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Adolescent Medication Misuse: Results from the MUSC Inventory of Medication Experiences (MIME)

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Abstract

Objectives—To survey a diverse high school population on current prescription and over-the-counter medication misuse behaviors and attitudes.

Methods—We administered the MUSC Inventory of Medication Experiences (MIME), a newly developed self-report instrument, in demographically diverse high schools in Charleston, SC, to assess the feasibility of its administration and determine characteristics associated with medication misuse among high school students.

Results—A total of 3182 students completed the MIME (93% completion rate). Nearly one-third (31%) reported misuse of a medication more than once a month. Analysis was conducted to evaluate associations between misuse and age (<15=33%, 15=32%, 16=33%, 17=30%, 18=26%, >18=34%; $p=.35$), grade (9=29%, 10=32%, 11=33%, 12=30%; $p=.22$), race (White 34%, African-American 26%, others 30%; $p<.001$), gender (M=32%, F=28%; $p=.01$), parent/guardian level of education (<HS=34%, HS=30%, college=29%, and >college=30%; $p=.12$), if a participant was prescribed medication (yes=46%, no=21%; $p<.001$), if a family member was prescribed medication (yes=40%, no=26%; $p<.001$), and if a family member had ever offered their prescribed medication to the student (yes=91%, no=29%; $p<.001$).

Conclusion—Medication misuse may be more pervasive than originally thought, with a notably high level among those most familiar with medications.

Keywords

Addictions; Demographics; High School; Student Health; Survey; Substance Use

Introduction

A June 2011 report by the National Center on Addiction and Substance Abuse (CASA) at Columbia University deemed adolescent substance abuse “America’s #1 Public Health Concern”. While much of the research in the 1980’s through early 2000’s was focused on alcohol and nicotine use, other substances have now emerged as a growing area of concern,

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among them misuse of prescription drugs (SAMHSA, 2010; Johnston, 2010; National Center on Addiction and Substance Abuse at Columbia University, 2011).

While, overall, CASA reports that prescription medication abuse has declined since 1999 (to a low of 14.1% in 2008), there did appear to be a slight uptick in abuse in the following year (to 14.8% in 2009). While many studies and surveys tend to focus on important “abuse” behaviors (use leading to unintended negative consequences), also of concern should be “misuse” behaviors (use of any medication not prescribed/intended for the user, or at times or doses not indicated). Over the last decade there has been increasing concern about the current and long term consequences of this troublesome pattern. While recent literature supports these concerns (Riggs, 2008), little effort has focused on determining who exactly is misusing. Recent estimates indicate that, on average, 2 to 8% of adolescents and/or college undergraduates misuse prescription medications (Barrett, Darredeau, Bordy, & Pihl, 2005; Boyd, McCabe, Cranford, & Young, 2007; McCabe, Teter, & Boyd, 2004; Novak, Kroutil, Williams, & Van Brunt, 2007; Poulin, 2001, 2007; Wilens et al., 2008). One study, however, suggested that as many as 70% of college age students with a prescription for stimulants may have been misusing their medications (Barrett, et al., 2005). Other studies indicate that as many as 15% to 29% of adolescents are diverting their prescribed medications at least sporadically (within the last month or year) (Barrett, et al., 2005; Boyd, et al., 2007; McCabe, et al., 2004; Poulin, 2007; Wilens, et al., 2008). One Canadian undergraduate survey identified some important demographic information associated with misusing and diverting medications. The students exhibiting these negative medication experiences were predominantly white, members of social fraternities or sororities, academically challenged, and abusers of other substances (Wilens, et al., 2008). A Michigan school district study performed by Boyd and colleagues showed that 36% of high school students surveyed were prescribed 1 of the 4 assessed classes of medication (sleeping, sedative or anxiety, stimulant, and pain medications) and that diversion was more likely to occur within gender peer groups than between them, with females overall more likely to divert than males (Boyd, et al., 2007). This study, while wide reaching, pre-defined the categories of medications that were being assessed for diversion, and did not look more globally at misuse behaviors. There has also been some work with Canadian youth, looking exclusively at stimulant medication misuse and abuse. These studies seem to more closely examine possible demographic data surrounding medication experiences, but it is not clear whether these results might accurately translate to United States youth, and is limited to only one subset of medications (Barrett, et al., 2005; Haydon, Rehm, Fischer, Monga, & Adlaf, 2005; Poulin, 2001, 2007).

While each of the aforementioned studies points to the growing concern for a possible “culture of misuse” in this very sensitive population and gives some insight into possible demographic correlates that may provide some clues to “who” is misusing medications, there has been no survey yet looking at the detailed demographics of medication misuse in an adolescent population. We attempted to answer this question by administering a comprehensive survey within a diverse South Carolina school district’s high school population.

METHODS

We developed the MIME in the interest of obtaining detailed information about adolescents' experiences with medication abuse, misuse, and diversion within a brief, age-appropriate instrument that minimizes participant burden. The survey consisted of 21 questions and took approximately two minutes for participants to fill out. The instrument was refined with the aid of adolescent focus groups in our clinical research program.

The MIME was designed to assess for key demographic variables (e.g., gender, age, parent/guardian educational attainment [proxy for family income]) as well as detailed information about several types of medication experiences (e.g., using non-prescribed medications, misusing prescribed medications, being solicited for medications, purchasing medications, selling medications, giving away medications). It also inquires about patterns of behaviors over the previous year concerning sources of misused medications, reasons for misusing medications, and route of medication administration during misuse. The MIME is not a published or validated instrument for diagnosing a substance use disorder.

We conducted the study with cooperation of the Charleston County (South Carolina) School District. Both the School District's Research Division and the MUSC Institutional Review Board approved the study. Administrators at multiple high schools representing a cross-section of settings (urban, suburban, rural) and student populations (ethnic and economic variables) expressed willingness to assist the investigators in conducting the survey in their schools.

Parents/guardians of students under age 18 provided passive consent, with an "opt out" opportunity communicated by phone alert. All data collected with the MIME was obtained anonymously, with no specific identifying information. Cover sheets and opaque envelopes were provided to ensure confidentiality.

The MIME was administered in 5 area high schools within the Charleston County School District. Surveys were administered in the "homeroom" period of the school day at a scheduled date and time chosen by the schools chief administrator to avoid interference with the school curriculum. The students were given approximately 10 minutes of this period to fill out the MIME.

Participants included all students whose parents did not opt out. During the course of administration, the study staff were notified of only one parent who called to have their child opt out of the survey across all participating schools. Participants ranged in ages from 14–21. There were no exclusions for any race, gender, socioeconomic status, or medical/psychiatric illness.

Level of participation

The total number of enrolled students at the five schools combined was 4435. While local school attendance rates were not readily available, State Department records from Los Angeles, Iowa, and Rhode Island report average daily absentee rates as approximately 10% of the enrolled population (3). We had 3182 students fill out the surveys within their

designated homeroom period. Calculating absentees at 10% (443) we achieved a 93% completion rate for the schools participating in the survey of students in attendance on the day of administration.

Data entry and management was performed using a secure computer database. Descriptive statistics were used to illustrate the overall prevalence of various medication experiences among the sample. Comparisons by demographic characteristics (age, ethnicity, socioeconomic status) were conducted using the Chi-Square test statistic for categorical variables. All tests were two-sided and analyzed at an alpha level of 0.05.

RESULTS

Data analysis

For analysis we examined demographics including age (14–21), grade level (9–12), race (white vs african american vs “other”), gender, and parent’s level of education (proxy for socioeconomic status); whether the student was prescribed a medication by their physician; whether the student had family members taking medications for anxiety, pain, or concentration; and whether they had been offered a medication by a family member for symptom relief. These were analyzed against a measure of “misuse” which was defined as a positive response (determined by frequency of event >1x per month) on a selection of questions of misuse behaviors (including stealing medication, taking larger doses than prescribed, using prescription drugs with alcohol or other drugs, using alternate methods of administration, taking medication to get high, utilizing medication to stay awake or sleep, using medication to help study, using medication to help lose weight, using medication not prescribed/intended for you to relieve anxiety, or using medication not prescribed/intended for you to relieve pain). A positive response to any of these questions was recorded as a “yes” for misuse.

Prevalence of misuse

Within the entire sample, 30.7% of the students gave answers consistent with our criteria for misuse of prescription or over-the-counter medication. There were no significant differences between reports of misuse and age after analysis (<15yo=33.4%, 15yo=32%, 16yo=32.6%, 17yo=30.3%, 18yo=26.3%, and >18yo=34.3%; $p=.350$). There was also no significant difference by grade level (9=28.6%, 10=32.4%, 11=32.5%, 12=29.8%; $p=.217$). A significant difference was shown between whites and African Americans (33.7% vs 26.1%, $p<.001$), but there was no difference between whites and “others” (33.7% vs 29.8%). Gender also showed significant differences in misuse reporting with females being more likely to misuse than males (32.3% vs 28%, $p=.013$).

Parent/guardian level of education did not separate on analysis (<high school=34.2%, high school=28.7%, college=29.3%, and graduate school=30.0%, $p=.123$). If a participant was prescribed a medication by their physician (s)he was significantly more likely to have misuse behaviors than those who did not (45.6% vs 20.8%, $p<.001$). If a patient family member was prescribed medication for concentration, anxiety or pain, the rates of misuse

rose significantly (25.7% vs 39.8%, $p<.001$), and if a family member had ever offered their prescribed medication to the student, it rose even further (91.2% vs 28.6%, $p<.001$).

DISCUSSION

Our finding that 30.7% of students in a large, diverse high school population were misusing prescription and over the counter medications suggests that this problem may be more pervasive than previously thought. The Monitoring the Future Study's (MTF) 2010 results report in their population a lifetime prevalence of misusing psychotherapeutic drugs at 21.6% (Johnston, 2010). Perhaps one significant difference in the studies is the narrower scope used in the MTF study, which focused on psychotropic medications (amphetamines, sedatives, tranquilizers, and narcotics). In our study we also asked about other medications, and found that students were misusing such drugs as cold medicines, antidepressants, mood stabilizers, and even neuroleptics.

Contrary to findings from prior studies (National Center on Addiction and Abuse at Columbia University, 2011) there were no significant differences in overall misuse between grade level, age, or parent's education level. We did find, not unexpectedly, that those who were over 18 old and who were in grade levels lower than 12th grade were significantly higher in their rates of misuse than those students whose age was consistent with grade level.

We found that whites were more likely to misuse these drugs than African Americans. There were, however, no significant differences between any other racial demographic ("others") and whites *or* between others and African Americans. Females were more likely to misuse medication than males, a finding consistent with that of the National Survey on Drug Use and Health which showed that females aged 12–17 were more likely to misuse psychotherapeutics than males (3.5% vs 2.8%) (SAMHSA, 2010).

Misuse was very most significantly associated with prescriptions for family members and themselves of drugs with abuse potential. . If a family member is prescribed a medication for concentration, anxiety, or pain, a student is approximately 15% more likely to misuse medications. If the student is prescribed a daily medication, he or is 25% more likely to have misuse behaviors. And, most strikingly, if a student had ever been offered a medication from a family member, (s)he is 63% more likely to misuse medications.

This study is limited in part by the survey itself. The MIME was developed by experienced clinicians, but has not been psychometrically tested or validated. It may thus not be considered diagnostic in nature for medication abuse, dependence, or even misuse. Also, while it was tested in focus populations of high school students, it was not standardized to a specific grade level. It was estimated by Microsoft Word-based software to be at a 5th grade level, but this does not necessarily assure that all high school students would be able to fully understand the questions. Another limit clinically may be the broad definition of "misuse" that we chose. We defined misuse as use of any medication in a way, by a person, or at a dosage not intended. The MTF study defines their criteria only with the statement "on your own-that is, without a doctor telling you to take them." Our definition, however, does seem

to align itself with the definition used by SAMHSA in their published treatment advisory: “Incorrect use of a medication by patients, who may use a drug for a purpose other than that for which it was prescribed, take too little of too much of a drug, take it too often, or take it too long.” (SAMHSA, 2006) Certainly an adolescent may have interpreted our question of “Have you taken a dose of medication larger than indicated” and stated that at one time they had taken 3 capsules of Tylenol rather than the instructed two. On the MIME, this would have been counted as a medication “misuse”. It can be argued, though, that this type of behavior, while certainly not abuse, is the type of behavior that would need to be targeted in order to provide the education needed for adolescents to become more healthy medication decision makers in the future.

These findings provide novel information on the issue of medication misuse in adolescents and also provide a possible direction for future interventions to provide public health benefits. Findings suggest that the typical high school targeted education program may be too late when administered in a 9th grade health class. This data, showing 9th grade misuse as similarly prevalent to 12th grade misuse, combined with the SAMHSA findings that average first exposure may be at about 14 years old, suggests that future interventions should target those in the early middle school years.

To the best of our knowledge, this is the first study that has attempted to look at family and individual variables related to prescription medication misuse. Our findings suggest that education for families of adolescents is a potentially fruitful area for intervention. Providing education to families about the potential of abuse of household medications may be an important step to decreasing the development of a problematic pattern of substance misuse within a family (or community). An important step may be simply to regularly inform families that prescribed medications are to be ONLY taken by the patient receiving the prescription. Another step may be to formulate a flyer or brochure that outlines the above statistics and dangers of adolescent medication misuse. As a clinician, I also recommend that parents always be in charge of household medications and at each dispense let the adolescent know the name of the medication, what it is for, and what the prescribed dose is.

While our research cannot make any definitive statement about the rates of medication abuse or dependence in adolescents, with nearly one third of teenagers reporting misuse in the last 30 days, it certainly speaks to the growing concern for a possible “culture of misuse” in this sensitive population. Encouragingly, it also points to some areas of possible educational intervention that may be helpful in dismantling this culture in the future.

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