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Short communication

The effect of perceived risk on the combined used of alcohol and marijuana: Results from daily surveys

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ABSTRACT

Background: Studies looking at the association between perceived risk and simultaneous use of alcohol and marijuana are scarce. The present study has three purposes: (1) to examine the association between alcohol and marijuana use at the daily level; (2) to document how this association varies by the perceived risk of using alcohol and marijuana simultaneously; (3) to test whether the association varies by college attendance.
Methods: 89 young adults (Mean Age = 18.3 years, *SD* = 0.5) participated between October 2012 and May 2013. Participants completed a 30-min survey followed by 14 brief daily surveys in each of three waves.
Results: Alcohol use on a given day was associated with increased odds of marijuana use that day, especially among young adults with lower perceived risk. For college students, the association between alcohol and marijuana was weaker than for non-students.
Conclusions: Alcohol and marijuana use were associated at a daily level, especially among young adults with lower perceived risk and those who were not attending college.

1. Introduction

A recent comprehensive review summarizing marijuana's negative health effects highlights particular risks for adolescents and young adults (Volkow et al., 2014). Marijuana use in adolescence can be detrimental for the functional connectivity of the brain (Zalesky et al., 2012), and frequent consumption can lead to a decline in IQ (Meier et al., 2012). Early marijuana use has been linked to poor school performance and a higher risk of dropping out of school (Bray et al., 2000; Lynskey and Hall, 2000). The risk of motor vehicle accidents is also greater when people drive under the influence of marijuana, and this risk is accentuated for those under the age of 21 and when marijuana and alcohol are used in combination (Peck et al., 2008).

1.1. Concurrent alcohol and marijuana use

Previous research has found that marijuana use is associated with underage alcohol use and binge drinking (Donovan et al., 1999; Patrick and Schulenberg, 2010; Patrick et al., 2013). In young adults and college students, alcohol use has also been linked to drug use. For example, in a study of college students, almost all of the past 30-day marijuana users reported having used other substances, including alcohol and tobacco (Mohler-Kuo et al., 2003). However, the majority of this research documents these associations between people; that is, people who use alcohol also tend to use marijuana. These between-person studies do not capture whether alcohol and marijuana are used at the same time, which has important implications for overlapping effects and consequences.

Less is known about the extent to which using alcohol on a given day may predict using marijuana that day. In a study using daily surveys of first-year college students, alcohol use on a given day had a positive but non-significant effect on illegal drug use that day (Neal and Fromme, 2007). Previous research has not yet examined the link between alcohol use and marijuana use among a more general sample of young adults both attending and not attending college.

1.2. Perceived risk

Perceived risk plays an important role in substance use. As part of the transition to adulthood and the identity formation process, experimentation is common among some people (Dworkin, 2005). However, the degree of experimentation with different substances can vary depending on the perceived risk by the users. Perceived risk among young adults has been associated with trajectories of marijuana use (Bachman et al., 1988) and cocaine use (Bachman et al., 1990). Additionally, an inverse correlation between marijuana use and the perception of its risk among adolescents has been observed for the most part of the last four decades (Johnston et al., 2014; Volkow et al., 2014). Very little is known regarding the perceived risks associated

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with using alcohol and marijuana simultaneously, and how perceptions of simultaneous use may be associated with using both substances on the same day.

1.3. College attendance

It has been well documented that the transition out of high school is a critical period for young adults that involves changes in responsibilities and social environments (Newcomb and Bentler, 1987). In many ways, including substance use, this transition is different for college students than for non-students. Using data from five different sources, O'Malley and Johnston (2002) concluded that the use of alcohol but not marijuana was higher among college students than among non-students. Therefore, college attendance will be examined as a moderator in the current study.

1.4. The current study

The present study uses daily survey data which allow for the investigation of the combined use of alcohol and marijuana on a given day. In addition, the study also includes a measure of the perceived risk of using alcohol and marijuana simultaneously.

The aim of this study is to understand the consumption of alcohol and marijuana among young adults, and the role that perceived risk plays in this use. Specifically, we examined three research questions: (RQ1) Does alcohol use on a given day predict marijuana use on the same day? (RQ2) Is this association moderated by perceived risk of simultaneous alcohol and marijuana use? (RQ3) Is this association moderated by college attendance?

2. Methods

2.1. Procedure

During the spring of 2012, 12th graders from three high schools (rural, suburban, and urban) in the Midwest were recruited to participate in a baseline survey (see also Griffin and Patrick, 2014). Out of 440 eligible students, 318 (72.3%) completed the baseline survey, of whom 300 (94.3%) provided their contact information for follow-up. Of the 300 students, about two-thirds ($N = 202$) were randomized into an intensive measurement group (IMG). In October 2012 (wave 1), January 2013 (wave 2), and May 2013 (wave 3) young adults in the IMG received a 30-min web survey followed by 14 consecutive web-based daily surveys. For each of the 14 daily surveys, participants were sent a link to a questionnaire about the previous day, (e.g., "This survey is about Thursday from the time you woke up until you went to sleep"). At the end of the study, each participant could have a maximum of 42 daily surveys (3-waves × 14-days). Participants who were under age 18 were not invited to participate in the follow-up surveys until they turned 18. Participants provided informed consent once they turned 18; all procedures were approved by the IRB.

The response rates were: 87 out of 193 (45.1%) eligible respondents for wave 1, 70 out of 201 (34.8%) for wave 2, and 69 out of 202 (34.2%) for wave 3. The mean number of completed daily surveys ranged from 6.36 ($SD = 6.15$) to 8.20 ($SD = 5.50$) within waves. Across all waves 48.3% of participants completed at least half (i.e., 21) of the daily surveys.

Attrition analysis indicated that participants in the current analysis did not significantly differ from attriters based on gender, age, alcohol use, marijuana use, or perceived risk of alcohol or marijuana. Attriters were more likely than participants to be Black, have parents who did not attend college, and attend an urban high school.

2.2. Participants

For the current analysis, data from 89 participants who completed at least one follow-up wave and at least one daily survey were used. Of 89 participants in this study, 38.2% were male, 78.8% were White, and 70.8% had a parent with at least some college education. The average age at baseline was 18.3 years ($SD = 0.5$, range = 17.6 to 20.1). About half (46.1%) were enrolled full-time in a four-year college during at least one of the waves.

2.3. Measures

2.3.1. Level 1 (daily level)

Marijuana use indicates whether participants used marijuana or hashish each day (0 = no, 1 = yes).

Number of drinks indicates the number of alcoholic drinks consumed each day, on a scale from 1 drink to 25 or more drinks. For participants not drinking on a given day, this variable was coded as 0.

Weekend days were coded as Thursday, Friday, or Saturday, based on research regarding substance use patterns among young adults (Del Boca et al., 2004; Maggs et al., 2011).

2.3.2. Level 2 (wave level)

Wave number was coded as 0 (Wave 1), 1 (Wave 2), and 2 (Wave 3).

Wave-level mean number of drinks was constructed by averaging the number of drinks within each wave.

2.3.3. Level 3 (person level)

College status was a time-invariant variable created using information from the three wave questionnaires, due to lack of variability across waves. Participants were coded as full-time 4-year college students (1) if they indicated that they were attending a 4-year college as a full-time student at any wave; all others were coded as non-students (0).

Perceived risk was measured with the question, "How much do you think people risk harming themselves (physically or in other ways) if they use alcohol and marijuana at the same time, so their effects overlap?" Response options included: (1) no risk, (2) slight risk, (3) moderate risk, (4) great risk. Perceived risk was used as a time-invariant variable (i.e., the mean of responses from the three waves for each person) because there was not enough variability to be modeled at the wave-level.

Person mean number of drinks was created by averaging the number of drinks across all available days.

Demographic variables included gender (female [reference group], male), race/ethnicity (White [reference], non-White), and parent education (parent[s] did not attend college [reference], parent[s] attended at least some college).

2.4. Data analysis plan

To model the nested structure of the data (i.e., daily surveys at level 1, nested within waves at level 2, nested within persons at level 3), a three-level multilevel model (Raudenbush and Bryk, 2002; Snidjers and Bosker, 1994) was used. A Bernoulli distribution with overdispersion was employed to model the dichotomous outcome (marijuana use). The level-3 variables measuring perceived risk and number of drinks were grand-mean centered; the level-2 variable number of drinks was group-mean centered. All analyses were run in HLM 7.0 (Raudenbush et al., 2011) using full penalized quasilikelihood (PQL) estimation. The simple slopes method was used to probe the significant interactions (Bauer & Curran, 2005; Preacher, Bauer, & Curran, 2006).