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Social Media, Marijuana and Sex: An Exploratory Study of Adolescents' Intentions to Use and College Students' Use of Marijuana

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ABSTRACT

Recreational marijuana continues to be legalized in U.S. states, with popular media discussing connections between cannabis and the facilitation of sexual activity. We conducted two surveys with adolescents and college students in Washington state to examine the role of viewing social media and pro-marijuana content on sex-related marijuana expectancies and intentions to use. In Study 1, among adolescents ($N = 350$), we found connections between social media use, exposure to pro-marijuana content, and sex-related marijuana expectancies, with boys' sex-related marijuana expectancies predicting intentions to use marijuana. In Study 2, we expanded this research to college students ($N = 966$), with the addition of frequency of marijuana use as an outcome. For men, sex-related marijuana expectancies were negatively associated with marijuana use. Sex-related marijuana expectancies were not associated with intentions to use or use of marijuana among adolescent girls and college women. Our findings highlight how social media use is associated with increased exposure to pro-marijuana content for adolescents and college students, and how such content is associated with sex-related marijuana expectancies. The mixed relationships in our data between sex-related marijuana expectancies and intentions and use highlight potential gender and developmental differences.

In early 2018, Ashley Manta trademarked the term Cannasexual™ to describe a person who purposely uses cannabis to facilitate sexual activity. Mass media also started covering the connection between marijuana and sex. In February 2018, *Huffpost* educated its readers with an article titled “Here’s what it means to be a ‘Cannasexual’” (Duberman, 2018). A *Maxim* article touted that “Marijuana leads to better and more frequent sex, according to science,” (Yenisey, 2018). *Cosmopolitan* promised its readers that it would reveal “8 sex positions that pair reaaaally well with weed,” (Hamilton, 2020). Similarly, social media outlets, which are frequented by young people, often include pro-marijuana messaging (Cavazos-Rehg et al., 2016; Krauss et al., 2017), including messages that positively connect marijuana and sexual activity (Cavazos-Rehg et al., 2015). Advertisements for marijuana, in states where recreational marijuana is legal, may also link cannabis to sexual appeals.

Washington state legalized recreational marijuana in 2012 for people 21 years of age and older. Thus, adolescents in the state have grown up with advertising and media messaging promoting marijuana and the knowledge that they could, once 21 years of age, purchase marijuana for personal use. Although Washington state does have restrictions pertaining to the advertising of marijuana toward youth, restrictions tend to focus on the location or placement of advertising messages and specific products (Washington State Liquor and Cannabis Board, n.d.), leaving the content of such advertising at the discretion of marketers. Additionally, social media allows for the creation and distribution of content, so young people are not only consumers of content, but also creators (e.g.,

Willoughby et al., 2020), allowing for exposure to additional messages about marijuana. In fact, social media posts about marijuana are most often not specifically advertisements, but content posted by individuals (Cavazos-Rehg et al., 2016).

Although marijuana advertising is relatively new, previous research into alcohol, another age-restricted substance, can be instructive. Alcohol advertising that connects alcohol to sexual appeals may influence sex-related alcohol expectancies, which are one’s expectations of how alcohol may facilitate sexual activity (Rhoades & Jernigan, 2013; Rodgers et al., 2019). Sex-related alcohol expectancies have been associated with alcohol use intentions and consumption behaviors among youth (Dermen & Cooper, 1994; Leigh, 1990) and alcohol expectancies influence decisions associated with drinking (George, 2019). However, the relationship between the pro-marijuana content adolescents view on social media and their sex-related marijuana expectancies is unclear. In addition, marijuana use increases from adolescence and peaks around early adulthood (Chen & Jacobson, 2012; Salas-Wright et al., 2015), but boys and girls use marijuana at different rates over this developmental time period. Specifically, girls tend to report a higher level of marijuana use during early adolescence (Chen & Jacobson, 2012), while boys report a higher rate of increased marijuana use and a higher likelihood of using marijuana from middle adolescence to early adulthood (Chen & Jacobson, 2012; Schepis et al., 2011).

In the current study, we used two surveys to address existing gaps in the research and help provide insights for marijuana policy and prevention efforts. In Study 1, we used a state-wide

online panel of adolescents (ages 15–17) to examine the relationship between social media use, exposure to positive content about marijuana use and relationship facilitation, sex-related marijuana expectancies, and intentions to use. In Study 2, we expanded upon Study 1 with a state-wide college sample to examine the relationship between social media use, exposure to positive content about marijuana use and relationship facilitation, sex-related marijuana expectancies, intentions to use, and frequency of marijuana use.

Social Media

The majority of American youth and young adults use social media. A 2018 Pew Research Institute study found that 97% of 13 to 17 years-olds are on social media (Pew Research Center, 2018), and 90% of 18 to 29 year-olds use social media (Pew Research Center, 2019). Adolescents also are frequent users of social media, reportedly using platforms multiple times a day or “almost constantly” (Pew Research Center, 2018). YouTube and Snapchat are the most daily used social networks among youths (Pew Research Center, 2018), and YouTube and Facebook are the most daily used social networks among young adults (Pew Research Center, 2019).

The associations between health behaviors and social media use among youth and young adults have been studied in depth in myriad contexts, including behaviors such as alcohol consumption (Moreno & Whitehill, 2014), body image (Fardouly et al., 2015), and marijuana use (Cabrera-Nguyen et al., 2016). Further, portrayals of alcohol and other substances are prevalent on social media (Beullens & Schepers, 2013; Cabrera-Nguyen et al., 2016; Cranwell et al., 2017; Moreno et al., 2016), including posts related to marijuana (Cavazos-Rehg et al., 2015; Krauss et al., 2017; Krauss et al., 2015; Thompson et al., 2015). Most social media posts about marijuana, across a variety of social media platforms, portray marijuana positively (Cavazos-Rehg et al., 2015, 2016; Krauss et al., 2017).

Sex-Related Marijuana Expectancies

Marijuana use has also been linked to early sexual initiation (El-Menshawi et al., 2019) and unprotected sex among young adults (Walsh et al., 2014). However, there is a dearth of research that looks at the effects of exposure to marijuana-related social media content on sex-related marijuana expectancies, even with research highlighting the presence of pro-marijuana content on social media.

Sex-related marijuana expectancies are important to examine as previous research has found that sex-related expectancies influence intentions to use marijuana in sexual situations (Hendershot et al., 2010) and are associated with marijuana use behavior (Currin et al., 2018). This supports previous research that has focused on sex-related alcohol expectancies. For example, sex-related expectancies have been positively associated with alcohol consumption during sexual situations (Dermen & Cooper, 1994). Furthermore, sex-related alcohol expectancies have also been associated with increased risky sexual behavior (Dermen et al., 1998; Leigh, 1990). By understanding factors associated with sex-related marijuana expectancy, it is possible to further evaluate other, indirect effects of

seeing pro-marijuana messages on social media. Indeed, Hendershot et al. (2010) observed that the frequency of marijuana use and risky sexual behavior was moderated by sex-related marijuana expectancies.

The research on marijuana and sex is still developing. The positive link between sex-related marijuana expectancies and marijuana use has been reported (Currin et al., 2018), but the processes through which such effects occur are unclear. Additionally, although the presence of pro-marijuana content in social media has been documented (Cavazos-Rehg et al., 2015, 2016; Krauss et al., 2017), research has not yet explored the relationship between exposure to such content, perceptions of such content, and outcomes.

Sexual script theory posits that meanings related to human sexuality can be conveyed through a variety of sources and at various levels, including at the cultural, interpersonal, and intrapsychic, or individual desire, level (Simon & Gagnon, 1986). Sexual scripts (e.g., ideas about how men and women should behave in certain sexual situations) to which people ascribe have been associated with increased sexual risk behaviors (Bowleg et al., 2015) and unhealthy sexual consent negotiation (Hust et al., 2017). For example, Bowleg et al. (2015) developed a sexual scripts scale and examined associations between sexual scripts and risk behaviors among Black heterosexual men. They found that greater alcohol script (i.e., motivation and use of alcohol as a precursor to sexual activity), greater media sexual socialization script (i.e., use of media as a guide to sexual behavior), greater marijuana script (i.e., motivation for using marijuana as a precursor to sex) and lower condom script (i.e., communication about condoms) scores were associated with more sexual risk behavior, which included measures of unprotected vaginal sex and number of partners.

Previous research has found exposure to media content was associated with adherence to traditional sexual scripts, such as a woman’s passivity in sexual contexts, which in turn can impact outcomes such as sexual agency (Seabrook et al., 2017). Reported exposure to traditional sexual scripts in magazine content was associated with young adults’ sexual consent negotiation (Hust et al., 2014). Of particular interest for the current study, exposure to alcohol advertisements that objectified women increased viewers’ beliefs that the ads linked alcohol to sexual activity, which in turn increased viewers’ sex-related alcohol expectancies (Rodgers et al., 2019). Social cognitive theory (Bandura, 1986, 2001) posits that people learn from the media to which they attend. According to social cognitive theory, people learn either through directly engaging in a behavior or watching others model behaviors. Portrayals in the media can often serve as such a model. According to social cognitive theory, outcome expectancies, which are peoples’ beliefs about potential outcomes if they perform the modeled behavior, can influence behaviors.

Previous research has highlighted the need to move beyond models that test simple exposure to media messaging, especially in relation to attitudes toward sex (e.g., Ward, 2003), calling for additional research to examine the processes through which effects occur. Furthermore, there are differences between young adults and adolescents in terms of sexual behavior, as the average age of first sexual intercourse experience is approximately 17 years old, based on national data from

2015–2017 (Centers for Disease Control and Prevention, *n.d.*), and in marijuana use (Salas-Wright et al., 2015; Schulenberg et al., 2005), which might lead to different effects of sex-related marijuana expectancies on intentions and use. Moreover, studies on alcohol use have revealed a gender difference in sex-related alcohol expectancies, with men reporting higher expectancies (Gálvez-Buccollini et al., 2009). Gender has also been shown to play a role in explaining the relationship between sex-related alcohol expectancies and drinking behavior (Pedersen et al., 2009). Few studies have examined gender differences in the relationship between sex-related expectancies and marijuana use. One exception is the study by Currin et al. (2018), which examined the association between sex-related drug expectancy and marijuana use in girls and boys separately and found a positive association for both girls and boys.

Current Study

In this study, we used two separate studies to examine the connections between social media use, exposure to pro-marijuana messaging, sex-related marijuana expectancies, and intentions to use marijuana among adolescents and young adults. In Study 1, we sought to examine how social media use and exposure to pro-marijuana content would be associated with intentions to use marijuana among adolescents. We hypothesized that (H1) social media use and (H2) exposure to pro-marijuana content would be positively associated with adolescents' intentions to use marijuana, accounting for all other variables. We also examined how sex-related marijuana expectancies might be associated with intentions to use marijuana, hypothesizing that (H3) sex-related marijuana expectancies would be positively associated with intentions to use marijuana, after accounting for all other variables. Lastly, we were also interested in whether exposure to pro-marijuana messages and sex-related marijuana expectancies would mediate the relationship between social media use and intentions to use marijuana among adolescents. We hypothesized that (H4) the relationship between social media use and intentions to use marijuana would be mediated by exposure to pro-marijuana messages, sex-related marijuana expectancies, and the combination of exposure to pro-marijuana messages and sex-related marijuana expectancies. Although we do not believe there is sufficient evidence to warrant specific gendered hypotheses, we think it is important to examine possible gender differences as has been done in previous work (e.g., Currin et al., 2018; Rodgers et al., 2019), and therefore, we tested the models separately by gender.

Study 1 Method

Participants

We recruited adolescents ($N = 350$) in June 2018 from an online panel of participants (Qualtrics) in Washington state. To be eligible, adolescents needed to be between 13 and 17 years of age and from Washington state. General recruitment messages asked parents of adolescents in the age range if they would allow their child to participate in the study. Parents were then provided with study information and asked to provide

consent. In the consent form, parents were informed the study would ask questions about attitudes, opinions, and perceptions related to marijuana content, but that we would not be showing marijuana messaging or asking questions about marijuana use behaviors. They were told the questions may be sensitive and may make their teen uncomfortable but that the participant could stop participation at any time. Parents also had an option to view a PDF of the complete survey prior to providing consent.

After providing consent, parents were instructed to have their child come to the computer. Adolescents were provided with similar information and informed that the survey contained sensitive questions that they might want to complete in private. Adolescents then provided assent. Screening questions then asked adolescents for their age and removed any participants who were not in the correct age range. We used a similar process to survey adolescents previously (Rodgers et al., 2019). Before the launch of the survey, we conducted five cognitive interviews with adolescents to assess question comprehension and clarity. The interviews were used to gather feedback on newly developed items or comprehension of items previously used primarily in young adult samples. Only minor changes, such as the addition of additional page breaks or the instruction before questions, resulted from the cognitive interviews. The authors' institutional review board approved all procedures prior to the beginning of the study.

Measures

Social Media Exposure

was assessed with five items that asked participants to indicate how often they used each of the following social media: Facebook, Twitter, Instagram, Snapchat, and YouTube on a 5-point scale ($1 = \text{never}$, $5 = \text{multiple times a day}$). Items were averaged to create a scale ($\alpha = .63$). We chose these specific social media platforms because previous literature has found the presence of pro-marijuana content on such platforms (Cavazos-Rehg et al., 2015, 2016; Krauss et al., 2017) and use is high among adolescents (Pew Research Center, 2018).

Pro-marijuana Content Exposure

was assessed with four items that asked participants to indicate how often they saw positive portrayals of marijuana on social media specific to marijuana use and relationship facilitation on a 6-point scale ($1 = \text{never}$, $6 = \text{very often}$). Items included "posts about how marijuana helps you to feel good" and "posts about marijuana use in relation to sex/romance attractiveness (e.g., sexy stoner girls)." All items from the scale are presented in Table 1. Items were selected from an extensive list of possible content viewed that was developed based on a previous content analysis (Cavazos-Rehg et al., 2015) considering our interest in the specific pro-marijuana topics and item loadings. Items were averaged to create a scale ($\alpha = .90$).

Sex-related Marijuana Expectancies

were assessed with thirteen items adapted from a previous study (Currin et al., 2018). Previously, the scale was used to assess the expectancies of general drug use. We adapted the prompt to "When a person consumes enough marijuana to feel

Table 1. Scale items.

Scale	Items
Pro-marijuana social media content on marijuana use and relationship facilitation	Posts about use of marijuana Posts about marijuana use in relation to sex/romance attractiveness (e.g., sexy stoner girls) Posts about marijuana helping to facilitate friendships Posts about how marijuana helps you to feel good
Sex-related marijuana expectancies	enjoys sex more is more sexually responsive gets horny (i.e., want sex) is a better lover feels closer to a sexual partner feels less shy is more self-confident feels less self-conscious becomes more forward is less nervous about sex has sex with people one would not have sex with when he or she was sober is more likely to do something sexually risky loses his or her inhibitions

the effects, the person ...” and participants were asked to indicate on a 5-point scale ($1 = \textit{strongly disagree}$, $5 = \textit{strongly agree}$) how much they agreed with statements regarding sex-related effects of using marijuana, such as “enjoys sex more,” and “is more sexually responsive.” Items were averaged to create a scale ($\alpha = .93$) and all items are presented in Table 1.

Intentions to Use Marijuana

was measured with a single item (i.e., “How likely is it that you will use marijuana, at least once or twice, in the future?”) on a 4-point scale ($1 = \textit{definitely will not}$, $4 = \textit{definitely will}$). The measure was adapted from previous research (Hohman et al., 2014). In the original item, the measure assessed intentions to use marijuana over the next 12 months. Due to legal and ethical considerations related to adolescent marijuana use, including concerns from the company through which we administered the survey about asking about youths’ illegal behaviors, we removed the timeframe from the item and asked more generally about future marijuana use.

Analysis Plan

All analyses were conducted using SPSS version 23. First, Spearman’s correlation and linear regression were tested to examine the relationship among the studied variables. Then, the mediations were tested using the bootstrapping approach through the PROCESS macro for SPSS. The current study used PROCESS model 6 with 5000 resamples to construct the 95% confidence intervals (CIs) for the indirect effects (i.e., the mediation effects). When the CI does not include the value of zero, a conclusion can be drawn that the indirect effect is significant. The PROCESS model also produces linear regression analysis results, which were used to address the hypotheses on the direct effects. Age and race were entered as covariates; exposure to pro-marijuana social media messages was used as the first mediator and sex-related marijuana expectancy was used as the second

mediator. To test the gender differences, the model was examined for girls and boys separately. Five participants (1.4%) identified their gender as “other” and were excluded from the analysis. The girls’ and boys’ models presented different results, providing information relevant to the research question, and thus the gender-specific models were reported. Power analysis using G^* power suggested that for a medium effect size and a power of .95, the regression analysis needed to have a sample size of 138; the current study had 164 girls and 181 boys, and thus met the sample size requirement. The mediation effects were analyzed using a bootstrap method, which is advocated for its power in analyzing small to moderate samples in mediation tests (Shrout & Bolger, 2002).

Study 1 Results

Sample information is presented in Table 2. The descriptive results and Spearman’s correlations are reported in Table 3. The correlations suggested that social media use, pro-marijuana messages, and sex-related marijuana expectancies were positively associated with youth’s intentions to use marijuana, $p < .001$. The correlations among predictors did not indicate a problem with multicollinearity.

Hypothesis Testing of the Direct Effects

Results from the regression analysis suggested that social media use, pro-marijuana content exposure, and sex-related marijuana expectancies along with the covariate variables accounted for 12% of the variance in girls’ intentions to use marijuana ($F(5, 158) = 4.14, p < .001$), and 28% of the variance in boys’ intentions to use marijuana ($F(5, 174) = 13.73, p < .001$). The results suggest that boys and girls differed mainly on the effects of sex-related marijuana expectancies. Although sex-related marijuana expectancies were associated with boys’ intentions to use marijuana ($\beta = .22, p < .001$), it was not a significant predictor of girls’ intentions to use (See Figures 1 and 2).

H1 predicted that social media use would be positively associated with intentions to use marijuana. The regression analysis results suggested that social media use was not significantly associated with boys’ or girls’ intentions to use marijuana, after accounting for all other variables in the model. Therefore, the hypothesis was not supported by the results.

H2, which predicted that pro-marijuana content exposure would be positively associated with intentions to use marijuana, was supported. After accounting for all other variables in the model, viewing pro-marijuana messages was positively associated with intentions to use marijuana for girls and boys, respectively ($\beta = .26, p < .001$; $\beta = .41, p < .001$).

H3 predicted that sex-related marijuana expectancies would be positively associated with intentions to use marijuana, and the regression results partially supported this hypothesis. The results suggest that sex-related marijuana expectancies were positively associated with boys’ intentions to use marijuana ($\beta = .22, p < .001$), but not significantly associated with girls’ intentions to use marijuana, after accounting for all other variables in the model.

Table 2. Demographic information for Study 1 and Study 2 participants.

Measure	Study 1 Adolescents (N = 350)		Study 2 College Students (N = 966)	
	M	SD	M	SD
Age	15.08	1.4	21.25	4.4
	n	%	n	%
Gender				
Male	181	51.7	368	38.1
Female	164	46.9	512	53
Other	5	1.4	8	.8
Missing	0	0	78	8.1
Received Free or Reduced-Price Meals at School	154	44	–	–
Family income	–	–	37	3.8
Very low income	–	–	144	14.9
Low income	–	–	488	50.5
Middle income	–	–	183	18.9
High income	–	–	21	2.2
Very high income	–	–	37	3.8
Not sure	–	–	17	1.8
Missing	–	–	76	7.9
Race				
White (not Hispanic)	254	72.6	609	63.0
Hispanic/Latino – White	32	9.1	76	7.9
Asian, Asian Indian, or Pacific Islander	22	6.3	82	8.5
Black or African-American (not Hispanic)	17	4.9	27	2.8
Some other race	13	3.7	32	3.3
Native American or Alaskan Native	9	2.6	9	.9
Hispanic/Latino – Black	2	.6	7	.7
Hispanic (unspecified)	1	.3	45	4.7
Missing	0	0	79	8.2
Social media use				
Never	15	4.3	28	2.9
Monthly	10	2.9	16	1.7
Weekly	38	10.9	42	4.3
Once a day	56	16	107	11.1
Multiple times a day	231	66	771	79.8
Missing	0	0	2	.2
Social media use				
Facebook	3.59	1.53	3.60	1.44
Twitter	2.36	1.56	2.79	1.78
Instagram	3.53	1.59	3.94	1.52
Snapchat	3.43	1.71	4.17	1.44
YouTube	4.36	.93	4.06	1.05

Mediation Effects

H4 predicted that the relationship between social media use and intentions to use marijuana would be mediated by exposure to pro-marijuana messages, sex-related marijuana expectancies, and the combination of the two variables, and this hypothesis was partially supported. The mediation tests suggested that, for girls, the relationship between social media use and intentions to use marijuana was mediated by pro-marijuana message exposure ($\beta = .07$, 95% CI [.015, .145]). However, sex-related marijuana expectancies and the

combination of exposure to pro-marijuana messages and sex-related marijuana expectancies did not mediate the relationship between social media use and intentions to use marijuana. The significant indirect path for girls is also presented in the Figure 1 Note.

For boys, the mediation tests suggested that the relationship between social media use and intentions to use marijuana was mediated by pro-marijuana message exposure ($\beta = .16$, 95% CI [.089, .242]), as well as by the combination of pro-marijuana messages and sex-related marijuana expectancies ($\beta = .03$, 95% CI [.007, .063]). However, sex-related marijuana expectancies on their own did not mediate the relationship between social media use and intentions. The significant indirect paths for boys are presented in the Figure 2 Note.

Study 1 Discussion

The findings from Study 1 highlight the connections between social media use, exposure to pro-marijuana content about marijuana use and relationship facilitation, sex-related marijuana expectancies, and intentions to use marijuana among a sample of Washington state adolescents. Among girls, exposure to pro-marijuana content was associated with increased intentions to use marijuana. However, social media use more generally and sex-related marijuana expectancies were not associated with intentions to use marijuana. Among boys, exposure to pro-marijuana messages and sex-related marijuana expectancies were positively associated with intentions to use marijuana. For both boys and girls, exposure to pro-marijuana messages on social media mediated the relationship between social media and intentions to use marijuana, and for boys, the combination of exposure to pro-marijuana messages and sex-related marijuana expectancies were associated with intentions to use.

These findings support previous research that found that the content to which people are exposed and their perceptions of content, as opposed to mere media exposure, matter (Rodgers et al., 2019). Given that exposure to pro-marijuana messaging about marijuana use and relationship facilitation was positively associated with intentions to use among youth and such exposure mediated the relationship between social media use and intentions for both boys and girls, it may be important to regulate or restrict the content in relation to marijuana advertisements. The alcohol industry, which self-regulates advertising, includes codes that aim to limit the use of advertising that implies alcohol may facilitate sexual activity (e.g., Distilled Spirits Council of the United States, n.d.). Our results suggest states that have legalized recreational marijuana use may want to similarly regulate marijuana advertising.

Table 3. Descriptives and Spearman's correlations among key variables for adolescents.

	Female		Male		1	2	3	4	5
	M	SD	M	SD					
(1) Intention to use	2.09	.94	2.07	.97	–	–.01	.20**	.49***	.36***
(2) Age	15.21	1.39	14.98	1.46	.08	–	–.03	.07	–.06
(3) Social media use	3.53	.91	3.38	.97	.12	.29***	–	.36***	.14
(4) Pro-marijuana message	2.93	1.32	3.05	1.41	.29***	.07	.26***	–	.36***
(5) Sex-related marijuana expectancy	3.11	.66	3.11	.76	.20**	.10	.11	.28***	–

Correlations for girls are presented below the diagonal, and correlations for boys are presented above the diagonal. Independent t-tests were conducted to test gender differences in the variables, but none of them were significant. ** $p < .01$, *** $p < .001$.

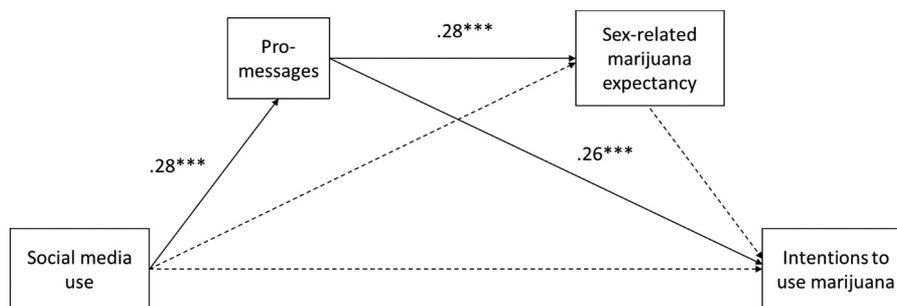


Figure 1. Mediation model predicting **girls'** intentions to use marijuana. Note: Standardized coefficients are reported. Dotted lines represent non-significant paths. Significant indirect paths: social media – pro-marijuana messages – intentions; *** $p < .001$

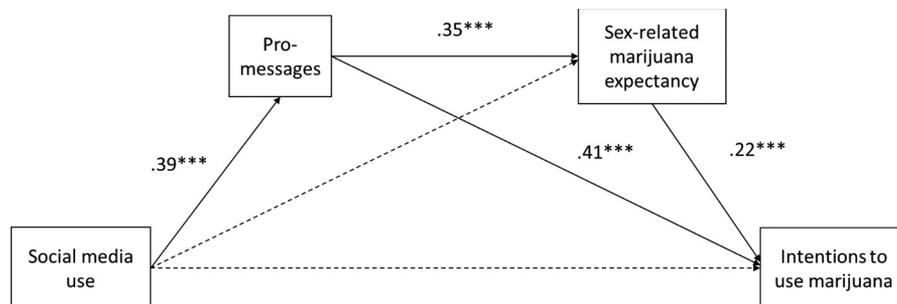


Figure 2. Mediation model predicting **boys'** intentions to use marijuana. Standardized coefficients are reported. Dotted lines represent non-significant paths. Significant indirect paths: social media – pro-marijuana messages – intentions; social media – pro-marijuana message – sex expectancy – intentions. *** $p < .001$

Although regulation of marijuana advertising will not curtail all exposure to pro-marijuana content, including content that links marijuana and sex among adolescents, it may be a positive step toward reducing such exposure and potential effects.

Additionally, the gender differences we found in our sample of adolescents are interesting. Sex-related marijuana expectancies were not predictive of intentions to use among girls, whereas sex-related marijuana expectancies were positively associated with intentions to use marijuana among boys. This finding may have relevance for prevention efforts, as research has found that more male college students may be likely to report engaging in sexually coercive behavior than women, and young people who engage in sexually coercive behaviors have been found to have higher sex-related alcohol expectancies (Palmer et al., 2010). Further work is needed to parse out the potential effects and implications of this work.

Study 2

As we were also interested in potential differences based on adolescent development, we conducted a second survey with young adults. As previously stated, research has noted differences between young adults and adolescents in terms of sexual behavior (Centers for Disease Control and Prevention, n.d.) and in marijuana use (Salas-Wright et al., 2015; Schulenberg et al., 2005), which could lead to different relationships between the key variables. In Study 2, we conducted a survey among a state-wide sample of college students and extended the research to include not only intentions to use marijuana as an outcome, but frequency of marijuana use.

We were interested in how social media use and exposure to pro-marijuana content would be associated with intentions to use marijuana and marijuana use by young adults. We hypothesized that (H1a) social media use would be positively associated with college students' intentions to use marijuana, and (H1b) positively associated with use of marijuana, accounting for all other variables. We also hypothesized that (H2a) exposure to pro-marijuana content would be positively associated with college students' intentions to use marijuana and (H2b) positively associated with marijuana use, after accounting for all other variables. We also examined how sex-related marijuana expectancies would be associated with intentions to use marijuana and marijuana use among college students. We hypothesized that (H3a) sex-related marijuana expectancies would be positively associated with college students' intentions to use marijuana and (H3b) their marijuana use, after accounting for all other variables. We examined whether intentions to use marijuana were associated with college students' use, hypothesizing that (H4) intentions to use marijuana would be positively associated with college students' marijuana use, after accounting for all other variables. Similar to the adolescent sample, we were also interested in mediation and examined whether exposure to pro-marijuana content, sex-related marijuana expectancies, and intentions to use marijuana mediated the relationship between social media use and marijuana use. We hypothesized that (H5) the relationships between social media use and marijuana use would be mediated by exposure to pro-marijuana messages, sex-related marijuana expectancies, intentions to use marijuana, and the

combination of these variables. Similar to the adolescent sample data, we again tested the models separately by gender.

Study 2 Method

We used an online survey to collect data from college students recruited from different campuses of a state-wide university in Washington in 2019. A total of 7994 college students were randomly selected from multiple campuses in the statewide system and invited to participate via an email invitation, and 1009 students responded to the survey (response rate 12.6%). After deleting invalid responses due to age (below 18 years old) and declined consent, the final sample consisted of 966 responses, for a completion rate of 98.7%. This study's response rate is adequate according to recommendations on conducting online surveys and is similar to other studies on cannabis among young adults (e.g., Krauss et al., 2017; Nulty, 2008). The completion rate is comparable to other studies that have examined marijuana use among young adults and used a similar method (e.g., Daniulaityte et al., 2017; Ramo et al., 2014).

Measures

The same measures used in Study 1 were used in Study 2. Alphas for all constructs were similar (e.g., pro-marijuana social media content, $\alpha = .85$; sex and marijuana expectancies, $\alpha = .87$). One additional variable was assessed. *Marijuana use*, measured with a single item taken from a larger assessment of cannabis use (Cutler & Spradlin, 2017), asked participants to indicate their frequency of marijuana use in the past week on an 8-point scale ($1 = 0$ day, $8 = 7$ days).

Analysis

All analyses were conducted using SPSS version 23. We followed the same analysis strategy as in Study 1. Age and race were entered as covariates; exposure to pro-marijuana social media messages was used as the first mediator, sex-related marijuana expectancies were used as the second mediator, and intentions to use marijuana was used as the third and final mediator. To test for gender differences, the model was examined separately for women and men. Eight participants (0.8%) identified their gender as "other" and 78 participants (8.1%) did not report their gender, and thus were excluded from the analyses. The college men and women models presented different results, and thus the gender-specific models are reported.

Study 2 Results

Sample information is presented in Table 2. The descriptive results and Spearman's correlations are reported in Table 4. The correlations suggested that social media use, pro-marijuana messages, and sex-related marijuana expectancies were positively associated with college students' intentions to use marijuana, $p < .001$. Social media use, pro-marijuana messages, sex-related marijuana expectancies, and intentions to use marijuana were also positively associated with college students' marijuana use in the past week. The correlations among predictors did not indicate a problem with multicollinearity.

Hypothesis Testing on the Direct Effects

Results from the regression analysis suggested that social media use, pro-marijuana messages, and sex-related marijuana expectancies along with the covariate variables accounted for 13% of the variance in college women's intentions to use marijuana ($F(5, 497) = 15.13, p < .001$), and 15% of the variance in college men's intentions to use marijuana ($F(5, 349) = 12.08, p < .001$); social media use, pro-marijuana messages, sex-related marijuana expectancies, and intentions to use marijuana along with the covariate variables accounted for 34% of the variance in college women's marijuana use in the past week ($F(6, 496) = 45.57, p < .001$), and 33% of the variance in college men's marijuana use in the past week ($F(6, 348) = 28.20, p < .001$).

The results suggested that men and women differed mainly on the effects of pro-marijuana messages and sex-related marijuana expectancies on their marijuana use. For women, exposure to pro-marijuana messages was significantly associated with marijuana use ($\beta = .09, p = .02$), but sex-related marijuana expectancies were not. For men, sex-related marijuana expectancies were significantly associated with marijuana use ($\beta = -.13, p < .001$), but exposure to pro-marijuana messages was not (See Figures 3 and 4).

H1 predicted that social media use would be positively associated with a) intentions to use marijuana and b) marijuana use, and only H1a was supported by the results. Based on the regression analysis results, social media use was positively associated with college women's intentions ($\beta = .26, p < .001$) and college men's intentions ($\beta = .28, p < .001$) to use marijuana after accounting for other variables in the model. However, social media use was not directly associated with college women's and men's marijuana use.

H2 predicted that exposure to pro-marijuana messages would be positively associated with a) intentions to use marijuana and b) marijuana use; H2a was supported by the results,

Table 4. Descriptives and Spearman's correlations among key variables for college students.

	Female		Male		1	2	3	4	5	6
	M	SD	M	SD						
(1) Marijuana use	2.75	2.60	2.88	2.60	–	.65***	.16***	.27***	.24***	–.10*
(2) Intention to use	2.91	1.19	3.02	1.13	.69***	–	.13**	.30***	.26***	.01
(3) Age	21.05	4.53	21.52	4.34	.13***	.19***	–	–.10*	–.08	–.17***
(4) Social media use	3.83^a	.81	3.53^a	.93	.24***	.26***	–.03	–	.28***	–.01
(5) Pro-marijuana message	3.16^b	1.18	2.92^b	1.20	.22***	.25***	–.01	.23***	–	.09
(6) Sex-related marijuana expectancy	3.07	.66	3.10	.57	.03	.11*	–.12**	.06	.17***	–

Correlations for college women are presented below the diagonal, and correlations for college men are presented above the diagonal. ^a and ^b Independent t-tests were conducted to test gender differences in the variables, and these two variables showed a significant gender difference. * $p < .05$, ** $p < .01$, *** $p < .001$.

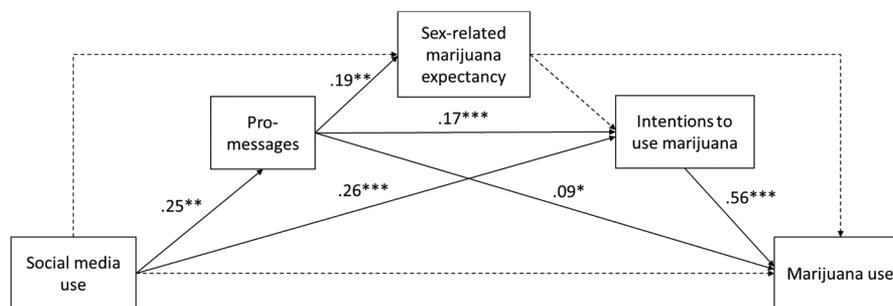


Figure 3. Mediation model predicting **female college students'** marijuana use. Standardized coefficients are reported. Dotted lines represent non-significant paths. Significant indirect paths: social media – pro-marijuana messages – marijuana use; social media – intentions – marijuana use; social media – pro-marijuana message – intentions – marijuana use. * $p = .02$, ** $p < .01$, *** $p < .001$

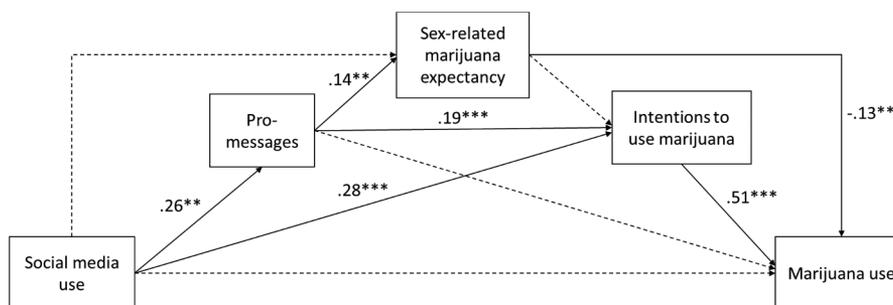


Figure 4. Mediation model predicting **male college students'** marijuana use. Standardized coefficients are reported. Dotted lines represent non-significant paths. Significant indirect paths: social media – intentions – marijuana use; social media – pro-marijuana message – intentions – marijuana use. ** $p < .01$, *** $p < .001$

while H2b was partially supported by the results. Exposure to pro-marijuana messages was positively associated with both women's ($\beta = .17$, $p < .001$) and men's intentions to use marijuana ($\beta = .19$, $p < .001$), after accounting for other variables in the model. On the other hand, exposure to pro-marijuana messages was positively associated with women's ($\beta = .09$, $p = .02$), but not with men's use in the past week.

H3 predicted that sex-related marijuana expectancies would be positively associated with intentions to use marijuana and actual marijuana use, and was partially supported by the results. The regression analysis results suggested that sex-related marijuana expectancies were not associated with college men or women's intentions to use marijuana, and so H3a was not supported. Sex-related marijuana expectancies were negatively associated with men's marijuana use ($\beta = -.13$, $p = .004$) but were not associated with women's use, and so H3b was also not supported.

H4 predicted that intentions to use marijuana would be positively associated with marijuana use. H4 was supported by the regression analysis results, which suggested that intentions to use marijuana was positively associated with women's marijuana use ($\beta = .56$, $p < .001$) as well as with men's use ($\beta = .51$, $p < .001$), after accounting for other variables in the model.

Mediation Effects

H5 predicted that the relationship between social media use and marijuana use would be mediated by exposure to pro-marijuana messages, sex-related marijuana expectancies, intentions to use marijuana, and the combination of these variables, and this hypothesis was partially supported. The mediation tests

suggested that, for college women, the relationship between social media use and marijuana use was mediated by pro-marijuana message exposure ($\beta = .02$, 95% CI [.004, .044]), intentions to use marijuana ($\beta = .14$, 95% CI [.095, .190]), as well as the combination of pro-marijuana messages and intentions to use marijuana ($\beta = .02$, 95% CI [.010, .039]). However, sex-related marijuana expectancies and its combinations with other mediators did not mediate the relationship between social media use and marijuana use. The significant indirect paths for college women are presented in the Figure 3 Note.

For college men, the mediation tests suggested that the relationship between social media use and marijuana use was mediated by intentions to use marijuana ($\beta = .14$, 95% CI [.091, .198]), as well as by the combination of pro-marijuana messages and intentions to use marijuana ($\beta = .03$, 95% CI [.009, .043]). However, sex-related marijuana expectancies and its combinations with other mediators did not mediate the relationship between social media use and marijuana use. The significant indirect paths for college men are presented in the Figure 4 Note.

Study 2 Discussion

In this study, we extended the research by focusing on college students, who are either legally able to now purchase recreational marijuana in Washington state (if 21 and older) or close to being able to do so, and included the outcome of frequency of marijuana use in the past week. We found that our models accounted for 34% of women's, and 33% of men's, marijuana use. For both men and women, intentions to use were highly associated with frequency of use. This supports previous

research that has found intentions to use marijuana to be strongly associated with and/or predictive of later marijuana use (Malmberg et al., 2012; Yzer et al., 2004).

Our research highlights that there may be differences by gender in terms of the pathways through which social media may influence marijuana use. For women, exposure to pro-marijuana content on marijuana use and relationship facilitation was positively associated with intentions to use and frequency of marijuana use. However, for men, the relationship between pro-marijuana content was mediated by intentions, and there was not a direct effect on marijuana use. This could, in part, highlight the lack of constructs in the model that more fully predict men's marijuana use, showing that while media may be influential among men, more internalized beliefs, attitudes, and alternative constructs are impacting use of marijuana. The finding that sex-related marijuana expectancies were negatively associated with use is somewhat baffling, as the relationship is in the opposite direction of what one might hypothesize and is indeed inconsistent with previous research (Currin et al., 2018).

Overall Discussion

We used two surveys (one with adolescents and the other with a state-wide sample of college students) to examine the relationships between social media use, exposure to pro-marijuana content on marijuana use and relationship facilitation, sex-related marijuana expectancies, and intentions to use marijuana. Our findings shed light on the relationships between social media use and exposure to pro-marijuana content, and how this content exposure is associated with intentions of behaviors. However, there were differences based on gender and age. We will first discuss the implications related to social media use and pro-marijuana content exposure and then discuss the complex findings related to sex-related marijuana expectancies.

When recreational marijuana was legalized in Washington state, the state's Liquor and Cannabis Board assumed the regulation of advertising for marijuana and associated products. Although the WSLCB has continued to refine its policies and recommendations for marijuana advertising, its rules about social media marijuana advertising primarily lay out expectations that advertisers should avoid appealing to youth. The current study suggests that Washington state youths' and young adults' attendance to social media is significantly associated with viewing pro-marijuana content on social media, and specifically content that portrays marijuana use and its connection to relationships. The presence of sexual and relationship appeals in marijuana messaging may not be surprising given that marijuana advertisers are trying to sell a product to consumers, but they are disconcerting since previous research has shown that adolescents may struggle with processing substance use messages (Scull et al., 2010).

In fact, a wealth of literature has focused on the potential negative effects of youths' exposure to alcohol advertisements that link consumption of alcohol to sexual portrayals (e.g., Hust et al., 2019; Rodgers et al., 2019), and the current results suggest this research should expand to include the effects of youth's exposure to marijuana ads that use similar appeals. Our

results also suggest adolescents' exposure to pro-marijuana messaging is associated with increased intentions to use the drug. This finding suggests that states that have legalized recreational marijuana may benefit from further refining their marijuana advertising policies, especially those focused on social media, to prevent underage marijuana use.

Further, due to the solitary viewing nature of social media, it's likely that youth are attending to these messages on their own, without guidance or mediation from their parents or guardians. This has implications for education programs aimed at improving parent-teen communication around media. This is especially true given that pro-marijuana content may come from sources other than advertisements that teens also need to interpret (Cavazos-Rehg et al., 2015; Willoughby et al., 2020). There is likely a need to equip adolescents with media literacy skills so that they can better critique pro-marijuana messaging to which they are exposed.

Our study of college students found a similar pattern between social media use and exposure to pro-marijuana messaging. Like their younger counterparts, college students who attended more frequently to social media were also more likely to see pro-marijuana messaging. This exposure to pro-marijuana messages was associated with college men's and women's intentions to use marijuana, which was subsequently associated with their use of the drug. Among college women, exposure to pro-marijuana content was directly associated with their decisions to use marijuana, which was not the case for college men. This suggests college aged women in our sample responded more favorably or that pro-marijuana content resonated differently with them than their male counterparts. Our findings on social media exposure and marijuana use also have some similarities to research conducted on social media exposure and alcohol, which have also found gender differences. In a longitudinal study, Boyle et al. (2016) found, among college students, that exposure to alcohol-related content on social media during the first six weeks of the semester predicted alcohol consumption six months later. There were gender differences such that men's social media exposure to drinking was only partially explained by variables such as norms, motives and beliefs, although they were predictive of alcohol consumption. The authors concluded that there were likely additional variables not identified in the study that may contribute uniquely to men's social media experiences and alcohol consumption. Much more research is needed to better understand gender differences in the processing and effects of exposure to marijuana messaging.

Although much research on the effects of substance use advertising has focused on its potential effects on adolescents, our results suggest there is a need to continue to focus on young adults as well. The effects of such marijuana-related social media content should also be considered in relation to the problematic effects marijuana can have on the developing brain (Jacobus et al., 2019). Recent and frequent marijuana use, especially if the age of first use is in early adolescence, results in lower attention, poor emotional functioning, and poor memory performance (Jacobus et al., 2019).

One limitation to our study among adolescents was its focus on intentions to use marijuana rather than use of the actual drug. The results of Study 2, however, suggested intentions to

use marijuana were positively associated with the use of the drug for both college-aged men and women. Our findings support other research that found intentions to use marijuana were associated with use of the drug (Malmberg et al., 2012; Skenderian et al., 2008; Yzer et al., 2004). This has implications for how we conduct research about marijuana use among underage participants. It is illegal for minors to use marijuana, therefore asking them about marijuana use may increase the risks they face when participating in research. The current findings, in addition to previous research, suggest that asking them about intentions may, in some cases, suffice.

Frequent exposure to pro-marijuana messaging on marijuana use and relationship facilitation was associated with girls' and college women's higher sex-related expectancies, although these expectancies were not associated with either their intentions to use or their use of marijuana. Essentially, for women, believing that marijuana facilitates sexual activity did not translate into their use of the drug, contrary to studies that found sex-related drug expectancies were associated with women's increased alcohol use (Pedersen et al., 2009) and marijuana use (Currin et al., 2018). It is possible that women who recognize marijuana facilitates sexual activity also recognize its potential to impede their decision making or increase their vulnerability to sexual coercion or sexual assault due to potential incapacitation.

Research has found that, among college women, 85% of drug-related assaults involved voluntary incapacitation prior to the assault (Lawyer et al., 2010). Women have been found to use protective strategies when engaging in substance use in an effort to avoid sexual assault (Hust & Rodgers, 2018; Palmer et al., 2010). Moreover, the previous studies on sex-related drug expectancy and substance use have largely been conducted prior to some of the recent social movements, such as Me Too, related to women's sexual agency, which could have shifted these relationships. Much more research is needed to further investigate women's perceptions of marijuana's role in facilitating sexual activities and their motivations to use marijuana. Another explanation for these findings, however, could be that the measure we used to examine marijuana use assessed frequency of use, and not situational use or use specific to sexual situations. It is possible that women's sex-related marijuana expectancies are associated with their use of the drug to facilitate sexual activity but not their use of the drug in general. Intentions in our study were also measured generally without specific reference to sexual behavior. Future research could be strengthened by examining situational marijuana use specifically and the outcome of marijuana use to facilitate sexual activity.

In contrast, among boys and men, frequent exposure to pro-marijuana messaging was associated with boys' and college men's higher sex-related expectancies, and this was associated with boys' intentions to use marijuana. Sex and marijuana expectancies were also directly, but negatively, associated with men's use of marijuana. Thus, men's beliefs that marijuana facilitates sexual activity is associated with their decisions to use marijuana. In part, the differences in our findings between boys and men could be explained by developmental differences. As the adolescents in our sample ranged in age from 13–17 years, and 17 is the average age at which young people in the United States are engaging in sexual behaviors

(based on national data from 2015–2017; Centers for Disease Control and Prevention, n.d.), it is possible that our sample of adolescents held perceptions of how marijuana may facilitate sexual activity even though they lacked personal experience with sex more generally. On the other hand, our college student sample was older, and therefore more likely to engage in sexual behaviors. This may mean that previous sexual experience had influenced their thoughts about the connection between marijuana and sex more generally, highlighting for them how this may not be the case. Because of these past sexual experiences, they did not intend to use marijuana to facilitate sexual activity. As we did not ask about sexual behavior, we were unable to control for it in this study, and future research would benefit from such a measure as well as additional outcomes specific to the use of marijuana to facilitate sexual activity instead of marijuana use more generally. Additionally, there may be other variables not accounted for in the study that could help to further explain the negative relationship between sex-related marijuana expectancies among college men and the negative association with marijuana use.

Limitations and Future Directions

This study was not without limitations. The data for both studies were cross-sectional, which limits the resulting findings to association and does not allow for conclusions about causation. Future research could benefit from longitudinal or experimental designs that allow for causation to be examined, or from more time-specific measures or the use of ecological momentary assessment or daily diaries that allow for more recent recollections of the messages to which participants were exposed and their resulting effects. Additionally, both data sets relied on convenience samples, either recruited by an online survey panel or from one university. For the online panel of adolescents, age data were collected based on self-report and adolescents were recruited by first contacting a parent. This may be problematic as parents who are willing to have their children participate in such research may differ from parents who would decline, therefore making the sample less generalizable than other recruitment methods. Future research could benefit from stronger and more generalizable samples.

Some specific measures could also be strengthened in this study. It is difficult to survey adolescents about illegal activities as it exposes this vulnerable population to significant risks. The survey management company through which we contracted for adolescent data (i.e., Qualtrics) wanted to avoid increasing the potential risks to adolescent participants and therefore we could not assess adolescents' marijuana use. Further, we only assessed one aspect of use in the college sample. Relatedly, we assessed marijuana use frequency using only data from participants' self-reported use in the past week. This approach limits the results by not considering more holistic measures, such as the amount of marijuana used at any one time. Future research could focus on a more comprehensive way of measuring frequency of marijuana use. Additionally, although we assessed participants' social media consumption across different platforms, the social media variables may not perfectly capture young people's social media use habits since we did not

measure the exact time and use pattern. We chose to focus on the most popular platforms used by participants in our sample and in our age range; however, this means that we did not differentiate effects between heavy users on specific platforms. Future work may benefit from focusing on specific platforms or platform types. The pro-marijuana content exposure variable assessed positive perceptions of use and relationship facilitation in social media, which, while relevant to our study, could also be broadened and may differ from more objective assessments of the content presented in posts. Previous research related to alcohol has found that trained coders may interpret content differently from message consumers (Austin et al., 2007). We were primarily interested in perceptions as we believe that such interpretations may impact outcomes; however, additional research may want to consider more objective measurement of items presented in social media and their effects. Lastly, in terms of measurement, we adapted the sex-related marijuana expectancy items from previous work (Currin et al., 2018), which had been based on previous items from alcohol among adolescents and a general adult population (Dermen & Cooper, 1994; Leigh, 1990). Future work should look to further develop and validate such a scale across various populations.

A relevant future step would be to conduct similar research among young people with the outcome of using marijuana prior to sex. In a review of the literature, George (2019) asserted that alcohol can increase sexual risk taking by motivating participants toward sexual gratification, and that research has identified mediating and moderating influences on the effects of alcohol such as alcohol expectancies, which can serve as potential intervention targets. As marijuana may actively be advertised using sexual appeals, it may be worthwhile to examine the connections between exposure to such content and engagement in using marijuana prior to sex, especially as such behaviors have been found to be taking place (e.g., Palamar et al., 2018; Walsh et al., 2014). Additionally, as media messages may include portrayals of marijuana use associated with sexual activities (e.g., Cavazos-Rehg et al., 2015), the behaviors being modeled may map more clearly on to the outcome of using marijuana prior to sex than marijuana use more generally.

Conclusion

Through two studies, we investigated the role of social media use, exposure to pro-marijuana content on marijuana use and relationship facilitation, sex-related marijuana expectancies, and outcomes, including intentions to use marijuana among adolescents and intentions and use among college students in Washington state-wide samples. As Washington legalized recreational marijuana in 2012, adolescents and young adults have been exposed to advertising and messaging pertinent to marijuana. Our research has implications for policymakers and health communicators.

As the specific pro-marijuana content to which people are exposed on social media was associated with intentions to use, and in our college sample we found intentions associated with use of marijuana, it makes sense to limit exposure to pro-marijuana content among adolescents to the extent possible. However, regulating advertising will only address some of the

pro-marijuana messaging adolescents see, as much of the content on social media related to marijuana is user generated and not specific to advertisements (e.g., Cavazos-Rehg et al., 2016). This suggests a need to improve adolescents' abilities to critique and critically evaluate such pro-marijuana content through media literacy training. Additionally, health communicators may want to create messaging that highlights the risks of using marijuana to try to combat some of the pro-marijuana messaging out there. Finally, the findings from the current study provide a rationale for future research into the relationships between pro-marijuana media messages, sex-related marijuana expectancies, and marijuana use.

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References

- Austin, E. W., Pinkleton, B. E., Hust, S. J., & Miller, A. C. R. (2007). The locus of message meaning: Differences between trained coders and untrained message recipients in the analysis of alcoholic beverage advertising. *Communication Methods and Measures*, 1(2), 91–111. <https://doi.org/10.1080/19312450701399354>
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bandura, A. (2001). Social cognitive theory of mass communication. *Media Psychology*, 3(3), 265–299. https://doi.org/10.1207/S1532785XMEP0303_03
- Beullens, K., & Schepers, A. (2013). Display of alcohol use on Facebook: A content analysis. *Cyberpsychology, Behavior and Social Networking*, 16(7), 497–503. <https://doi.org/10.1089/cyber.2013.0044>
- Bowleg, L., Burkholder, G. J., Noar, S. M., Teti, M., Malebranche, D. J., & Tschann, J. M. (2015). Sexual scripts and sexual risk behaviors among Black heterosexual men: Development of the Sexual Scripts Scale. *Archives of Sexual Behavior*, 44(3), 639–654. <https://doi.org/10.1007/s10508-013-0193-y>
- Boyle, S. C., LaBrie, J. W., Froidevaux, N. M., & Witkovic, Y. D. (2016). Different digital paths to the keg? How exposure to peers' alcohol-related social media content influences drinking among male and female first-year college students. *Addictive Behaviors*, 57, 21–29. <https://doi.org/10.1016/j.addbeh.2016.01.011>
- Cabrera-Nguyen, E. P., Cavazos-Rehg, P., Krauss, M., Bierut, L. J., & Moreno, M. A. (2016). Young adults' exposure to alcohol- and marijuana-related content on Twitter. *Journal of Studies on Alcohol and Drugs*, 77(2), 349–353. <https://doi.org/10.15288/jsad.2016.77.349>
- Cavazos-Rehg, P. A., Krauss, M., Fisher, S. L., Salyer, P., Grucza, R. A., & Bierut, L. J. (2015). Twitter chatter about marijuana. *Journal of Adolescent Health*, 56(2), 139–145. <https://doi.org/10.1016/j.jadohealth.2014.10.270>
- Cavazos-Rehg, P. A., Krauss, M. J., Sowles, S. J., & Bierut, L. J. (2016). Marijuana-related posts on Instagram. *Prevention Science*, 17(6), 710–720. <https://doi.org/10.1007/s11121-016-0669-9>
- Centers for Disease Control and Prevention. (n.d.). *NSFG - Listing S - Key statistics from the national survey of family growth*. https://www.cdc.gov/nchs/nsfg/key_statistics/s.htm#vaginalsexual
- Chen, P., & Jacobson, K. C. (2012). Developmental trajectories of substance use from early adolescence to young adulthood: Gender and racial/ethnic differences. *Journal of Adolescent Health*, 50(2), 154–163. <https://doi.org/10.1016/j.jadohealth.2011.05.013>

- Cranwell, J., Britton, J., & Bains, M. (2017). "F*ck it! Let's get to drinking—poison our livers!": A thematic analysis of alcohol content in contemporary YouTube music videos. *International Journal of Behavioral Medicine*, 24(1), 66–76. <https://doi.org/10.1007/s12529-016-9578-3>
- Currin, J. M., Croff, J. M., & Hubach, R. D. (2018). Baked sex: The exploration of sex-related drug expectancies of marijuana users. *Sexuality Research and Social Policy*, 15(3), 378–386. <https://doi.org/10.1007/s13178-017-0281-1>
- Cuttler, C., & Spradlin, A. (2017). Measuring cannabis consumption: Psychometric properties of the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU). *PLOS ONE*, 12(5), e0178194. <https://doi.org/10.1371/journal.pone.0178194>
- Daniuliatyte, R., Lamy, F. R., Barratt, M., Nahhas, R. W., Martins, S. S., Boyer, E. W., Sheth, A., & Carlson, R. G. (2017). Characterizing marijuana concentrate users: A web-based survey. *Drug and Alcohol Dependence*, 178, 399–407. <https://doi.org/10.1016/j.drugalcdep.2017.05.034>
- Dermen, K. H., & Cooper, M. L. (1994). Sex-related alcohol expectancies among adolescents: II. Prediction of drinking in social and sexual situations. *Psychology of Addictive Behaviors*, 8(3), 161–168. <https://doi.org/10.1037/0893-164X.8.3.161>
- Dermen, K. H., Cooper, M. L., & Agocha, V. B. (1998). Sex-related alcohol expectancies as moderators of the relationship between alcohol use and risky sex in adolescents. *Journal of Studies on Alcohol*, 59(1), 71–77. <https://doi.org/10.15288/jsa.1998.59.71>
- Distilled Spirits Council of the United States. (n.d.). *Code of responsible practices for beverage alcohol advertising and marketing*. <https://www.distilledspirits.org/code-of-responsible-practices/>
- Duberman, A. (2018, February 23). Here's what it means to be a 'Cannasexual'. *Huffpost*. https://www.huffpost.com/entry/cannasexual-ashley-manta_n_5a8f2458e4b00804dfe6b336
- El-Menshawi, M., Castro, G., de la Vega, P. R., Peláez, J. G. R., & Barengo, N. C. (2019). First time cannabis use and sexual debut in U.S. high school adolescents. *Journal of Adolescent Health*, 64(2), 194–200. <https://doi.org/10.1016/j.jadohealth.2018.08.018>
- Fardouly, J., Diedrichs, P. C., Vartanian, L. R., & Halliwell, E. (2015). Social comparisons on social media: The impact of Facebook on young women's body image concerns and mood. *Body Image*, 13, 38–45. <https://doi.org/10.1016/j.bodyim.2014.12.002>
- Gálvez-Buccollini, J. A., Paz-Soldán, V. A., Herrera, P. M., DeLea, S., & Gilman, R. H. (2009). Gender differences in sex-related alcohol expectancies in young adults from a peri-urban area in Lima, Peru. *Revista Panamericana de Salud Pública*, 25(6), 499–505. <https://doi.org/10.1590/S1020-49892009000600005>
- George, W. H. (2019). Alcohol and sexual health behavior: "What we know and how we know it". *Journal of Sex Research*, 56(4–5), 409–424. <https://doi.org/10.1080/00224499.2019.1588213>
- Hamilton, J. (2020, March 11). 8 sex positions that pair reaaally well with weed. *Cosmopolitan*. <https://www.cosmopolitan.com/sex-love/positions/g26810746/weed-sex-positions/>
- Hendershot, C. S., Magnan, R. E., & Bryan, A. D. (2010). Associations of marijuana use and sex-related marijuana expectancies with HIV/STD risk behavior in high-risk adolescents. *Psychology of Addictive Behaviors*, 24(3), 404–414. <https://doi.org/10.1037/a0019844>
- Hohman, Z. P., Crano, W. D., Siegel, J. T., & Alvaro, E. M. (2014). Attitude ambivalence, friend norms, and adolescent drug use. *Prevention Science*, 15(1), 65–74. <https://doi.org/10.1007/s11121-013-0368-8>
- Hust, S. J. T., Marett, E. G., Ren, C., Adams, P. M., Willoughby, J. F., Lei, M., Ran, W., & Norman, C. (2014). Establishing and adhering to sexual consent: The association between reading magazines and college students' sexual consent negotiation. *Journal of Sex Research*, 51(3), 280–290. <https://doi.org/10.1080/00224499.2012.727914>
- Hust, S. J. T., & Rodgers, K. B. (2018). *Scripting adolescent romance*. Peter Lang. <https://doi.org/10.3726/b13316>
- Hust, S. J. T., Rodgers, K. B., & Bayly, B. (2017). Scripting sexual consent: Internalized traditional sexual scripts and sexual consent expectancies among college students: Scripting sexual consent. *Family Relations*, 66(1), 197–210. <https://doi.org/10.1111/fare.12230>
- Hust, S. J. T., Rodgers, K. B., Cameron, N., & Li, J. (2019). Viewers' perceptions of objectified images of women in alcohol advertisements and their intentions to intervene in alcohol-facilitated sexual assault situations. *Journal of Health Communication*, 24(3), 328–338. <https://doi.org/10.1080/10810730.2019.1604911>
- Jacobus, J., Courtney, K. E., Hodgdon, E. A., & Baca, R. (2019). Cannabis and the developing brain: What does the evidence say? *Birth Defects Research*, 111(17), 1302–1307. <https://doi.org/10.1002/bdr2.1572>
- Krauss, M. J., Grucza, R. A., Bierut, L. J., & Cavazos-Rehg, P. A. (2017). "Get drunk. Smoke weed. Have fun.": A content analysis of tweets about marijuana and alcohol. *American Journal of Health Promotion*, 31(3), 200–208. <https://doi.org/10.4278/ajhp.150205-QUAL-708>
- Krauss, M. J., Sowles, S. J., Mylvaganam, S., Zewdie, K., Bierut, L. J., & Cavazos-Rehg, P. A. (2015, October 1). Displays of dabbing marijuana extracts on YouTube. *Drug and Alcohol Dependence*, 155, 45–51. <https://doi.org/10.1016/j.drugalcdep.2015.08.020>
- Krauss, M. J., Sowles, S. J., Sehi, A., Spitznagel, E. L., Berg, C. J., Bierut, L. J., & Cavazos-Rehg, P. A. (2017, May 1). Marijuana advertising exposure among current marijuana users in the U.S. *Drug and Alcohol Dependence*, 174, 192–200. <https://doi.org/10.1016/j.drugalcdep.2017.01.017>
- Lawyer, S., Resnick, H., Bakanic, V., Burkett, T., & Kilpatrick, D. (2010). Forcible, drug-facilitated, and incapacitated rape and sexual assault among undergraduate women. *Journal of American College Health*, 58(5), 453–460. <https://doi.org/10.1080/07448480903540515>
- Leigh, B. C. (1990). The relationship of sex-related alcohol expectancies to alcohol consumption and sexual behavior. *Addiction*, 85(7), 919–928. <https://doi.org/10.1111/j.1360-0443.1990.tb03722.x>
- Malmberg, M., Overbeek, G., Vermulst, A. A., Monshouwer, K., Vollebergh, W. A. M., & Engels, R. C. (2012). The theory of planned behavior: Precursors of marijuana use in early adolescence?. *Drug and Alcohol Dependence*, 123(1–3), 22–28. <https://doi.org/10.1016/j.drugalcdep.2011.10.011>
- Moreno, M. A., Arseniev-Koehler, A., Litt, D., & Christakis, D. (2016). Evaluating college students' displayed alcohol references on Facebook and Twitter. *Journal of Adolescent Health*, 58(5), 527–532. <https://doi.org/10.1016/j.jadohealth.2016.01.005>
- Moreno, M. A., & Whitehill, J. M. (2014). Influence of social media on alcohol use in adolescents and young adults. *Alcohol Research: Current Reviews*, 36(1), 91–100. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4432862/#_ffn_sectitle
- Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done?. *Assessment & Evaluation in Higher Education*, 33(3), 301–314. <https://doi.org/10.1080/02602930701293231>
- Palamar, J. J., Acosta, P., Ompad, D. C., & Friedman, S. R. (2018). A qualitative investigation comparing psychosocial and physical sexual experiences related to alcohol and marijuana use among adults. *Archives of Sexual Behavior*, 47(3), 757–770. <https://doi.org/10.1007/s10508-016-0782-7>
- Palmer, R. S., McMahon, T. J., Rounsaville, B. J., & Ball, S. A. (2010). Coercive sexual experiences, protective behavioral strategies, alcohol expectancies and consumption among male and female college students. *Journal of Interpersonal Violence*, 25(9), 1563–1578. <https://doi.org/10.1177/0886260509354581>
- Pedersen, E. R., Lee, C. M., Larimer, M. E., & Neighbors, C. (2009). Gender and dating relationship status moderate the association between alcohol use and sex-related alcohol expectancies. *Addictive Behaviors*, 34(9), 786–789. <https://doi.org/10.1016/j.addbeh.2009.04.015>
- Pew Research Center. (2018). *Teens, social media, & technology 2018*. <https://www.pewinternet.org/2018/05/31/teens-social-media-technology-2018/>
- Pew Research Center. (2019, June 12). *Demographics of social media users and adoption in the United States*. <https://www.pewinternet.org/fact-sheet/social-media/>
- Ramo, D. E., Delucchi, K. L., Liu, H., Hall, S. M., & Prochaska, J. J. (2014). Young adults who smoke cigarettes and marijuana: Analysis of thoughts and behaviors. *Addictive Behaviors*, 39(1), 77–84. <https://doi.org/10.1016/j.addbeh.2013.08.035>
- Rhoades, E., & Jernigan, D. H. (2013). Risky messages in alcohol advertising, 2003–2007: Results from content analysis. *Journal of Adolescent Health*, 52(1), 116–121. <https://doi.org/10.1016/j.jadohealth.2012.04.013>

- Rodgers, K. B., Hust, S. J. T., Willoughby, J. F., Wheeler, J., & Li, J. (2019). Adolescents' sex-related alcohol expectancies and alcohol advertisements in magazines: The role of wishful identification, realism, and beliefs about women's enjoyment of sexualization. *Journal of Health Communication, 24*(4), 395–404. <https://doi.org/10.1080/10810730.2019.1630523>
- Salas-Wright, C. P., Vaughn, M. G., Todic, J., Córdova, D., & Perron, B. E. (2015). Trends in the disapproval and use of marijuana among adolescents and young adults in the United States: 2002–2013. *The American Journal of Drug and Alcohol Abuse, 41*(5), 392–404. <https://doi.org/10.3109/00952990.2015.1049493>
- Schepis, T. S., Desai, R. A., Cavallo, D. A., Smith, A. E., McFetridge, A., Liss, T. B., Potenza, M. N., & Krishnan-Sarin, S. (2011). Gender differences in adolescent marijuana use and associated psychosocial characteristics. *Journal of Addiction Medicine, 5*(1), 65–73. <https://doi.org/10.1097/ADM.0b013e3181d8dc62>
- Schulenberg, J. E., Merline, A. C., Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Laetz, V. B. (2005). Trajectories of marijuana use during the transition to adulthood: The big picture based on national panel data. *Journal of Drug Issues, 35*(2), 255–280. <https://doi.org/10.1177/002204260503500203>
- Scull, T. M., Kupersmidt, J. B., Parker, A. E., Elmore, K. C., & Benson, J. W. (2010). Adolescents' media-related cognitions and substance use in the context of parental and peer influences. *Journal of Youth and Adolescence, 39*(9), 981–998. <https://doi.org/10.1007/s10964-009-9455-3>
- Seabrook, R. C., Ward, L. M., Cortina, L. M., Giacardi, S., & Lippman, J. R. (2017). Girl power or powerless girl? Television, sexual scripts, and sexual agency in sexually active young women. *Psychology of Women Quarterly, 41*(2), 240–253. <https://doi.org/10.1177/0361684316677028>
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and non-experimental studies: New procedures and recommendations. *Psychological Methods, 7*(4), 422–445. <https://doi.org/10.1037/1082-989X.7.4.422>
- Simon, W., & Gagnon, J. H. (1986). Sexual scripts: Permanence and change. *Archives of Sexual Behavior, 15*(2), 97–120. <https://doi.org/10.1007/BF01542219>
- Skenderian, J. J., Siegel, J. T., Crano, W. D., Alvaro, E. E., & Lac, A. (2008). Expectancy change and adolescents' intentions to use marijuana. *Psychology of Addictive Behaviors, 22*(4), 563–569. <https://doi.org/10.1037/a0013020>
- Thompson, L., Rivara, F. P., & Whitehill, J. M. (2015). Prevalence of marijuana-related traffic on Twitter, 2012–2013: A content analysis. *Cyberpsychology, Behavior and Social Networking, 18*(6), 311–319. <https://doi.org/10.1089/cyber.2014.0620>
- Walsh, J. L., Fielder, R. L., Carey, K. B., & Carey, M. P. (2014). Do alcohol and marijuana use decrease the probability of condom use for college women? *Journal of Sex Research, 51*(2), 145–158. <https://doi.org/10.1080/00224499.2013.821442>
- Ward, L. (2003). Understanding the role of entertainment media in the sexual socialization of American youth: A review of empirical research. *Developmental Review, 23*(3), 347–388. [https://doi.org/10.1016/S0273-2297\(03\)00013-3](https://doi.org/10.1016/S0273-2297(03)00013-3)
- Washington State Liquor and Cannabis Board. (n.d.). *Know the law*. <https://lcb.wa.gov/mj-education/know-the-law>
- Willoughby, J. F., Hust, S. J. T., Li, J., Couto, L., Kang, S., & Domgaard, S. (2020). An exploratory study of adolescents' social media sharing of marijuana-related content. *Cyberpsychology, Behavior and Social Networking, OnlineFirst, 23*(9), 642–646. <https://doi.org/10.1089/cyber.2019.0721>
- Yenisey, Z. (2018, September 10). Marijuana leads to better and more frequent sex, according to science. *Maxim*. Biglari Holdings. <https://www.maxim.com/news/weed-makes-sex-better-2018-9>
- Yzer, M. C., Cappella, J. N., Fishbein, M., Hornik, R., Sayeed, S., & Ahern, R. K. (2004). The role of distal variables in behavior change: Effects of adolescents' risk for marijuana use on intention to use marijuana. *Journal of Applied Social Psychology, 34*(6), 1229–1250. <https://doi.org/10.1111/j.1559-1816.2004.tb02005.x>