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Affective dysregulation predicts incident nonmedical prescription analgesic use among college students

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Abstract

Introduction—This study investigated the relationship between four suspected risk factors—affective dysregulation, conduct problems, depressive symptoms, and psychological distress—and incident nonmedical prescription analgesic (NPA) use among college students.

Methods—The sample was derived from 929 college students from a large, mid-Atlantic university who completed the third annual College Life Study assessment (Y_3) and were NPA use naïve at baseline (Y_1). A series of logistic regression analyses were conducted to evaluate the predictors of incident NPA use by Y_3. Separate models were developed to evaluate the association between the suspected risk factors and (a) NPA use relative to non-use of other drugs, including nonmedical use of other drug classes, (b) NPA use relative to other drug use, and (c) other drug use relative to non-use. All models included gender, parental education level, and race/ethnicity.

Results—Affective dysregulation was significantly associated with becoming an incident NPA user relative to both drug users without NPA use as well as non-users, after statistically controlling for demographic characteristics and other factors. Conduct problems in early childhood were positively related to both incident NPA use and other drug use without NPA use relative to non-users, after statistically controlling for demographic characteristics and other factors. Depressive symptoms were associated with NPA incidence at the bivariate level only.

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Contributors

C.K. Morioka generated the idea for this study. C.K. Morioka, D.E. Howard, and A.M. Arria developed the manuscript. C.K. Morioka managed the literature searches and summaries of previous work. C.K. Morioka and K.M. Caldeira performed the statistical analyses. C.K. Morioka wrote the first draft of the manuscript. All authors assisted with writing and approved the final manuscript.

Conflicts of Interest

No conflicts declared.

Conclusions—These findings extend previous research suggesting that NPA use might be related to deficits in regulating negative emotional states, and highlight possible markers for screening and intervention to prevent NPA use.

Keywords

Affective dysregulation; emotional regulation; longitudinal studies; nonmedical use; opiates; prescription opioids

1. Introduction

The widespread availability of prescription analgesics (e.g., opioid-containing pain relievers) for the treatment of pain, along with their strong addictive potential, have led to increases in their nonmedical use (Volkow & McLellan, 2016). Nonmedical prescription analgesic (NPA) use—defined as "use without a prescription or use that occurred simply for the experience or feeling the drug caused" (Substance Abuse and Mental Health Services Administration, 2013)—is one of the nation's most pressing public health problems because of its relationship with addiction and overdose deaths (Compton, Jones, & Baldwin, 2016).

1.1. Young adult NPA use

Nationally, past-month NPA use is more common among young adults 18 to 25 years old than for individuals ages 26 or older [2.8% versus 1.4%, respectively (Center for Behavioral Health Statistics and Quality, 2015)]. Although NPA use is more prevalent among young adults who are not enrolled in college (Martins et al., 2015), college students engage in NPA use with past-year use estimates ranging from 7% to 9% (Arria, O'Grady, Caldeira, Vincent, & Wish, 2008c; McCabe, Cranford, Boyd, & Teter, 2007; McCabe, Teter, & Boyd, 2006; McCabe, Teter, Boyd, Knight, & Wechsler, 2005).

1.2. Risk factors associated with NPA use

Given that the college years are a unique developmental stage where illicit drug use initiation occurs (Gledhill-Hoyt, Lee, Strote, & Wechsler, 2000; Pinchevsky et al., 2012), research to elucidate risk factors for this particular population is critical. Cross-sectional research on NPA use among college students has identified low perceived risk (Lord, Brevard, & Budman, 2011), polydrug use (Quintero, Peterson, & Young, 2006), more substance use, white race, earning lower grades, and living off campus or in fraternity or sorority houses (McCabe et al., 2005) as risk factors. Low perceived risk and sensation seeking have also been found to be longitudinally associated with NPA use among college students (Arria, Caldeira, Vincent, O'Grady, & Wish, 2008b).

Mental health problems have been observed in relation to NPA use (Boyd, Young, & McCabe, 2014; Conway, Compton, Stinson, & Grant, 2006; Green, Black, Grimes Serrano, Budman, & Butler, 2011; Martins, Keyes, Storr, Zhu, & Chilcoat, 2009). Anxiety and depression are common comorbid conditions with addiction (Regier et al., 1990; Ross, Glaser, & Germanson, 1988) and are prospectively related to the onset of opioid use disorders among the general population (Martins et al., 2012) and cross-sectionally related to NPA use among college students (Zullig & Divin, 2012). It is well known that negative

mood states can trigger drug cravings among individuals with drug dependence (Childress et al., 1994).

Affective dysregulation, a deficit in the capacity to regulate one's reactions to unpleasant mood states or cognitively appraise stress, might also be an important risk factor for initiating NPA use. Persons who are affectively dysregulated might experience numbing of emotions and the inability to feel pleasure or positive emotions (Cloitre, Garvert, Brewin, Bryant, & Maercker, 2013). Research conducted with individuals attending addiction treatment found that individuals often self-reported using opiates to alleviate negative mood states (Garland, Hanley, Thomas, Knoll, & Ferraro, 2015). There is also some evidence that among adolescents and young adults, self-treatment for negative affective states, such as anxiety, psychological trauma, and poor emotional control, is commonly reported as a motive for NPA use (Boyd, McCabe, Cranford, & Young, 2006; McCabe, Boyd, & Teter, 2009; McCauley et al., 2010; Young, McCabe, Cranford, Ross-Durow, & Boyd, 2012). The notion that NPA use could be a maladaptive coping mechanism to specifically alleviate unpleasant emotional states is plausible, but requires further study.

It is also well understood that the presence of externalizing disorders (e.g., conduct disorder) is a potent risk factor for subsequent involvement in many forms of substance use (Arria, Vincent, & Caldeira, 2009; Huizinga & Elliott, 1981; Pedersen, Mastekaasa, & Wichstrom, 2001). The relationship between early conduct problems and substance use (e.g., alcohol abuse) is well documented (Boyle et al., 1993; Button et al., 2007; Falls et al., 2011; Johnson, Arria, Borges, Ialongo, & Anthony, 1995; Nurco, Blatchley, Hanlon, & O'Grady, 1999) however, limited research has specifically investigated the association between conduct problems and NPA use among college students.

The extent to which these risk factors might contribute to NPA use rather than simply being correlated requires longitudinal investigations. Furthermore, a dearth of literature exists which is directed at identifying personal characteristics that might distinguish individuals at risk for NPA use, as opposed to polydrug use in general.

1.3. Purpose

The purpose of the present study was to evaluate the significance of several suspected risk factors for becoming an incident NPA user among a college student sample. Utilizing data from a prospective study of individuals originally enrolled as college students, we examined affective dysregulation, conduct problems, depressive symptoms, and psychological distress at baseline as possible predictors of becoming an incident NPA user two years later. Given that NPA use tends to coincide with other forms of illicit and nonmedical prescription drug use (Back, Payne, Simpson, & Brady, 2010; Nargiso, Ballard, & Skeer, 2015), an important focus of this study was to understand whether or not such risk factors might be uniquely related to incident NPA use, as opposed to substance use in general.

2. Methods

2.1. Study design

Data for this analysis were drawn from a longitudinal, prospective study of college students, the College Life Study (CLS), which was launched in 2004. Additional details related to the recruitment and follow-up procedures utilized for the CLS are available elsewhere (Arria et al., 2008a; Vincent et al., 2012). Briefly, this sample was derived from a cohort of incoming first-time, first-year students recruited from one large public university in the mid-Atlantic region. After administration of a pre-college survey, students who had used an illicit drug or nonmedically used a prescription drug at least once during high school were sampled for a longitudinal study at 100% probability; others were sampled at a 40% probability. Students in the final longitudinal sample (representing an 87% response rate) were administered a two-hour, face-to-face interview sometime during their first year of college (N=1,253) in 2004–2005 (Year 1= Y_1). The sample was demographically representative of the entire first-year class of students. Follow-up assessments were conducted annually after Y_1, and were similar in length and content (e.g., drug use patterns, mental health).

The CLS was reviewed and approved by the university's Institutional Review Board. Informed consent was obtained for participation in all waves of data collection, and a federal Certificate of Confidentiality was also acquired. Participants received cash incentives for completing each assessment.

2.2. Sample

The current analysis used data from the baseline (Y_1) and third annual assessments (Year 3= Y_3; n=1,100 follow-up rate=87.9%). The Y_3 data were specifically selected for this analysis because the sample prevalence of NPA use (14.3%) peaked in Y_3. The modal ages for Y_1 and Y_3 were 18 and 20, respectively. After restricting the sample to the 1,100 individuals who completed the Y_3 assessment, another 171 were excluded due to either lifetime or past-year NPA use at Y_1, leaving a final analysis sample of n=929.

2.3. Measures

2.3.1. Nonmedical prescription analgesic (NPA) use—Data on NPA use were collected during the annual interview. The NPA use questions were adapted from the 2002 National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2003). The interviewer presented cards with the names and color photos of several commonly prescribed analgesics, and explained that nonmedical use involved taking any medication "that was not prescribed for you or that you took only for the experience or feeling they caused," excluding any over-the-counter medications. At Y_1, participants were asked the number of occasions they had used a prescription analgesic for nonmedical reasons during both their lifetime and the past 30 days. They were also asked, "When was the last time you used prescription analgesics nonmedically?". At Y_3, participants were asked the number of occasions they had used a prescription analgesic for nonmedical reasons during both the past 12 months and the past 30 days. Each type of analgesic was dichotomized as "ever" versus "never" used. NPA use was denoted as past-year nonmedical

use of any form of prescription analgesic medication at both Y_1 and Y_3 as well as lifetime use at Y_1.

2.3.2. Other illicit and nonmedical drug use—Similar questions were asked regarding past-year nonmedical use of prescription stimulants and tranquilizers, as well as past-year use of seven different types of illicit drugs: marijuana, inhalants, hallucinogens, cocaine, heroin, amphetamines/methamphetamine, and ecstasy. Responses were later combined to form a dichotomous variable representing any past-year use of one or more illicit or nonmedical prescription drugs (i.e., once or more during the past year, versus none), not including NPA use.

2.3.3. Conduct problems—The College Early Conduct Problems Index (CECPI) was used to measure conduct problems at Y_1 (Falls et al., 2011) based on prior measures of conduct problems (Johnson et al., 1995; Nurco et al., 1999). The self-administered survey asked about 16 behaviors corresponding to the DSM-IV criteria for conduct disorder (American Psychiatric Association, 1994). Participants were asked to indicate the frequency of the behavior before they turned 18. Scoring is weighted based on the severity and frequency of each behavior, such that more severe items were scored if they occurred two or more times (e.g., “hurt others physically,” “skipped school,” “ran away from home overnight,” “used a weapon in a fight,” “broke into someone’s house, building, or car,” and “set fires”), whereas less severe items had to occur three or more times to be scored [e.g., “took property belonging to others,” “damaged other people’s property on purpose,” “lied,” “started physical fight with other youths,” and “broke rules” (Johnson et al., 1995)]. The CECPI has been demonstrated to have strong psychometric properties (Falls et al., 2011). The CECPI was used in the analyses as a continuous variable (range=26; *SD*=4.74).

2.3.4. Depressive symptoms—Depressive symptoms were measured at Y_1 using the Beck Depression Inventory [BDI (Beck, Rush, Shaw, & Emery, 1979)] and the Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1977). The BDI and CES-D are valid and reliable screening instruments to measure depressive symptoms, both with strong psychometric properties (Ambrosini, Metz, Bianchi, Rabinovich, & Undie, 1991; Knight, Williams, McGee, & Olaman, 1997). The BDI (range=51; *SD*=5.19) and CES-D (range=52; *SD*=7.73) were both used as continuous variables in the analysis.

2.3.5. Psychological Distress—Psychological distress was measured at Y_1 using the 12-item General Health Questionnaire [GHQ-12 (Goldberg, 1978; Jackson, 2007)] which was interviewer-administered. Scoring was based on the three-point Likert Scale method and the sum was calculated for a possible total range of zero to 36 (Goldberg & Williams, 1988). The GHQ-12 is a previously validated instrument with strong psychometric properties (Tait, French, & Hulse, 2003). The GHQ-12 was used in the analyses as a continuous variable (range=33; *SD*=4.18).

2.3.6. Affective dysregulation—Affective dysregulation was measured at Y_1 using the affective subscale (DI-A) from the Dysregulation Inventory [DI (Mezzich, Tarter, Giancola, & Kirisci, 2001)]. The DI is a 92-item self-administered questionnaire that measures aspects of temperament and behavior. A higher score on the DI-A indicates an inability to regulate

and control one's emotions (Wilcox et al., 2010). For each item, participants were asked to read a statement and indicate how well it described their own behaviors and experiences, with response options of "never true," "occasionally true," "mostly true," and "always true." Examples include "It is very difficult for you not to think about your fears and worries", "You slam the door when you are mad", and "When you are emotionally upset, it lasts for one or two hours even if the problem is gone". Item scores were summed. The DI-A is a previously validated instrument with strong psychometric properties (Mezzich et al., 2001; Wilcox et al., 2010). The DI-A was used in the analysis as a continuous variable (range=65; *SD*=10.56).

2.3.7. Sociodemographic covariates—The following demographic characteristics were collected at Y_1: race/ethnicity (self-reported), age (self-reported), and gender. As a proxy for socioeconomic status, mother's and father's education level were self-reported by students and a combined variable was created to reflect the highest level of education attained by either parent.

2.4. Statistical analyses

All analyses were conducted using IBM® SPSS® Statistics version 23 software. After excluding the Y_1 lifetime and past-year NPA users in order to focus on incident NPA use, three mutually exclusive groups were created based on Y_3 NPA and other drug use: (1) incident NPA use (i.e., any participant who reported past-year NPA use, with or without other drug use); (2) other drug use without NPA use (i.e., past-year illicit or nonmedical drug use, other than NPA); and (3) non-users (i.e., neither NPA use nor any other illicit or nonmedical drug use). Notably, only seven of the NPA users did not use another illicit drug or prescription drug nonmedically, one of whom used neither alcohol, tobacco, nor any other substances.

The first phase of data analysis (Stage 1) involved understanding the degree to which the risk factors were correlated with each other so as to select non-overlapping constructs for inclusion in the final multivariate model. Second, a series of logistic regression models (Stage 2) were developed to understand the relationship between each of the four suspected risk factors alone (i.e., affective dysregulation, conduct problems, psychological distress, depressive symptoms) and NPA use, after adjusting for demographic characteristics. Separate logistic models were developed to evaluate the association between the suspected risk factors and (a) NPA use relative to non-use, (b) NPA use relative to other drug use, and (c) other drug use relative to non-use. All models included gender, parental education level, and race/ethnicity.

Next, a similar series of multivariate models (Stage 3) were developed by entering multiple predictor variables into each model in the following order: depressive symptoms (BDI), affective dysregulation (DI-A), psychological distress (GHQ), and conduct problems (CECPI). For each of the three hypothesized associations, a best-fitting model was obtained by adding independent variables one at a time, retaining those that were statistically significant ($p<.05$), and dropping those that were not significant. Gender, parental education level, and race/ethnicity were retained regardless of statistical significance.

3. Results

Table 1 describes the sample characteristics within the three groups of interest. Approximately half of the sample was female (53.8%) and almost three quarters was white non-Hispanic (70.7%). By Y_3, approximately one in ten individuals became incident past-year NPA users (n=87, or 9.4%), half (n=470, or 50.6%) were drug users but not NPA users, with the remainder (n=372, or 40.0%) using neither drugs nor NPA. The three drug use groups were similar on parental education and GHQ, but differed significantly on all of the other Y_1 variables we tested (all ps<.05).

Correlations between the independent variables are presented in Table 2. Moderate-to-strong correlations were observed amongst the DI-A, BDI, CES-D, and GHQ variables (Pearson rs ranging from .419 to .799), whereas the CECPI variable was more distinct (all rs<.15). To reduce the possible effects of multicollinearity on our statistical models, we selected the BDI as our preferred measure of depressive symptoms and dropped the CES-D (r=.799). The other measures were retained for theoretical reasons, despite their statistical overlap, because affective dysregulation is regarded as an underlying trait that might influence states such as distress and depressive symptoms.

Results of the multivariate logistic regression models are presented in Table 3. As shown in the first column, the likelihood of initiating NPA rather than abstaining from NPA and all other drugs in Y_3 was significantly greater for males (AOR=1.80, 95% CI=1.23–2.63, p=.003) and whites (AOR=2.70, 95% CI=1.65–4.43, p<.001). Continuing down the first column, Stage 2 results showed that, even controlling for demographics, all four of the suspected risk factors were positively associated with incident NPA use versus no drug use (all ps<.05). In Stage 3, when all four suspected risk factors were entered simultaneously with the demographic control variables, the effects of the BDI and GHQ variables were not robust to the inclusion of the DI-A variable, thus yielding a best-fitting model comprised of the DI-A (AOR=1.05, 95% CI=1.02–1.07, p<.001) and the CECPI (AOR=1.07, 95% CI=1.01–1.13, p=.020).

The second column of Table 3 depicts a similar series of analyses for the comparison between individuals who used other drugs (but not NPA) and non-users of any drugs (including NPA). Unlike in the preceding comparison, race (AOR=1.86, 95% CI=1.34–2.57, p<.001) but not gender was significantly associated with drug use, and controlling for demographics, the CECPI was the only suspected risk factor that predicted drug use (AOR=1.06, 95% CI=1.02–1.10, p=.003).

The third column of Table 3 presents the models comparing individuals who initiated NPA use with those who used other drugs (but not NPA). None of the demographic variables distinguished NPA users from other drug users, nor did the CECPI. Interestingly, all three suspected risk factors (DI-A, BDI, GHQ) distinguished NPA initiators from other drug users, although they could not be retained simultaneously in the Stage 3 model. In Stage 3, the CECPI, BDI, and GHQ variables became non-significant and were dropped and could not be re-added in any sequence, thus leaving the DI-A as the only significant predictor (AOR=1.05, 95% CI=1.02–1.07, p<.001).

Results for the demographic control variables remained essentially unchanged from Stage 2 to Stage 3 and were therefore omitted from Table 3 for brevity, with the sole exception that in the comparison between NPA initiation and other drug use without NPA (column 3), the effect of gender became statistically significant (AOR=2.05, 95% CI=1.23–3.44, p=.006; data not shown in table) once the DI-A was taken into account.

3.1. Post-hoc analysis

Because a small subset of the NPA initiators abstained from other drug use (n=7, or 8.1% of the 87 NPA initiators identified), we sought to examine whether they differed from the rest of the sample and/or if they influenced the results of our model. Descriptively, these seven NPA-only users were not significantly different from other NPA initiators with respect to demographics or their scores on the CECPI, BDI, GHQ, and DI-A. Not surprisingly their substance use patterns were noticeably (but not significantly) different, with much lower NPA use frequency than other NPA initiators (mean 1.7 days vs. 6.7 days, respectively, p=.294). However, results of the Stage 3 analyses did not change appreciably when these seven individuals were excluded from the sample.

4. Discussion

In this study of college students, both conduct problems and four measures of psychological problems (i.e., affective dysregulation, two measures of depressive symptoms, and psychological distress) were all initially predictive of subsequent initiation of NPA use, even after accounting for demographic differences. The variables related to affect and depression distinguished NPA users from both non-users of all drugs and individuals who used drugs other than NPA, but did not distinguish other drug users from non-users. Conversely, conduct problems distinguished both NPA users and other drug users from non-users, but did not distinguish NPA users from individuals who used other drugs but not NPA. The apparent specificity of the observed associations between depression and affective dysregulation and NPA use—but not with other drug use—supports the notion that not being able to appropriately manage emotions might be a particularly important precipitating factor for NPA use, consistent with previous findings from a treatment sample (Garland et al., 2015). Alternatively, we cannot rule out the possibility that our NPA use measure was a proxy for more severe substance use overall, which one might expect to correlate with poorer psychological functioning (Armstrong & Costello, 2002).

Given the multitude of adverse consequences associated with NPA use, prevention is a high priority and requires a better understanding of factors involved in susceptibility. To this end, research has focused on characterizing subpopulations at risk (Boyd et al., 2014; Wu, Woody, Yang, & Blazer, 2010). Among the general population, NPA use has been commonly associated with the demographic characteristics of white race, younger age, and male gender (Back et al., 2010; Blanco et al., 2013). Similarly, among college students, NPA use has been associated with white race and male gender (Garnier et al., 2009; McCabe et al., 2005; McCabe, West, Teter, & Boyd, 2014) and the current findings corroborate this association.

The present findings also provide longitudinal, prospective evidence that higher DI-A scores distinguished individuals who became NPA users from individuals who used other types of drugs. Although statistically significant, the magnitude of this difference was modest, and therefore its clinical implications remain unclear. Nevertheless, this finding is consistent with prior research indicating a link between deficits in regulating negative emotional states and nonmedical prescription opioid use (Boyd et al., 2014; Garland et al., 2015). The results also corroborate prior evidence of a prospective association between conduct problems during childhood and drug use later in college (Arria et al., 2009; Falls et al., 2011).

Interestingly, the relationship between depressive symptoms and NPA use incidence was significant in the Stage 2 models, however, this relationship was not robust to the inclusion of affective dysregulation. Further study is warranted to more fully explore the interrelationships between depressive symptoms, affective dysregulation, and NPA use. It is also possible that the level of depressive symptoms among this sample of college students was not severe enough to detect an independent association. For example, research with clinical samples could explore the possibility that individuals with depression who have higher levels of emotional dysregulation might be particularly at risk for NPA use. More sophisticated modeling strategies could be utilized to understand the how affective dysregulation and depression might be related to increased risk for NPS use. Future research with larger samples should investigate possible gender differences in the constellation of risk factors for NPA use.

Several limitations must be acknowledged. Because the data were collected from a sample at one large public university, it is unclear whether the findings have generalizability to other settings (i.e., other regions) and populations (e.g., small private colleges). Self-report measures were used and, while we have no indication that under- or over-reporting occurred, social desirability bias cannot be ruled out. A number of factors that might influence NPA initiation were not accounted for in this study, such as accessibility, motives, and concurrent alcohol use. Our drug use measure was simplistic because the intention was to focus on the transition from non-use to use, but future research should examine how affective dysregulation might influence changes in frequency of NPA use. The analysis did not examine patterns of NPA use in Y_2 of the study, thus NPA initiation might have actually occurred in Y_2. Despite such limitations, the study has several strengths, including the prospective longitudinal design, large sample size, and use of validated measures with strong psychometric properties.

Our findings might have important implications for prevention of NPA use among college students including screening procedures (i.e., if a patient screens positive for affective dysregulation or conduct problems, drug use behaviors should be assessed) and patient education (e.g., preventing nonmedical use, diversion). Future research should examine whether this finding is unique to the college student population or if emotional problems and/or conduct disorder are associated with NPA use among other age groups (e.g., adolescents, adults) and other non-college attending samples. While no single factor can predict whether or not a person will become a NPA user, individuals with more risk factors have a greater chance of becoming a user (National Institute on Drug Abuse, 2016). There is an urgent need for future research to examine the etiology of NPA use to better inform health

professionals about potential targets for primary, secondary, and tertiary preventive interventions. Future studies should also expand on existing qualitative research (Merlo, Singhakant, Cummings, & Cottler, 2013) as to the motives and effects of NPA use, especially among college students. The college years present an important window of opportunity for drug use intervention because it is a high-risk time for onset of drug use and students are highly accessible for screening, treatment, and recovery programs.

In conclusion, the current findings help alert clinicians to specific characteristics that might confer greater risk for NPA use—including affective dysregulation, depressive symptoms, and conduct problems—and underscore the importance of considering risk factors when designing prevention, treatment, and recovery programs for the college student population. Additionally, given that NPA use is more common among young adults (18 to 25 years old) than older individuals (Back et al., 2010; Blanco et al., 2013; Center for Behavioral Health Statistics and Quality, 2015), urgent attention on preventive strategies for this age group is warranted.

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Abbreviations

AOR	Adjusted Odds Ratio
BDI	Beck Depression Inventory
CES-D	Center for Epidemiologic Studies Depression Scale
CLS	College Life Study
CECPI	College Early Conduct Problems Index
DI-A	Dysregulation Inventory Affective Subscale
DSM	Diagnostic and Statistical Manual of Mental Disorders
GHQ	General Health Questionnaire
NPA	Nonmedical Prescription Analgesic

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Table 1

Sample characteristics by drug use groups.

	Overall (*N*=929)	Y_3 Self-Reported Past-year Drug Use		
		Incident NPA Use (*n*=87)	Drug Use without NPA Use (*n*=470)	Neither Drug nor NPA Use (*n*=372)
Demographic Characteristics [n (%)]				
Gender *				
Female	500 (53.8)	39 (44.8)	241 (51.3)	220 (59.1)
Male	429 (46.2)	48 (55.2)	229 (48.7)	152 (40.9)
Race/Ethnicity **				
White (Non-Hispanic)	657 (70.7)	70 (80.5)	355 (75.5)	232 (62.4)
Black (Non-Hispanic)	94 (10.1)	4 (4.6)	37 (7.9)	53 (14.2)
Asian (Non-Hispanic)	94 (10.1)	7 (8.0)	33 (7.0)	54 (14.5)
Other (Non-Hispanic)	42 (4.5)	1 (1.1)	25 (5.3)	16 (4.3)
Hispanic	42 (4.5)	5 (5.7)	20 (4.3)	17 (4.6)
Parental Education[a]				
Some college or less	124 (14.3)	10 (12.3)	56 (12.8)	58 (16.6)
Bachelor's degree	230 (26.5)	24 (29.6)	116 (26.5)	90 (25.8)
Graduate degree	514 (59.2)	47 (58.0)	266 (60.7)	201 (57.6)
Suspected Risk Factors [Mean, (SD)]				
Affective Dysregulation (DI-A)[b] **	23.4 (10.5)	27.6 (14.2)	23.0 (9.9)	23.0 (10.1)
Conduct Problems (CECPI)[b] **	6.3 (4.5)	7.6 (4.7)	6.7 (4.7)	5.5 (4.2)
Depressive Symptoms (BDI)[b]*	5.2 (5.2)	6.7 (7.3)	5.1 (5.0)	5.0 (4.8)
Depressive Symptoms (CES-D)[b]**	10.4 (7.5)	13.2 (9.7)	10.0 (7.3)	10.3 (7.1)
Psychological Distress (GHQ)[b]	9.6 (4.1)	10.4 (4.6)	9.4 (4.0)	9.6 (4.1)

* $p<.05$;

** $p<.01$

[a] Highest reported education level between the participant's mother and father.

[b] Higher scores indicate higher levels of symptoms or problems.

Table 2

Intercorrelations among the suspected risk factors of NPA use (*N*=929).

	Affective Dysregulation (DI-A)	Conduct Problems (CECPI)	Depressive Symptoms (BDI)	Depressive Symptoms (CES-D)
Conduct Problems (CECPI)	.092*			
Depressive Symptoms (BDI)	.506*	.132*		
Depressive Symptoms (CES-D)	.531*	.126*	.799*	
Psychological Distress (GHQ)	.419*	.104*	.662*	.665*

*Pearson correlation coefficients that are statistically significant at the $p<.01$ level (2-tailed).

Table 3

Results of multivariate logistic regression models comparing the three drug use groups.

		Y_3 Self-Reported Past-year Drug Use					
		NPA Use[a] vs. No Drug Use[c] (*n*=430)		Drug Use without NPA[b] vs. No Drug Use[c] (*n*=787)		NPA Use[a] vs. Drug Use without NPA[b] (*n*=519)	
		***AOR* (95%CI)**	***p***	***AOR* (95%CI)**	***p***	***AOR* (95%CI)**	***p***
Stage 1	Gender = Male	1.80 (1.23, 2.63)	.003	1.32 (0.99, 1.77)	.062	1.40 (0.94, 2.08)	.098
	Race/Ethnicity = White Non-Hispanic	2.70 (1.65, 4.43)	<.001	1.86 (1.34, 2.57)	<.001	1.44 (0.86, 2.41)	.164
	Parental Education						
	Some college or less	Reference		Reference		Reference	
	Bachelor's degree	0.97 (0.50, 1.87)	.923	1.09 (0.67, 1.77)	.726	1.07 (0.55, 2.09)	.842
	Graduate degree	0.90 (0.49, 1.66)	.743	1.11 (0.72, 1.72)	.631	0.90 (0.48, 1.67)	.730
	BIC	71.4		92.3		73.6	
Stage 2	Affective Dysregulation (DI-A)	1.05 (1.03, 1.07)	<.000	1.01 (0.99, 1.02)	.550	1.05 (1.02, 1.07)	<.001
	Conduct Problems (CECPI)	1.10 (1.03, 1.16)	.003	1.06 (1.02, 1.10)	.003	1.04 (0.98, 1.09)	.181
	Depressive Symptoms (BDI)	1.07 (1.03, 1.12)	.002	1.02 (0.98, 1.05)	.387	1.06 (1.01, 1.11)	.009
	Psychological Distress (GHQ)	1.07 (1.01, 1.13)	.015	1.00 (0.97, 1.04)	.848	1.07 (1.01, 1.12)	.020
Stage 3	Affective Dysregulation (DI-A)	1.05 (1.02, 1.07)	<.001	–	–	1.05 (1.02, 1.07)	<.001
	Conduct Problems (CECPI)	1.07 (1.01, 1.13)	.020	1.06 (1.02, 1.10)	.003	–	–
	BIC	386.6		457.0		336.1	

Note. The Stage 1 model for each outcome included the three demographic variables (gender, race/ethnicity, parental education) only. Stage 2 represents a series of four models for each outcome, in which the statistical effect of each of the four predictors on the outcome is evaluated in turn, while adjusting for demographics. The Stage 3 model for each outcome reflects the best-fitting combination of predictor variables for that outcome, while adjusting for demographics and other predictors in that model (if any). For all predictor variables shown, higher scores indicate higher levels of problems or symptoms. BIC=Bayesian information criterion