significant findings are presented. Non-significant findings are described in the footnote to Table 3.4 and are available from the first author by request. There were no significant group differences across demographic variables, though girls (25.0%), Latinos (17.9%), and youth residing in urban areas (46.4%) were overrepresented in Class 2.

Class 1 youth reported a history of fewer health and mental health problems than youth in Classes 2 and 3. Over half of youth in Class 2 reported a history of head injury producing unconsciousness, a significantly higher proportion than reported by youth in Classes 1 and 3. Youth in Class 3 were more likely to have been diagnosed with a mental illness than members of Class 1, whereas youth in Class 2 were more likely to report a history of hearing voices compared with members of Class 1. Each of the three classes

differed significantly on the MAYSI-2 suicidal ideation scale and the five BSI subscales used for profile analysis. Class 1 and Class 2 youth evidenced the lowest and highest psychiatric severity, respectively. Substantial differences were observed between Classes 1 and 2 for suicidal ideation (Cohen's  $d = 1.4$ ), obsessive-compulsive symptoms ( $d = 3.4$ ), interpersonal sensitivity ( $d = 2.2$ ), hostility ( $d = 1.9$ ), paranoid ideation ( $d = 2.5$ ), and psychoticism ( $d = 2.8$ ).

Frequency of substance use differed significantly among classes for several drug use categories. Class 1 consistently reported the lower frequency of use for each of 15 psychoactive substances, whereas no significant differences in frequency of use were observed between Classes 2 and 3. Notably, frequency of lifetime sedative/anxiolytic misuse was significantly greater among youth in Classes 2 and 3 compared to youth in Class 1.

Members of Classes 2 and 3 evidenced significantly greater antisocial personality traits on the APSD narcissism subscale compared to members of Class 1. Classes demonstrated varied findings in regard to psychopathy. Class 3 had significantly higher PPI Total scores than Class 1 ( $d = .38$ ), but did not differ significantly from Class 2. Class 1 reported higher scores on social potency, coldheartedness, and stress immunity subscales compared with Classes 2 and 3. Class 2 reported significantly lower levels of social potency than Classes 1 and 3; otherwise, Class 2 and Class 3 did not differ across PPI subscales, and both classes reported significantly higher scores on Machiavellian egocentricity, carefree nonplanfulness, blame externalization, and impulsive nonconformity than Class 1. Compared to Class 1, Classes 2 and 3 evidenced higher

levels of past-year criminal victimization, and no differences were observed among classes with regard to age of onset of criminal offending and contact with police.

#### **4. Discussion**

LPA of adolescent sedative/anxiolytic misusers identified three distinct groups of youth. These findings contribute to an emerging literature documenting clinically relevant heterogeneity among adolescent PDMs. By assessing the mental health status of sedative/anxiolytic misusers, this work complements previous research categorizing PDMs based on motive for use, route of administration, and co-ingestion with alcohol (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Boyd, & Teter, 2009). This study also demonstrates that misusers can be meaningfully classified using measures of psychiatric symptoms, substance use problems, antisocial behavior, and temperament.

Youth in Class 1, who were the majority (59.1%) of sedative/anxiolytic misusers in this study, reported comparatively low levels of psychiatric problems, substance use and related problems, traumatic experiences, antisocial behavior, and impulsivity. Youth in this class used sedatives/anxiolytics, as well as other psychoactive substances, less frequently than did members of Classes 2 and 3. Given these youths' comparatively low scores on BSI measures assessing anxiety, depression, and related problems, they may lack a need or motive to use sedatives/anxiolytics for self-treatment. Neither does this class comport with McCabe and colleagues (2009) recreational subtype, given their relatively low levels of substance use and related problems compared to other classes identified in this study. Instead, Class 1 youth seem to represent a group of youth whose sedative/anxiolytic misuse was primarily limited to experimentation and who evidenced low levels of psychopathology and behavior disturbances.

Class 2 (11.3%) and Class 3 (29.5%) were smaller in size and reported similar scores across four-of-nine indicator variables. However, Classes 2 and 3 differed substantially with regard to severity of current psychiatric symptoms, and to a lesser degree, antisocial behavior. Class 2 exhibited significantly higher scores than other classes across the four BSI indicators used to derive the LPA classes, as well as the five remaining BSI subscales used for comparative analyses. Given their high levels of anxiety and other distressing psychiatric symptoms, members of Class 2 may use sedatives/anxiolytics for self-treatment purposes. The self-treatment subtype has been shown to be more common among girls (McCabe, Boyd, & Teter, 2009), and the group with the highest proportion of girls in this study was Class 2. However, Class 2 was also more impulsive and had higher rates of substance use and related problems than Class 1, suggesting they were more likely to have used sedatives/anxiolytics for recreational purposes. Class 3 was comprised of moderately troubled misusers. Compared to Class 1, Class 3 reported higher rates of psychiatric symptoms across all BSI measures, suggesting an elevated need to use sedatives/anxiolytics for self-treatment purposes. Similar to Class 2, however, Class 3 also had higher rates of impulsivity and substance use than Class 1. This group may represent a mixed-motive subtype. It is notable that frequency of sedative/anxiolytic misuse was highest among Classes 2 and 3, groups that also reported the highest rates of psychiatric symptoms for which sedatives/anxiolytics would be medically indicated. In sum, depressive and anxious symptomatology in adolescence may lead to self-treatment misuse of prescription sedatives/anxiolytics and, when conjoined with antisocial attitudes and behaviors, may lead to mixed motive prescription drug misuse.

These findings are consistent with previous nationally representative studies of comorbid sedative/anxiolytic misuse and distressing psychiatric symptoms. Anxiety, social anxiety, panic, agoraphobia, and depression were found to be significantly correlated with sedative/anxiolytic misuse in an analysis of data from the National Survey on Drug Use and Health (Becker, Fiellin, & Desai, 2007). Similarly, Goodwin and Hasin (2002) identified major depression, suicidal ideation, agoraphobia, and antisocial personality disorder as significant correlates of nonmedical prescription sedative misuse among respondents to the National Comorbidity Survey. These studies highlight the importance of research on subtypes of PDMs. If the subtypes identified in this study can be extended to general population studies, significant differences between PDMs and nonmisusers across levels of psychiatric symptoms may result from the elevated rates of these symptoms by Class 2 and 3 misusers. Put another way, our findings suggest that influential subtypes of sedative/anxiolytic misusers may exaggerate overall differences between misusers and nonmisusers in regard to level of psychiatric symptoms. In this study, Class 1 misusers, who we described as likely experimental misusers, reported comparatively low levels of psychiatric symptoms and comprised 59.1% of all adolescent sedative/anxiolytic misusers.

Recent research has demonstrated that universal preventive interventions administered in middle school reduce PDM in late adolescence and early-adulthood (Spoth, Trudeau, Shin, & Redmond, 2008). Such efforts would likely benefit the majority of youth at risk of PDM (e.g., the low-severity youth in Class 1). For youth whose profiles more closely match Classes 2 and 3, however, the effectiveness of universal preventive interventions may be limited. For these youth, whose PDM may be driven by

the desire to medicate distressing psychiatric symptoms, alternative or supplementary preventive interventions may need to be developed. Additionally, these findings highlight the importance of integrated substance use and mental health treatment (Mueser, Noordsy, Drake, & Fox, 2003). Despite growing consensus that integrated treatment is the optimal approach for individuals with co-occurring disorders, research suggests that it is still a rarity in practice (Harris & Edlund, 2005).

In conclusion, three distinct classes of adolescent sedative/anxiolytic misusers were identified. When compared to the self-treatment, recreational, and mixed subtypes of PDMs described by McCabe and colleagues (2009), similarities and differences are evident. Differences could result from the types of measures used (i.e., motives, co-ingestion vs. mental health status), samples studied (normative, school-based vs. high-risk, residential treatment), or analysis procedures (variable-centered approach vs. person-centered approach) employed. However, taken together, these studies indicate that PDM is a multifaceted behavior undertaken by diverse youth with varying motives. Intervention targets for PDMs should consist of universal preventive interventions for substance use as well as increased attention to mental health treatment.

Measures used in this study were self-report in nature and possibly were subject to various response and recall biases. However, self-report studies are normative in substance use research and research has documented their validity except in circumstances where strong incentives operate to bias responding (Harrison, Martin, Enev, & Harrington, 2007). A second limitation is the cross-sectional design of the study, which does not allow for an assessment of the temporal ordering of reported associations. Third, the structure of the sedative/anxiolytic questions, which asked respondents



whether they had used drugs from these classes that were not prescribed for them, may not have captured youth who exclusively misused their own prescription drugs (i.e., medical prescription drug misuse). This limitation could have led to an underestimation of the number of PDMs. Though given the high rates of sedative (11.2%) and anxiolytic (32.0%) misuse reported in the larger sample of the parent study, we believe the risk of undetected PDM to be low. Fourth, the small size of Class 2 ( $N = 28$ ) may have limited power to detect differences among subgroups in the study. Finally, this study used a high-risk sample and elected to focus only on sedative/anxiolytic misuse. The derived subtypes may not be generalizable to community-based samples or misusers of other categories of prescription drugs. Although findings from this study share important commonalities with prior work using school-based populations (Boyd, McCabe, Cranford, & Young, 2006), future research should use latent variable approaches to investigate subtypes of prescription opioid and stimulant misusers in high-risk and general population samples of youth. Longitudinal studies of different classes of adolescent nonmedical PDMs using latent growth curve modeling might provide useful information regarding the differential long-term outcomes of youth in these subgroups. Despite these limitations, this study is the first to examine the epidemiology of sedative/anxiolytic misuse among delinquent youth and to identify subtypes of adolescent PDMs using LPA.

## **CHAPTER 4**

### **OVERALL SUMMARY AND CONCLUSIONS**

The three papers that comprise this dissertation advance the knowledge of PDM among adolescents. Study 1 provided a theoretical explanation of PDM among youth, Study 2 described the prevalence and correlates of PDM among a high-risk and vulnerable sample of adolescents, and Study 3 identified three distinct subtypes of sedative/anxiolytic misusers. Though the dissertation consists of three independent studies, this section of the paper will briefly interpret the empirical findings from Studies 2 and 3 in light of the theoretical issues discussed in Study 1.

The theories described in Study 1 explain PDM from cultural (i.e., the anthropological perspective), relational (i.e., social learning theory), and cognitive (i.e., theory of planned behavior) perspectives. To summarize, the expansion of medical jurisdiction, and the resultant increase in prescription drug treatments, provides abundant opportunities for adolescents to observe and engage in prescription drug use. The familiarity of prescription drugs, as well as perceptions of their safety, may influence the attitudes, subjective norms, and control beliefs youth have about PDM.

These theories may be useful in explaining the high rates of PDM reported by youth in Study 2. Given that family history is one the most reliable predictors of substance use problems (Merikangas et al., 1998), it is reasonable that substance use

behaviors were modeled by the parents of many of the youth in this study. Though genetic influences exert a large effect on problems of abuse and dependence, environmental influences have been shown to be most influential in predicting substance use initiation (Fowler et al., 2007; Rhee et al., 2003). Similarly, the youth profiled in Study 2 are highly likely to have been exposed to substance use through peer relationships, also among the strongest risk factors for substance use (Hawkins, Catalano, & Miller, 1992).

Study 3 identified subtypes of sedative/anxiolytic misusers based primarily on psychiatric profiles. The theories described in Study 1 appear relevant regardless of frequency of PDM or PDM subtype; however, frequency and subtype may require the adaptation of certain theoretical constructs. In regard to TPB, for example, self-treatment, recreational, and mixed-motive misusers all likely hold favorable attitudes about PDM, though the behavioral beliefs that precipitate these attitudes may differ by subtype. In the context of self-treatment, the behavioral belief that fosters favorable attitudes toward PDM may involve the expected efficacy of a prescription drug to alleviate a perceived problem. For recreational misusers, however, the behavioral belief leading to favorable attitudes toward PDM may result from expectations of euphoria. Mixed-motive misusers may hold *both* these types of behavioral beliefs simultaneously. Similarly, low-and high-frequency misusers may have different beliefs about what is to be gained from PDM, though both groups ultimately hold favorable attitudes toward the behavior. Another TPB construct, normative beliefs, also may differ by frequency group and subtype. For some youth, self-treatment PDM may be subjectively normative, whereas recreational PDM

may remain non-normative. Other theoretical constructs, such as control beliefs, could most likely be applied consistently across PDM subtypes.

There is an important implication of this discussion for prevention interventions and treatments that might rely on a TPB model to address PDM (presuming that such interventions target behavioral beliefs and subjective norms). If the behavioral beliefs that undergird favorable attitudes about PDM vary by subtype, then TPB-based interventions must allow for multiple behavioral beliefs. Thus, TPB-based interventions for PDM should include content focused on behavioral beliefs associated with both self-treatment (e.g., expectations of reduced symptoms) and recreational misuse (e.g., expectations of euphoria). Similarly, normative beliefs should be understood as potentially varying by subtype. It may be normative in some families for members to share prescription drugs when there is a perceived physical or psychiatric need, though only in such cases. In other families, prescription drugs may be shared for multiple reasons. Both experiences may foster normative beliefs about PDM, and should be addressed in the context of TPB-based interventions.

In summary, these findings argue for a nuanced understanding of PDM that is sometimes missing from more general discussions of adolescent substance use. The theories described herein provide fairly broad applicability in explaining adolescent PDM, though only by being flexible enough to accommodate important differences among PDMs. Prevention interventions, particularly those informed by TPB, may benefit from giving full consideration to the heterogeneity found in adolescent PDMs.

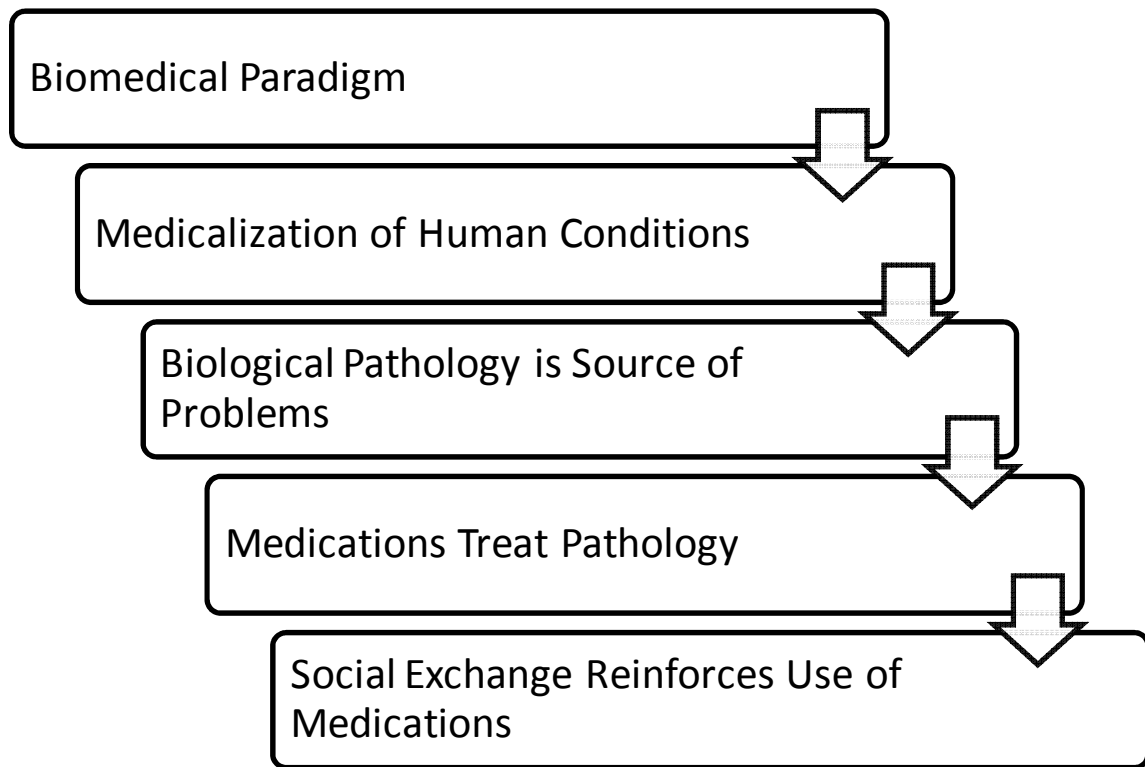


Figure 1.1 *Anthropological Model of Prescription Drug Use*

Table 2.1

*Demographic Characteristics of 723 Adolescents Residing in 32 Missouri  
Division of Youth Services Residential Rehabilitation Facilities\**

Demographics	N	(%)
Age		
11-12	9	(1.2)
13-14	120	(16.6)
15-16	472	(65.3)
17-18	114	(15.8)
19-20	8	(1.1)
Gender		
Male	629	(87.0)
Female	94	(13.0)
Urbanicity of Family Residence		
Urban	283	(39.1)
Suburban	100	(13.8)
Small Town	286	(39.6)
Rural	54	(7.5)
Race		
African American	238	(33.0)
White	400	(55.4)
Latino/Latina	28	(3.9)
Bi/Multi-Racial	56	(7.7)
Current/Last Completed Grade		
5 <sup>th</sup> -6 <sup>th</sup>	19	(2.6)
7 <sup>th</sup> -8 <sup>th</sup>	149	(20.7)
9 <sup>th</sup> -10 <sup>th</sup>	444	(61.6)
11 <sup>th</sup> -12 <sup>th</sup>	109	(15.1)

\*There were 2 missing values for the grade measure and 1 missing value for the race measure.

Table 2.2

*Bivariate Comparisons of Lifetime Prescription Drug Misusers (N = 314) and Nonusers (N = 409) across Demographic, Health, Substance Use, Mental Health, Attitudinal, and Criminological Measures*

Variable	Lifetime PDMs	Nonusers	Results
<b>Demographic</b>			
Gender N (%)			
Male	263 (83.8 %)	366 (89.5 %)	$\chi^2(1) = 5.2, p < .05, OR^a = 1.7$ (1.1 – 2.6)
Female	51 (16.2 %)	43 (10.5 %)	
Age M <sup>b</sup> (SD)	15.8 (1.1)	15.2 (1.3)	$t(718) = -6.8, p < .001, d^c = .49$
Race N (%)			
African American	44 (14.0 %)	194 (47.5 %)	$\chi^2(4) = 91.7, p < .001, OR = 3.1$ (2.3 – 4.3)*
White	222 (70.7 %)	178 (43.6 %)	
Latino	15 (4.8 %)	13 (3.2 %)	
Biracial	25 (8.0 %)	20 (4.9 %)	
Other	8 (2.5 %)	3 (0.7 %)	
Urbanicity of Family Residence N (%)			
Urban	98 (31.2 %)	185 (45.2 %)	$\chi^2(3) = 16.7, p < .01, OR = 1.7$ (1.2 – 2.3)**
Suburban	48 (15.3 %)	52 (12.7 %)	
Small town	146 (46.5 %)	140 (34.2 %)	
Rural/country	22 (7.0 %)	32 (7.8 %)	
<b>Physical and Mental Health N (%)</b>			
<b>History of:</b>			
Head injury with loss of consciousness	69 (22.0 %)	63 (15.5 %)	$\chi^2(1) = 5.1, p < .05, OR = 1.5$ (1.1 – 2.3)
Receipt of mental illness diagnosis	189 (60.2 %)	181 (44.6 %)	$\chi^2(1) = 17.3, p < .001, OR = 1.9$ (1.4 – 2.5)
Substance Use M (SD)			
Lifetime number of	8.6 (3.0)	3.9 (2.3)	$t(566) = -22.9, p < .001, d =$

drug classes used		1.76	
Massachusetts Youth Screening Inventory-2 M (SD)			
Alcohol and Drug Problems	5.4 (1.8)	2.9 (5.4)	$t(498) = -8.6, p < .001, d = .62$
Suicidal Ideation	2.8 (2.5)	1.8 (2.2)	$t(631) = -5.7, p < .001, d = .42$
Lifetime Trauma	3.3 (1.5)	2.7 (1.7)	$t(701) = -4.5, p < .001, d = .37$
Brief Symptom Inventory M (SD)			
Global Severity Index	50.4 (35.6)	38.7 (33.4)	$t(721) = -4.6, p < .001, d = .39$
Somatization	4.0 (4.5)	3.3 (4.3)	$t(721) = -2.3, p < .05, d = .16$
Obsessive Compulsive	8.0 (5.7)	5.5 (4.9)	$t(612) = -6.1, p < .001, d = .47$
Depression	5.6 (5.4)	4.0 (4.7)	$t(622) = -4.2, p < .001, d = .32$
Anxiety	5.2 (5.0)	3.7 (4.4)	$t(633) = -4.1, p < .001, d = .32$
Hostility	6.7 (4.9)	5.5 (4.9)	$t(721) = -3.3, p < .01, d = .24$
Phobic Anxiety	2.3 (3.4)	1.8 (3.0)	$t(721) = -2.1, p < .05, d = .16$
Paranoid Ideation	7.0 (4.6)	5.7 (4.7)	$t(721) = -3.5, p < .01, d = .28$
Psychoticism	4.4 (4.2)	3.1 (3.5)	$t(610) = -4.5, p < .001, d = .34$
Antisocial Process Screening Device M (SD)			
APSD total	17.5 (5.3)	15.3 (5.5)	$t(720) = -5.4, p < .001, d = .41$
Impulsivity	7.2 (1.9)	5.9 (2.2)	$t(720) = -8.0, p < .001, d = .63$
Psychopathic Personality Inventory M (SD)			
PPI Total	140.6 (14.6)	133.2 (12.7)	$t(619) = -7.2, p < .001, d =$



			.54
Social Potency	21.0 (4.1)	20.4 (4.2)	t (721) = -2.1, p < .05, d = .14
Coldheartedness	15.6 (4.9)	14.9 (4.4)	t (636) = -2.0, p < .05, d = .15
Carefree nonplanfulness	15.2 (4.0)	13.5 (3.7)	t (721) = -5.7, p < .001, d = .44
Fearlessness	18.2 (5.2)	16.2 (5.1)	t (721) = -5.2, p < .001, d = .39
Blame externalization	18.8 (4.6)	17.8 (4.9)	t (721) = -3.0, p < .01, d = .21
Impulsive nonconformity	15.5 (4.5)	14.2 (3.8)	t (609) = -4.1, p < .001, d = .31
The Self-Report of Delinquency M (SD)			
SRD total	27.5 (18.4)	22.0 (18.2)	t (721) = -4.0, p < .001, d = .30
Property crime	16.7 (11.7)	12.0 (11.5)	t (721) = -5.4, p < .001, d = .41
Victimization Index M (SD)			
Victimization Index	6.8 (5.8)	5.9 (6.0)	t (721) = -2.0, p < .05, d = .15
Onset of Criminal Offending and Contact with Police M (SD)			
Age at commission of first crime	10.3 (2.7)	10.7 (3.0)	t (719) = 2.0, p < .05, d = .14
Age at first contact with police	10.8 (2.6)	11.2 (2.6)	t (719) = 2.1, p < .05, d = .15

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<sup>a</sup> OR = Unadjusted Odds Ratio with 95% Confidence Interval

<sup>b</sup> M = Mean; SD = Standard Deviation

<sup>c</sup> d = Cohen's effect size for two independent groups computed using t-test values and associated degrees of freedom (cf., [web.uccs.edu/lbecker/Psy590/es.htm](http://web.uccs.edu/lbecker/Psy590/es.htm) for effect size calculator)

\*White vs. other

\*\*Small town vs. other

Table 2.3

*Multiple Logistic Regression Analysis (with simultaneous entry of variables) Identifying Correlates of Prescription Drug Misuse (N = 723)*

Variable	<i>b</i>	S.E.	Wald	<i>p</i>	OR	95.0 % CI (OR)
Male vs. Female	.28	.31	.80	.37	1.3	(.72-2.4)
<b>White vs. African American*</b>	<b>1.0</b>	<b>.30</b>	<b>12.4</b>	<b>.00</b>	<b>2.8</b>	<b>(1.6-5.0)</b>
Latino vs. African American	.07	.57	.02	.90	1.1	(.36-3.2)
<b>Other races vs. African American</b>	<b>1.2</b>	<b>.43</b>	<b>7.4</b>	<b>.01</b>	<b>3.3</b>	<b>(1.4-7.6)</b>
<b>Age (Years)</b>	<b>.50</b>	<b>.10</b>	<b>24.0</b>	<b>.00</b>	<b>1.6</b>	<b>(1.3-2.0)</b>
Small town vs. Other levels of urbanization	.41	.22	3.4	.07	1.5	(.97-2.3)
History of mental illness	.08	.22	.12	.73	1.1	(.70-1.7)
<b>Lifetime Inhalant user</b>	<b>1.0</b>	<b>.25</b>	<b>16.5</b>	<b>.00</b>	<b>2.8</b>	<b>(1.7-4.5)</b>
Cocaine/crack use	.31	.28	1.2	.27	1.7	(.79-2.4)
<b>Lifetime Marijuana user</b>	<b>2.2</b>	<b>.56</b>	<b>15.5</b>	<b>.00</b>	<b>9.2</b>	<b>(3.0-27.6)</b>
<b>Lifetime LSD user</b>	<b>1.5</b>	<b>.29</b>	<b>24.9</b>	<b>.00</b>	<b>4.3</b>	<b>(2.4-7.7)</b>
MAYSI-2 <sup>a</sup> Substance-related problems	.07	.05	1.9	.17	1.1	(.97-1.2)
BSI <sup>b</sup> Global Severity Index	.00	.00	.17	.68	1.0	(.99-1.0)
PPI <sup>c</sup> Carefree Nonplanfulness	.04	.03	1.6	.21	1.0	(.98-1.1)
PPI Fearlessness	-.03	.02	1.4	.24	.97	(.93-1.0)
SRD <sup>d</sup> Property Crimes	.02	.01	2.1	.15	1.0	(.99-1.0)
<b>APSD<sup>e</sup> Impulsivity Scale</b>	<b>.13</b>	<b>.06</b>	<b>4.8</b>	<b>.03</b>	<b>1.1</b>	<b>(1.0-1.3)</b>
MAYSI-2 Suicidal ideation	-.08	.06	2.0	.16	.93	(.83-1.0)
MAYSI-2 Traumatic experiences	.03	.08	.11	.74	1.0	(.89-1.2)

<sup>a</sup> = Massachusetts Youth Screening Instrument; <sup>b</sup> = Brief Symptom Inventory; <sup>c</sup> = Psychopathic Personality Inventory; <sup>d</sup> = Self-Report of Delinquency; <sup>e</sup> = Antisocial Process Screening Device

\*Variables in bold are significant at the  $p < .05$  level.

Table 2.4

*Multiple Logistic Regression Analysis (with simultaneous entry of variables Comparing Low- (N = 143) versus High- (N = 162) Frequency Prescription Drug Misusers*

Variable	<i>b</i>	S.E.	Wald	<i>p</i>	OR	95.0 % CI (OR)
White vs. African American	.66	.41	2.6	.11	1.9	(.87-4.4)
Latino vs. African American	.82	.82	1.0	.32	2.3	(.46-11.3)
Other vs. African American	.01	.54	.00	.99	1.0	(.35-2.9)
History of head injury	.48	.35	1.9	.17	1.6	(.82-3.2)
Age at 1 <sup>st</sup> crime	-.08	.05	2.5	.12	.92	(.84-1.0)
Victimization index	.05	.03	3.1	.08	1.1	(.99-1.1)
<b>MAYSI-2<sup>a</sup> Substance-related problems*</b>	<b>.28</b>	<b>.08</b>	<b>11.3</b>	<b>.00</b>	<b>1.3</b>	<b>(1.1-1.6)</b>
MAYSI-2 Suicidal ideation	.08	.06	1.9	.17	1.1	(.97-1.2)
BSI <sup>b</sup> Somatization	-.43	.31	1.9	.17	.65	(.35-1.2)
BSI Anxiety	.03	.04	.54	.46	1.0	(.95-1.1)
PPI <sup>c</sup> Carefree nonplanfulness	.01	.04	.06	.84	1.0	(.93-1.1)
SRD <sup>d</sup> Violent offending	-.02	.02	1.6	.21	.98	(.94-1.0)
SRD Property crime	.01	.01	.96	.33	1.0	(.99-1.0)
<b>APSD<sup>e</sup> Impulsivity</b>	<b>.20</b>	<b>.08</b>	<b>5.5</b>	<b>.02</b>	<b>1.2</b>	<b>(1.0-1.4)</b>

<sup>a</sup> = Massachusetts Youth Screening Instrument; <sup>b</sup> = Brief Symptom Inventory; <sup>c</sup> = Psychopathic Personality Inventory; <sup>d</sup> = Self-Report of Delinquency; <sup>e</sup> = Antisocial Process Screening Device

\*Variables in bold are significant at the  $p < .05$  level.

Table 3.1

*Description of Nine Indicator Variables Used in Latent Profile Analysis to Identify Latent Classes*

Variable	Description	Sample <i>M</i> * (SD)	Reliability (alpha)
1 Somatization <sup>a</sup>	Seven items assessing bodily dysfunction and discomfort (e.g., “pains in heart or chest”)	4.1 (4.7)	.77
2 Depression <sup>a</sup>	Six items assessing dysphoric mood states (e.g., “feeling lonely”)	5.9 (5.6)	.82
3 Anxiety <sup>a</sup>	Six items assessing nervousness, tension, and panic attacks (e.g., “feeling tense or keyed up”)	5.4 (5.2)	.80
4 Phobic Anxiety <sup>a</sup>	Five items assessing persistent situational fear (e.g., “feeling nervous when you are left alone”)	2.3 (3.5)	.70
5 Traumatic Experiences <sup>b</sup>	Four items assessing history of specific traumatic experiences (e.g., “ever seen someone severely injured or killed in person?”)	3.3 (1.5)	.69
6 Alcohol/Drug Use Scale <sup>b</sup>	Eight items assessing substance-related problems (e.g., “ever been drunk or high at school?”)	5.5 (1.7)	.83
7 Lifetime number of drug classes used <sup>c</sup>	“Yes or no” questions assessing use of each of 15 categories of psychoactive substances	9.0 (3.1)	
8 Self-Report of Delinquency <sup>d</sup>	Seventeen items assessing frequency of nonviolent and violent crime in past year (e.g., “stole marijuana”; “hit a parent”)	28.6 (18.6)	.84
9 Impulsivity <sup>e</sup>	Five items assessing problems of impulse control (e.g., “engage in risky or dangerous activities”)	7.2 (2.0)	.67

\*M = Mean; SD = Standard Deviation

<sup>a</sup> = Subscales of the *Brief Symptom Inventory* (BSI); item response options: 0 = not at all; 4 = extremely

<sup>b</sup> = *Massachusetts Youth Screening Instrument—2<sup>nd</sup> Version* (MAYSI-2); item response options: “yes” or “no”

<sup>c</sup> = inhalants, heroin, opioids, cocaine/crack, speed, marijuana, hallucinogens, malt liquor, other alcohol, ecstasy (MDMA), GHB/GBL, cigarettes, cigars, oral tobacco, and PCP; range 0-15

<sup>d</sup> = *Self-Report of Delinquency*; item response options: 0 (never) to 8 (2-3 times a day)

<sup>e</sup> = Subscale of the *Antisocial Process Screening Device*; item response options: 0 = not at all true, 1 = sometimes true, 2 = definitely true

Table 3.2

*Fit Indices for Two, Three, and Four Class Latent Profile Models Identifying Subtypes of Adolescent Sedative/Anxiolytic Misusers (N = 247)*

Model	BIC	Entropy	Lowest Class Probability	L-M-R
Two class	10617.07	.96	.97	.0006
Three class	10552.47	.89	.94	.0024
Four class	10543.73	.91	.92	.2868

*Note.* BIC = Bayesian Information Criterion; L-M-R = Lo-Mendell-Rubin.

Table 3.3

*Differences among Three Latent Classes of Adolescent Sedative/Anxiolytic Misusers across Nine Latent Class Indicator Variables*

LPA Indicator	Class 1* <i>N</i> = 146	Class 2 <i>N</i> = 28	Class 3 <i>N</i> = 73	Results	Significant Post-hoc tests**
1 Somatization <sup>a</sup>	1.7 (1.9)	13.6 (4.2)	5.4 (3.4)	F(2,244) = 233.0, <i>p</i> < .001	1 < 2; 1 < 3; 3 < 2
2 Depression <sup>a</sup>	2.9 (2.9)	15.2 (4.2)	8.4 (5.0)	F(2,244) = 144.0, <i>p</i> < .001	1 < 2; 1 < 3; 3 < 2
3 Anxiety <sup>a</sup>	2.1 (2.0)	15.8 (3.3)	7.9 (3.0)	F(2,244) = 403.4, <i>p</i> < .001	1 < 2; 1 < 3; 3 < 2
4 Phobic Anxiety <sup>a</sup>	.82 (1.4)	9.3 (4.5)	2.7 (2.5)	F(2,244) = 159.1, <i>p</i> < .001	1 < 2; 1 < 3; 3 < 2
5 Traumatic Experiences <sup>b</sup>	2.8 (1.5)	4.4 (.96)	4.0 (1.2)	F(2,244) = 31.3, <i>p</i> < .001	1 < 2; 1 < 3
6 Alcohol/Drug Use Scale <sup>b</sup>	4.9 (1.7)	6.6 (1.3)	6.3 (1.4)	F(2,244) = 23.8, <i>p</i> < .001	1 < 2; 1 < 3
7 Lifetime number of drug classes used <sup>c</sup>	8.0 (2.8)	11.0 (3.3)	10.2 (2.8)	F(2,244) = 22.1, <i>p</i> < .001	1 < 2; 1 < 3
8 Self-Report of Delinquency <sup>d</sup>	22.2 (15.3)	45.3 (19.3)	34.9 (18.3)	F(2,244) = 29.7, <i>p</i> < .001	1 < 2; 1 < 3
9 Impulsivity <sup>e</sup>	6.5 (1.9)	8.0 (1.7)	8.3 (1.6)	F(2,244) = 29.5, <i>p</i> < .001	1 < 2; 1 < 3

\*Entries in each column = Mean (Standard Deviation). \*\*Tamhane post-hoc tests were conducted for all ANOVAs.

<sup>a</sup> = Subscales of the *Brief Symptom Inventory* (BSI) (Derogatis, 1993)

<sup>b</sup> = *Massachusetts Youth Screening Instrument—2<sup>nd</sup> Version* (MAYSI-2) (Grisso & Barnum,

2000)

<sup>c</sup> = inhalants, heroin, opioids, cocaine/crack, speed, marijuana, hallucinogens, malt liquor, other alcohol, ecstasy (MDMA), GHB/GBL, cigarettes, cigars, oral tobacco, and PCP; range 0-15 (Howard et al., 2008)

<sup>d</sup> = *Self-Report of Delinquency* (Elliott et al., 1989)

<sup>e</sup> = Subscale of the *Antisocial Process Screening Device* (Vitacco et al., 2003)



Table 3.4

*Comparisons of Three Latent Classes of Adolescent Sedative/Anxiolytic Misusers across Demographic, Health, Substance Use, Mental Health, Attitudinal, and Criminological Measures.*

Variable	Class 1 <i>N</i> = 146	Class 2 <i>N</i> = 28	Class 3 <i>N</i> = 73	Results	Significant Post-hoc tests
<b>Demographic</b>					
Gender <i>N</i> (%)					
Male	126 (86.3%)	21 (75.0%)	60 (82.2%)	$\chi^2 (2) = 2.4$ , n.s.	
Female	20 (13.7%)	7 (25.0%)	13 (17.8%)		
Age <i>M</i> ( <i>SD</i> )	15.8 (1.2)	15.9 (.94)	15.9 (.90)	$F (2, 244) = .27$ , n.s.	
Race* <i>N</i> (%)					
African American	24 (16.4%)	4 (14.3%)	6 (8.2%)		
White	106 (72.6%)	17 (60.7%)	50 (68.5%)		
Latino	2 (1.4%)	5 (17.9%)	6 (8.2%)		
Biracial	10 (6.8%)	1 (3.6%)	9 (12.3%)		
Other	4 (2.7%)	1 (3.6%)	2 (2.7%)		
Urbanicity of Family Residence <i>N</i> (%)					
Urban	38 (26.0%)	13 (46.4%)	26 (35.6%)	$\chi^2 (6) = 6.7$ , n.s.	
Suburban	21 (14.4%)	4 (14.3%)	12 (16.4%)		
Small town	74 (50.7%)	10 (35.7%)	29 (39.7%)		
Rural/country	13 (8.9%)	1 (3.6%)	6 (8.2%)		
<b>Physical and Mental Health <i>N</i> (%)</b>					
<b>History of:</b>					
Head injury with unconsciousness	22 (15.2%)	16 (57.1%)	17 (30.9%)	$\chi^2 (2) = 23.9$ , $p < .001$	$1 < 2$ ; $3 < 2$
Birth complications	6 (4.1%)	2 (10.5%)	11 (15.1%)	$\chi^2 (2) = 8.2$ , $p < .05$	$1 < 3$
Receipt of mental illness diagnosis	72 (49.3%)	20 (71.4%)	54 (74.0%)	$\chi^2 (2) = 14.2$ , $p < .01$	$1 < 3$

Hearing voices	16 (11.0%)	9 (32.1%)	15 (20.5%)	$\chi^2 (2) = 9.2, p < .05$	$1 < 2$
<b>Mental Health</b>					
Massachusetts Youth Screening Inventory-2 M (SD)					
Suicidal Ideation	2.1 (2.3)	4.9 (1.7)	3.8 (2.3)	$F (2, 244) = 25.3, p < .001$	$1 < 2; 1 < 3; 3 < 2$
Brief Symptom Inventory M (SD)					
Obsessive Compulsive	4.8 (3.7)	17.5 (3.8)	11.1 (4.5)	$F (2, 244) = 150.4, p < .001$	$1 < 2; 1 < 3; 3 < 2$
Interpersonal Sensitivity	1.5 (2.1)	8.1 (3.6)	4.3 (3.4)	$F (2, 244) = 82.5, p < .001$	$1 < 2; 1 < 3; 3 < 2$
Hostility	4.4 (3.7)	12.3 (4.6)	9.5 (4.7)	$F (2, 244) = 66.4, p < .001$	$1 < 2; 1 < 3; 3 < 2$
Paranoid Ideation	4.7 (3.2)	13.4 (3.7)	9.3 (3.9)	$F (2, 244) = 96.0, p < .001$	$1 < 2; 1 < 3; 3 < 2$
Psychoticism	2.3 (2.9)	10.9 (3.3)	6.5 (3.8)	$F (2, 244) = 102.4, p < .001$	$1 < 2; 1 < 3; 3 < 2$
<b>Substance Use Frequency</b>					
Frequency of: M (SD)					
Sedative/ anxiolytic use	2.7 (1.7)	4.0 (2.0)	3.8 (2.1)	$F (2, 244) = 12.4, p < .001$	$1 < 2; 1 < 3$
Opioid use	2.3 (1.2)	2.6 (1.3)	2.9 (1.0)	$F (2, 170) = 4.9, p < .01$	$1 < 3$
Cocaine use	2.1 (1.2)	3.1 (1.1)	2.7 (1.2)	$F (2, 113) = 6.6, p < .01$	$1 < 2; 1 < 3$
Marijuana use	3.8 (.54)	4.0 (.19)	4.0 (.20)	$F (2, 243) = 4.4, p < .05$	$1 < 2; 1 < 3$
LSD use	1.9 (1.1)	2.8 (.95)	2.2 (1.0)	$F (2, 118) = 4.8, p < .01$	$1 < 2$
Malt liquor use	2.9 (1.0)	3.2 (1.0)	3.3 (.81)	$F (2, 171) = 4.1, p < .05$	$1 < 3$
Alcohol use	3.2 (.92)	3.7 (.68)	3.5 (.78)	$F (2, 237) = 5.7, p < .01$	$1 < 2; 1 < 3$

## Personality

### Antisocial Process Screening Device M (SD)

Narcissism	1.7 (1.8)	2.5 (1.0)	2.5 (1.3)	F (2, 244) = 12.5, $p < .001$	1 < 2; 1 < 3
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### Psychopathic Personality Inventory M (SD)

PPI Total Score	139.1 (13.7)	144.8 (19.3)	144.5 (14.4)	F (2, 244) = 4.2, $p < .01$	1 < 3
Machiavellian	16.1 (4.2)	19.5 (3.8)	18.8 (3.7)	F (2, 244) = 15.7, $p < .001$	1 < 2; 1 < 3
Egocentricity					
Social Potency	22.0 (3.7)	18.4 (4.6)	20.9 (4.1)	F (2, 244) = 10.2, $p < .001$	2 < 1; 2 < 3
Coldheartedness	16.9 (4.8)	13.1 (5.2)	14.8 (4.5)	F (2, 244) = 10.3, $p < .001$	2 < 1; 3 < 1
Carefree	14.2 (3.8)	17.8 (4.5)	16.4 (3.3)	F (2, 244) = 16.3, $p < .001$	1 < 2; 1 < 3
Nonplanfulness					
Fearlessness	17.9 (5.4)	19.5 (5.1)	19.2 (5.2)	F (2, 244) = 12.5, n.s.	
Blame	17.4 (4.5)	22.4 (3.7)	20.6 (4.2)	F (2, 244) = 23.5, $p < .001$	1 < 2; 1 < 3
Externalization					
Impulsive	14.4 (4.2)	18.8 (4.6)	16.8 (4.3)	F (2, 244) = 15.8, $p < .001$	1 < 2; 1 < 3
Nonconformity					
Stress Immunity	20.3 (4.0)	15.6 (3.9)	17.1 (3.8)	F (2, 244) = 27.2, $p < .001$	2 < 1; 3 < 1

## Criminological

### Victimization Index M (SD)

Victimization Index	5.3 (4.8)	11.5 (7.0)	9.3 (6.6)	F (2, 244) = 21.6, $p < .001$	1 < 2; 1 < 3
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*Note.* M = Mean; SD = Standard Deviation. Some variables may not total 100.0% due to rounding error. Due to space limitations, the following non-significant group comparisons were not reported: frequency of heroin, ecstasy, and PCP use, and age of onset of criminal offending and contact with police. Tamhane post-hoc tests were conducted for all ANOVAs. Significant chi-square tests were subsequently evaluated using z-tests comparing class proportions ( $p$  values were adjusted using Bonferroni method for multiple comparisons). \*Due to small cell sizes, chi-square tests were not conducted on this variable.

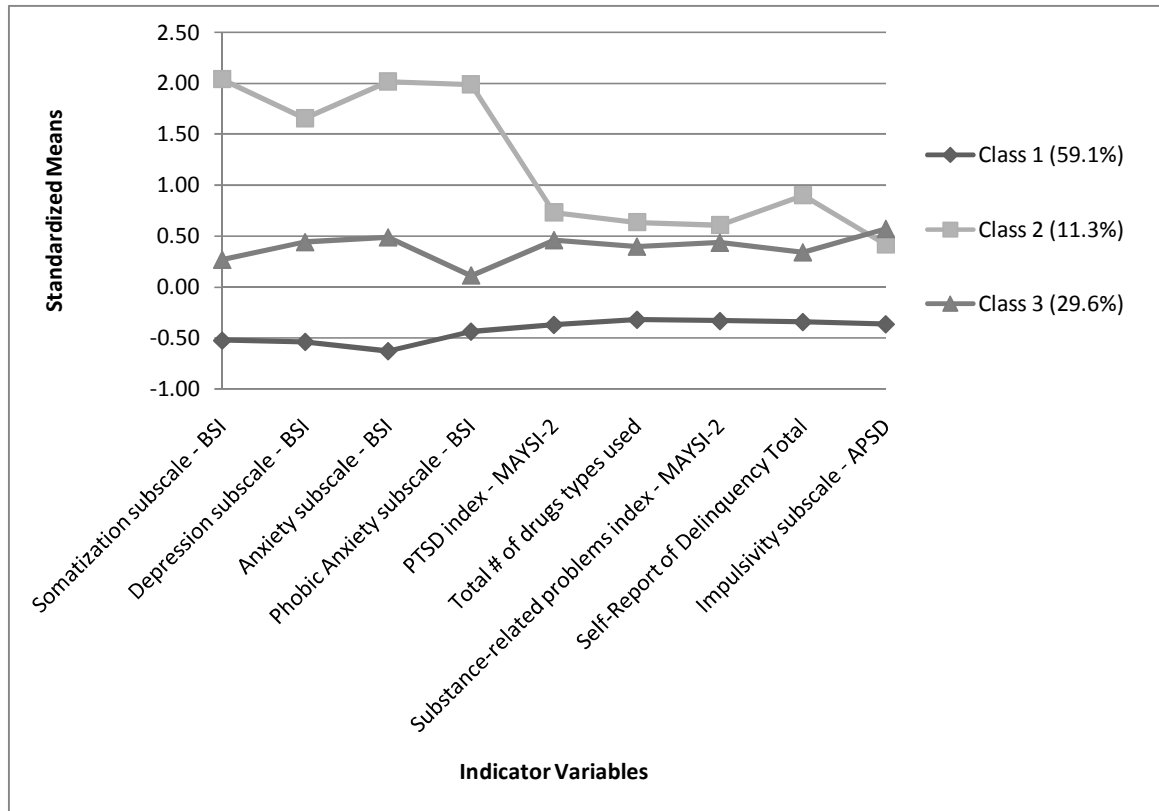


Figure 3.1 *Standardized Mean Scores of Three Classes of Adolescent Sedative/Anxiolytic Misusers across Nine Latent Class Indicator Variables*

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