



Trajectories of Substance Use Frequency among Adolescents Seen in Primary Care: Implications for Screening

Scott E. Hadland, MD, MPH, MS^{1,2,3,4}, Sarah H. Copelas, BA^{3,5,6}, and Sion K. Harris, PhD^{3,4,5}

Objective To identify trajectories of substance use in a prospective cohort of adolescent primary care patients one year after a clinic visit.

Study design We recruited 12- to 18-year-olds from 9 New England practices between 2005 and 2008 and identified 5 trajectories of substance use. We first distinguished adolescents with no past-year use at a baseline clinic visit and at 12-month follow-up (trajectory A). For adolescents who used substances, we assessed past 90-day use at both timepoints, and identified the remaining 4 trajectories based on frequency of use. Trajectories included less than monthly use at both timepoints (trajectory B), less than monthly use increasing to monthly or more often (trajectory C), monthly or more often use decreasing to less than monthly (trajectory D), and monthly or more often use at both timepoints (trajectory E). Using multiple logistic regression, we then examined associations with substance-involved parents, siblings, and peers.

Results Among 860 adolescents (mean age 15.4 years; 60.9% female; 65.6% non-Hispanic white), more than one-half (52.7%) abstained (trajectory A). The remainder were classified into trajectories B (23.8%), C (9.5%), D (5.7%), and E (8.3%). Those who abstained were least likely to have substance-involved parents (aOR 0.58; 95% CI 0.46-0.72), siblings (aOR 0.49; 95% CI 0.40-0.60), or peers (aOR 0.44; 95% CI 0.37-0.52). Those increasing from less than monthly use to using monthly or more often were more likely to have substance-involved siblings (aOR 1.58; 95% CI 1.23-2.03) or peers (aOR 1.51; 95% CI 1.06-2.17).

Conclusions Most adolescent primary care patients remained abstinent or infrequent users over 1 year, but 1 in 5 showed frequent use, with substance-involved siblings and peers predicting escalation of use. (*J Pediatr* 2017;184:178-85).

Substance use frequently begins in adolescence, with 1 in 3 high school students reporting past-month alcohol use and nearly 1 in 4 reporting past-month marijuana use.¹ Detecting and intervening on substance use early in the life course is critical to avert a worsening trajectory toward heavy use and associated harms.² Although light or moderate substance use in adolescence often persists as low-level use during adulthood,^{3,4} some adolescent initiates show a steady increase in use with significant negative social and health outcomes continuing into adulthood.^{5,6} Risk factors for heavier and more problematic use among adolescents and young adults include having peers who initiated substance use at a young age, as well as substance use by family members.⁷ Elucidating the relative odds of adverse trajectories, and the risk markers that promote its likelihood, could help to inform screening and intervention efforts.

To that end, a number of studies have examined substance use trajectories among adolescents; however, the majority to date have followed school- or community-based cohorts of adolescents,^{5,8-10} often focusing on a single substance to the exclusion of others.^{4,11-13} Primary care practitioners, the usual source of health care for three-quarters of adolescents under 18 years of age,¹⁴ are in a position to offer screening, brief intervention, and referral to treatment for adolescent substance use.² Understanding the extent to which an adolescent's substance use may escalate during the year after a routine visit may help to guide the clinician's follow-up schedule; by identifying adolescents at greatest risk for escalation, a primary care clinician may choose to have 1 or several intervening visits between annual routine health maintenance visits.

Current clinical practice guidelines recommend that adolescent providers ask about multiple substances, including the co-occurring use of alcohol, marijuana, and other drugs.^{2,15,16} Because adolescents often engage in more than 1 type of substance use,¹⁷ it is important to account for use of all substances when characterizing

From the ¹Division of General Pediatrics, Department of Pediatrics, Boston University School of Medicine; ²Department of Pediatrics, Boston Medical Center; ³Division of Adolescent/Young Adult Medicine, Department of Medicine, Boston Children's Hospital; ⁴Department of Pediatrics, Harvard Medical School; ⁵Center for Adolescent Substance Abuse Research, Division of Developmental Medicine, Boston Children's Hospital, Boston, MA; and ⁶College of Osteopathic Medicine, University of New England, Biddeford, ME

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PEI Personal Experience Inventory
TLFB Timeline followback

their trajectories. Additionally, although many clinicians do not ask adolescents about use of substances by their parents, siblings, and peers,¹⁸ understanding how role modeling may shape adolescent patients' substance use trajectories would greatly inform primary care clinicians, who are in a position to ask about such influences.

In the present study, we sought to determine the prevalence of various substance use trajectories in a prospective cohort of adolescent primary care patients during the year after a routine visit. We defined trajectory groups based on frequency of any substance use (ie, alcohol, marijuana, or other drugs) to account for the high prevalence of polysubstance use during adolescence.¹⁹ Because many clinicians see adolescents annually, we aimed to delineate the frequency of substance use at 2 assessments of adolescents' substance use separated by 12 months. We hypothesized that trajectories toward more frequent use would be associated with the presence of substance-involved peers, siblings, and/or parents.

Methods

As part of a large intervention trial described previously,²⁰ adolescents 12-18 years of age presenting for a routine primary care visit were recruited at 9 large primary care practices in New England from 2005 to 2008. Data for the present study included 860 (80.5%) of the 1068 treatment-as-usual control participants who completed both baseline and 12-month follow-up assessments. Participants who were retained at 12 months did not differ significantly from those who did not with regard to age, sex, or race/ethnicity, but were significantly more likely to have been recruited at a well-visit (84.6% vs 46.2%; $P < .001$) and to have a parent who graduated college (46.2% vs 34.7%; $P = .004$). In contrast, those not returning for 12-month follow-up had higher rates of any lifetime drug use (34.6% vs 21.4%, $P < .001$), and were more likely to report having substance-involved parents (20.7% vs 14.8%; $P = .040$) and siblings (26.0% vs 17.6%; $P = .006$). Informed assent (<18 years) or consent (=18 years) was obtained; parents gave parental permission in person or by phone for minors. Participants received a \$15 gift certificate for completing each of the 2 assessments. The study was approved by the Institutional Review Board at Boston Children's Hospital and at all clinic sites.

At the baseline visit and 12-month follow-up, participants completed "yes"/"no" items regarding any use of each substance during the past 12 months, and a confidential modified timeline followback (TLFB) calendar interview administered by a trained research assistant assessing past 90-day frequency of use separately for alcohol, marijuana, or other drugs.^{21,22} The TLFB is a reliable measure of adolescent substance use that has been validated previously among adolescents,²³ and uses a structured interview with memory aids (including a calendar with probes about special events, such as birthdays or other holidays) to collect estimates of the number of days of substance use during the preceding 90 days. For these analyses, we examined the number of days on which use of any substances (ie, alcohol, marijuana, or other

substances, but not cigarettes) was reported. Substances were examined together as a single outcome because polysubstance use was common in the sample (eg, 78% of past 90-day marijuana users at baseline had also used alcohol) and because we were interested in overall use frequency across all substances.

To describe clinically meaningful trajectories of substance use in the sample, we began by identifying youth who had abstained from substances entirely during the past year as reported both at baseline and at 12-month follow-up (trajectory A). We then divided the remaining adolescents (ie, those who used any substances) into 4 additional mutually exclusive trajectories. Based on prior literature highlighting that monthly or more often use is a sensitive and specific threshold for identifying substance use disorder among adolescents,²⁴ we sought a priori to develop clinically meaningful cutoffs readily applicable to pediatric practice. We delineated trajectories based on reported number of days use according to the TLFB approach, and we considered fewer than 3 days of use of the preceding 90 days to represent "less than monthly use" and 3 or more of 90 days to represent "monthly or more often use."

Using these cutoffs, we identified 4 additional trajectories, including adolescents who used less than monthly at both baseline and the 12-month follow-up (trajectory B); adolescents who used less than monthly at baseline but increased their use by the 12-month follow-up to monthly or more often (trajectory C); adolescents who used monthly or more often at baseline but decreased their use to less than monthly at the 12-month follow-up (trajectory D); and adolescents who used monthly or more often at both timepoints (trajectory E). To determine the relative contributions of alcohol, marijuana and other drugs to trajectories, we also identified the past 90-day use of each substance separately.

We then examined sociodemographic characteristics in relation to trajectories, including age, sex, self-reported race/ethnicity (white Non-Hispanic, black non-Hispanic, and Hispanic/other), as well as perceived substance use of peers, siblings, and parents as assessed using items derived from the previously validated Personal Experience Inventory (PEI).^{25,26} Internal consistency reliability, as demonstrated by Cronbach alpha,²⁷ was high in this sample for all 3 measures (peer use [5 items], alpha = 0.87; sibling use [4 items], alpha = 0.87; and parent use [4 items], alpha = 0.86). Examples of PEI questions include: "Some kids I hang around with have trouble at school due to using alcohol or drugs" (peer use), "I have a brother or a sister who gets drunk or high" (sibling use), and "I have a parent whose use of alcohol or other drugs worries me" (parent use).²⁶ All PEI item responses used a 4-point Likert scale of "strongly disagree/disagree/agree/strongly agree." As shown by the example items, these measures were designed to identify more problematic levels of substance use (eg, use that resulted in a sibling appearing "drunk" or "high," or parental substance use that the adolescent found worrisome or warranted treatment). We generated separate dichotomous variables for peer, sibling, and parental use, and considered peer/sibling/parent use to be positive if the study participant gave an affirmative response ("agree" or "strongly agree") to any of the questions for that particular subscale.

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