

A Descriptive Study of Nicotine, Alcohol, and Cannabis Use in Urban, Socially Disadvantaged, Predominantly African-American Patients with First-Episode Nonaffective Psychosis

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Abstract

Introduction: Given the importance of substance use comorbidity among individuals with schizophrenia (even first-episode patients), and because of the dearth of descriptive reports on substance use among first-episode patients in the United States (especially in minority populations), use of nicotine, alcohol, and cannabis is described in a relatively homogeneous sample of first-episode patients. **Methods:** One hundred and nine hospitalized patients with first-episode nonaffective psychosis in a public-sector setting (age 23.1 ± 4.7 years, 76.1% male, 89.9% African American) were assessed using a structured, standardized method regarding use of nicotine, alcohol, and cannabis, as well as age at first use, age at beginning weekly use, and age at beginning daily use. **Results:** Substance use was highly prevalent and progressed substantially during adolescence. Most participants had used all three substances (69.7%, 83.7%, and 73.7% for nicotine, alcohol, and cannabis, respectively) prior to onset of psychotic symptoms. Patients with daily nicotine use had fewer years of education (10.6 ± 2.3 compared to 12.6 ± 2.1 , $p < 0.001$); those with weekly alcohol use were significantly older (24.1 ± 4.9 compared to 22.2 ± 4.6 , $p = 0.05$) and were more likely to be male (56.4% compared to 43.6%, $p = 0.01$); and patients with daily cannabis use had fewer years of education (10.8 ± 2.2 compared to 12.3 ± 2.4 , $p < 0.01$). **Conclusions:** The very high prevalence of comorbid substance use in this sample, which typically began and progressed well before the onset of psychotic symptoms, suggests that all first-episode patients should be evaluated for comorbid substance use disorders, and integrated treatment approaches should be provided.

Key Words: Alcohol, Cannabis, First-Episode Psychosis, Marijuana, Nicotine, Schizophrenia, Substance Abuse, Tobacco

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Introduction

Psychiatric disorders are often complicated by a wide range of comorbid psychosocial and behavioral problems, including substance abuse or dependence. Individuals living with schizophrenia often develop substance use disorders (SUDs), with nicotine, alcohol, and cannabis being among the most commonly used substances in this population (1). Aside from the markedly high rates of cigarette smoking, people with schizophrenia have been shown to most commonly abuse cannabis, followed by alcohol (2). Estimates of recent or current substance abuse observed in samples of patients with schizophrenia range from 20 to 40% (3-5). In fact, data from large community surveys, such as the Epide-

Clinical Implications

In light of the very high prevalence of comorbid nicotine, alcohol, and cannabis use documented in this sample, which began and progressed typically well before the onset of psychotic symptoms, all first-episode patients should be carefully evaluated for comorbid substance use disorders. Nicotine use was very common in this sample (e.g., nearly half of participants had smoked on a daily basis), though the mean FTND score among those who smoked was lower than mean FTND scores reported in other studies involving patients with schizophrenia not in the first episode (37-39). Cigarette smoking is a very common adverse health behavior among people with schizophrenia that should be targeted with both treatment and prevention strategies (40), and the present data further indicate that cigarette smoking is common even prior to initial treatment. Alcohol and cannabis use were also very common, and use of such substances is likely to exacerbate certain symptoms, interfere with medication and follow-up adherence, and detrimentally affect the early course of the psychotic disorder. For example, data from this study suggest an effect of escalation to daily pre-illness cannabis use on hastening onset of psychosis (41). Research on integrated treatment approaches, which address both the new-onset psychotic disorder and the oftentimes long-standing substance use comorbidity, are seriously needed.

miological Catchment Area (ECA) study, have demonstrated that people with schizophrenia are 4.6 times more likely to have an SUD than members of the general population (6). Cantor-Graae and colleagues found a lifetime prevalence of substance abuse of 48% in 87 patients with schizophrenia, and among those with substance abuse, 88% began using substances prior to experiencing symptoms of schizophrenia (7). In that study, alcohol was the main drug of choice, followed by cannabis. Multiple investigations have revealed that first-episode patients in particular also have a greater prevalence of a lifetime SUD than the general population (8-10).

Studies of comorbid substance use in individuals with schizophrenia have revealed interesting findings related to rates and patterns of substance abuse, as well as associations between substance abuse and sociodemographic variables. Male sex, younger age, and lower educational attainment are associated with a greater likelihood of substance abuse (2, 8, 9, 11-16). For example, a study in Canada found that substance abuse was associated with male sex and younger age (8). In the same country, Archie and coworkers revealed that, in a sample of 200 first-episode patients, cannabis was the most prevalent substance abused (60%), followed by hallucinogens (29%), cocaine (20%), and alcohol (9%); that between the ages of 18 and 24 years, males had higher rates of comorbid substance abuse (43%) than females (21%); and, that nearly half of cannabis users also had used at least one other substance (11). Barnett and associates found cannabis and alcohol to be the most common substances abused in a sample of 139 first-episode patients in the United Kingdom (51% and 43%, respectively), with first use of both substances typically occurring between the ages of 12 and 14 years (12). They also found a positive correlation between age at first use of cannabis and age at onset of first psychotic symptom. A study by Cantwell and colleagues, also in the United Kingdom, examined substance misuse versus no use among first-episode patients and found that those using substances were significantly more likely to be male and younger in age (2).

Hambrecht and Häfner found alcohol and cannabis to be the most prominent substances abused in a sample of 232 first-episode patients in Germany (24% and 13%, respectively), with a significant association between a lifetime diagnosis of cannabis abuse and male sex and completion of secondary school, as well as between alcohol abuse and male sex and age at onset of psychosis (13). Further, those with a history of tobacco or cannabis use were significantly more likely to be diagnosed with alcohol abuse or dependence than those without a history of tobacco or cannabis use, while those with a history of tobacco or alcohol use were also more likely to have a lifetime diagnosis of cannabis abuse. Rabinowitz and colleagues demonstrated that women with comorbid substance abuse were six years younger when experiencing first psychotic symptoms than women without substance abuse (14). Van Mastrigt and coworkers demonstrated that patients who had used cannabis or both alcohol and cannabis had a younger age at onset than those who had not (15). In Australia, Wade and associates revealed that among 126 patients with nonaffective or affective first-episode psychosis, 77%, 28%, and 64% of participants had a lifetime history of daily tobacco use, an alcohol use disorder, and a cannabis use disorder, respectively (16). They also reported prominent comorbidity across these three substances.

The "gateway hypothesis" has been proposed by several researchers to explain the developmental patterns of using "soft" drugs like alcohol or tobacco prior to the use of illicit or "hard" drugs like cannabis or opioids (17-19). This hypothesis suggests that during adolescence, the use of soft drugs is very common and that particular patterns or predictors may lead to the use of harder drugs. A study by Tarter and associates examined specific risk factors associated with the use of licit drugs in adolescents and how this behavior can transition to the use of illicit drugs, demonstrating that those who transitioned to cannabis from softer drugs displayed more signs of deviant behavior, greater involvement with peers who displayed deviant behavior, little

involvement with school, and less inclination to make the choice to stop using substances (19). In India, Saddichha and colleagues demonstrated that among 70 participants diagnosed with substance abuse or dependence with no history of psychiatric disorders, 44 (63%) were diagnosed with alcohol dependence, 16 (23%) with opioid dependence, and 5 (7%) with cannabis abuse, and that nicotine (followed by alcohol) was the primary “gateway” drug that led to future abuse of harder drugs. Both the alcohol (66%) and opioid (44%) abusers credited initiation of nicotine use to external factors like peer pressure and lack of a proper role model (18). Aside from the somewhat controversial “gateway hypothesis,” the initiation and progression of substance use, including nicotine, alcohol, and cannabis use, is crucial to understand in considering the complex health needs of first-episode patients.

In light of the importance of substance use comorbidity among individuals with schizophrenia (even first-episode patients), and given the dearth of research on substance use among first-episode patients in the United States (especially in minority populations), prior use of nicotine, alcohol, and cannabis is described in detail in a relatively homogeneous sample of first-episode patients in Atlanta, Georgia. This descriptive study involved first-episode patients in an urban setting who were socially disadvantaged and predominantly African American. This particular population deserves focused research attention given that sociocultural factors may prominently influence substance use, treatment seeking, and early-course features.

Methods

Study Objectives

Proportions of patients having ever used nicotine, alcohol, and cannabis, having ever used them weekly, and having ever used them daily, were examined, along with mean ages at initiation and escalation of use. Patterns of substance use progression also were examined. Correlations among the use of the three substances were determined. Finally, associations between the regular use of the three substances and six sociodemographic variables were assessed: age at hospitalization for first-episode psychosis, gender, years of education completed, having ever been in special classes for learning or behavioral problems, who the patient lived with prior to hospitalization, and whether or not the patient was employed prior to hospitalization.

Setting and Sample

Participants in this study took part in the cross-sectional portion of The ACES Project (Atlanta Cohort on the Early course of Schizophrenia), a National Institute of Mental Health (NIMH)-funded study investigating predictors of treatment delay, or the duration of untreated

psychosis (DUP), in an understudied and disadvantaged population—urban, low-income, predominantly African-American patients reliant on public-sector health services. For the purposes of The ACES Project, first-episode psychosis was defined as the initial manifestation of a primary, nonaffective psychotic illness, including schizophreniform disorder, schizophrenia, schizoaffective disorder, brief psychotic disorder, delusional disorder, or psychotic disorder not otherwise specified.

All patients were hospitalized in a psychiatric unit of a large, university-affiliated, inner-city, public-sector hospital or an urban county psychiatric crisis center. The majority of uninsured first-episode patients who require hospitalization are admitted to these psychiatric units, located in two large counties of metropolitan Atlanta, though patients with public or private insurance may also be admitted to private psychiatric units in the area. Only those patients who were between the ages of 18 and 40 years and able to speak and read English were eligible to participate. Patients were excluded for any of the following reasons: known mental retardation, a Mini-Mental State Examination (20, 21) score of <24, a significant medical condition that could compromise ability to participate in the evaluation, prior outpatient treatment for psychosis lasting longer than three months, previous hospitalization for psychosis greater than three months prior to the assessment, or inability to provide written informed consent.

The mean age of participants was 23.1 ± 4.7 years (range: 18–39) and 83 (76.1%) were male. While the majority of participants self-identified as Black/African American (98, 89.9%), others identified as White/Caucasian (7, 6.4%), Asian American (2, 1.8%), or African/Ethiopian (2, 1.8%). The mean years of educational attainment in the sample was 11.6 ± 2.4 , and 76 (69.7%) lived with parents or other family members in the month prior to hospitalization. The sample can be considered “socially disadvantaged” by virtue of the high rates of: high school drop-out (44.0%), unemployment during the month prior to hospitalization (61.5%), history of incarceration (57.8%), and living below the federally defined poverty level (65.3%), the latter based on self-reported household income, the number of people living in the household, and federal thresholds for the year the patient was assessed. Based on the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I [22]), 62 patients (56.9%) received a research diagnosis of schizophrenia (48 with paranoid type, 10 with disorganized type, 2 with residual type, and 2 with undifferentiated type); 8 (7.3%) had schizoaffective disorder (5 with bipolar type and 3 with depressive type); 22 (20.2%) had schizophreniform disorder; 12 (11.0%) had psychotic disorder not otherwise specified; 4 (3.7%) had brief psychotic disorder; and, 1 (0.9%) had delusional disorder.

Procedures and Materials

Patients included in the current investigation underwent a clinical research assessment as part of the baseline, cross-sectional portion of The ACES Project. All assessments were conducted during hospitalization, once acute psychosis was stabilized adequately enough to allow for informed consent and research participation. The research was approved by all relevant institutional review boards.

Sociodemographic data were gathered, including information on age at hospitalization, gender, and years of education completed. Patients also were queried as to whether or not they had ever been in special classes for learning or behavioral problems, who they lived with during the month prior to hospitalization, and employment status in the month prior to hospitalization.

Alcohol and cannabis abuse and dependence were diagnosed using the substance use disorders module of the SCID-I (22). All available sources of information about the patient were used, including a structured interview with the patient, data gleaned from a chart review, and informant/family member collateral information when available. Patients were asked to provide additional information on their use of not only alcohol and cannabis, but also nicotine. Specifically, they were asked to provide their age when they first used each substance, their age when they began using each substance on a weekly basis, and their age when they began using each substance daily.

For patients who had smoked within the last month, nicotine dependence was measured using the Fagerström Test for Nicotine Dependence (FTND [23]) and the Hooked on Nicotine Checklist (HONC [24]). The FTND is a six-item measure designed to assess one's level of tobacco dependence, with scores ranging from 0 to 10. Good reliability and validity have been demonstrated for the FTND, with scores relating closely to biochemical indices of smoking heaviness (25). The HONC is a reliable and valid ten-item measure of diminished autonomy over, or dependence on, tobacco (26, 27). Due to the moderate but not excessive correlation between FTND and HONC scores among those who had smoked within the last month in the present sample ($r=0.41$, $p=0.003$, $n=53$), a single composite variable was computed by averaging z-scores from the two measures.

Data Analysis

Basic descriptive statistics were calculated for nicotine, alcohol, and cannabis use, abuse, and dependence; FTND scores; HONC scores; and patterns of substance use initiation. As appropriate, independent samples Student's t-tests, chi-square tests, and Pearson's product-moment correlation coefficients were used to assess for associations between nicotine, alcohol, and cannabis use, as well as associations between substance use and the six select sociodemographic

characteristics. All analyses were conducted using SPSS 15.0. The dataset included very few missing data points and imputation methods were not employed.

Results

Descriptive Statistics Pertaining to Nicotine, Alcohol, and Cannabis Use

Descriptive characteristics of nicotine, alcohol, and cannabis use are shown in Table 1. Of the 80 participants (73.4%) who had ever smoked cigarettes, the mean age of first use was 15.5 ± 4.0 years. For those with habitual use of nicotine, the mean age of beginning to smoke cigarettes on a weekly basis (64, 58.7%) was 16.9 ± 3.7 years, while those who had ever smoked daily (53, 48.6%) started doing so at a mean age of 17.6 ± 4.0 years. The mean FTND and HONC scores for those who smoked during the month prior to hospitalization were 3.5 ± 2.2 and 4.5 ± 2.8 , respectively.

For the 96 patients (88.1%) who had ever consumed alcohol, the mean age of first use was 15.3 ± 3.6 years, while the mean ages of initiating weekly (50, 45.9%) and daily (12, 11.0%) alcohol consumption were 18.4 ± 3.3 years and 17.8 ± 3.6 years, respectively. Among the 87 participants (79.8%) who had ever used cannabis, the mean age of first use was 15.8 ± 4.0 years, while those who had used cannabis weekly (66, 60.6%) or daily (49, 45.0%) had mean ages of beginning use at these levels of 16.5 ± 2.9 years and 17.2 ± 3.4 years, respectively. While 16.5% of participants met criteria for cannabis abuse and 41.3% met criteria for cannabis dependence, only 28% of participants had a cannabis-positive urine drug screen at the time of hospital admission.

Onset and Escalation of Substance Use in Adolescence and in Relation to Onset of Psychosis

Table 2 shows the percentages of patients initiating and escalating use in relation to early adolescence (12–15 years of age), late adolescence (16–18 years of age), and the onset of psychosis. The percentage of patients who had never used cannabis decreased from early adolescence (55.0%) to late adolescence (28.4%) and to the onset of psychotic symptoms (26.3%), while the percentage of patients with a history of daily use increased across these periods (11.0%, 35.8%, and 39.4%, respectively). As expected, similar patterns were observed for nicotine use and alcohol use (Table 2).

Patterns of Nicotine, Alcohol, and Cannabis Use Initiation

Among the 73 participants (67.0%) who endorsed having ever used each of the three substances (nicotine, alcohol, and cannabis), 10 (13.7%) began using nicotine and alcohol at the same age, 12 (16.4%) began using nicotine and cannabis at the same age, and 11 (15.1%) began using alcohol and

Table 1 Descriptive Statistics Pertaining to Substance Use in 109 Hospitalized Patients with First-Episode Nonaffective Psychosis

Nicotine	
Number of participants having ever smoked cigarettes	80 (73.4%)
Age at first use (n=80)	15.5±4.0
Age at weekly use (n=64)	16.9±3.7
Age at daily use (n=53)	17.6±4.0
Fagerström Test for Nicotine Dependence score (FTND; n=55)	3.5±2.2
Hooked on Nicotine Checklist score (HONC; n=58)	4.5±2.8
Composite standardized FTND/HONC score (n=53; range: -1.58–1.64)	0.0±0.9
Alcohol	
Number of participants having ever drank alcohol	96 (88.1%)
Age at first use (n=96)	15.3±3.6
Age at weekly use (n=50)	18.4±3.3
Age at daily use (n=12)	17.8±3.6
Number meeting SCID criteria for Alcohol Abuse	16 (14.7%)
Number meeting SCID criteria for Alcohol Dependence	14 (12.8%)
Cannabis	
Number of participants having ever used cannabis	87 (79.8%)
Age at first use (n=87)	15.8±4.0
Age at weekly use (n=66)	16.5±2.9
Age at daily use (n=49)	17.2±3.4
Number meeting SCID criteria for Cannabis Abuse	18 (16.5%)
Number meeting SCID criteria for Cannabis Dependence	45 (41.3%)
Number with a cannabis-positive urine drug screen (n=92)	26 (28.3%)

cannabis at the same age (Table 3). Additionally, 7 (9.6%) began using nicotine, alcohol, and cannabis at the same age. Only 4 patients (5.5%) began using nicotine at least one age-year prior to ever using alcohol, which in turn had been used at least one age-year before first use of cannabis. Percentages of patients with other patterns of initiating first use of substances are shown in Table 3. Among the 35 patients with a history of weekly use of all three substances, patterns of initiating first use of substances are shown as well.

Associations among Nicotine, Alcohol, and Cannabis Use

Ever use of nicotine was highly associated with ever use of alcohol ($\chi^2=18.98$, $df=1$, $p<0.001$) and ever use of canna-

bis ($\chi^2=25.45$, $df=1$, $p<0.001$). Similarly, ever use of alcohol was highly associated with ever use of cannabis ($\chi^2=50.03$, $df=1$, $p<0.001$). However, these associations were not absolute; for example, among 105 participants with data on both nicotine use and cannabis use, 12 participants (11.4%) had never used nicotine but had used cannabis, and 6 participants (5.7%) had used nicotine but had never used cannabis. Similarly, strong associations were found between having used nicotine on a weekly basis, alcohol on a weekly basis, and cannabis on a weekly basis (all $p<0.001$). Furthermore, a history of daily use of nicotine was associated with history of daily use of alcohol ($p<.001$) and daily use of cannabis ($p<.001$). However, a history of daily use of alcohol was not significantly associated with a history of daily use of can-

Table 2 Percentages of Patients Using Nicotine, Alcohol, and Cannabis at Various Levels of Frequency across Three Time Frames: Prior to or during Early Adolescence, Prior to or during Late Adolescence, and Prior to the Onset of Psychotic Symptoms

	Used at Least Once, but Never Weekly	Used Weekly, but Never Daily	Used Daily
Nicotine			
Prior to or during early adolescence (≤ 15 years)	18.3%	7.3%	13.8%
Prior to or during late adolescence (≤ 18 years)	14.7%	33.9%	14.7%
Prior to the onset of psychotic symptoms	15.2%	13.1%	41.4%
Alcohol			
Prior to or during early adolescence (≤ 15 years)	36.7%	3.7%	0.9%
Prior to or during late adolescence (≤ 18 years)	46.8%	22.9%	5.5%
Prior to the onset of psychotic symptoms	44.9%	30.6%	8.2%
Cannabis			
Prior to or during early adolescence (≤ 15 years)	23.9%	10.1%	11.0%
Prior to or during late adolescence (≤ 18 years)	21.1%	14.7%	35.8%
Prior to the onset of psychotic symptoms	21.2%	13.1%	39.4%

Table 3 Patterns of Substance Use Initiation Among Hospitalized Patients with First-Episode Nonaffective Psychosis

	Ever Used All Three Substances (n=73)	History of Weekly Use of All Three Substances (n=35)
Nicotine and alcohol at the same age	10 (13.7%)	5 (14.3%)
Nicotine and cannabis at the same age	12 (16.4%)	6 (17.1%)
Alcohol and cannabis at the same age	11 (15.1%)	6 (17.1%)
Nicotine, alcohol, and cannabis at the same age	7 (9.6%)	5 (14.3%)
Nicotine first, then alcohol, then cannabis	4 (5.5%)	2 (5.7%)
Nicotine first, then cannabis, then alcohol	10 (13.7%)	3 (8.6%)
Alcohol first, then cannabis, then nicotine	7 (9.6%)	0 (0.0%)
Alcohol first, then nicotine, then cannabis	3 (4.1%)	2 (5.7%)
Cannabis first, then nicotine, then alcohol	4 (5.5%)	5 (14.3%)
Cannabis first, then alcohol, then nicotine	5 (6.8%)	1 (2.9%)

nabis ($\chi^2=2.12$, $df=1$, $p=0.15$). The latter finding was due to the fact that among 100 patients with data available on both daily alcohol use and daily cannabis use, 39 patients (39.0%) who had never used alcohol on a daily basis had used cannabis on a daily basis.

Intercorrelations among the age at first use, age at weekly use, and age at daily use of each of the three substances were examined excluding age at daily use of alcohol, given that only 12 participants had a history of daily alcohol use. Ages at first, weekly, and daily use of nicotine

were significantly correlated with ages at first and weekly use of alcohol ($r_s=0.41$ – 0.69 , all $p\leq 0.001$). Ages at first, weekly, and daily use of nicotine were significantly correlated with ages at first, weekly, and daily use of cannabis ($r_s=0.30$ – 0.66 , all $p<0.05$). Ages at first and weekly use of alcohol were significantly correlated with ages at first and weekly use of cannabis ($r_s=0.27$ – 0.46 , all $p<0.05$), though the correlation between age at weekly use of alcohol and age at daily use of cannabis did not reach significance ($r_s=0.27$, $p=0.09$).

Associations between Key Sociodemographic Variables and Substance Use

Independent samples Student's t-tests and chi-square tests of independence were used to assess for associations between sociodemographic variables (age at hospitalization for first-episode psychosis, gender, years of education completed, having ever been in special classes for learning or behavioral problems, who the patient lived with prior to hospitalization, and whether or not the patient was employed prior to hospitalization) and a history of daily nicotine, weekly alcohol, or daily cannabis use. In order to provide the best dichotomizations for these tests, daily nicotine use ($n=53$), weekly alcohol use ($n=50$), and daily cannabis use ($n=49$) were used. Of the six sociodemographic variables examined, daily nicotine use was associated only with years of education. That is, the mean years of educational attainment among those who smoked cigarettes daily was 10.6 ± 2.3 , compared to 12.6 ± 2.1 years among those who had never smoked cigarettes daily ($t=4.69$, $df=102$, $p<0.001$). With regard to composite nicotine dependence scores based on the FTND and HONC (data not shown), again, years of

educational attainment was significantly associated with the composite score ($r=0.27$, $p=0.05$, $n=53$).

Participants with a history of weekly alcohol use were significantly older at hospitalization (24.1 ± 4.9 years) than those without a history of weekly alcohol use (22.2 ± 4.6 years; $t=1.98$, $df=100$, $p=0.05$). Further, males were significantly more likely to have a history of weekly alcohol use than females (56.4% compared to 25.0%, $\chi^2=7.25$, $df=1$, $p=0.01$).

Patients who had a history of daily cannabis use were significantly different from those without a history of daily use in terms of years of educational attainment. Specifically, those with a history of daily cannabis use had completed 10.8 ± 2.2 years, compared to 12.3 ± 2.4 years in those without a history of daily cannabis use ($t=3.22$, $df=101$, $p<0.01$).

Discussion

This descriptive overview of substance use in this sample reveals that nicotine, alcohol, and cannabis use are highly prevalent among predominantly African-American first-episode patients in a public-sector setting in the southeastern United States. Substance use clearly progresses during adolescence, and most participants had used all three substances prior to the onset of psychosis. Use across the three substances was highly associated, and ages at first, weekly, and daily use across the substances were highly correlated. Daily nicotine use and nicotine dependence scores were associated with fewer years of educational attainment. Those with a history of weekly alcohol use were older at first hospitalization and were more likely to be male. Daily cannabis use was associated with fewer years of educational attainment relative to those without a history of daily cannabis use.

When assessing nicotine, alcohol, and cannabis use, abuse, and dependence in this sample, findings were comparable to those of other first-episode studies. For example, Barnett and coworkers (12) described lifetime and current substance use in 123 first-episode patients referred to their Cameo program in Cambridge and south Cambridgeshire in the United Kingdom. Some 75.6% of their sample was male, consistent with the 76.1% reported here for The ACES Project. In their sample, 43.1% met criteria for an alcohol use disorder, and 50.8% met criteria for a cannabis use disorder, compared to 27.5% and 57.8%, respectively, in the present study. In Cameo, the median age at first use of both substances was 15 years, comparable to the means of 15.3 and 15.8 described here. Among 126 first-episode patients (70.6% male) in Australia, primarily drawn from the Early Psychosis Prevention and Intervention Centre, Wade and associates (16) reported that 27.8% and 63.5% had a lifetime history of an alcohol use disorder or a cannabis use disorder, respectively. In their sample, some 77.0% had a history of

daily tobacco use, compared to nearly half (48.6%) in The ACES Project. They also found strong associations between uses of different substances, as reported here. Among 203 participants (70.0% male) in the Calgary Early Psychosis Program, 16.3% and 14.8% had a lifetime history of alcohol abuse/dependence or cannabis abuse/dependence, respectively (8). In the present sample, highly variable patterns of substance use initiation and progression were observed, though more precise estimates of dates or months of initiation of use were not determined (only age at first, weekly, and daily use).

When comparing associations between select sociodemographic variables and substance use within the present first-episode study to those of other first-episode studies, there are some notable similarities. For instance, weekly alcohol use was more prevalent among male first-episode patients than female patients, similar to findings from other studies (8, 11, 14). Wade and associates (16) reported an association between daily nicotine use and lower educational attainment, which also was demonstrated in the present study.

A major strength of this study was its focus on an understudied sample—urban, socially disadvantaged, predominantly African-American patients seeking care in a public-sector setting. Also, all participants were experiencing first-episode nonaffective psychosis, allowing us to avoid a variety of potential confounds, including the effects of previous treatments or the long-standing use of antipsychotic medications, as well as chronicity of illness. Furthermore, most aforementioned studies focused on patients outside of the United States—in Canada, Australia, and western European countries—with varying durations of untreated psychosis. The present study, in contrast, provided descriptive data on substance use in an American first-episode sample.

Several methodological limitations are noteworthy. First, while abuse and dependence diagnoses were made using the SCID-I, the cross-sectional design required retrospective self-report of all past substance-related data. Second, the nature of information on substance use was limited due to the relatively crude measures of substance use in this study. A more in-depth assessment of substance use behaviors would be of great benefit to further characterize substance use, abuse, and dependence within this specific population; such research is currently underway. Third, the specific sociodemographic and clinical characteristics of this predominantly African-American sample limit the generalizability of findings to dissimilar populations; however, internal validity may be particularly strong given this sample's relative homogeneity.

This descriptive study involved a particular population—urban, socially disadvantaged, predominantly

African-American, first-episode patients. This group requires in-depth research attention because sociocultural characteristics may influence the early course of psychotic disorders. For example, research suggests that minority populations have less access to healthcare, receive poorer quality care, and are less likely to have health insurance compared to non-minorities (28-30). Furthermore, minority populations may have more protracted treatment delays and less optimal pathways to care than non-minorities (31-36).

In light of the very high prevalence of comorbid nicotine, alcohol, and cannabis use documented in this sample, which began and progressed typically well before the onset of psychotic symptoms, all first-episode patients should be carefully evaluated for comorbid substance use disorders. Nicotine use was very common in this sample (e.g., nearly half of participants had smoked on a daily basis), though the mean FTND score among those who smoked was lower than mean FTND scores reported in other studies involving patients with schizophrenia not in the first episode (37-39). Cigarette smoking is a very common adverse health behavior among people with schizophrenia that should be targeted with both treatment and prevention strategies (40), and the present data further indicate that cigarette smoking is common even prior to initial treatment. Alcohol and cannabis use were also very common, and use of such substances is likely to exacerbate certain symptoms, interfere with medication and follow-up adherence, and detrimentally affect the early course of the psychotic disorder. For example, data from this study suggest an effect of escalation to daily pre-illness cannabis use on hastening onset of psychosis (41). Research on integrated treatment approaches, which address both the new-onset psychotic disorder and the oftentimes long-standing substance use comorbidity, are seriously needed.

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References

1. Mueser KT, McGurk SR. Schizophrenia. *Lancet* 2004;363(9426):2063-2072.
2. Cantwell R, Brewin J, Glazebrook C, Dalkin T, Fox R, Medley I, et al. Prevalence of substance misuse in first-episode psychosis. *Br J Psychiatry* 1999;174:150-153.
3. Drake RE, Osher FC, Wallach MA. Alcohol use and abuse in schizophrenia: a prospective community study. *J Nerv Ment Dis* 1989;177(7):408-414.
4. Mueser KT, Yarnold PR, Levinson DF, Singh H, Bellack AS, Kee K, et al. Prevalence of substance abuse in schizophrenia: demographic and clinical correlates. *Schizophr Bull* 1990;16(1):31-56.
5. Mueser KT, Bellack AS, Blanchard JJ. Comorbidity of schizophrenia and substance abuse: implications for treatment. *J Consult Clin Psychol* 1992;60(6):845-856.
6. Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, et al. Comorbidity of mental disorders with alcohol and other drug abuse: results from the Epidemiologic Catchment Area (ECA) study. *JAMA* 1990;264(19):2511-2518.

7. Cantor-Graae E, Nordström LG, McNeil TF. Substance abuse in schizophrenia: a review of the literature and a study of correlates in Sweden. *Schizophr Res* 2001;48(1):69-82.
8. Addington J, Addington D. Patterns, predictors and impact of substance use in early psychosis: a longitudinal study. *Acta Psychiatr Scand* 2007;115(4):304-309.
9. Kavanagh DJ, Waghorn G, Jenner L, Chant DC, Carr V, Evans M, et al. Demographic and clinical correlates of comorbid substance use disorders in psychosis: multivariate analyses from an epidemiological sample. *Schizophr Res* 2004;66(2-3):115-124.
10. Lambert LM, Conus P, Lubman DI, Wade D, Yuen H, Moritz YH, et al. The impact of substance use disorders on clinical outcome in 643 patients with first-episode psychosis. *Acta Psychiatr Scand* 2005;112(2):141-148.
11. Archie S, Rush B, Akhtar-Danesh N, Norman R, Malla A, Roy P, et al. Substance use and abuse in first-episode psychosis: prevalence before and after early intervention. *Schizophr Bull* 2007;33(6):1354-1363.
12. Barnett JH, Werners U, Secher SM, Hill KE, Brazil R, Masson K, et al. Substance use in a population-based clinic sample of people with first-episode psychosis. *Br J Psychiatry* 2007;190:515-520.
13. Hambrecht M, Häfner H. Cannabis, vulnerability, and the onset of schizophrenia: an epidemiological perspective. *Austr N Z J Psychiatry* 2000;34(3):468-475.
14. Rabinowitz J, Bromet EJ, Lavelle J, Carlson G, Kovasznay B, Schwartz JE. Prevalence and severity of substance use disorders and onset of psychosis in first-admission psychotic patients. *Psychol Med* 1998;28(6):1411-1419.
15. Van Mastrigt S, Addington J, Addington D. Substance misuse at presentation to an early psychosis program. *Soc Psychiatry Psychiatr Epidemiol* 2004;39(1):69-72.
16. Wade D, Harrigan S, Edwards J, Burgess PM, Whelan G, McGorry PD. Patterns and predictors of substance use disorders and daily tobacco use in first-episode psychosis. *Austr N Z J Psychiatry* 2005;39(10):892-898.
17. Kandel DB, Yamaguchi K, Chen K. Stages of progression in drug involvement from adolescence to adulthood: further evidence for the gateway theory. *J Stud Alcohol* 1992;53(5):447-457.
18. Saddichha S, Sinha B, Khess C. The role of gateway drugs and psychosocial factors in substance dependence in eastern India. *Int J Psychiatry Med* 2007;37(3):257-266.
19. Tarter RE, Vanyukov M, Kirisci L, Reynolds M, Clark DB. Predictors of marijuana use in adolescents before and after licit drug use: examination of the gateway hypothesis. *Am J Psychiatry* 2006;163(12):2134-2140.
20. Cockrell JR, Folstein MF. Mini-Mental State Examination (MMSE). *Psychopharmacol Bull* 1998;24:689-692.
21. Folstein MF, Folstein SE, McHugh PR, et al. Mini-Mental State Examination: user's guide. Odessa (FL): Psychological Assessment Resources, Inc.; 2001.
22. First MB, Spitzer RL, Gibbon M, Williams JBW. Structured Clinical Interview for DSM-IV Axis I Disorders. New York (NY): New York State Psychiatric Institute, Biometrics Research Department; 1998.
23. Fagerström KO. Measuring degree of physical dependency to tobacco smoking with reference to individualization of treatment. *Addict Behav* 1978;3(3-4):235-241.
24. DiFranza J, Savageau J, Fletcher K, Ockene JK, Rigotti NA, McNeill AD, et al. Measuring the loss of autonomy over nicotine use in adolescents. *Arch Pediatr Adolesc Med* 2002;156(4):397-403.
25. Heatherington T, Kozlowski L, Frecker R, Fagerström K. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. *Br J Addiction* 1991;86(9):1119-1127.
26. O'Loughlin J, DiFranza J, Tarasuk J, Meshefedjian G, McMillan-Davey E, Paradis G, et al. Assessment of nicotine dependence symptoms in adolescents: a comparison of five indicators. *Tobacco Control* 2002;11(4):354-360.
27. Wellman RJ, DiFranza JR, Savageau JA, Godiwala S, Friedman K, Hazelton J. Measuring adults' loss of autonomy over nicotine use: the Hooked on Nicotine Checklist. *Nicotine Tobacco Res* 2005;7(1):157-161.
28. Smedley BD, Stith AY, Nelson AR. Unequal treatment: confronting racial and

- ethnic disparities in health care. Washington, DC: National Academy Press; 2003.
29. Snowden LR, Thomas K. Medicaid and African American outpatient mental health treatment. *Ment Health Serv Res* 2000;2(2):115-120.
 30. U.S. Department of Health and Human Services. Mental health: culture, race, and ethnicity—a supplement to mental health: A report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services; 2001.
 31. Burnett R, Mallett R, Bhugra D, Hutchinson G, Der G, Leff J. The first contact of patients with schizophrenia with psychiatric services: social factors and pathways to care in a multi-ethnic population. *Psychol Med* 1999;29(2):475-483.
 32. Commander MJ, Cochrane R, Sashidharan SP, Akilu F, Wildsmith E. Mental health care for Asian, black and white patients with non-affective psychoses: pathways to the psychiatric hospital, in-patient and after-care. *Soc Psychiatry Psychiatr Epidemiol* 1999;34:484-491.
 33. Morgan C, Mallett R, Hutchinson G, Leff J. Negative pathways to psychiatric care and ethnicity: the bridge between social science and psychiatry. *Soc Sci Med* 2004;58(4):739-752.
 34. Morgan C, Mallett R, Hutchinson G, Bagalkote H, Morgan K, Fearon P, et al. Pathways to care and ethnicity. 1: Sample characteristics and compulsory admission. Report from the AESOP study. *Br J Psychiatry* 2005;186:281-289.
 35. Morgan C, Mallett R, Hutchinson G, Bagalkote H, Morgan K, Fearon P, et al. Pathways to care and ethnicity. 2: Source of referral and help-seeking. Report from the AESOP study. *Br J Psychiatry* 2005;186:290-296.
 36. Merritt-Davis OB, Keshavan MS. Pathways to care for African Americans with early psychosis. *Psychiatr Serv* 2006;57(7):1043-1044.
 37. Steinberg ML, Williams JM, Steinberg HR, Krejci JA, Ziedonis DM. Applicability of the Fagerström Test for Nicotine Dependence in smokers with schizophrenia. *Addict Behav* 2005;30(1):49-59.
 38. Weinberger AH, Reutenauer EL, Allen TM, Termine A, Vessicchio JC, Sacco KA, et al. Reliability of the Fagerström Test for Nicotine Dependence, Minnesota Nicotine Withdrawal Scale, and Tiffany Questionnaire for Smoking Urges in smokers with and without schizophrenia. *Drug Alcohol Depend* 2007;86(2-3):278-282.
 39. Kelly DL, McMahon RP, Weiner E, Boggs DL, Dickinson D, Conley RR, et al. Lack of beneficial galantamine effect for smoking behavior: a double-blind randomized trial in people with schizophrenia. *Schizophr Res* 2008;103(1-3):161-168.
 40. Compton MT, Daumit GL, Druss BG. Cigarette smoking and overweight/obesity among individuals with serious mental illnesses: a preventive perspective. *Harvard Rev Psychiatry* 2006;14(4):212-222.
 41. Compton MT, Kelley ME, Ramsay CE, Pringle M, Goulding SM, Esterberg ML, et al. Association of pre-onset cannabis, alcohol, and tobacco use with the age at onset of prodrome and age at onset of psychosis in first-episode patients. *Am J Psychiatry* 2009;166(11):1251-1257.