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Associations of adolescent cannabis use with academic performance and mental health: A longitudinal study of upper middle class youth☆

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ABSTRACT

Background: There is a hypothesis that low socioeconomic status (SES) may explain the link between cannabis use and poorer academic performance and mental health. A key question, therefore, is whether adolescent cannabis use is associated with poorer academic performance and mental health in high SES communities where there is reduced potential for confounding.
Methods: Youth ($n = 254$) from an upper middle class community were followed prospectively through the four years of high school (from age 14/15 to age 17/18). Past-year frequency of cannabis use was assessed annually. Official school records of academic performance and self-reported mental health symptoms (externalizing and internalizing symptoms) were assessed in grades 9 and 12.
Results: Persistent cannabis use across the four years of high school was associated with lower grade-point average ($\beta = -0.18$, $p = .006$), lower Scholastic Aptitude Test (SAT) score ($\beta = -0.13$, $p = .038$), and greater externalizing symptoms ($\beta = 0.29$, $p < .001$) in 12th grade, but not with greater internalizing symptoms ($\beta = 0.04$, $p = .53$). Moreover, persistent cannabis use was associated with lower grade-point average ($\beta = -0.13$, $p = .014$) and greater externalizing symptoms ($\beta = 0.24$, $p = .002$) in 12th grade, even after controlling for 9th grade levels of these outcomes. Similar associations were observed for persistent alcohol and tobacco use. Effects for persistent cannabis use became non-significant after controlling for persistent alcohol and tobacco use, reflecting the difficulties of disentangling effects of cannabis from effects of alcohol and tobacco.
Conclusions: Low SES cannot fully explain associations between cannabis use and poorer academic performance and mental health.

1. Introduction

Adolescents who use cannabis are at risk for experiencing a variety of problems by young adulthood, including reduced educational attainment and poor mental health (Hall, 2015; Lynskey and Hall, 2000). For example, a recent analysis of three large longitudinal studies showed that, compared with those who never used cannabis, adolescents who used cannabis daily were less likely to complete high school and attain a university degree and were more likely to attempt suicide in young adulthood (Silins et al., 2014). Associations persisted through adjustment for a broad range of covariates, suggesting that cannabis use might cause reduced educational attainment and poor mental health. The causal nature of these associations remains uncertain, however (Macleod et al., 2004; Rogeberg, 2013; Temple et al., 2011).

One hypothesis is that low socioeconomic status (SES) may explain the link between cannabis use and problems later in life (Rogeberg, 2013). That is, adolescent cannabis users show reduced educational achievement and poor mental health not because of their cannabis use, but because they come from low SES backgrounds. Low SES increases risk for reduced educational achievement and poor mental health (Caldas and Bankston, 1997; Everson et al., 2002; Walpole, 2003; Wright et al., 1999), and some studies (though not all; Danielsson et al., 2015) suggest that low SES is associated with an increased risk of cannabis use (Daniel et al., 2009). Moreover, several studies have demonstrated that associations between cannabis use and poorer educational achievement and mental health are attenuated or eliminated after controlling for SES and other related childhood risks (Degenhardt et al., 2003; Macleod et al., 2004; Stiby et al., 2014; Temple et al., 2011). Because the effects of low SES are cumulative and indirect, operating, for example, through lower expectations for educational success and greater alienation and financial strain (Everson et al., 2002;

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Walpole, 2003; Wright et al., 1999), low SES could contribute to decline in academic performance and mental health. Thus, low SES could explain why longitudinal studies of adolescents from diverse socioeconomic backgrounds find that cannabis use is associated with reduced educational achievement and poor mental health in young adulthood, even after accounting for childhood risk (Silins et al., 2014; Stiby et al., 2014).

A key question, therefore, is whether adolescent cannabis use is associated with poorer academic performance and mental health in high SES communities where there is reduced potential for confounding. Adolescents from high SES communities typically have higher educational aspirations than adolescents from low SES communities (Walpole, 2003), and adolescents from high SES communities may not experience the degree of financial strain or alienation that increases risk for problems later in life. Thus, a demonstration that adolescent cannabis users from high SES communities show poorer academic performance and mental health would suggest that low SES, and factors related to low SES, cannot fully account for these associations.

The only longitudinal study of high SES youth to test associations between adolescent substance use, academic performance, and mental health found that substance use was not associated with decline in these outcomes from 10th to 12th grade (McMahon and Luthar, 2006). In a re-analysis of the same data in which cannabis use was considered separately from other substance use, findings were similar (Ansary and Luthar, 2009), suggesting that low SES, and related risks that are uncommon in high SES communities, could potentially explain associations between cannabis use and poorer academic performance and mental health reported in other longitudinal studies. An alternative explanation, however, is that adolescent substance users had already begun to show poorer academic performance and mental health by 10th grade, resulting in underestimates of decline. Given that fewer adolescents today think cannabis use may be harmful, and corresponding rises in adolescent cannabis use (Johnston et al., 2015), it is important to clarify whether adolescent cannabis users from high SES communities show poorer academic performance and mental health.

The purpose of the present study was to test whether persistent cannabis use over the four years of high school was associated with poorer academic performance and mental health in a sample of youth from an upper middle class community – a community with a median income in the top 5% of United States household incomes. This study represents only the second longitudinal study of upper middle class youth to test associations between cannabis use and academic performance and mental health. Further, unlike most studies of cannabis use and academic performance, we obtained official school records of academic performance to eliminate the possibility that cannabis users have biased perceptions of their academic performance. We tested four sets of associations. First, we tested whether persistent cannabis use over the four years of high school was associated with poorer academic performance and mental health in the 12th grade. Second, we tested whether persistent cannabis use was associated with poorer academic performance and mental health in 12th grade after controlling for 9th grade levels of these outcomes. Third, we tested whether any association between persistent cannabis use and poorer academic performance and mental health remained after controlling for other potential confounders. Fourth, we tested associations of persistent alcohol and tobacco use with academic performance and mental health. Previous research suggests that alcohol and tobacco use may be associated with worse educational and mental health outcomes (Ellickson et al., 2001; Hill et al., 2000; Newcomb et al., 2002), and alcohol and tobacco use may also be associated with low SES (Goodman and Huang, 2002; Hiscock et al., 2012). By testing associations for cannabis, alcohol, and tobacco within the same study, we put effects for cannabis in context.

2. Methods

2.1. Participants

Participants are members of the New England Study of Suburban Youth (NESSY), a cohort of 319 6th graders (48% female) recruited from schools in an upper middle class New England community in 1998 and followed annually thereafter (Luthar and Barkin, 2012). The median annual family income in the community at the inception of the study in 1998 was $125,381, which represented the top 5% of U.S. household incomes at that time. Thirty-three percent of students' parents had a graduate degree. Only 3% of the students in the school sample were eligible for free or reduced lunches. Ninety-three percent of students were Caucasian, less than 2% each were African–American and Hispanic, 3% were Asian, and the remainder were of other ethnic backgrounds.

Assessments were conducted at the end of each academic year during a 90-minute group session in the school cafeteria. Measures were read aloud by the principal investigator (S.S.L), and students marked their responses accordingly. Two members of the research team supervised each student table and were available to clarify questions. Passive consent procedures were used, as data collection was done as part of school-based initiatives on positive youth development. There was no evidence of differential attrition from 6th to 12th grade: there were no significant differences between 12th grade participants and non-participants in terms of 6th grade delinquent behavior ($F = 0.08$, $p = .78$), depression ($F = 0.82$, $p = .37$), and substance use (aggregate index of cannabis, alcohol, and tobacco use; $F = 3.60$, $p = .06$). This article focuses on the NESSY cohort during the four years of high school (ages 14/15 to ages 17/18), with $n = 279, 296, 251, 252$ students participating in the 9th–12th grades, respectively.

2.2. Substance use

Students reported on frequency of cannabis, alcohol, and tobacco use in the past year in grades 9, 10, 11 and 12. Response options were: 0 times, 1–2 times, 3–5 times, 6–9 times, 10–19 times, 20–39 times, and 40+ times.

Our main exposure, persistent cannabis use, was defined as the number of high school assessments, out of four, for which a student reported using cannabis 10–19 times a year or more (i.e., approximately monthly or greater use). Students were grouped as follows: (i) never used cannabis over the four years of high school, (ii) used cannabis but never on a monthly basis, (iii) used cannabis monthly for one year of high school, (iv) used cannabis monthly for two years of high school, and (v) used cannabis monthly for 3–4 years of high school. The Supplemental Table[1] shows how we used information about past-year frequency of cannabis use to create these cannabis-use groups.

Like with cannabis use, we grouped students according to persistence of alcohol and tobacco use (Table 1). Students had to have substance-use data for three of the four years of high school to be classified. This left 254 participants for analysis ($n = 253$ for cannabis, as one participant did not report on past-year cannabis use).

2.3. Twelfth grade academic performance and mental health

We assessed 12th grade grade-point average (GPA), Scholastic Aptitude Test performance (SAT), externalizing symptoms, and internalizing symptoms.

[1] Supplementary material can be found by accessing the online version of this paper.

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