Young Adults' Exposure to Alcohol- and Marijuana-Related Content on Twitter

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ABSTRACT. Objective: Twitter is among the most popular social media platforms used by young adults, yet it has been underutilized in substance use research compared with older platforms (e.g., MySpace and Facebook). We took a first step toward studying the associations between exposure to pro–alcohol- and marijuana-related content among young adults via Twitter and current heavy episodic drinking and current marijuana use, respectively. **Method:** We conducted an online survey of 587 (254 men, 333 women) Twitter users between ages 18 and 25 years in February 2014 using an online survey system that has been previously used in research on health behaviors and attitudes. **Results:** Current heavy episodic drinking was significantly associated with higher levels of exposure to pro-alcohol content. Similarly, current marijuana use was significantly associated with higher levels of exposure to pro-marijuana content. **Conclusions:** Our findings suggest that in-depth research regarding young adults' exposure to pro–alcohol- and marijuana-related content via Twitter may provide a foundation for developing effective prevention messages on this social media platform to counter the pro–alcohol and marijuana messages. (*J. Stud. Alcohol Drugs, 77,* 349–353, 2016)

TWITTER HAS 288 MILLION USERS worldwide (Twitter, 2015) and is one of the most popular social media platforms among young people. Approximately 37% of online adults ages 18–29 use Twitter (Duggan et al., 2015). It is a free-to-use social media platform where users can instantly interact with a mass audience via Tweets (Marwick & Boyd, 2011), which are publicly visible brief messages (≤140 characters) sent from a user's profile ("handle") to a network of "followers" who have chosen to "follow" that particular handle. Twitter differs from platforms like Facebook because it facilitates more active, real-time interactions among users (Fiegerman, 2014).

Twitter has emerged as a resource for and subject of public health research on diverse topics because of its widespread use and readily accessible content (Bosley et al., 2013; Chunara et al., 2012; Conway, 2014; Eke, 2011; Paul & Dredze, 2011; Sznitman et al., 2014). However, it remains underutilized in substance use research—few studies have examined the impact of exposure to substance use–related content via Twitter among young people (Sznitman et al., 2014). Much of the literature on exposure to substance use–related content via social media focuses on MySpace and Facebook (i.e., older social media platforms that were launched in 2003 and 2004, respectively) (Kaplan & Haenlein, 2010).

On Facebook, adults between ages 55 and 64 years are now the fastest growing demographic (Tappin, 2014). Young adults may thus engage in more candid substance use–related interactions on Twitter because there may be less interaction with older adults/parents. Consequently, substance use–related chatter among young people abounds on Twitter, especially regarding alcohol and marijuana (Burton et al., 2013; Cavazos-Rehg et al., 2014, 2015; Dadich et al., 2013; West et al., 2012).

Alcohol and marijuana use by young people is a significant public health problem (Duncan et al., 2015). These substances are among the most frequently used by young adults (Duncan et al., 2015; Haberstick et al., 2014; Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). In 2012, the rate of heavy episodic drinking (i.e., ≥5 drinks on one occasion) in the United States was 39% for young adults ages 18–25 (SAMHSA, 2013). In addition, the rate of current marijuana use for young adults ages 18–25 was approximately 19% in 2012 (SAMHSA, 2013).

This pilot study takes a first step toward understanding how young adults' exposure to pro–alcohol- and marijuana-related content on Twitter relates to current heavy episodic drinking and current marijuana use, respectively. Guided by selective exposure theory (Festinger, 1957; Himelboim et al., 2013; Prado et al., 2008) within a broader marketing framework (Thackeray et al., 2008) consistent with Twitter's distinct attributes, we believe exposure can occur "passively" by viewing peers' pro–substance use Tweets or "actively" via following Twitter handles that encourage substance use behaviors and/or posting one's own pro–substance use Tweets.

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This study makes a unique contribution to the literature in three ways. First, it focuses specifically on how Twitter exposure is associated with alcohol- and marijuana-use behavior among young adults (Sznitman et al., 2014). Second, our definition of exposure as being passive or active distinguishes it from prior studies of exposure to substance use–related content on Twitter and other platforms that conceptualized exposure as being passive. Finally, our study is the first to examine how exposure via Twitter relates to use of an illicit substance (i.e., marijuana) (Sznitman et al., 2014).

Method

Participants

We administered an online survey to participants from SurveyMonkey Audience, a proprietary panel of respondents from the diverse population of more than 30 million people who complete its surveys (Blodorn & O'Brien, 2013; Coleman, 2014; Hughes et al., 2014; Kavanaugh et al., 2013; Pickett et al., 2013; Schoettle & Sivak, 2014; Wiebe et al., 2013). SurveyMonkey regularly conducts benchmarking surveys to ensure Audience members are representative of the U.S. population. Audience members are incentivized with charitable donations and sweepstakes entries for completing surveys. SurveyMonkey has evaluated the quality of Audience member responses by sending the same survey through SurveyMonkey Audience and several other online panel providers. SurveyMonkey Audience's validity rate was 98%, whereas the validity rate among other providers ranged between 76% and 88% (SurveyMonkey Help Center, 2015). We aimed to survey approximately 500–600 young adult Twitter users for this study. SurveyMonkey emailed invitations to 28,060 known social media users between ages 18 and 25, and it took 1,403 responses for us to reach our target recruitment goal ($N = 587$).

All consent procedures were conducted online and were approved by the Washington University Human Research Protection Office. All surveys were completed anonymously. Data were collected in February 2014.

Measures

Participants completed a self-administered survey that assessed current heavy episodic drinking and current marijuana use (our two dependent variables); exposure to pro-alcohol and pro-marijuana content on Twitter, respectively (our focal independent variables); and demographic covariates. Current heavy episodic drinking was defined as having consumed five or more drinks of alcohol in a row within a few hours on at least one day in the past 30 days (yes/no). Current marijuana use was defined as having used marijuana at least once in the past 30 days (yes/no). Demographic covariates included gender, age, race/ethnicity (non-Latino White vs. other), employment status (employed vs. unemployed), and currently enrolled as a student (yes/no).

Exposure level to pro-alcohol content on Twitter was measured via responses to the following items: (a) "In the past year, how many of your friends have Tweeted to share that they like to drink/get drunk, are drinking/drunk, or want to drink/get drunk?" (response options ranged from 0 [*none*] to 3 [*almost all*] and were dichotomized [yes/no] to indicate if the participant had any friends who posted such pro-alcohol Tweets in the past year); (b) "Do you follow any Twitter accounts that encourage heavy drinking/partying?" (yes/no); and (c) "In the past year, approximately how many times have you Tweeted to let others know that you like drinking/getting drunk, you are drinking/drunk, or you want to drink/get drunk?" Response options ranged from 0 (*never*) to 5 (*more than 20 times*) and were dichotomized to indicate if the participant had posted such pro-alcohol Tweets in the past year (yes/no).

Participants were identified as having active exposure to pro-alcohol content if they had Tweeted to let others know they like drinking/getting drunk, are drinking/drunk, or want to drink/get drunk and/or followed accounts that encourage heavy drinking/partying, regardless of whether their friends had posted pro-alcohol Tweets. Participants were classified as having passive exposure to pro-alcohol content if they had friends who posted pro-alcohol Tweets but had not themselves posted pro-alcohol Tweets and did not follow any accounts that encouraged heavy drinking/partying. Finally, participants were classified as having no exposure to pro-alcohol content if they did not have friends who posted pro-alcohol Tweets, did not themselves post pro-alcohol Tweets, and did not follow accounts that encourage heavy drinking/partying.

We measured exposure level to pro-marijuana content on Twitter by examining responses to the following items: (a) "In the past year, how many of your friends have Tweeted about how they like smoking marijuana or getting high?" (response options ranged from 0 [*none*] to 3 [*almost all*] and were dichotomized [yes/no] to indicate if the participant had any friends who posted pro-marijuana Tweets in the past year); (b) "Do you follow any Twitter accounts that encourage smoking marijuana or getting high?" (yes/no); and (c) "In the past year, approximately how many times have you Tweeted to let others know that you like smoking marijuana or getting high?" Response options ranged from 0 (*never*) to 5 (*more than 20 times*) and were dichotomized to indicate if the participant had posted any pro-marijuana Tweets in the past year (yes/no).

Participants were identified as having active exposure to pro-marijuana content if they had Tweeted to let others know they liked smoking marijuana or getting high and/or followed accounts that encourage smoking marijuana or getting high, regardless of whether their friends had posted pro-marijuana Tweets. Participants were classified as having

TABLE 1. Binomial logistic models for heavy episodic drinking and current marijuana use, adjusted for demographic covariates

Variable	*n* (%)	Current heavy episodic drinking[a,e] aOR [95% CI]	Current marijuana use[b,e] aOR [95% CI]
Exposure level to pro-alcohol content[c]			
None	162 (28%)	Ref.	
Passive	192 (34%)	1.92 [1.16, 3.18]**	
Active	217 (38%)	8.63 [5.20, 14.30]***	
Exposure level to pro-marijuana content[d]			
None	288 (54%)		Ref.
Passive	148 (28%)		2.97 [1.54, 5.72]***
Active	100 (19%)		11.86 [6.30, 22.31]***
Gender			
Male	254 (43%)	Ref.	Ref.
Female	333 (57%)	0.73 [0.50, 1.08]	0.87 [0.52, 1.46]
Race			
White (non-Latino)	471 (80%)	Ref.	Ref.
Other	116 (20%)	0.51 [0.31, 0.83]**	1.24 [0.68, 2.24]
Currently employed			
No	182 (31%)	Ref.	Ref.
Yes	405 (69%)	1.32 [0.87, 2.02]	1.50 [0.83, 2.68]
Currently enrolled as a student			
No	215 (37%)	Ref.	Ref.
Yes	372 (63%)	0.87 [0.55, 1.36]	1.34 [0.73, 2.47]
	M (*SD*)		
Age (18–25 years)	21.8 (2.2)	1.08 [0.98, 1.20]	1.09 [0.95, 1.24]

Notes: aOR = adjusted odds ratio; CI = confidence interval; ref. = reference. [a]Defined as having consumed five or more drinks of alcohol in a row within a few hours on at least one day in the past 30 days. Yes = 233 (42%), no = 325 (58%). [b]Defined as having used marijuana at least once in the past 30 days. Yes = 86 (16%), no = 452 (84%). [c]None: Does not have friends who posted pro-alcohol Tweets, has not posted pro-alcohol Tweets, and does not follow accounts that encourage heavy drinking/partying. Passive: Has friends who posted pro-alcohol Tweets but has not himself/herself posted pro-alcohol Tweets and does not follow accounts that encourage heavy drinking/partying. Active: Has Tweeted to let others know he/she likes drinking/getting drunk, is drinking/drunk, or wants to drink/get drunk, and/or follows accounts that encourage heavy drinking/partying, regardless of whether his/her friends had posted pro-alcohol Tweets. [d]None: Does not have friends who posted pro-marijuana Tweets, has not posted pro-marijuana Tweets, and does not follow accounts that encourage smoking marijuana. Passive: Has friends who posted pro-marijuana Tweets but has not himself/herself posted pro-marijuana Tweets and does not follow accounts that encourage smoking marijuana. Active: Has Tweeted that he/she likes smoking marijuana and/or follows accounts that encourage smoking marijuana, regardless of whether his/her friends had posted pro-marijuana Tweets. [e]29 participants missing data for current heavy episodic drinking, 16 participants missing data for exposure level to pro-alcohol content, 49 participants missing data for current marijuana use, 50 participants missing data for exposure level to pro-marijuana content. **$p \leq .01$; ***$p \leq .001$.

passive exposure to pro-marijuana content if they had friends who posted pro-marijuana Tweets but had not themselves posted pro-marijuana Tweets and did not follow any accounts that encouraged smoking marijuana or getting high. Last, participants were classified as having no exposure to pro-marijuana content if they did not have friends who had posted pro-marijuana Tweets, did not themselves post pro-marijuana Tweets, and did not follow accounts that encourage smoking marijuana or getting high.

Statistical analyses

We conducted two multivariable logistic regression models. First, we examined the association between exposure level to pro-alcohol content on Twitter and current heavy episodic drinking. Next, we examined the association between exposure level to pro-marijuana content on Twitter and current marijuana use. Missing data were handled via multiple imputation (Royston, 2004; White et al., 2011). All analyses were conducted using Stata 13/MP (StataCorp LP, College Station, TX).

Results

Respondent characteristics are presented in Table 1. The majority of the sample of Twitter users was female ($n = 333$; 57%) and White ($n = 471$, 80%). Participants' ages ranged from 18 to 25 years ($M = 21.8$, $SD = 2.2$). Approximately 42% ($n = 233$) of the participants reported current heavy episodic drinking, and 16% ($n = 86$) reported current mari-

juana use. Moreover, our measure of exposure to pro-alcohol content via Twitter classified participants as follows: Approximately 38% (n = 217) were identified as having active exposure, 34% (n = 192) were identified as having passive exposure, and 28% (n = 162) were identified as having no exposure to pro-alcohol content. Likewise, our measure of exposure to pro-marijuana content via Twitter classified participants as follows: Nineteen percent (n = 100) were identified as having active exposure, 28% (n = 148) were identified as having passive exposure, and 54% (n = 288) were identified as having no exposure to pro-marijuana content.

Results from both multivariable logistic models are shown in Table 1. In the first model, the odds of current heavy episodic drinking were nearly two times (aOR = 1.92, 95% CI [1.16, 3.18]) greater for participants with passive exposure to pro-alcohol content via Twitter compared with participants with no exposure. Further, the odds of being a current heavy episodic drinker were nearly nine times greater (aOR = 8.63, 95% CI [5.20, 14.30]) for participants with active exposure to pro-alcohol content compared with participants with no exposure to pro-alcohol content.

In the second model, the odds of being a current marijuana user were almost three times greater (aOR = 2.97, 95% CI [1.54, 5.72]) for participants with passive exposure to pro-marijuana content via Twitter compared with participants with no exposure. Finally, the odds of being a current marijuana user were substantially higher among participants with active exposure to pro-marijuana content compared with those with no exposure (aOR = 11.86, 95% CI [6.30, 22.31]).

Discussion

To the best of our knowledge, our study is the first to (a) use selective exposure theory within a marketing framework (i.e., "passive" and "active" exposure) to examine associations between exposure to pro–alcohol- and marijuana-related content via Twitter and current substance use behaviors among young adults, and (b) examine the association between exposure level via Twitter and current use behavior among young adults vis-à-vis an illicit substance (i.e., marijuana). Specifically, we found that greater exposure to pro–alcohol- and marijuana-use content was significantly associated with greater likelihood of current heavy episodic drinking and current marijuana use, respectively. These results are consistent with prior studies using other platforms, which found associations between substance use–related exposure and substance use behaviors (Brockman et al., 2012; Moreno & Whitehill, 2012; Moreno et al., 2009).

This pilot study has several limitations. First, the cross-sectional design precludes making causal inferences. Second, our study relied on participant self-report versus data obtained via available online information regarding participants' activities. Third, our purposive sampling approach limits the generalizability of our findings. Fourth, we did not consider exposure to pro–alcohol and marijuana content via other social media (e.g., Facebook, YouTube) and traditional media outlets (e.g., television, magazines) in our analysis. More comprehensive research is needed to understand associations between current heavy episodic drinking/marijuana use and exposure to pro–alcohol- and marijuana-related content across multiple media platforms. Fifth, only young adult Twitter users were invited to participate, and the extent to which these findings could be generalized to younger adolescent populations is unknown.

Notwithstanding these limitations, the present study offers a unique first glance at the pro–alcohol- and marijuana-related interactions occurring on Twitter. Although preliminary, our findings are concerning in light of Twitter's popularity among young adults and the frequency of substance use–related chatter on Twitter (Burton et al., 2013; Cavazos-Rehg et al., 2014, 2015; Dadich et al., 2013; Duggan et al., 2015; West et al., 2012). Our results suggest a need for additional research into the relationship between exposure to pro–alcohol- and marijuana-related content via Twitter and actual use behaviors. Such research may provide a foundation for the eventual development of effective substance use prevention efforts on Twitter to counteract the pro–alcohol and marijuana content to which young people are being exposed.

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