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Predictors and consequences of prescription drug misuse during middle school

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ABSTRACT

Objectives: Non-medical prescription drug use (NMPDU) is a growing public health problem among adolescents. This is the first study to examine the correlates of early NMPDU initiation during middle school, and how early initiation is associated with four domains of functioning in high school (mental health, social, academic, and delinquency).
Methods: Students initially in 6th–8th grades from 16 middle schools completed in-school surveys between 2008 and 2011 (Waves 1–5), and a web-based survey in 2013–2014 (Wave 6). We used discrete time survival analysis to assess predictors of initiation from Waves 1 to 5 based on students who provided NMPDU information at any of these waves ($n = 12{,}904$), and regression analysis to examine high school outcomes associated with initiation based on a sample that was followed into high school, Wave 6 ($n = 2539$).
Results: Low resistance self-efficacy, family substance use, low parental respect, and offers of other substances from peers were consistently associated with NMPDU initiation throughout middle school. Further, perceiving that more of one's peers engaged in other substance use was associated with initiation at Wave 1 only. By high school, those students who initiated NMPDU during middle school reported lower social functioning, and more suspensions and fighting, compared to students who did not initiate NMPDU during middle school.
Conclusion: NMPDU initiation during middle school is associated with poorer social functioning and greater delinquency in high school. It is important for middle school prevention programs to address NMPDU. Such programs should focus on both family and peer influences, as well as strengthening resistance self-efficacy.

1. Introduction

1.1. Prevalence of NMPDU

Nonmedical prescription drug use (NMPDU) has reached epidemic proportions in the United States (McHugh et al., 2015), and is a growing public health problem among adolescents (Ford and Watkins, 2012). NMPDU is typically defined as using prescription drugs without a medical doctor's prescription for personal use, in a way other than prescribed, or for the experience or feelings that it elicits. Steep increases occur from 8th to 12th grade in past year non-medical use of prescription drugs such as Adderall, OxyContin, Ritalin, and Vicodin (Miech et al., 2015). This suggests that middle school students (i.e., 6th–8th graders) may be exposed to risks for future use or may be contemplating use in the near future. Studies are needed to identify risk and protective factors for NMPDU that can be targeted in prevention efforts for middle school students, as well as to understand the consequences of early NMPDU initiation on different domains of functioning during high school.

1.2. Risk and protective factors for NMPDU

Most of what is known about the risk and protective factors for drug use during adolescence comes from studies of substances other than prescription drugs. Studies examining the correlates of adolescent NMPDU have mostly been cross-sectional studies of high school students or samples combining middle and high school students (Young et al., 2012). Given developmental changes during adolescence, longitudinal studies of middle school students are needed to identify individual, peer and family factors relevant to

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NMPDU initiation in this younger age group. For example, adolescents who perceive themselves as popular tend to engage in more substance use (Allen et al., 2005; Ober et al., 2013; Tucker et al., 2013), perhaps as a way of maintaining their social status, as do those who feel less efficacious at resisting substances (Hiemstra et al., 2012; Ober et al., 2013). Although low resistance self-efficacy is likely relevant to NMPDU, popularity may be less of a risk factor for NMPDU than substances typically used in social settings such as alcohol. Both of these individual factors have been understudied in the context of NMPDU (Nargiso et al., 2015). Peer factors associated with adolescent NMPDU include exposure to drug use and pro-drug attitudes (Ford, 2008a; Ford and Hill, 2012). However, other peer factors largely overlooked in studies of NMPDU include receiving substance offers (Ellickson et al., 2004; Siegel et al., 2015) and overestimating peer use (D'Amico and McCarthy, 2006; Ober et al., 2013; Wu et al., 2015), although the prevalence of NMPDU overestimation has been documented (McCabe, 2008; Sanders et al., 2014). Family factors relevant to NMPDU include poor parental monitoring and involvement (Ford, 2009; Ford and McCutcheon, 2012). Exposure to family member substance use (Chan et al., 2013; Ober et al., 2013) and weaker family values (Shih et al., 2012; Soto et al., 2011; Unger et al., 2002) have also been identified as important risk factors for other forms of adolescent substance use and thus may be useful in understanding NMPDU initiation.

1.3. Outcomes associated with NMPDU

Cross-sectional studies indicate that adolescent NMPDU is associated with weaker academic orientation (Ford, 2009; Havens et al., 2011; McCabe et al., 2004), greater delinquency (Boyd et al., 2009; Ford, 2008b), and other substance use (Ford, 2009; Ford and McCutcheon, 2012; Havens et al., 2011; McCabe et al., 2004, 2007). Few longitudinal studies have examined how NMPDU initiation is associated with later adolescent functioning. One study of 7th–11th grade students found that those who engaged in nonmedical use of prescription opioids were more likely to screen positive for substance abuse 12 months later than abstainers (McCabe et al., 2013), but another study of 14–17 year olds involved in the juvenile justice system did not find that NMPDU predicted greater engagement in various types of delinquency over the same period of time (Drazdowski et al., 2015). The extent to which early NMPDU initiation is a risk factor for academic and behavioral problems as adolescents transition into high school remains an important, yet largely unexplored question. In addition, beyond these outcomes, there has been no research examining whether NMPDU initiation is a risk factor for problems in other domains of functioning in high school, such as mental health and social functioning.

1.4. The present study

This is the first study to specifically focus on NMPDU initiation during middle school, identifying both correlates of initiation and high school outcomes associated with early initiation, addressing the critical need for longitudinal research in this area (Nargiso et al., 2015; Young et al., 2012). We followed a diverse cohort of middle school students over 4 years (6 waves of data) to address the following research questions: First, to what extent do time-varying individual factors (resistance self-efficacy, perceived popularity), family factors (family substance use, parental respect), and peer factors (offers, approval, and perceived prevalence of substance use) predict initiation of NMPDU during the middle school years? Second, does the strength of the association between these factors and NMPDU initiation change over time? Third, to what extent is NMPDU initiation during middle school associated with high school outcomes in four domains of functioning: mental health, social, academic, and delinquency?

2. Methods

2.1. Participants and procedures

Participants were part of the evaluation of CHOICE, a voluntary after-school substance use prevention program (see D'Amico et al., 2012a, 2012b for details). All 6th–8th grade students enrolled in16 middle schools across three school districts in southern California were invited to participate. Schools were selected and matched to their nearest neighbor school based on the squared Euclidean distance measure, estimated using publicly available information on ethnic diversity, approximate size and standardized test scores. At Wave 1, 8932 students enrolled in the study, and an additional 3982 students (e.g., those new to the school) were added to the cohort between Waves 2 and 4. Waves 1–5 involved in-school surveys during the evaluation (fall 2008, spring 2009, fall 2009, spring 2010, spring 2011), with follow-up rates ranging from 83% to 95%. Initiation models are based on 12,904 students with NMPDU data at any of these waves.

Youth transitioned from 16 middle schools to over 200 high schools nationally and internationally. The cohort was re-contacted and re-consented to complete an outside-of-school web-based survey (Wave 6) between May, 2013–April, 2014 when participants were in 9th–12th grades. Of the 4366 youth who were eligible for Wave 6 (i.e., in 6th–7th grade at Wave 1, could be located, were re-consented), 2653 (61%) of those completed the survey. Dropout was not associated with demographics or risk behaviors, such as alcohol and marijuana use. High school outcome models are based on 2539 youth who completed Wave 6 and had usable data.

As shown in Table 1, the sample at baseline was 11.60 years old on average, 50.7% female, 54.1% Hispanic, 16.8% Asian or Pacific Islander, 15.3% non-Hispanic White, 10.4% multiracial/other, and 3.4% non-Hispanic Black. The percentage of students initiating NMPDU at each of Waves 1–5 ranged from 0.95% to 1.76%, with 6.62% of students initiating use at some point during middle school. A Certificate of Confidentiality was obtained, and all materials and procedures were approved by the school districts and the institution's review board.

2.2. Measures

2.2.1. Lifetime nonmedical use of prescription drugs. This was assessed with a single item: "During your life, how many times have you used or tried prescription medicines to get 'high,' like Ritalin, OxyContin, or Vicodin?" Responses options ranged from 0 times to 7 or more times. Students were classified as having initiated NMPDU by Wave 1 if they reported any lifetime use at Wave 1, and were classified as having initiated NMPDU at each of Waves 2–5 if they reported any lifetime use at that wave and no lifetime use at the previous wave.

2.2.2. Time-invariant background characteristics. The Wave 1 survey asked students about their age, race/ethnicity, gender, and mother's education. Students were classified as non-Hispanic White (reference group), non-Hispanic Black, Hispanic, Asian/Pacific Islander, or multiracial/other. Mother's education was rated from 1 = *did not finish high school* to 4 = *graduated from college*.

2.2.3. Individual time-varying covariates: resistance self-efficacy and perceived popularity. Resistance self-efficacy was assessed with separate items for marijuana, alcohol, and cigarettes asking students what they would do if they were offered substances in different situations (e.g., all your friends at a party are [using marijuana; alcohol; cigarettes]) and did not want to use (Ellickson et al., 2004). Items were rated from 1 = *I would definitely use* to 4 = *I would definitely not use* and averaged (α = .93 at Wave 1). Self-rated popularity was assessed with a 5-item scale based on a measure of social goals (Jarvinen and Nicholls, 1996; sample item: "When I'm with people my own age, everyone wants to be my friend"). Items were rated from 1 = *strongly disagree* to 4 = *strongly agree* and averaged (α = .89 at Wave 1).

2.2.4. Family time-varying covariates: substance use and parental respect. Family substance use was assessed with four items asking whether they had an older sibling who used marijuana and used alcohol sometimes (0 = *no*, 1 = *yes*; those without an older sibling were coded as 0) and how often the adult who is most important to them used marijuana and used alcohol (0 = *never* to 3 = *4–7 days per week*). This information was combined to create a three-level variable (0 = *no substance use by important adult or sibling*, 1 = *substance use by either important adult or sibling*, 2 = *substance use by both important adult and sibling*). Parental respect was assessed with a 4-item scale developed by Unger et al. (2002) and updated by Soto et al. (2011). It asked about the importance of honoring, respecting, and caring for one's parent(s), as well as striving to be a good person. Items were rated from 1 = *strongly disagree* to 4 = *strongly agree* and averaged (α = .92 at Wave 1).

2.2.5. Peer time-varying covariates: offers, approval, and perceived prevalence. Offers were assessed by asking how often in the past 30 days they had been offered alcohol, marijuana and cigarettes (1 = *never* to 7 = *20 or more times*; Ellickson et al., 2004). Each response was then dichotomized (0 = *never*, 1 = *1 or more times*) and the three items were averaged (α = .79 at Wave 1). Approval was assessed by asking how their friends