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A Prospective Study of Adolescents' Nonmedical Use of Anxiolytic and Sleep Medication

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Abstract

The purpose of this longitudinal study (N=2745) was to determine whether adolescents recent medical use of anxiolytic or sleep medication was associated with increased incidence of using someone else's prescription for these classes of medication (nonmedical use). Data were collected from adolescents attending five Detroit area secondary schools between December and April in three consecutive academic years between 2009 and 2012. Respondents were assigned to the following three mutually exclusive groups for the analyses: 1) never prescribed anxiolytic or sleep medication (in their lifetime); 2) prescribed anxiolytic or sleep medication in their lifetime, but not during the study period; or 3) prescribed anxiolytic or sleep medication during the study period. Almost 9% of the sample had received a prescription for anxiolytic or sleep medication during their lifetime and 3.4% had received at least one prescription during the three-year study period. Compared with adolescents never prescribed anxiolytic or sleep medication, adolescents prescribed these medicines during the study period were 10 times more likely to engage in nonmedical use for reasons such as "to get high" or to experiment (Adjusted Odds Ratio [AOR], 10.15 [95% CI, 3.97–25.91]), and 3 times more likely to engage in nonmedical use to self-treat anxiety or to sleep (AOR, 3.24 [95% CI, 1.67–6.29]). Adolescents prescribed anxiolytics during their lifetime, but not during the three-year study, were 12 times more likely to use another's anxiolytic medication, compared to adolescents never prescribed anxiolytics (AOR, 12.17 [95% CI, 3.98–37.18]). These risk factors have significant implications for later substance use problems.

Introduction

Over the past decade there has been an upward trend in the prescribing of controlled anxiolytic and sleep medication in the United States (Comer, Olfson, & Mojtabai, 2010; Fenton, Keyes, Martins, Hasin, 2010; Fortuna, Robbins, Caiola, Joynt, & Halterman, 2010; Thomas, Conrad, Casler, & Goodman, 2006), and a parallel increase in their misuse by adolescents (Ford & McCutcheon, 2012; McCabe, West, Cranford et al., 2011; Meier, Troost, & Anthony, 2012; Rigg & Ford, 2014; Substance Abuse and Mental Health Services

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Administration (SAMHSA), 2012). The National Survey on Drug Use and Health (NSDUH) (SAMHSA, 2012) estimates indicate that approximately 3% of adolescents have engaged in prescription drug misuse with anxiolytics, sedatives or hypnotics; medication often referred to as "ASH" medications (i.e., anxiolytics, sedatives and hypnotics). In a recent report on adolescent psychotropic drug use the Centers for Disease Control categorized ASH medication as one drug category (Jonas, Gu, & Albertorio-Diaz, 2013). This ASH categorization recognized the similar Central Nervous System depressant properties of these classes of medication, as well as their similar abuse potential and schedule status (Schedule IV).

Using data from the NSDUH, Rigg and Ford (2014) found that 3% of adolescents had engaged in lifetime benzodiazepine misuse, and that this misuse was associated with poly-substance use and co-ingestion with other controlled medication (e.g., with other ASH medication). While these are important findings, analyses of available NSDUH data have not been able to provide insight into the characteristics associated with different types of medical misuse because questions in the NSDUH fail to adequately distinguish between nonmedical users (using someone else's medication) and medical misusers (misusing one's own medication). The distinction between these two types of misusers may be important for the development of effective and tailored prevention messages (Boyd & McCabe, 2008) since one type of misuse involves both a prescriber in a clinical setting and the lack of adherence to a medication regimen by a patient (medical misuse). The other involves illegal behaviors (using someone else's prescription medication). In addition, when compared to adolescents who use their medication correctly, adolescents who misuse their own controlled medication are more likely to divert their medication to friends, which is a felony (i.e., diverted to nonmedical users) (McCabe, West, Teter et al., 2011). Thus, the distinction between these two types of misuse has notable clinical and legal implications.

Most of what we know about the motivations for prescription drug abuse comes from studies of opioid analgesics and stimulants. We have learned from these studies that adolescents' and young adults' motivations are important because they predict other risky behaviors (Boyd, McCabe, Cranford, & Young, 2006; Boyd, Young, Grey, & McCabe, 2009; McCabe, Boyd, Cranford, & Teter, 2009; McCabe, Cranford, Boyd, & Teter, 2007; McCabe, West, & Boyd, 2013a). For example, an adolescent given a sleep medication by her parent because she has trouble sleeping before a big exam may have a different risk profile than an adolescent who steals her mother's sleep medication and mixes it with alcohol at a party. Yet both types of nonmedical users are collapsed into one group in the NSDUH. One nonmedical user was attempting to self-treat a condition (e.g., insomnia) without the benefit of an appropriate medical intervention, while the other was using the medication "to get high." Alternatively, a medical misuser may take two of his own sleeping pills because he is having trouble sleeping before an exam, while another adolescent may take two of his sleeping pills, along with a friend's opioid analgesic, to get high at a party. Researchers have found that adolescents who misuse opioid analgesics for sensation-seeking motivations (e.g., to get high) tend to demonstrate greater deviant behaviors, including more substance abuse problems than those who endorse self-treating motivations (Boyd, Young et al., 2009). However, the relationships among prescription drug abuse, motivations and other

risky behaviors among adolescents engaged in nonmedical use and medical misuse with anxiolytic and sleep medication has not been established (Young, Glover, & Havens, 2012).

This is the first, three-wave longitudinal study to examine nonmedical use and medical misuse of anxiolytic and sleep medication among adolescents. When we use the term nonmedical use, it refers to using another person's controlled (Schedule IV) anxiolytic or sleep medication.

Purpose and Hypotheses

This study examined whether receiving a prescription for a Schedule IV anxiolytic or sleep medication was associated with higher incidence of adolescents' nonmedical use of these classes of medication.

H1) Compared with adolescents who were never prescribed controlled anxiolytic or sleep medication, adolescents with a recent prescription (i.e., during the 3-year study period) will demonstrate an increased incidence of past year nonmedical use. This hypothesis predicts that a recent prescription will be associated with a higher incidence of nonmedical use.

H2) Compared with adolescents who were never prescribed controlled anxiolytic or sleep medication, adolescents prescribed these classes of medication at any point in the past will demonstrate increased incidence of nonmedical use of these classes of medication for sensation seeking motivations (e.g., to get high). This hypothesis predicts that once exposed to these classes of medication, some adolescents will be more likely to use someone else's prescription for these classes of medication for sensation seeking (e.g., to get high).

H3) During the study period, adolescents who received prescriptions for a greater number of years will demonstrate increased incidence of past year nonmedical use of the same classes of medication, when compared to adolescents prescribed for fewer years. This third hypothesis predicts that acquiring more cumulative experience medically using anxiolytic or sleep medication will be associated with an increased incidence of using someone else's prescription for these classes of medication.

Methods

The present study is a sub-sample (2,745) from a larger, mixed-method NIDA funded study (DA024678) of 5,217 respondents who participated in cross-sectional, web-based surveys between 2009 and 2012 in their Detroit area secondary school. Surveys were administered annually between December and April. All students attending the five schools were invited to participate in the study. The parent study aimed to characterize subtypes of adolescent prescription drug users based on controlled medication status, nonmedical use, medical misuse (using too much of one's own prescription, or using one's own prescription to get high), motivations to engage in prescription drug abuse, and prescription drug classes abused (anxiolytics, sleep medication, stimulants and opioid analgesics). Respondents in the parent study who completed both Time 1 and Time 2 were included in the present sub-

sample, as were respondents who completed all three consecutive time points. The sub-sample did not notably differ from the cross-sectional sample except in age distribution, since older respondents aged out of the longitudinal sample.

Data

The web-based *Secondary Student Life Survey* (SSLS) (Boyd, Teter, West, Morales, & McCabe, 2009) was used to collect data at all three time points between December and April during academic years: 2009–2010 (Time 1); 2010–2011 (Time 2); and 2011–2012 (Time 3). The final retention rate for the SSLS was 89% for Time 1-Time 2; 91% for Time 2-Time 3; and 83% for Time 1-Time 2-Time 3. This compares favorably with *The Monitoring the Future* study of substance use among high school seniors in the United States (Johnston, O'Malley, Bachman, & Schulenberg, 2011). The final sample was 50.5% female and 65.4% white, with a mean age of 14.2 years at Time 1. The University of Michigan Institutional Review Board approved the study, and a Certificate of Confidentiality was obtained from the National Institutes of Health. Active parental consent and child assent were obtained. The SSLS takes approximately 40 minutes to complete and is maintained on a hosted secure Internet site running under a Secure Sockets Layer protocol to ensure safe transmission of data.

Medical use was assessed by asking: "On how many occasions in your lifetime [or past 12 months] has a doctor, dentist, or nurse prescribed the following types of medicines [the aforementioned examples of anxiolytic and sleep medication were inserted here] for you?" The response scale ranged from (1) 0 occasions to (7) 40 or more occasions. Binary variables were created for each of the two drug classes, and binary variables indicating lifetime and past year use (yes or no) were created by aggregating data from the medical use of anxiolytic and sleep medication variables.

Nonmedical use was assessed by asking: "On how many occasions in the past 12 months have you used the following types of medicines [the aforementioned examples of anxiolytics and sleep medication were inserted here] not prescribed to you?"

Motivations for nonmedical use were assessed with the following: "Please provide the reason(s) why you used [relevant medication class – either anxiolytic or sleep] medication not prescribed to you?" Respondents were asked to select from a list of 9 motives (because it helps decrease anxiety, because it helps me sleep, because it gives me a high, because I am addicted) based on previous research (Boyd et al., 2006; Johnston & O'Malley, 1986; Teter, McCabe, Cranford, Boyd, & Guthrie, 2005). Respondents could select as many motives as they wished. Responses such as (because it helps decrease anxiety or because it helps me sleep) were coded as self-treating. If any sensation-seeking motive was endorsed, the adolescent was put into the sensation-seeking category. Some adolescents endorsed both self-treating motives and sensation-seeking motives and they were categorized as sensation-seeking. This decision was based on earlier findings on opioid abuse; these revealed that any sensation-seeking motive was associated with greater risk for substance abuse problems, as well as other risky behaviors (Boyd, Young, et al., 2009). **Nine respondents endorsed both sensation-seeking and self-treating motivations. Seven of these respondents elected to rank order their three main reasons for engaging in nonmedical use and listed**

sensation-seeking motivations as either their first or second reason for engaging in nonmedical use (e.g., "Because it gives me a high." "For experimentation."). Self-treating and sensation seeking groups were mutually exclusive.

Analysis

For the analyses, respondents were assigned to three mutually exclusive groups based on their responses to SSLS questions about lifetime and recent medical use of anxiolytic medication (e.g., Ativan®, Xanax®, Valium®, Klonopin®, diazepam, lorazepam) and sleep medication (e.g., Ambien®, Lunesta®, Restoril®, temazepam, triazolam). The three groups were defined as follows: 1) never prescribed anxiolytic or sleep medication in their lifetime; 2) prescribed anxiolytic or sleep medication in their lifetime, but not during the three-year study; or 3) prescribed anxiolytic or sleep medication during the three-year study. Each time the SSLS was administered the respondents were asked about their medical use and nonmedical use (i.e., using someone else's prescription), as well as about their motivations to engage in nonmedical use.

All the statistical analyses were performed using commercially available software (SPSS 20.0; SPSS Inc., Chicago, Illinois or http://www.spss.com). No procedures were used to impute missing data and the two drug classes were pooled for analyses unless otherwise noted. When a drug class was analyzed independently, statistical results reflect prescription and nonmedical use of only the medication class listed.

Generalized estimating equation (GEE) models were used to compare the odds of adolescents in the three groups (never prescribed, prescribed during lifetime but not during study, and prescribed during study) engaging in past year nonmedical use. The comparisons are over the three time points. The GEE approach accounts for the correlation of repeated measures within the same individual over time and provides flexibility to retain the full sample of respondents (e.g., respondents with two or three consecutive time points of data can be included in the GEE analysis, while controlling for time point of administration) (Hanley, Negassa, Edwardes, & Forrester, 2003; Zeger, Liang, & Albert, 1988). Several control variables were included in the analyses to account for factors that may influence nonmedical use: study time point, sex, race/ethnicity, age, parent's highest level of education completed and severity of depression and anxiety symptoms (at baseline) were tested and included in each GEE model *when significant* (Boyd, Young et al., 2009; McCabe & Boyd, 2005; McCabe et al., 2009; McCabe, Boyd, & Young, 2007; McCabe, West, Cranford et al., 2011).

The GEE models compared the odds of the three groups engaging in past year nonmedical use over time for two mutually exclusive types of motivations: 1) sensation seeking; or 2) self-treating (Table 3). For all respondents, GEE models also compared the odds of the three groups engaging in past year nonmedical use over time (Table 4). Adjusted odds ratios (AORs) and 95% confidence intervals (95% CIs) were computed to describe adjusted contrasts among groups.

Results

The sample was evenly distributed by sex and grade. Sixty-five percent (65.4%) were white/Caucasian, 29% were African-American, and 5.6% were "other" (Asian, Hispanic, and American Indian/Alaskan Native (AI/AN)). We collapsed adolescents who identified as Asian, Hispanic, and AI/AN in to "other race" given their small sample sizes among eligible respondents. The data were collected in the Detroit metropolitan area, which is predominantly white and black. We include this "other race" category as a control to account for any possible bias in the statistical models due to racial identification. The average age was 14.8 (SD=1.9) years. The sample was relatively well educated, with 80% having at least one parent with a college degree or higher (see Table 1).

The first hypothesis predicting that a recent prescription would be associated with a higher incidence of nonmedical use was supported (see Table 2). Results from analyses by medication class indicated that adolescents with a recent prescription were 6 to 9 times more likely to engage in nonmedical use of the class of medication they were recently prescribed (see Table 2). These GEE analyses held race/ethnicity and levels of anxiety and depression at Time 1 constant. Compared to black participants, white participants were 2 times more likely to use another person's anxiolytic and sleep medication (AOR, 2.52 [95% CI, 1.25–5.08] $P<0.05$). Respondents with higher levels of anxiety and depression at Time 1 were also more likely to engage in nonmedical use of these classes of medication (AOR, 1.02 [95% CI, 1.02–1.10] $P\leq0.01$). Effects of time points, sex, age, and parent's highest level of education were not significant.

Hypothesis 2 predicted that once exposed to a prescribed anxiolytic or sleep medication, some adolescents would begin using them for sensation-seeking motivations, in contrast to self-treating motivations. This hypothesis was also supported. Once medical exposure occurred, there where highest odds of nonmedical use for sensation-seeking motivations **(AOR, 10.15 [95% CI, 3.97 – 25.91] *P*≤0.001),** in contrast to self-treating motivations (AOR, 3.24 [95% CI, 1.67 – 6.29] $P\leq0.001$). Results of GEE analyses indicated that the odds of engaging in sensation-seeking with someone else's prescribed medication were 10 times higher in respondents with their own prescription in the three- year study period when compared to respondents never prescribed anxiolytic or sleep medication.

Respondents prescribed sleep medication during the study demonstrated higher incidence of nonmedical use for sensation seeking motivations (AOR, 28.01 [95% CI, 9.34 – 84.00] $P\leq0.001$). Respondents prescribed anxiolytic medication during the study were 3 to 14 times more likely to engage in nonmedical use for self-treating or sensation seeking motivations, respectively (self-treating, AOR, 3.88 [95% CI, 1.20 – 12.54] $P<0.05$; sensation seeking, 14.29 [4.56 – 44.81] $P\leq0.001$).

Results of GEE analyses indicated that being older (age range was 12 to 18) was associated with greater odds of nonmedical use of anxiolytic or sleep medication for sensation- seeking motivations (AOR, 1.33 [95% CI, 1.11 – 1.56] $P\leq0.01$), while being white, female, or reporting more symptoms of anxiety and depression at Time 1 was associated with greater odds of nonmedical use for self-treating motivations (white, 2.44 [1.18 – 5.04] $P<0.05$;

female, 1.82 [1.06 – 3.11] $P \leq 0.01$); anxious-depressed, 1.06 [1.02 – 1.11] $P < 0.05$). Effects of time and parent's highest level of education completed were tested, but were not found to be significant in these models.

The third hypothesis predicted that acquiring more cumulative experience medically would be associated with an increased incidence of nonmedical use. Hypothesis 3 was supported (Table 4). Results of GEE analyses indicated that receiving a prescription for an anxiolytic or sleep medication for two or three years was associated with increased incidence of nonmedical use (AOR, 4.83 [95% CI, 2.75 – 8.47] $P \leq 0.001$).

Time was held constant in the GEE models, as was the interaction between cumulative prescription and time. The progression of time was associated with decreased odds of nonmedical use (AOR, 0.70 [95% CI, 0.54 – 0.92] $P \leq 0.01$), while an older age was associated with increased odds of nonmedical use (1.21 [1.09 – 1.36] $P \leq 0.001$). Effects of parent's highest level of education completed, and anxiety and depression symptoms at Time 1, were tested but were not found to be significant in these models.

Discussion

This is the first longitudinal, prospective study to examine the association between an adolescent having a legally prescribed prescription for an anxiolytic or sleep medication and their long term risk of using another person's prescription for these classes of medication. Our data show that being recently prescribed an anxiolytic or sleep medication was associated with a greater likelihood of nonmedical use (i.e., misusing another person's prescription) with the same class of medication recently prescribed. In addition, being prescribed an anxiolytic or sleep medication for a greater number of years during adolescence is associated with increased odds of nonmedical use. Specifically, the odds of nonmedical use were greater among respondents who received a prescription during the three-year study period, and even greater among those prescribed at least once a year for two to three years during the three-year study period compared to those prescribed during only one year. Further, the odds of nonmedical use for sensation seeking motivations were 10 times greater among respondents prescribed these classes of medication during the study, when compared with those never prescribed.

Temporality appears important. Respondents who received a prescription for anxiolytics during their lifetime, but not during the three-year study period, demonstrated a higher incidence of nonmedical use of anxiolytics. However, we did not observe this association with sleep medication. Studies are needed to further clarify the time between medical use and later nonmedical use of controlled anxiolytic or sleep medication. One possible explanation is that respondents with a more recent prescription for sleep medication continued to experience symptoms such as insomnia after their medication ran out, and having run out, they decided to use someone else's sleep medication. However, this explanation is challenged by the finding that medical users of both classes of medication (anxiolytic and sleep medication) who had a prescription *during the study period* had far greater odds of using nonmedically for sensation-seeking motivations (such as to get high) versus for self-treating motivations (such as to help them sleep). Alternatively, both of these

controlled medication classes are well recognized for their abuse liability (Schedule IV), and the explanation may be that more recent exposure along with greater availability creates a desire for more of the drug.

We found a relatively high prevalence of recent anxiolytic and sleep prescriptions (5.3%), although this is still a relatively low estimate when compared with opioid analgesic prescriptions. Our prevalence estimates were higher than studies using medical records or national databases (Fortuna et al., 2010; Jonas et al., 2013; Segool et al., 2013), but consistent with an emergency department study conducted in southeastern Michigan (Whiteside et al., 2013). There are several possible explanations for our higher rates: our data are recent, longitudinal and may reflect a new trend; prescription rates may be higher in southeastern Michigan; or data collected from medical records or the NSDUH may yield different estimates because of those study designs and data collection methods.

Across all age groups, adolescents and young adults are the most likely to abuse scheduled medications, including anxiolytic and sleep medication (Fenton et al., 2010; Ford & McClutheon, 2012; Office of National Drug Control Policy, 2008; Rigg & Ford, 2014; SAMHSA, 2012; Schepis & Krishnan-Sarin, 2008; Young et al., 2012). Other studies of adolescents (Ford & McCutcheon, 2012; Schepis & Krishnan-Sarin, 2008) found that misusing anxiolytics and sedatives is associated with being white, female, or older (>15 years), and our results coincide with these findings. Nonetheless, while recognizing disproportional risk among subgroups (e.g., females), all adolescents prescribed scheduled medications are at some risk and providers have a role in reducing this risk.

For clinical providers in busy practices, it is necessary to devise ways to feasibly educate adolescent patients and their parents about the possible risks of both nonmedical use and medical misuse (using too much of one's own prescription) of anxiolytic and sleep medication (SAMHSA, 2012). One suggestion is to use a brief provider protocol that reminds parents and adolescent patients about the proper dosages (to use as advised), the dangers of sharing (do not give away), the importance of controlling the medication (supervised storage), and the need for proper disposal, especially given the risk of adolescents misusing leftover medication (Boyd, Anderson, & Rieckmann, 2011; McCabe, West, & Boyd, 2013b; McCabe, West, & Boyd, 2013c). Another suggestion is to carefully consider the number of refills prescribed to adolescents, recognizing that a number of adolescents divert their controlled medication to peers for nonmedical use (McCabe, West, Teter et al., 2011). And finally, given the high correlation between nonmedical use of controlled medications and other forms of substance abuse (Boyd et al., 2009; Rigg & Ford, 2014; Schepis &Krishnan-Sarin, 2008), health providers should reexamine the quality of their patient assessments prior to writing a prescription for a controlled medication. It should be standard practice that a brief substance use assessment is conducted before prescribing a controlled medication; if the assessment is positive, the patient should be closely monitored while using the anxiolytic or sleep medication.

Limitations

This study represents the first longitudinal study to examine the nonmedical use of Schedule IV anxiolytic and sleep medication in an adolescent sample. The response and attrition rates

are consistent with national studies and the diverse sample is large enough to examine subgroup differences, although the prevalence and incidence of anxiolytic and sleep medication use was relatively low. The study design also constrains broad interpretations. First, we cannot generalize since the sample was from one region and included only adolescents attending school. Second, the estimates are subject to potential bias introduced when assessing sensitive behaviors using self-report, and in some cases, we had small cell sizes. Finally, our earlier work found important differences between medical users, medical misusers, and nonmedical users (McCabe, Boyd, et al., 2007; McCabe et al., 2013c), and thus, we use different definitions than the NSDUH (Boyd & McCabe, 2008).

Despite their relative safety profile when used correctly, this longitudinal, prospective study demonstrates that adolescents prescribed anxiolytic and sleep medication may be at greater risk for engaging in nonmedical use; a behavior that is not only illegal, but confers substantial risk for overdose, substance abuse disorders and deviant behaviors (Ford & McCutcheon, 2012; Jann, Kennedy, & Lopez, 2014; Schepis & Krishnan-Sarin, 2008).

Many national studies fail to differentiate between using someone else's prescription and using one's own prescription and these distinctions have implications; thus, this study provides a new perspective of adolescent prescription drug abusers. Appropriate prevention and clinical interventions will require an understanding of the characteristics of nonmedical users, including whether they use someone else's prescription for self-treating or sensation-seeking motivations. These results may provide some direction for designing such interventions.

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Table 1

Demographic Characteristics of Sample at Time 1

Characteristics	Anxiolytic and Sleep Medication Prescription History			
	Never prescribed in lifetime (n = 2,508, 91.4%)	Prescribed in lifetime but not during the three-year study period (n = 92, 3.4%)	Prescribed during the three-year study period (n = 145, 5.3%)	Total (N = 2,745)
Sex of study participant, %[a]				
Male	51.0	53.3	38.6	50.5
Race/ethnicity[b] **of study participant, %**				
White	64.6	69.6	75.9	65.4
Black	29.8	26.1	17.2	29.0
Other	5.6	4.3	6.9	5.6
Age in years at Time 1				
11	0.1	1.1	0.0	0.1
12	17.6	14.1	13.8	17.3
13	21.9	18.5	17.4	21.5
14	16.5	23.9	13.8	16.7
15	19.9	18.5	20.2	19.9
16	17.4	13.0	25.7	17.6
17	6.4	10.9	9.2	6.7
18	0.2	0.0	0.0	0.1
Highest Level of Education Completed by Either Parent				
High School Degree or Less	8.1	9.8	5.5	8.0
Some College	11.5	4.4	11.0	11.3
College Degree	30.9	28.9	33.8	31.0
Graduate or Professional Degree	49.4	56.7	49.7	49.7

[a] Valid percentages reported.

[b] Race/ethnicity reported by parent or legal guardian of child.

Table 2

Past Year Nonmedical Use and Past Year Nonmedical Use of Anxiolytic and Sleep Medication Based on Historyof being Prescribed these Medication Classes

	Sleep and Anxiolytic Prescription History				
Binary Outcome Variables	**Never prescribed in lifetime (reference group) (n = 2,508)**	**Prescribed in lifetime but not during the three-year study (n = 92)**	**Prescribed during the three-year study (n = 145)**	**Adjusted Odds Ratio for prescribed during lifetime but not during the three-year study [a] (95% CI)**	**Adjusted Odds Ratio for prescribed during the three-year study (95% CI)**
Past year nonmedical use only, % [b] during the three-year study					
Sleeping Medication [c]	0.9	2.0	5.6	2.18 (0.79 – 6.00)	6.40*** (2.78 – 14.78)
Anxiolytic Medication	0.4	5.3	3.8	12.17*** (3.98 – 37.18)	9.06*** (4.26 – 19.26)

*$P < 0.05$;

**$P \leq 0.01$;

***$P \leq 0.001$

[a] Generalized Estimating Equation (GEE) models held year of study constant. Sex, race/ethnicity, age, parent's highest degree of education completed, and severity of depression and anxiety symptoms at Time 1 were tested and included in each GEE model when statistically significant.

[b] Percentage reported is the sum of percentages from Time 1, Time 2, and Time 3 within each of the three prescription history subgroups, by medication class (sleep medication, anxiolytic medication, or combined medication classes).

[c] When a specific medication class is listed (sleep or anxiolytic medication), statistical results reflect prescription and nonmedical use of only the medication class listed.

Table 3

Motivations for Past Year Nonmedical Use

Binary Outcome Variables	Anxiolytic and Sleep Prescription History				
	Never prescribed in lifetime (reference group) (n = 2,508)	Prescribed in lifetime but not during the three-year study (n = 92)	Prescribed during the three-year study (n = 145)	Adjusted Odds Ratio for prescribed during lifetime but not during the three-year study [a] (95% CI)	Adjusted Odds Ratio for prescribed during the three-year study (95% CI)
Past year nonmedical use, % during the three-year study, by motivation					
Sensation Seeking with Sleep Medication [b]	0.1	0.0	2.5	---	28.01*** (9.34 – 84.00)
Self-Treating with Sleep Medication [c]	0.7	2.0	2.0	2.43 (0.88 – 6.75)	2.73 (0.98 – 7.62)
Sensation Seeking with Anxiolytic Medication	0.1	3.6	1.6	30.07*** (8.83 – 102.32)	14.29*** (4.56 – 44.81)
Self-Treating with Anxiolytic Medication	0.2	0.9	1.6	2.78 (0.39 – 20.09)	3.88* (1.20 – 12.54)
Sensation Seeking (Combined Medication Classes) [d]	0.2	0.7	2.3	3.03 (0.67 – 13.75)	10.15*** (3.97 – 25.91)
Self-Treating Year (Combined Medication Classes)	0.8	1.1	3.9	1.06 (0.33 – 3.42)	3.24*** (1.67 – 6.29)

* $P < 0.05$;

** $P \leq 0.01$;

*** $P \leq 0.001$

[a] Generalized Estimating Equation (GEE) models held time (year of study) constant. Sex, race/ethnicity, age, parent's highest degree of education completed, and severity of depression and anxiety symptoms at Time 1 were tested and included in each GEE model when statistically significant.

[b] When a specific medication class is listed (sleep or anxiolytic medication), statistical results reflect prescription and nonmedical use of only the medication class listed.

[c] Sensation Seeking and Self-Treating are mutually exclusive motivation categories.

[d] When "Combined Medication Classes" is listed, statistical results reflect prescription and nonmedical use of sleep and/or anxiolytic medication.

Table 4

Past Year Nonmedical Use Based on Number of Prescriptions

	Number of Prescriptions
Binary Outcome Variables	**Adjusted Odds Ratio for cumulative prescriptions [a] (95% CI) (N = 2,745)**
Past year nonmedical use during the three-year study	
Sleep Medication [b]	5.37*** (2.58 – 11.20)
Anxiolytic Medication	3.86*** (1.71 – 8.67)
Combined Medication Classes [c]	4.83*** (2.75 – 8.47)

*$P < 0.05$;

**$P \leq 0.01$;

***$P \leq 0.001$

[a] Generalized Estimating Equation (GEE) models held time (year of study) constant and tested for an interaction between time and the cumulative prescription independent variable, which was coded as "0" for no prescription during the study period, "1" for one past year prescription during the study period, and "2" for two or three past year prescriptions during the study period. Sex, race/ethnicity, age, parent's highest degree of education completed, and severity of depression and anxiety symptoms at Time 1 were tested and included in each GEE model when statistically significant.

[b] When a specific medication class is listed (sleep or anxiolytic medication), statistical results reflect prescription and nonmedical use of only the medication class listed.

[c] When "Combined Medication Classes" is listed, statistical results reflect prescription and nonmedical use of sleep and/or anxiolytic medications.