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Subtypes of Adolescent Sedative/Anxiolytic Misusers: A Latent Profile Analysis

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Abstract

Background—Few empirically-based taxonomies of nonmedical prescription drug misusers have been published. This study used latent profile analysis (LPA) to identify classes of adolescent sedative/anxiolytic misusers.

Methods—Interviews assessing substance use, psychiatric symptoms, antisocial traits/behavior, and traumatic life experiences were conducted with 723 Missouri youth in residential care for antisocial behavior. Sedative/anxiolytic misusers (N = 247) averaged 15.8 (S.D. = 1.1) years of age; a majority were male (83.8%), White (70.0%), and resided in rural/small town areas (53.8%).

Results—LPA yielded a three-class solution. 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. Frequency of sedative/anxiolytic misuse was significantly higher in Classes 2 and 3 compared to Class 1. Members of Class 2 and Class 3 also had the highest levels of psychiatric symptoms for which sedatives/anxiolytics are commonly prescribed. Significant differences between classes were observed across a range of health, mental health, personality, and behavioral variables.

Conclusions—Adolescents who misused prescription sedatives/anxiolytics evidenced significant heterogeneity across measures of psychiatric and behavioral dysfunction. 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.

Keywords

Nonmedical prescription drug misuse; youth; self-treatment; anxiety

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1. Introduction

Prescription drug misuse (PDM¹) is prevalent in the U.S. An estimated 6.4 million persons ages 12 and older reported past-month PDM in 2005 (Lessenger and 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 12th grade students report lifetime sedative and anxiolytic misuse, respectively (Johnston et al., 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 et al., 2006). Diversion of these agents is common and is a key factor in the growing misuse of drugs in these classes (Boyd et al., 2007; Johnston et al., 2008).

Misuse of prescription sedatives or anxiolytics is highly correlated with illicit substance use among adolescents (Boyd et al., 2006; McCabe et al., 2007a; 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 et al., 2007b). 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 et al., 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 et al., 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 et al., 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 et al., 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,

¹This article uses 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).

McCabe, Cranford, and Young (2006), the sample used for these analyses consisted of youth in residential treatment for antisocial behavior. Antisocial youth are at high-risk for substance use and co-morbid psychiatric disorders (Howard et al., 2008; Teplin et al., 2002). As such, these youth represented a meaningful population in which to study subtypes of prescription drug misusers. 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 between previous studies of PDM subtypes and the present study, 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 et al., 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 and 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 and 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 et al., 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 and 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 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 et al., 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—2nd Version* (MAYSI-2; Grisso and Barnum, 2000). Post-traumatic stress has been associated with adolescent PDM (McCauley et al., 2009), and traumatic experiences reliably predict anxiety, depression, and other psychiatric problems (Copeland et al., 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 et al., 2006; McCabe et al., 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 et al., 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 et al., 2003). Delinquency and impulsivity are significantly correlated with substance use (D'Amico et al., 2008; Dawe and 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 ≥ 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 (α '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) (α '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 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 provides mean and standard deviations across the nine indicator variables for the three derived latent 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 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 4. Due to space limitations, only significant findings are presented. Non-significant findings are described in the footnote to Table 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 et al., 2006; McCabe et al., 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 et al., 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, and 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 et al., 2008). Such efforts may benefit the majority of youth at risk of PDM. However, for institutionalized youth, particularly those whose profiles closely match Classes 2 and 3, 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 et al., 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 and 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 et al., 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). Also, the instrument did not list some commonly misused prescription sedatives (e.g., Ambien, Halcion, Restoril) and anxiolytics (e.g., Ativan, Klonopin). These limitations 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 et al., 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.

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Figure 1.
Standardized Mean Scores of Three Classes of Adolescent Sedative/Anxiolytic Misusers across Nine Latent Class Indicator Variables.

Table 1

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

Variable	Description	Sample M^* (SD)	Reliability (alpha)
1 Somatization ^a	Seven items assessing bodily dysfunction and discomfort (e.g., “pains in heart or chest”)	4.1 (4.7)	.77
2 Depression ^a	Six items assessing dysphoric mood states (e.g., “feeling lonely”)	5.9 (5.6)	.82
3 Anxiety ^a	Six items assessing nervousness, tension, and panic attacks (e.g., “feeling tense or keyed up”)	5.4 (5.2)	.80
4 Phobic Anxiety ^a	Five items assessing persistent situational fear (e.g., “feeling nervous when you are left alone”)	2.3 (3.5)	.70
5 Traumatic Experiences ^b	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 ^b	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 ^c	“Yes or no” questions assessing use of each of 15 categories of psychoactive substances	9.0 (3.1)	
8 Self-Report of Delinquency ^d	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 ^e	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

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

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

^c 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

^d *Self-Report of Delinquency*; item response options: 0 (never) to 8 (2–3 times a day)

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

Table 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

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

LPA Indicator	Class 1* N = 146	Class 2 N = 28	Class 3 N = 73
1 Somatization ^a	1.7 (1.9)	13.6 (4.2)	5.4 (3.4)
2 Depression ^a	2.9 (2.9)	15.2 (4.2)	8.4 (5.0)
3 Anxiety ^a	2.1 (2.0)	15.8 (3.3)	7.9 (3.0)
4 Phobic Anxiety ^a	.82 (1.4)	9.3 (4.5)	2.7 (2.5)
5 Traumatic Experiences ^b	2.8 (1.5)	4.4 (.96)	4.0 (1.2)
6 Alcohol/Drug Use Scale ^b	4.9 (1.7)	6.6 (1.3)	6.3 (1.4)
7 Lifetime number of drug classes used ^c	8.0 (2.8)	11.0 (3.3)	10.2 (2.8)
8 Self-Report of Delinquency ^d	22.2 (15.3)	45.3 (19.3)	34.9 (18.3)
9 Impulsivity ^e	6.5 (1.9)	8.0 (1.7)	8.3 (1.6)

* Entries in each column = Mean (Standard Deviation).

^a Subscales of the *Brief Symptom Inventory* (BSI) (Derogatis, 1993)

^b *Massachusetts Youth Screening Instrument—2nd Version* (MAYSI-2) (Grisso & Barnum, 2000)

^c 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)

^d *Self-Report of Delinquency* (Elliott et al., 1989)

^e Subscale of the *Antisocial Process Screening Device* (Vitacco et al., 2003)

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

Table 4

Variable	Class 1 N = 146	Class 2 N = 28	Class 3 N = 73	Results	Significant Post-hoc tests
Demographic					
Gender N (%)					
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 M (SD)	15.8 (1.2)	15.9 (.94)	15.9 (.90)	F (2, 244) = .27, n.s.	
Race* N (%)					
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 N (%)					
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%)		
Physical and Mental Health N (%)					
History of:					
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
Mental Health					
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

Variable	Class 1 N = 146	Class 2 N = 28	Class 3 N = 73	Results	Significant Post-hoc tests
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
Substance Use Frequency					
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
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 Egocentricity	16.1 (4.2)	19.5 (3.8)	18.8 (3.7)	F (2, 244) = 15.7, $p < .001$	1 < 2; 1 < 3
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 Nonplanfulness	14.2 (3.8)	17.8 (4.5)	16.4 (3.3)	F (2, 244) = 16.3, $p < .001$	1 < 2; 1 < 3
Fearlessness	17.9 (5.4)	19.5 (5.1)	19.2 (5.2)	F (2, 244) = 12.5, n.s.	
Blame Externalization	17.4 (4.5)	22.4 (3.7)	20.6 (4.2)	F (2, 244) = 23.5, $p < .001$	1 < 2; 1 < 3
Impulsive Nonconformity	14.4 (4.2)	18.8 (4.6)	16.8 (4.3)	F (2, 244) = 15.8, $p < .001$	1 < 2; 1 < 3
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

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.