Adolescent peer networks and the moderating role of depressive symptoms on developmental trajectories of cannabis use

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HIGHLIGHTS

- We model longitudinal trajectories of adolescent cannabis use in two data sets, separated by 18 years.
- We examine peer, family, and individual factors.
- Peer network marijuana use predicted higher trajectories.
- Greater levels of depressive symptoms attenuated the role of peer cannabis use.
- Results suggest depressed adolescents withdraw from peers, may become isolated.

ARTICLE INFO

ABSTRACT

This paper investigated how depressive symptoms moderate the role of peer cannabis use on developmental patterns of individual cannabis use from adolescence to young adulthood, controlling for a broad set of individual and family factors. Data from two sources were analyzed separately: two saturated schools in the National Longitudinal Study of Adolescent to Adult Health Waves I–III ($N = 1550$) covering 1994–2001; and three schools in the CARBIN study, covering 2012–2014. Discrete mixture models identified developmental trajectories of cannabis use in each data source, and logit models linked network and depressive symptom information to the trajectories. Five similar cannabis use trajectories were identified in both datasets: Nonuse, Low, Moderate, Increasing, and High. Peer cannabis use at baseline predicted higher individual cannabis use trajectories, controlling for a wide range of factors. However, the association between peer cannabis use and higher levels of use (Moderate and High) attenuated as the adolescent's level of depressive symptoms increased. Although these results may suggest that depression dampers adolescents' susceptibility to peer influence, these results are also consistent with the notion that depressed adolescents withdraw from their peer groups, distancing them from the initial source of peer influence over time. The resulting isolation may place adolescents at higher risk of adverse outcomes.

1. Introduction

Past-year cannabis use among high school seniors now exceeds one in three, up from one in five in 1991 (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016). Cannabis use during adolescence is associated with abuse of other drugs and other deviant behaviors, such as theft and selling drugs, in young adulthood (Tucker, Ellickson, Orlando, Martino, & Klein, 2005). Peer relationships are a key context in which adolescents are acculturated and learn social behaviors (Brechwald & Prinstein, 2011). Exposure to substance-using peers is positively associated with cannabis *initiation* (Buu et al., 2009; de la Haye, Green, Kennedy, Pollard, & Tucker, 2013; Dishion & Loeber, 1985; Hoffman, 1995; Tucker, Pollard, de la Haye, Kennedy, & Green, 2013) and *level of use* (Juon, Fothergill, Green, Doherty, & Ensminger, 2011; Tucker, de la Haye, Kennedy, Green, & Pollard, 2014; Washburn & Capaldi, 2014; Windle & Wiesner, 2004). There is substantial variation in the patterns of adolescent cannabis use over time (Epstein et al., 2015; Johnson & Hopfer, 2016), and the influence of peers on the overall *developmental trajectory* of cannabis use from adolescence to young adulthood is substantially less clear.

Depression – one of the most common mental health issues among adolescents – is also rising, with 12-month major depressive episode

prevalence up from 8.7% in 2005 to 11.3% in 2014 (Mojtabai, Olfson, & Han, 2016); most adolescents report some depressive symptoms during this critical developmental period (Bluth, Campo, Futch, & Gaylord, 2016). Subclinical levels of depression also contribute to negative outcomes among adolescents (Cantwell & Baker, 1991; Kessler et al., 1994). The majority of studies on adolescent depression and substance use focus on alcohol and tobacco, but a small number include depression as a predictor of cannabis use. These studies tend to focus on clinical or high levels of depressive symptoms, but a few examine the more common experience of subclinical depressive symptoms. Kelder et al. (2001) found that among middle school students in Houston, adolescents with more depressive symptoms were also more likely to use cannabis. Diego, Field, and Sanders (2003) found the same result among high school seniors in Florida. Explanations for the link between depression and cannabis use invoke Khantzian's (1985) self-medication hypothesis, which suggests adolescents use substances to cope with psychological distress, or that depressed people will be more motivated to believe substance use will improve their mood (Friedman-Wheeler, Ahrens, DAF, McIntosh, & Thorndike, 2007; Fucito and Juliano, 2009).

The trends of increasing cannabis use and depression during adolescence suggest that this is a high-risk period for the confluence of these two problems that could lead to serious consequences (Brent & Birmaher, 2002), particularly as evidence indicates that the co-occurrence of substance use disorders and depression is associated with especially poor clinical prognoses (Rao, 2006). A recent literature review of studies from 1991 to 2013 found that many individual-level factors moderated and magnified the influence of peers on adolescent cannabis use, including personality factors such as risk-taking, sensation-seeking, and social anxiety (Marschall-Lévesque, Castellanos-Ryan, Vitaro, & Séguin, 2014). However, none of these studies considered depression. Only one study examined whether depressive symptoms moderated the association between peers' and adolescents' substance use (as well as violent and suicidal behaviors) – a cross-sectional study with 527 adolescents at an urban New England high school (Prinstein, Boergers, & Spirito, 2001). Although depression moderated peer effects on fighting and suicidal behaviors, depression did not moderate peer behaviors on cannabis use, smoking, or drinking.

Given this limited literature, much remains to be learned about the potential for depressive symptoms to moderate the role of peer influence on personal cannabis use. The present study aimed to address this critical gap in our understanding of: (1) peer effects on adolescent cannabis use trajectories, and: (2) whether the influence of peer substance use is moderated by depressive symptoms. We used data from two sources, separated by twenty years, to address these questions. Using multiple data sources, capturing different eras, and complimentary analyses, helped validate our results.

2. Material and methods – add health

2.1. Participants and data collection

2.1.1. Add health

Data came from Waves I–III of Add Health, a school-based probability sample of American adolescents in Grades 7–12 during the 1994–95 school year. The analytic sample for this study focused on the two "saturated" schools, in which all enrolled students were invited to participate, and that met the data requirements for our network analysis (excluded schools were too small in size or had too much missing data; see de la Haye et al., 2013), resulting in a total sample of *N* = 1550. These two schools comprised 66% of the total Add Health saturated sample and had the most complete network information, allowing valid inferences to be made about school-based peer network structures. Retention rates at Wave II were 88% in School 1 and 87% in School 2, with 80% retained at Wave III (2001 − 02). See Harris et al., 2008 for more details on the study design and longitudinal data. An

important strength of this dataset is that all students in the "saturated" schools completed a similar friendship nomination process, allowing for rigorous identification of friendship networks, as well as providing reports of substance use behaviors from each respondent, rather than relying on an individual's perception of his or her friends' substance use.

2.1.2. CARBIN

Data came from waves 6 (spring 2012), 7 (spring 2013), and 9 (spring 2014) of CARBIN.[1] Participants were part of the University of Illinois Bullying and Violence Study (Espelage, Basile, & Hamburger, 2012). All students in 6th–8th grades from three diverse Midwestern public middle schools were initially invited to participate in the study during Spring 2008. Data were collected through in-school paper surveys biannually from Spring 2008 until Spring 2010 (Waves 1–5), and then again in Spring 2012 (Wave 6) and 2013 (Wave 7). Incoming students were recruited into the study at each wave. The analytic sample included those students with observations in at least two of the three analytic waves (*N* = 1304; 1020 students appeared only once).

2.2. Measures

2.2.1. Add health

Cannabis use trajectory group membership was based on the following item at each wave: "During the past 30 days, how many times did you use marijuana?" Trajectories were based on the number of cannabis uses per month at each of these waves. See Section 2.3.1 for how these trajectories were identified. Peer substance use was based on proportions of school-based friendship network members who were cannabis users and heavy drinkers, and were derived from those individuals' own responses. Respondents were asked to nominate up to five male and five female friends. Nominated friends were linked to their own survey responses to assess peer substance use. From this information we calculated the proportion of friendship network members (other than the ego) who reported: a) any past month cannabis use; and b) any past year heavy drinking, defined as "five or more drinks in a row" (past month heavy drinking was not assessed). See Section 2.3.2 for how these networks were identified. Depressive symptoms were measured with a 10-item derivative of the CES-D scale (range 0–30, α = 0.81; see Meadows, Brown, & Elder, 2006 for scale details). Control variables previously linked to substance use included gender, race/ethnicity, household income (reported by parent), baseline frequency of heavy drinking during the past 30 days (total past-year heavy drink episodes were converted to a monthly average), delinquency (assessed using 14 items from the Add Health delinquency scale – one item on drug selling was excluded – which asked how often the adolescent engaged in various behaviors in the past 12 months [0 = never to 3 = 5 or more times] range 0–39, α = 0.83), low school engagement (6 items, assessing whether the student felt close to people at school, felt like a part of the school, and how often they had trouble getting along with teachers and other students; higher scores indicated less closeness and integration range 0–24, α = 0.76), a self-esteem scale assessed by averaging respondents' agreement (l = strongly disagree, 5 = strongly agree) with three statements ("you have a lot of good qualities," "you like yourself the way you are," and "you feel loved and wanted") (3 items; range 0–12, α = 0.72), closeness to mother (1 item; range 0–5), and whether illegal drugs are "easily available" in their home (1 item). We included a four-item active coping index (range 0–16, α = 0.74). We also controlled for overall peer group size (mean = 8.4), and number of nominated friends who did not attend that school (were outside-of-school friends; mean = 1.75).

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[1] Wave 8 (fall 2013) only collected data from a small subsample of students as a pilot of the EgoWeb computerized data collection tool, used in Wave 9. Only these three waves are considered as they begin to cover the high school years of interest.