Substance Use Problems and Associated Psychiatric Symptoms Among Adolescents in Primary Care

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ABSTRACT. Objective. Substance use disorders (SUDs) are associated with other mental disorders in adolescence, but it is unclear whether less severe substance use problems (SUPs) also increase risk. Because youths with SUPs are most likely to present first to their site of primary care, it is important to establish the presence and patterns of psychiatric comorbidity among adolescent primary care patients with subdiagnostic use of alcohol or other drugs. The objective of this study was to determine the association between level of substance use and psychiatric symptoms among adolescents in a primary care setting.

Methods. Patients who were aged 14 to 18 years and receiving routine care at a hospital-based adolescent clinic were eligible. Participants completed the Problem Oriented Screening Instrument for Teenagers Substance Use/Abuse scale, which is designed to detect social and legal problems associated with alcohol and other drugs, and the Adolescent Diagnostic Interview, which evaluates for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition diagnoses of substance abuse/dependence and 8 types of psychiatric symptoms. We examined gender-specific associations of no/nonproblematic substance use (NSU), SUP, and SUD with psychiatric symptom presence (any symptoms within each type), score (symptom scores summed across all types), and number of types (number of different symptom types endorsed).

Results. Of 538 adolescents (68% female; mean ± standard deviation age: 16.6 ± 1.4 years), 66% were classified with NSU, 18% with SUP, and 16% with SUD, and 80% reported having at least 1 type of psychiatric symptom in the previous 12 months. Symptoms of anxiety were most common (60% of both boys and girls), followed by symptoms of depression among girls (51%) and symptoms of attention-deficit disorder (ADD) among boys (47%). Compared with those with NSU, youths with SUP and those with SUD were more likely to report symptom presence for several types of psychiatric symptoms. Girls with SUP or SUD had increased odds of reporting symptoms of mania, ADD, and conduct disorder; girls with SUD were at increased risk for symptoms of depression, eating disorders, and hallucinations or delusions. Boys with SUP had increased odds of ADD symptoms, whereas boys with SUD had increased odds of reporting hallucinations or delusions. Boys with SUP or SUD had increased odds of reporting symptoms of conduct disorder. Youths with SUP and SUD also had higher psychiatric symptom scores and reported a wider range of psychiatric symptom types (number of types) compared with youths with NSU.

Conclusions. Like those with SUD, adolescents with subdiagnostic SUP were at increased risk for experiencing a greater number of psychiatric symptoms and a wider range of psychiatric symptom types than youths with NSU. Specifically, adolescents with SUP are at increased risk for symptoms of mood (girls) and disruptive behavior disorders (girls and boys). These findings suggest the clinical importance of SUP and support the concept of a continuum between subthreshold and diagnostic substance use among adolescents in primary care. Identification of youths with SUP may allow for intervention before either the substance use or any associated psychiatric problems progress to more severe levels. Pediatrics 2003;111:e699–e705. URL: http://www.pediatrics.org/cgi/content/full/111/6/e699; substance use, substance abuse, substance use disorder, psychiatric symptoms, comorbidity, adolescent.

ABBREVIATIONS. SUD, substance use disorder; ADHD, attention-deficit/hyperactivity disorder; SUP, substance use problem; DSM-PC, Diagnostic and Statistical Manual for Primary Care; POSIT, Problem Oriented Screening Instrument for Teenagers; ADI, Adolescent Diagnostic Interview; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; NSU, no/nonproblematic substance use; ADD, attention-deficit disorder.

Substance use disorders (SUDs) in adolescents have been correlated with other psychiatric diagnoses, including dysthymia and major depression, conduct disorder, attention-deficit/hyperactivity disorder (ADHD), eating disorders, and psychosis. However, less is known about the psychiatric comorbidity for adolescents with less severe but more prevalent substance use problems (SUPs).

In publishing the Diagnostic and Statistical Manual for Primary Care (DSM-PC) Child and Adolescent Version, the American Academy of Pediatrics has recognized the importance of subdiagnostic mental health problems in the primary care clinician’s office. The DSM-PC identifies “substance use problem” as a diagnostic category that is along the same developmental spectrum as yet distinct from SUD (ie, abuse or dependence). Common manifestations of SUP in adolescents include using a substance because of behavioral or emotional problems and having occasional impaired memory or motor dysfunction as a result of substance use.
Researchers as well as clinicians have recognized that substance use exists along a continuum and that patterns of use below the diagnostic threshold for abuse/dependence may still be associated with substantial morbidity. In 1 large community-based study of adolescents, increasing levels of alcohol use—from abstention to experimentation, social drinking, problem drinking, and abuse/dependence—were associated with increasing lifetime occurrence of Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised diagnoses of depressive disorders and disruptive behavior disorders, as well as problematic use of tobacco and other drugs. Because youths with SUPs are most likely to present first to their site of primary care, it is important to establish the presence and patterns of psychiatric comorbidity among adolescent clinic outpatients with subdiagnostic use of alcohol or other drugs.

Gender differences have been described in the epidemiology of substance use 15 and in psychiatric comorbidity. Epidemiologic studies in adults have found that although substance use is more common in men than in women, substance-abusing women experience higher rates of comorbidity. Boys and girls with problematic substance use (SUP or SUD) may also differ in psychiatric comorbidity, which has important implications for designing gender-appropriate approaches to treatment. Some studies have found higher rates of depression among adolescent girls with SUD, although others have reported no difference between the genders. Conduct and other disruptive behavior disorders have been more prevalent among adolescent boys with SUD in some studies but not others. Previous studies have examined gender differences for disorders that meet Diagnostic and Statistical Manual of Mental Disorders criteria and in adolescents in substance abuse treatment.

The objective of this study was to examine the gender-specific associations between SUPs and SUDs and the quantity, quality, and variety of correlated psychiatric symptoms among patients of a general adolescent medicine practice. We hypothesized that SUPs, like SUDs, would be associated with significant psychiatric comorbidity and that gender differences would exist in the patterns of substance use and psychiatric comorbidity.

METHODS

Participants

The study protocol and data management procedures have been previously described in detail. Patients who were 14 to 18 years of age and presented for routine care to an urban, hospital-based adolescent clinic between March 1999 and September 2000 were invited to participate in the study at the conclusion of the medical visit. Patients were excluded when their provider determined that they were in a medical or emotional crisis at the time of the visit or when they were unable to read and understand English. Participants were offered a $25 merchandise certificate as compensation for their time. After a research assistant explained the study and answered any questions, each participant provided informed assent. The institutional review board of the hospital approved the study and waived parental consent in accordance with federal regulations and the Society for Adolescent Medicine guidelines for adolescent health research.

Participants completed an assessment battery that included the 17-item Substance Use/Abuse Scale from the Problem Oriented Screening Instrument for Teenagers (POSIT) and the structured Adolescent Diagnostic Interview (ADI) for substance use. The POSIT Substance Use/Abuse Scale is designed to detect social and legal problems associated with alcohol and other drugs. The reliability and validity of the POSIT has been tested in several studies of adolescents, including high school students, youths in outpatient and inpatient drug treatment, arrested youths, and youths attending a general adolescent clinic. The POSIT Substance Use/Abuse Scale differentiates heavy substance users from nonusers (ie, demonstrates good concurrent differential validity) and correlates with other measures of substance use. The internal consistency reliability of the Substance Use/Abuse Scale is generally very good to excellent, ranging from 0.77 to 0.93, and the 1-week test–retest reliability in 1 study of well adolescent clinic patients was 0.80. The POSIT Substance Use/Abuse Scale includes questions such as, “During the past month, have you driven a car while you were drunk or high?” and, “Do you miss out on activities because you spend too much money on drugs or alcohol?” A positive POSIT Substance Use/Abuse score is considered to be 1 or more “yes” answers (possible score range: 0–17).

The ADI generates Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) diagnoses of alcohol/drug abuse and dependence and has demonstrated sound psychometric properties (interrater agreements, test–retest reliability, concurrent validity, and criterion validity) in adolescents. The ADI is administered by a trained interviewer and takes 30 to 90 minutes to complete. The ADI was scored by a research assistant using the ADI manual instructions and by computer with an SPSS syntax algorithm developed by the author of the ADI. Two study investigators who were blinded to the study hypotheses reviewed the data and resolved by consensus any discrepancies in scoring of the ADI or assignment of a diagnosis. For the purposes of this study, substance use was classified as no/nonprobihetive substance use (NSU; no alcohol/drug use in previous 12 months, or some use in previous 12 months and POSIT score = 0), SUP (POSIT score ≥ 1 but no ADI diagnosis of substance abuse or dependence), and SUD (ADI diagnosis of either alcohol or drug abuse or dependence).

The ADI also evaluates 3 to 5 psychiatric symptoms in the previous 12 months from each of the following domains: depression, mania, eating disorder, delusional thinking and hallucinations (combined for these analyses), attention-deficit disorder (ADD), anxiety, and conduct disorder. Psychiatric symptomatology was examined in 3 different ways. First, report of any symptom (psychiatric symptom presence) within each of the symptom types was noted. Second, a psychiatric symptom score was created to reflect the degree of psychiatric distress. The sum of reported symptoms within each symptom type was normalized (ie, converted to a z score) for each gender, then the normalized sums were summed across all symptom types. Thus, a higher psychiatric symptom score represented more reported symptoms. The actual values of the psychiatric symptom scores are derived from normalized data and thus have no clinical relevance as numbers. Therefore, for avoiding confusion, the results of statistical comparisons are reported but the scores themselves are not presented. Third, for quantifying the variety of symptom types reported by an individual, a variable for the number of psychiatric symptom types was created by summing the number of different symptom types for which at least 1 symptom was reported.

Associations of category of substance use with psychiatric symptoms (presence, score, and number of types) were examined with and analysis of variance in SPSS. Multivariate logistic regression was used to determine the odds of reporting symptom presence within each psychiatric symptom type for adolescents with SUPs and SUDs, compared with those with NSU. Because the variables psychiatric symptom score and number of symptom types had skewed distributions, quartiles were used for categorial multivariate analyses. Proportional odds regression models estimated the odds of 1 quartile increase in psychiatric symptom score and number of types for SUPs and SUDs compared with NSU. Multivariate analyses were conducted separately by gender and included all covariates (age, race/ethnicity, family history of substance use) found to be significant at the 0.15 level on bivariate analysis. Effect modification by the association between psychiatric use category and psychiatric symptom variables by the demographic variables was evaluated by testing the significance of
interaction terms with the substance use variable. The presence of confounding by demographic variables was determined using the change in \( \beta \) estimate method (ie, whether the estimate of the \( \beta \) for the substance use variable and its standard error changed by at least 10% with inclusion of each demographic variable in the model).32

**RESULTS**

**Descriptive Analyses**

The 538 adolescents were 68% female and of diverse race/ethnicity (Table 1). Girls in our sample were slightly older than were boys. Nearly one half of girls and boys reported a family history of substance use. Two thirds (66%) of the participants were classified with NSU, 18% with SUPs, and 16% with SUDs; there were no differences by gender in substance use classification.

Sixty percent of adolescents reported the presence of at least 1 type of psychiatric symptom in the past 12 months; girls were more likely than boys were to report any psychiatric symptoms. Anxiety symptoms were most commonly reported, followed by symptoms of depression among girls and ADD among boys. Girls were more likely than were boys to report symptoms of depression and eating disorders. There were no differences between the genders in rates of reporting symptoms of mania, anxiety, delusions or hallucinations, ADD, or conduct disorder. Although girls and boys reported similar degrees of psychiatric distress (had similar psychiatric symptom scores), girls reported a greater number of psychiatric symptom types compared with boys.

**Bivariate Analyses**

Compared with girls with NSU, girls with SUDs were more likely to report experiencing symptoms of depression and eating disorders. Girls with SUPs as well as those with SUDs were more likely to report symptoms of mania, ADD, and conduct disorder (Table 2). Compared with boys with NSU, boys with SUPs were more likely to report experiencing symptoms of ADD. Increasing severity of substance use was associated with increasing likelihood of conduct disorder symptoms in boys. Boys with SUDs were much more likely than were boys with NSU to report hallucinations or delusions.

The psychiatric symptom score was higher for adolescents with SUPs and SUDs compared with those with NSU (\( P = .0005 \) for both boys and girls). Both boys and girls using substances reported greater number of psychiatric symptom types compared with those with NSU (mean number of symptom types reported: 2.7 SUPs and 3.0 SUDs vs 1.7 NSU; \( P = .0005 \)).

**Multivariate Analyses**

Table 3 displays the adjusted odds ratios and 95% confidence intervals for adolescents with SUPs and those with SUDs reporting each type of psychiatric symptom, by gender. The models for girls controlled for age and family history of substance use, and the models for boys controlled for age. Girls with SUPs as well as girls with SUDs had increased odds of symptoms of mania, ADD, and conduct disorder. Girls with SUDs were at increased risk of symptoms of depression, eating disorders, and hallucinations or delusions. Boys with SUPs had increased odds of ADD symptoms, and boys with SUDs had increased odds of reporting hallucinations or delusions. Boys with either SUPs or SUDs had increased odds of symptoms of conduct disorder. Post hoc testing revealed that SUPs and SUDs did not significantly differ from each other in any of the models. None of the interaction terms between covariates and substance use category was significant. There was no evidence of confounding by the covariates in any of the models.

Adjusting for family history of substance abuse, SUPs and SUDs were associated with higher psychiatric symptom score and number of symptom types for both boys and girls (Table 4). For example, compared with those with NSU, adolescent girls with SUPs had 2.4 times the odds of being 1 quartile higher on psychiatric symptom score. SUPs and SUDs did not significantly differ from each other in any of the models. The interaction between family history of substance abuse and substance use category was not significant in any of the models. Family history of substance abuse did not seem to confound the observed associations.

**DISCUSSION**

This study showed that adolescents with SUPs, like those with SUDs, report a greater number and variety of symptoms of psychiatric distress compared with those with NSU. These findings support a continuity approach to substance use among adolescents in primary care and are consistent with studies of subclinical substance use in other populations.

In a community sample of high school students,
TABLE 2. Percentage of Girls and Boys Reporting Psychiatric Symptom Type, by Substance Use Category*

<table>
<thead>
<tr>
<th>Psychiatric symptom type</th>
<th>Girls (n = 368)</th>
<th>Boys (n = 170)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>NSU</td>
<td>SUP</td>
<td>SUD</td>
</tr>
<tr>
<td>Anxiety</td>
<td>56.6</td>
<td>67.6</td>
<td>69.4</td>
</tr>
<tr>
<td>Mania</td>
<td>17.9</td>
<td>40.8</td>
<td>33.9</td>
</tr>
<tr>
<td>Eating disorders</td>
<td>14.5</td>
<td>22.5</td>
<td>29.0</td>
</tr>
<tr>
<td>Hallucinations/delusions</td>
<td>11.1</td>
<td>12.9</td>
<td>21.0</td>
</tr>
<tr>
<td>ADD</td>
<td>35.0</td>
<td>62.0</td>
<td>62.9</td>
</tr>
<tr>
<td>Conduct disorder</td>
<td>27.7</td>
<td>29.8</td>
<td>42.6</td>
</tr>
</tbody>
</table>

* SUD significantly different from NSU by χ² test, P < .05.
† SUP significantly different from NSU by χ² test, P < .05.
‡ Analyses could not be performed because of small cell sizes.

TABLE 3. Adjusted Odds Ratios (95% CI) for Psychiatric Symptom Type by Substance Use Category in Adolescent Girls and Boys

<table>
<thead>
<tr>
<th>Psychiatric Symptom Type</th>
<th>Depression</th>
<th>Mania</th>
<th>Eating Disorders</th>
<th>Hallucinations/Delusions</th>
<th>Attention Deficit Disorder</th>
<th>Conduct Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls*</td>
<td>NSU Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>SUP</td>
<td>1.6 (0.9–2.7)</td>
<td>3.1 (1.7–5.6)</td>
<td>1.6 (0.8–3.1)</td>
<td>1.3 (0.6–3.0)</td>
<td>3.0 (1.7–5.4)</td>
<td>4.2 (1.8–9.8)</td>
</tr>
<tr>
<td>SUD</td>
<td>2.4 (1.3–4.4)</td>
<td>2.3 (1.2–4.4)</td>
<td>2.2 (1.1–4.4)</td>
<td>2.4 (1.1–5.3)</td>
<td>3.2 (1.8–5.9)</td>
<td>8.3 (3.7–18.8)</td>
</tr>
<tr>
<td>Boys†</td>
<td>NSU Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
<td>Referent</td>
</tr>
<tr>
<td>SUP</td>
<td>1.5 (0.3–7.6)</td>
<td>4.1 (1.6–10.7)</td>
<td>3.6 (1.0–12.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUD</td>
<td>6.4 (1.8–23.6)</td>
<td>2.2 (0.9–5.5)</td>
<td>10.2 (3.2–32.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CI indicates confidence interval.
* Models adjusted for age and family history of substance use.
† Models adjusted for age.

TABLE 4. Proportional Odds (95% CI) of Increasing Quartile for Psychiatric Symptom Score and Number of Psychiatric Symptom Types by Substance Use Category for Adolescent Girls and Boys†‡

<table>
<thead>
<tr>
<th>Psychiatric Symptom Score (in Quartiles)</th>
<th>Number of Psychiatric Symptom Types (in Quartiles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>NSU Referent</td>
</tr>
<tr>
<td>SUP</td>
<td>2.4 (1.3–3.8)</td>
</tr>
<tr>
<td>SUD</td>
<td>3.9 (2.3–6.7)</td>
</tr>
<tr>
<td>Boys†</td>
<td>NSU Referent</td>
</tr>
<tr>
<td>SUP</td>
<td>3.7 (1.6–8.3)</td>
</tr>
<tr>
<td>SUD</td>
<td>5.9 (2.5–14)</td>
</tr>
</tbody>
</table>

* Models adjusted for family history of substance abuse.
† The interaction term family history of substance abuse × substance use category was not significant in any of the models.
‡ Post hoc testing showed that SUP and SUD were significantly different from NSU in each model; P < .05.

Rohde et al² similarly found that the likelihood of DSM-IV psychiatric disorder increased with increasing level of problematic alcohol use. As the DSM-PC suggests, primary care clinicians care for youths with psychological issues that do not meet criteria for a disorder but still warrant a response.¹⁴ Identification of youths with SUPs may allow for intervention before either the substance use or any associated psychiatric problems progress to more severe levels. Indeed, primary care providers are increasingly placed on the front lines of diagnosis and management of mental disorders. A study conducted in an urban general medicine practice found that clinically important substance use, anxiety, and depression were common and associated with substantial functional impairment.33 Limited research has been done to identify the prevalence of psychiatric problems among adolescents who attend sites of primary care,34 but school- and community-based surveys suggest that the rates are high.35,36 Health maintenance visits provide an important opportunity to screen for substance use and other psychiatric problems.

Both boys and girls with problematic substance use (SUP or SUD) had increased odds of reporting symptoms of disruptive behavior disorders. The association of SUD with ADHD and conduct disorder has been well described.6–8,37,38 One study of behaviorally disordered, substance-using adolescents found that symptoms of ADHD were common in adolescents with conduct disorder and were positively correlated with severity of substance dependence.⁷ Among incarcerated youths, the number of symptoms of conduct disorder was shown to increase with the level of substance abuse.⁸ Research suggests that conduct disorder may account in part for the association between ADHD and SUD.⁶
which includes substance use as a component of the pattern of conduct problems. Furthermore, impaired social functioning may substantially worsen outcomes associated with psychiatric illness, including the development of SUDs.

In our study, girls with SUDs reported internalizing as well as externalizing symptoms of emotional distress. This finding is consistent with a previous study of adolescents referred for substance abuse, in which girls engaged in externalizing behaviors as extensively as their male counterparts but were distinguished by higher levels of internalizing symptoms. Other studies have found gender differences in the associations between psychiatric distress and substance use. However, the predominance of depressive symptoms in substance-abusing girls has not always been seen. In 1 longitudinal study, depressive symptoms at 11 years of age was shown to predict substance use at 15 years of age for boys but not for girls. In another study, depression and disruptive behavior disorders were correlated with substance use and abuse in both male and female adolescents. Although anxiety symptoms were common in our study, we did not observe an association with substance use in girls, which has been previously reported.

The gender differences in which and how psychiatric symptoms are associated with substance use suggest that causative and/or vulnerability factors for the comorbidities may be different for boys and girls. For example, substance-using girls have more comorbidity and more family dysfunction than boys, suggesting that they have more severe psychological disturbance. Parents of depressed, substance-using girls have reported that their daughters exhibited more psychosocial dysfunction, including more impaired relationships with their parents, than did parents of girls with depression alone, whereas no differences were seen in the reports by parents of depressed boys with and without substance use. Future research is needed to determine the temporal ordering of the development of psychosocial dysfunction, SUDs, and other psychiatric morbidity in girls and boys.

There are several limitations to this study. The participants were primarily middle adolescents recruited from a single adolescent clinic in an urban children’s hospital and were largely nonwhite. Our findings may not be generalizable to younger children or young adults or to adolescents seen in other settings. Because this was a convenience sample, selection bias may be present. Older adolescents and those with serious SUDs or other psychiatric problems may be less likely to seek routine health care; although youths with comorbid conditions may also be more likely to present for treatment of their symptoms (Berkson’s bias). Knowing the purpose of the study, clinic providers may have been more likely to refer patients with substantial substance use. Adolescent substance users may have been less likely to consent to participate in research, but there was no evidence of this sort of self-selection. Eighty percent of adolescents who were invited to participate consented to the study, and there were no differences between those who refused and those who agreed to participate with regard to age; gender; race/ethnicity; or provider impressions of alcohol use, drug use, or any substance use. Patients in emotional crisis were excluded from this study, which would bias the results toward the null hypothesis. Nonetheless and not surprising, across all substance use groups, the rates of psychiatric symptoms reported by our sample are substantially higher than the rates of psychiatric diagnoses reported in previous research. The data were collected by self-report, which is subject to both recall and social desirability bias. As such, we would expect participants to minimize their substance use, which would result in underestimation of the associations of interest. Finally, sample size prohibited the differentiation in the analyses between use of alcohol and use of other drugs.

It is important to note that causality cannot be inferred from this cross-sectional study. Individuals with psychiatric disorders may self-medicate their symptoms through the use of nonprescribed substances. Substance use may also worsen preexisting psychiatric symptoms or precede the development of psychiatric disorder. Finally, there may be genetic or environmental factors that predispose to both psychiatric disorders and substance use. Indeed, there are conflicting findings from longitudinal studies about the causal nature of the relationship between SUDs and other psychiatric disorders. Depending on the temporal and causal pathways, different treatments targeting the primary psychopathological process may be appropriate for patients with comorbidity.

This study of adolescents in primary care adds to the growing literature supporting the clinical relevance of subclinical substance use and other psychiatric problems. Whether SUP represents an earlier point on the continuum to SUD, serves as a marker for other psychological or social problems, or is associated with medical or psychiatric morbidity in its own right, its identification warrants additional evaluation and intervention. In particular, our findings suggest that primary care clinicians should screen adolescents with SUDs for the presence of a wide range of other psychiatric symptoms. Early intervention may prevent the development of more severe morbidity from substance use and correlated psychiatric disorders among at-risk adolescents.

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