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Differences in reporting of perceived acute effects of alcohol use, marijuana use, and simultaneous alcohol and marijuana use

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Abstract

Background—Although there are serious negative harms associated with simultaneous alcohol and marijuana (SAM) use, little is known about the self-reported acute effects of SAM use and how they may be similar to or different than effects experienced when using alcohol or marijuana only. The current study examines the perceived acute effects of SAM use, compared to using alcohol or marijuana only, as well as demographic and substance use predictors of overall SAM effects.

Methods—Participants were a community sample of young adults ages 18–23 participating in a longitudinal study on social role transitions and substance use during young adulthood. Young adults who reported SAM use at least once in their lifetime were selected for the present analyses (N=315; mean age = 21.42; 58% female) and reported the effects they experienced from typical alcohol use, marijuana use, and SAM use.

Results—There were significant differences in the extent to which young adults perceived the effects depending on the substances used. Most effects (i.e., clumsy, confused, dizzy, difficulty concentrating) were rated strongest when engaging in SAM use, compared to typical alcohol or marijuana use alone. Feeling high and feeling marijuana effects were rated strongest when engaging in marijuana use alone compared to SAM use, but feeling drunk was greater during SAM use compared to alcohol use alone. Greater alcohol use and increased time spent high during typical SAM use were associated with greater overall SAM effects.

Conclusions—When young adults engage in SAM use they report experiencing greater negative physiological and cognitive effects.

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Contributors

CL designed the study and conceptualized the manuscript. JC analyzed the data. CL and MP drafted the initial manuscript. All authors have approved the final version of the manuscript for submission.

Conflict of Interest

The authors have declared that no competing interests exist

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Keywords

Alcohol; Marijuana; Simultaneous alcohol and marijuana (SAM) use; Subjective Effects; Young Adults; Consequences

1. Introduction

Alcohol and marijuana use are common among young adults in the US: in the past year 82% have used alcohol and 32% have used marijuana (Johnston et al., 2016). The majority of people who use both alcohol and marijuana sometimes do so simultaneously, so that their effects overlap (Brière et al., 2011; Subbaraman and Kerr, 2015). Based on a large population survey of U.S. adults, 15% of young adults aged 18 to 29 engaged in simultaneous alcohol and marijuana (SAM) use (Subbaraman and Kerr, 2015).

Documented consequences of SAM use include substance-related legal, academic, interpersonal, physical, and mental health problems (Brière et al., 2011; Midanik et al., 2007; Pape et al., 2009). The majority of research on SAM use consequences focused on the significant outcome of impaired driving. Results indicate the incidence of traffic collisions is higher among those reporting SAM use than alcohol or marijuana use alone (Ramaekers, et al., 2004; Sewell et al., 2009; Terry-McElrath et al., 2014). Comparisons of perceptions of acute consequences of alcohol, marijuana, and SAM use are needed to understand how young adults view the results of their substance use and to inform prevention and intervention efforts regarding simultaneous ingestion.

The purpose of the present study is to examine perceived acute effects of using alcohol and marijuana simultaneously, compared to effects when typically using alcohol or marijuana alone, among young adults. Further, we examine the potential interaction effects of alcohol and marijuana use on overall SAM effects.

2. Method

2.1. Participants

Participants were a subsample of young adults from *Project Transitions* (N=779, ages 18–23 at recruitment), a longitudinal study including 24 online monthly assessments to examine social role transitions and substance use during young adulthood. The present analyses utilize data collected in May 2016, regardless of which monthly survey the participant was given (i.e., participants were on Months 4 to 15). In May 2016, the overall response rate was 86.8% (N=676). Those who reported SAM use at least once in their lifetime were selected for the present analyses (46.6%, N=315, mean age of 21.42 [SD=1.87], 58.4% female, 78.1% Caucasian, 74.3% heterosexual, 56.2% were students at a 4-year or 2-year post-secondary institution). All procedures were approved by the local University Institutional Review Board and a federal Certificate of Confidentiality was obtained.

2.2. Procedures

Recruitment included mainly online and print advertisements, directing interested participants to a website (or phone number) for more information and to complete a brief online eligibility survey. Eligible participants were 18–23 years old, resided within the greater Seattle metropolitan area, had a valid email address, drank alcohol at least once in the last year, and were willing to come to the study office for an initial baseline assessment (N=779).

2.3. Measures

2.3.1—SAM Use was assessed with the item, “On how many occasions (if any) in your lifetime have you used alcohol and marijuana at the same time, that is, so their effects overlapped?” with responses ranging but coded as 0=none and 1=at least once.

2.3.2. Perceived Effects of Alcohol Use, Marijuana Use, and SAM Use—

Regarding alcohol effects, participants were asked to complete the Subjective High Assessment Scale (Eng et al., 2005) which included 7 items from the larger SHAS (Schuckit et al., 1997a, 1997b) that have the greatest sensitivity to the effects of alcohol and cluster together (Schuckit et al., 2000). Instructions include, “The following words describe feelings that are sometimes produced by drinking alcohol. Please rate the extent to which you feel each of the following when you typically use alcohol.” Participants rated the extent to which they felt three general effects (i.e., feeling alcohol effects, drunk, high) and four more specific effects of alcohol (i.e., clumsy, confused, dizzy, difficulty concentrating, from 0=not at all to 4=extremely).

The SHAS-7 was modified to ask the same items in relation to marijuana use and to SAM use due to many of the SHAS effects being relevant for marijuana use. For when participants “typically use marijuana,” they rated the extent to which they felt two general effects (i.e., feeling marijuana effects, high) and four specific effects (i.e., clumsy, confused, dizzy, difficulty concentrating). For when participants “typically use alcohol and marijuana at the same time - that is so their effects overlap,” they rated the extent to which they felt four general effects (i.e., feeling alcohol effects, feeling marijuana effects, drunk, high) and four specific effects (i.e., clumsy, confused, dizzy, difficulty concentrating). All responses were from 0=not at all to 4=extremely. The sum of the effects was used to create an “average SAM effects” item.

2.3.3—Alcohol Use on Typical Occasions was assessed with, “When you drink alcohol, how many drinks in total do you typically have?” *Alcohol use on typical SAM occasions* was assessed with, “These next questions are about your typical use of alcohol and marijuana at the same time, that is, so that their effects overlap...How many drinks in total do you have?” Response options for both questions were 1 = 1 drink to 25 = 25 or more drinks.

2.3.4—Marijuana Use on Typical Occasions was assessed with, “Thinking about when you typically use marijuana, how long are you high?” *Marijuana use on typical SAM occasions* was assessed with, “These next questions are about your typical use of alcohol and

marijuana at the same time, that is, so that their effects overlap... How long are you high in total?" Response options were 0 = 0 hours to 12= 12 or more hours.

2.4. Analytic Plan

To address the first aim of the study, within-person repeated measures ANOVA models examined mean differences in perceived effects for typical alcohol use, typical marijuana use, and typical SAM use. For models with two comparisons (e.g., drunk effect for alcohol use only compared to SAM use), paired samples *t* tests were used to examine differences. To address the second aim, hierarchical multiple regression analyses examined predictors of the average SAM effects (Step 1: sex, student status, ethnicity, and age), and evaluated the extent to which levels of alcohol and marijuana use (Step 2: number of drinks consumed and hours high on typical SAM occasions) and their interaction (Step 3) were associated with SAM effects. Drinks and hours high were mean centered to reduce collinearity and aid in interpretation. Results of the final model (Step 3) are presented.

3. Results

On average, participants reported typically drinking nearly four drinks ($M = 3.86$, $SD=2.73$) and being high about three hours ($M=2.97$, $SD=1.85$). There were no significant differences when comparing typical alcohol only and marijuana only occasions to typical SAM occasions for alcohol ($M=4.01$, $SD=2.41$; $t(244) = -1.038$, $p = .300$) nor for marijuana ($M=2.92$, $SD=1.67$; $t(198) = -1.361$, $p = .175$). Nearly half of the sample used SAM at least ten or more times in their lifetime (48.6%), with 21.9% using 1–2, 19.0% using 2–5, and 10.5% using 6–9 occasions.

Table 1 provides mean differences of perceived effects of typical alcohol use, typical marijuana use, and typical SAM use. For each effect, with the exception of “feeling alcohol effects,” there was a significant difference in the extent to which participants felt the effect depending on the typical substance(s) used. The majority of effects (i.e., clumsy, confused, dizzy, difficulty concentrating) were rated strongest during SAM use, compared to alcohol or marijuana use alone. The effects of “high” and “feeling marijuana effects” were weaker during SAM use compared to marijuana use alone, although the effect of “drunk” was greater during SAM use compared to alcohol use alone. Table 2 summarizes regression results of the final model for the average SAM effects.

Being female, greater alcohol use during typical SAM use, and greater time spent high during typical SAM use were associated with more overall SAM effects. There was a significant interaction between drinks and hours high. Examination of simple slopes (Figure 1) indicated that for people who spent less time high, greater alcohol use was associated with increased overall SAM effects ($\beta = .122$, $p < .001$). For those who spent more time high, alcohol use was not associated with overall SAM effects ($\beta = .041$, $p > .05$).

4. Discussion

While epidemiological evidence suggests there are serious negative harms associated with SAM use, including greater rates of drunk driving (Brière et al., 2011; Subbaraman and

Kerr, 2015; Terry-McElrath et al., 2014), behavioral research had not yet examined self-reported acute effects of SAM use and how they may be similar to or different than effects experienced when typically using alcohol or marijuana alone. The present study aimed to extend our knowledge of these SAM effects. There has been some research to suggest that young adults engage in SAM use for different reasons including to increase intoxication (e.g., cross-faded effects) or to reduce the negative effects of alcohol (e.g., feeling less hungover) (Patrick et al., 2017; Patrick and Lee, 2017). It is important to understand how SAM use influences various acute effects.

For each of the four specific aspects of the effects of alcohol as identified by Eng and colleagues (2005, i.e., clumsy, confused, dizzy, difficulty concentrating), effects were reported higher for SAM use, compared to effects reported with typical alcohol or marijuana use, despite similar levels of consumption. Therefore, it may not be level of use that leads to greater perceived SAM effects, but possibly additive or synergistic effects when both alcohol and marijuana are used simultaneously. As expected, the perceived effects of “high” and “feeling marijuana effects” were greater for marijuana use compared to SAM use, as those effects are typically associated with marijuana use (despite high being asked on the original alcohol SHAS). More surprising was that the perceived effect of “drunk” was greater during SAM use compared to alcohol use, although there was no difference in perceptions of “feeling alcohol effects” for alcohol use compared to SAM use. Greater perceptions of intoxication on SAM occasions than on alcohol only occasions may be because the combination of substances (e.g., cross-faded effects; Patrick and Lee, 2017) increases the sensation of drunkenness. However, young adults may interpret “alcohol effects” as feeling the initial effects of alcohol, such as feeling a buzz, which may not differ across types of use.

Beyond mean differences in effects, we were interested in whether level of typical alcohol and marijuana use on SAM use occasions mattered, and if so to what extent. That is, would the use of marijuana have additive effects or moderate the effects of alcohol use on SAM effects? Alcohol and marijuana use were independently associated with greater SAM effects, as well as synergistically. The findings suggest that the association between alcohol use and effects experienced on SAM occasions was stronger for young adults who spent less time high on typical SAM occasions. That is, the response of alcohol’s effects on typical occasions when young adults also used marijuana was dependent on how much alcohol they consumed and not the extent to which they were high.

Young adults use alcohol and/or marijuana for a variety of different reasons (Cooper, 1994; Lee et al., 2009; Simons et al., 2000). While research is just starting regarding motivations for SAM use, evidence suggest young adults may use SAM for “cross-faded effects”, that is to get a more intense intoxication or quest for a “better high” (Lukas and Orozco, 2001; Patrick and Lee, 2017). Some evidence may support this hypothesis as pharmacologic studies provide partial support due to plasma THC (tetrahydrocannabinol) levels increasing if alcohol is consumed simultaneously (Downey et al., 2013; Lukas and Orozco, 2001). However, we found marijuana-specific effects were reported as stronger during marijuana use without alcohol. Overall, though, our findings support the notion that young adults report increased subjective effects on typical SAM occasions compared to alcohol or marijuana only occasions.

Of great public health interest are the implications of SAM use for risk of motor vehicle collisions and related injuries and fatalities. The incidence of motor vehicle collisions is higher among those engaging in SAM use (Ramaekers et al., 2004; Sewell et al., 2009; Terry-McElrath et al., 2014). Findings that young adults perceive greater clumsiness, confusion, dizziness, difficulty concentrating, and greater feeling drunk on SAM occasions compared to alcohol or marijuana only occasions is of particular importance as these effects have impacts on driving abilities. Clinical interventions could incorporate these perceived effects into alcohol or marijuana interventions.

The present results, while novel and important, should be viewed with caution. The results are based on self-reported use and assess perceived effects from the typical occasions of alcohol, marijuana, and SAM use. Results may be different if peak occasions were assessed. Further, the sample was drawn from a community sample in Washington State where recreational marijuana use is currently legal for those ages 21 and over. Nevertheless, the findings suggest that young adults who use SAM are at greater risk for a host of consequences and further research should explore motivations, type, method, and quantity of marijuana and alcohol use on SAM occasions, and additional perceived and objective physiological effects of SAM use.

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Highlights

- We examined perceived effects of simultaneous alcohol and marijuana (SAM) use.
- Perceived effects of alcohol, marijuana (MJ), SAM use were significantly different.
- Subjective effects were rated strongest for SAM use compared to only alcohol or MJ.
- More negative physiological/cognitive effects for SAM compared to alcohol or MJ.



Figure 1. Two-way interaction between SAM alcohol use and SAM hours high.

Table 1

Mean differences of perceived effects for typical alcohol use, typical marijuana use, and typical SAM use.

Specific Effects	Alcohol Use Only		Marijuana Use Only		SAM Use		
	Mean	SD	Mean	SD	Mean	SD	
Clumsy	1.26 ^b	.91	1.11 ^c	.99	1.59 ^a	1.08	$F(2, 387) = 22.97, p < 0.001$
Confused	.56 ^c	.69	.75 ^b	.93	1.01 ^a	1.03	$F(2, 378) = 22.71, p < 0.001$
Dizzy	.61 ^b	.75	.48 ^b	.86	1.07 ^a	1.08	$F(2, 382) = 35.54, p < 0.01$
Difficulty Concentrating	1.06 ^c	.92	1.39 ^b	1.13	1.52 ^a	1.10	$F(2, 380) = 19.879, p < 0.05$
General Effects							
Drunk	1.89 ^b	1.18	-	-	2.12 ^a	1.14	$t(285) = 2.923, p < .01$
High	1.14 ^c	1.13	2.74 ^a	.98	2.47 ^b	.99	$F(2, 382) = 183.79, p < 0.001$
Feeling Alcohol Effects	2.16 ^a	.99	-	-	2.28 ^a	1.11	$t(248) = -1.750, p = .081$
Feeling Marijuana Effects	-	-	2.61 ^a	1.10	2.36 ^b	1.02	$t(197) = 3.519, p < .001$

Note. Posthoc pairwise comparisons evaluated differences of effects between pairs of substances. Different superscripts represent significant differences in effects ($p < .05$); same superscripts represent no significant difference.

Table 2

Hierarchical regression results for SAM effects as a function of SAM alcohol consumption and SAM hours high.

	<i>Average SAM Effects</i>
Predictor	<i>B (SE)</i>
Male Sex	-.273 (.101)**
Student (vs. non-student)	.010 (.106)
Asian (vs. ref)	-.073 (.149)
Other ethnicity (vs. ref)	-.092 (.120)
Age	-.006 (.028)
Drinks	.148 (.034)***
High	.182 (.047)***
Drink x High	-.019 (.008)**

Note.

**
 $p < .01$.

 $p < .001$.

Table shows results of the final model. Drinks = number of drinks consumed during typical SAM use; High = number of hours high during typical SAM use. Ref = reference group (Caucasian); Other ethnicity = all other ethnicities compared to Caucasian.