Instagram Participation and Substance Use Among Emerging Adults: The Potential Perils of Peer Belonging

Brandon G. Bergman, PhD,[1] Tara M. Dumas, PhD,[2]
Matthew A. Maxwell-Smith, PhD,[3] and Jordan P. Davis, PhD[4]

Abstract

Emerging adults (ages 18–29) have the highest rates of both harmful drinking and participation on social network sites (SNSs) compared to adolescents and older adults. In fact, greater SNS participation has been shown to predict greater alcohol use. Little is known, however, about noncollege samples, substances apart from alcohol, and SNSs other than Facebook. Furthermore, few studies have examined what might moderate any observed influence of SNS participation on substance use. In this study, we used hierarchical linear and negative binomial regression analyses to examine the unique associations between Instagram participation and alcohol as well as marijuana use, controlling statistically for demographic characteristics, peer norms, and social status, in a community sample of emerging adults ($N = 194$). We also tested whether peer belonging or motives for Instagram participation moderated these relationships. Results showed that Instagram participation was positively related to alcohol use only for those with high levels of peer belonging. The initial negative association between Instagram participation and marijuana use disappeared once peer norms and social status were included. Peer norms were positively related to both alcohol and marijuana use, while peer belonging was positively related to marijuana use. Peer belonging appears to be an important variable in the study of SNSs and substance use among emerging adults. Future work might test the somewhat counterintuitive hypotheses raised by these findings that peer belonging sensitizes individuals to SNS influences on drinking and could be a marker of greater marijuana use.

Keywords: social network sites, substance use, emerging adults, social norms

Introduction

EMERGING ADULTS (ages 18–29)[1] have higher rates of harmful and risky alcohol use relative to adolescents (ages 12–17) and older adults (ages 30+).[2] Social influences, including peer relationships and norms, are key risk factors for problematic drinking in this age group.[3–5] Social norms theory suggests that individuals automatically calibrate their behaviors to conform with peer norms.[4,6,7] Thus, experiences that facilitate peer comparison are likely to influence an individual's substance use. Dozens of studies show that perceived drinking norms are related to personal drinking behavior among young adults.[8] In parallel, individuals who have higher peer group social status have been shown to drink more than their lower status peers,[9–11] potentially because they are more attuned to young adult norms.[11]

The contemporary social ethos, however, is markedly different than it was just 10 years ago. This shift is due, in large part, to the proliferation of social network sites (SNSs)[12] such as Facebook, Twitter, and Instagram. Nearly 90 percent of emerging adults in the United States use SNSs, most of whom do so on a daily basis.[13] Recognizing that youth now commonly socialize online, researchers have begun to examine SNS participation in models of emerging adults' substance use for two primary reasons: (a) to augment models of peer influence on harmful substance use and (b) to identify new targets and platforms for prevention and treatment.

[1]Recovery Research Institute & Center for Addiction Medicine, Massachusetts General Hospital, and Harvard Medical School, Boston, Massachusetts.
[2]Department of Psychology, Huron University College at Western University, London, Canada.
[3]Western University, London, Canada.
[4]Department of Children, Youth, and Families, Suzanne Dwoark-Peck School of Social Work, USC Center for Artificial Intelligence in Society, University of Southern California, Los Angeles, California.

What is known about SNS participation and substance use

SNS users interact with streams of curated content posted by a vast network of peers and other influential entities (e.g., celebrities).[14] Among youth, this content is often geared toward displays of fun and exciting experiences, which are more likely to present drinking in a positive rather than negative light.[15] From social norms theory,[4,6,7] exposure to a disproportionate number of posts that show or promote drinking on SNSs might lead to even greater overestimation of peer drinking behavior than is typically observed. Such overestimation would then result in greater alcohol consumption.

Early research in the area has shown that emerging adults are likely to be exposed to pro-alcohol content on SNSs[16–19] and that greater interaction with pro-alcohol content is associated prospectively with increased drinking among college[20] and community samples.[21] In a meta-analysis of 19 studies, Curtis et al.[22] found that the relationship between alcohol-related SNS participation (e.g., posting and exposure to posts) and drinking outcomes among youth was significant and moderate in magnitude ($r = 0.36$). For example, Boyle et al.[20] showed that first-year college students' typical exposure to alcohol-related SNS content on Facebook, Instagram, and Snapchat at baseline predicted an increase from baseline to follow-up (about 4 months later) on weekly number of drinks, controlling for close friends' weekly drinks at baseline.

While these data do not yet demonstrate that SNS engagement causes increased drinking, the temporal precedence of SNS engagement to increased drinking[20] and significant exposure-consumption associations across a range of settings[22] suggest that a causal relationship is tenable. Cross-sectional studies can continue to inform this burgeoning line of scientific inquiry by addressing limitations in prior work and generating hypotheses for future longitudinal investigations. Specifically, this study builds on Boyle et al.'s and similar studies in three overarching ways.

This Study

First, most prior studies have focused on Facebook participation in college students at 4-year universities.[22] We targeted Instagram participation in a community-based, nationwide sample of emerging adults 18–29 years of age. Far less is known empirically about this second most popular SNS[13] relative to Facebook, an important gap given that college students report greater likelihood of seeing posts that glamorize drinking on Instagram compared to Facebook.[15] We hypothesized that, when controlling for demographic characteristics and social influences shown to relate to drinking—peer norms and social status—Instagram participation would be associated with greater drinking (H1).

Second, studies have rarely examined moderators of the SNS-substance use relationship, and, among exceptions, have investigated demographic differences only (e.g., gender[20]). Peer belonging and SNS participation motives are two potentially important variables in the study of SNS effects on substance use. Social Identity[23,24] and Active Self-Theories[25] both predict that greater salience of a particular group identity (i.e., high peer belonging) will lead an individual to behave or alter their behavior (i.e., increased drinking) in accordance with prototypes or stereotypes of those group members (i.e., norms derived from exposure to pro-alcohol SNS posts). Lower salience of a group identity, on the other hand, would be associated with less pull to adhere to peer group member prototypes. We hypothesized that individuals with higher levels of peer belonging would have a greater association between Instagram participation and drinking (H2a). In addition, emerging adults who participate on SNSs more for reasons that relate to peer comparison or approval might also be more influenced by their peers' posts. We hypothesized that individuals more motivated by a desire to view peer activities and updates (i.e., ''surveillance'' motives; to see what other people share)[26] or to improve one's social standing (i.e., ''coolness'' motives; to become popular)[26] would have a greater association between Instagram participation and drinking (H2b).

Third, nearly all SNS-substance use studies to date have focused on alcohol (see Cabrera-Nguyen et al. for an exception[16]). We examined cannabis (hereafter referred to as marijuana) in addition to alcohol for two reasons. Specifically, marijuana is legal for recreational and/or medical use in a majority of states[27] and young adults are increasingly less likely to perceive its use as risky.[28,29] At the same time, several studies show marijuana use during emerging adulthood is associated longitudinally with poorer health and academic functioning.[30–33] Given the paucity of studies on the relationship between SNS and marijuana, we treated the marijuana-related analyses as exploratory.

In sum, this study builds on existing literature by examining associations between Instagram participation and alcohol as well as marijuana use, and moderators of these associations, in a community sample of emerging adults. We hypothesized that Instagram participation would predict alcohol use, over and above the variance accounted for by demographic and social influence covariates (H1). We also hypothesized this association would be stronger among individuals with greater levels of peer belonging (H2a), and greater Instagram surveillance and coolness motives (H2b).

Methods

Participants

This sample consisted of 194 Instagram users (M age = 25.3 years; $SD = 2.9$), from a survey of 445 emerging adults (ages 18–29), who were recruited through the online crowdsourcing portal, Amazon Mechanical Turk (mTurk).[34] Four individuals were excluded before analyses, because they were extreme outliers on Instagram participation (see below for measure details). Compared to the overall sample, participants had a greater proportion of females (43.8 percent vs. 39.6 percent, respectively), but similar mean age. Demographic characteristics of the final sample ($N = 194$) are displayed in Table 1. Participants received a $3 Amazon credit.

Measures

Instagram participation. We computed a z-score mean of the amount of time an individual spent on Instagram and number of times an individual checked Instagram per day.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS
OF THE SAMPLE ($N = 194$)

	N	%
Female	85	43.8
Race/ethnicity		
White	106	54.6
Asian	36	18.2
Black	23	11.9
Latino	22	11.3
Other	7	3.6
Education (highest degree completed)		
Some High School	2	1.0
High School Diploma	13	6.7
Some College	77	39.7
College/Bachelor's Degree	67	34.5
Some Graduate School	14	7.2
Masters' Degree	18	9.3
Doctoral Degree	3	1.5
Employment status		
Full time	109	56.2
Part time	40	20.7
Not employed	24	12.4
In School	21	10.8
Household income compared to other American Families		
Far below average	13	6.7
Somewhat below average	61	31.4
Average	89	45.9
Somewhat above average	29	14.9
Far above average	2	1.0
Relational status		
Single	84	43.3
In a committed relationship	68	35.1
Married	38	19.6
Separated	2	1.0
Divorced	2	1.0

Alcohol and marijuana use. We computed an alcohol composite based on the mean z-score of (1) past-month days of alcohol use, and (2) number of days participants reported they either ''got drunk'' or had four or more drinks, for women, or five or more drinks, for men (hereafter referred to as ''binge drinking''[2]). The primary marijuana outcome was number of past-month days participants ''used marijuana, hashish, blunts, or THC.''

Peer belonging. From the Group Identity Scale,[35] participants indicated level of agreement from 1 to 5 regarding the extent to which five statements (e.g., ''I have strong ties to my peer group'') described them. Internal consistency in this sample was good ($\alpha = 0.83$).

Instagram motives. Sheldon and Bryant's[26] Instagram Motives Scale assesses the frequency of using Instagram for different reasons on a five-point ordinal scale (never, rarely, sometimes, often, and always). This study included the seven-item surveillance (e.g., ''to see what other people share'') and four-item coolness (e.g., ''to become popular'') subscales. Internal consistencies of these subscales in this sample were good (surveillance motives, $\alpha = 0.82$; coolness motives, $\alpha = 0.82$).

Peer norms. We operationalized descriptive drinking norms as the mean of (1) perceived past-month drinking days for an average peer group member and (2) perceived past-month binge drinking days for an average peer group member. We defined descriptive marijuana norms as perceived past-month marijuana use days for an average peer group member. For injunctive drinking norms, we averaged individuals' responses on an ordinal scale (from 1 = ''strong disapproval'' to 7 = ''strong approval'') to three items that asked if their peer group members would approve of drinking alcohol (1) every weekend, (2) daily, and (3) enough to ''pass out.'' While internal consistency for injunctive drinking norms in this sample was questionable ($\alpha = 0.60$), it was good ($\alpha = 0.85$) when removing the item querying drinking every weekend. We decided to keep this item in the scale, however, given its inclusion in prior high-quality studies of young adult drinking.[36]

Social status. Participants ranked themselves (e.g., first, second, third, etc.) compared to a maximum of seven other individuals in their peer group along four status-related dimensions as in Dumas et al.[10]: (1) makes group decisions; (2) has opinions that are listened to by other group members; (3) possesses popularity; and (4) with whom others comply. For ease of statistical interpretation, participants' rankings were reverse-scored so that higher scores represent higher status in the peer group. Social status scores were calculated by averaging participants' rankings in their peer group across each of four dimensions and dividing by the number of group members. For example, in a peer group of eight individuals, rankings of second, third, third, and first would be reverse-scored as 7, 6, 6, and 8, the average of which is 6.75, and divided by 8 (the number of peer group members) to yield a social status score of 0.84. Internal consistency of this measure in this sample was good ($\alpha = 0.82$).

Analysis plan

Analyses were conducted using IBM SPSS Statistics 24. Missing data were minimal, ranging from 0 percent to 2 percent for all main variables, and was estimated using the expectation-maximization algorithm.

To test our hypotheses, we ran two series of regression models with either the alcohol composite or marijuana use as the dependent variable. For the alcohol composite, we ran a hierarchical linear regression with predictors entered in the following steps: (1) Instagram use and demographics (gender, age, and ethnicity), (2) social influence covariates (descriptive drinking norms, injunctive drinking norms, and social status), (3) proposed moderators (peer belonging, Instagram surveillance motives, and Instagram coolness motives), and (4) two-way interactions between Instagram use and proposed moderators. Because the alcohol composite was positively skewed, we log-transformed this variable before analyses.

For marijuana use, because this variable is a count variable and was overdispersed (variance was greater than the mean), we used a series of negative binomial regressions.[37] Predictors were entered in the same steps as for the alcohol models, except instead of including descriptive drinking norms, we included descriptive marijuana norms as part of the set of social influence covariates in Step 2. Even though

our injunctive norms measure specifically targeted alcohol, we used the same variable for the marijuana models because (a) there was no corresponding variable in the dataset for marijuana and (b) we wanted the alcohol and marijuana models to be as similar as possible.

Predictor variables involved in interactions were grand-mean centered. Significant interactions were plotted at the mean and one standard deviation above and below the mean.[38] Simple slopes were tested using Preacher's simple slopes calculator.[39]

Results

Table 2 contains intercorrelations among variables included in the models for primary aims, including Instagram participation, alcohol and marijuana use, social influence covariates, peer belonging, as well as surveillance and coolness Instagram motives.

Alcohol models

There was a significant positive association between Instagram participation and the alcohol composite when controlling for demographic variables (Table 3, Model 1). This effect disappeared, however, once social influence variables were added to the model, at which point descriptive and injunctive drinking norms became the strongest predictors (Table 3, Model 2). Social status, however, was not a significant predictor. Social influence variables predicted an additional 20 percent of the variance in the alcohol composite over and above Instagram participation and demographics.

In models containing the interactions between Instagram participation and proposed moderators (Table 3, Model 4), only the Instagram-peer belonging interaction was significant. Neither of the Instagram motives were significant moderators, nor did they have significant main effects on the alcohol composite. Probes of simple Instagram participation-alcohol composite slopes showed that the effect was significant and positive only for individuals with high levels of peer belonging ($b = 2.60$, $t = 2.30$, $p = 0.02$); in contrast, the effect was nonsignificant for individuals with medium ($b = 0.95$, $t = 1.34$, $p = 0.18$) and low levels ($b = -0.70$, $t = -0.76$, $p = 0.45$) of peer belonging. As shown in Figure 1, among individuals with high levels of peer belonging, those highest on the alcohol composite had high levels of Instagram participation, while those lowest on the alcohol composite had low levels of Instagram participation.

Marijuana models

There was a negative association between Instagram participation and marijuana use, over and above demographic characteristics, which disappeared once social influence variables were added to the model (Table 4, Models 1 and 2). None of the interactions were significant (Table 4, Models 4). The main effect of peer belonging on marijuana use was positive and significant in the full model (Table 4, Model 4).

Discussion

This study examined the unique associations between Instagram participation and alcohol or marijuana use in a sample of emerging adults. Counter to hypotheses, Instagram participation was not uniquely associated with alcohol use. Consistent with hypotheses, peer belonging significantly moderated this effect such that Instagram participation was associated with alcohol use only for individuals with high levels of peer belonging. Counter to hypotheses, neither surveillance nor coolness Instagram motives significantly moderated the Instagram-alcohol relationship. Exploratory analyses showed that Instagram participation was inversely related to marijuana use, but had no association once peer norms and social status were considered.

Effects of Instagram participation on alcohol use

The disparate findings between our study, which found no unique effect of Instagram participation on alcohol use, and related studies, which have shown that SNS participation does uniquely predict increased drinking,[16,20] are likely artifacts of measurement and analytical differences. *Alcohol-related SNS exposure* (e.g., friends who posted pro-alcohol content in the past year) was a significant predictor of the alcohol outcome both in Boyle et al.'s[20] study of college students' participation across Facebook, Instagram, and Snapchat, and Cabrera-Nguyen et al.'s[16] study of 18–25 year-old individuals' participation on Twitter. Of note, also, is that Cabrera-Nguyen et al.[16] did not include peer norms in their analyses, which may account, in part, for their observed Twitter-drinking effect. Overall, measuring true risks of SNS participation on drinking may require assessment of exposure to pro-alcohol content, while controlling for peer norms.

TABLE 2. CORRELATIONS AMONG INSTAGRAM PARTICIPATION, SUBSTANCE USE, SOCIAL NORMS, SOCIAL STATUS, PEER BELONGING, AND INSTAGRAM MOTIVES

	1	2	3	4	5	6	7	8	9
1. Instagram participation									
2. Alcohol composite	0.13								
3. Marijuana use	−0.12	0.10							
4. Descriptive drinking norms	0.06	0.46**	0.16*						
5. Injunctive drinking norms	0.07	0.36**	−0.06	0.44**					
6. Descriptive marijuana norms	−0.06	0.15*	0.55**	0.45**	0.07				
7. Social status	0.11	0.05	−0.06	0.03	−0.01	−0.01			
8. Peer belonging	0.02	−0.08	0.06	−0.03	−0.14	−0.04	0.20**		
9. Surveillance Instagram motives	0.41**	0.08	−0.01	0.07	−0.02	−0.02	0.06	0.09	
10. Coolness Instagram motives	0.38**	0.08	−0.01	0.06	0.02	−0.05	0.22**	−0.05	0.54**

*$p < 0.05$, **$p < 0.01$.

TABLE 3. HIERARCHICAL LINEAR REGRESSION PREDICTING ALCOHOL COMPOSITE
(MEAN PAST-MONTH ALCOHOL USE AND BINGE DRINKING DAYS)

	Model 1		Model 2		Model 3		Model 4	
R^2	0.07		0.27		0.27		0.30	
ΔR^2	0.06		0.19		0.00		0.03	
ΔF	3.77*		16.29**		0.36		2.32^	
Predictors	B	SE	B	SE	B	SE	B	SE
Instagram participation	0.15*	0.63	0.10	0.57	0.09	0.63	0.11	0.71
Gender (male=0)	−0.16*	0.69	−0.09*	0.65	−0.09	0.68	−0.07	0.67
Age	0.10	0.12	0.06	0.10	0.06	0.11	0.05	0.11
Ethnicity (Non-white=0)	0.16*	0.69	0.07	0.64	0.08	0.64	0.07	0.65
Descriptive drinking norms			0.34**	0.08	0.33**	0.08	0.33**	0.08
Injunctive drinking norms			0.19**	0.25	0.19**	0.25	0.20**	0.72
Social status			0.01	0.64	0.02	0.73	0.02	0.08
Peer belonging (PB)					−0.05	0.47	−0.03	0.49
Surveillance Instagram motives (SM)					0.06	0.55	0.03	0.58
Coolness Instagram motives (CM)					−0.01	0.39	−0.05	0.39
Instagram participation×PB							0.16*	0.91
Instagram participation×SM							−0.12	0.97
Instagram participation×CM							0.07	0.71

Regression B weights were unstandardized.
^$p=0.08$, *$p<0.05$, **$p<0.01$.

Like Boyle et al.,[20] however, our findings point to an explanatory role of peer norms in the relationship between SNS participation and drinking. Their study showed that the effect of SNS alcohol exposure on increased drinking was explained by greater perceived peak college student drinking. In our study, the Instagram-alcohol association went from significant in the model only with demographic variables, to nonsignificant when peer norms were added. Although true mediation could not be tested in the absence of a longitudinal study, our findings suggest that the mediating role of "upregulated" peer norms in the Instagram-alcohol relationship remains a tenable hypothesis for future investigations.

Instagram participation and marijuana use

It is worth discussing the negative, zero-order association between Instagram participation and marijuana use, given a potential distinction relative to the positive association between Instagram participation and alcohol use. Despite the changing sociocultural marijuana landscape in the United States, its use is illegal federally and it is a crime to use it recreationally in 28 of 50 U.S. states.[40] Thus, individuals who use marijuana—20 percent in this study used marijuana at least one day in the past month—may simply participate less on Instagram to protect against these activities being documented. Another related possibility is that individuals
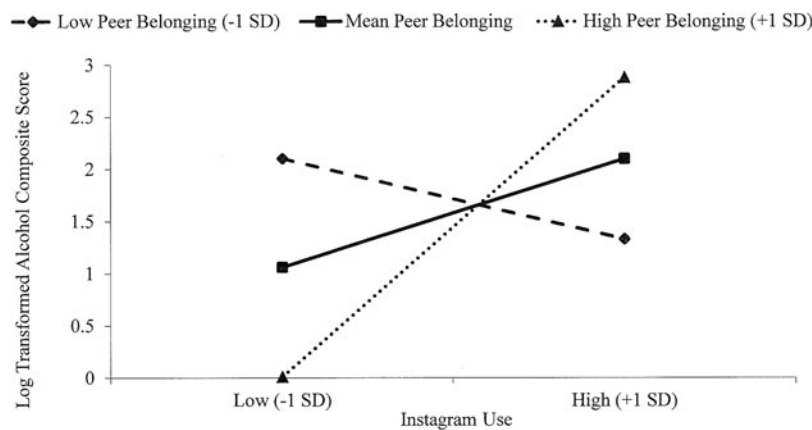

FIG. 1. The association between Instagram participation (mean Z-score, minutes spent on Instagram, and number of times individuals check Instagram per day) and the alcohol composite (mean Z-score, past-month alcohol use, and binge drinking days, log-transformed to account for positive skew) is conditional on peer belonging, measured at three levels: 1 standard deviation below the mean (*low*), mean, and 1 standard deviation above the mean (*high*). As shown, the association between Instagram use and the alcohol composite was significant only for those with high peer belonging. Individuals with high peer belonging and low Instagram participation were lowest on the alcohol composite, while those with high peer belonging and high Instagram participation were highest on the alcohol composite.

TABLE 4. NEGATIVE BINOMIAL REGRESSION PREDICTING PAST-MONTH MARIJUANA USE DAYS

	Model 1		Model 2		Model 3		Model 4	
Akaike Information Criterion	475.87		453.48		449.88		455.13	
Bayesian Information Criterion	495.48		482.89		489.10		504.15	
Predictors	B	SE	B	SE	B	SE	B	SE
Instagram participation	−1.17*	0.53	−0.24	0.56	−0.05	0.58	0.34	0.82
Gender (male = 0)	−0.33	0.57	0.19	0.65	0.61	0.61	0.61	0.61
Age	−0.08	0.10	−0.24*	0.11	−0.18	0.10	−0.18	0.11
Ethnicity (Non-white = 0)	0.08	0.56	0.49	0.48	0.86	0.52	0.77	0.54
Descriptive marijuana norms			0.20**	0.05	0.21**	0.04	0.22**	0.04
Injunctive drinking norms			0.02	0.23	0.13	0.22	0.15	0.23
Social status			−0.57	1.43	−1.19	0.63	−1.38	1.48
Peer belonging (PB)					1.10**	0.36	1.21**	0.43
Surveillance Instagram motives (SM)					0.38	0.25	0.37	0.30
Coolness Instagram motives (CM)					−0.43	0.44	−0.68	0.55
Instagram participation × PB							0.05	1.18
Instagram participation × SM							−0.47	0.99
Instagram participation × CM							−0.29	0.64

Regression B weights were unstandardized.
*p < 0.05, **p < 0.01

may post pro-marijuana content less frequently due to anticipated disapproval, reflecting disproportionately *lower* rates of use. Contrary to alcohol, this might result in "downregulated" marijuana norms, and thus, lower marijuana use. Future research will help determine whether these patterns change given the dynamic legal status, and related perceived harms, of marijuana use in the United States.

The perils of peer belonging

We found that Instagram participation had a unique and positive effect on alcohol use only for individuals with high levels of peer belonging. From Social Identity Theory,[23,24] individuals with greater levels of peer belonging may identify more strongly as a member of their peer group. This greater identification, in turn, could increase the likelihood that they change their drinking in accordance with what appears to be frequent and heavy peer drinking as reflected in their Instagram feed.[41] Among the study's more interesting findings was that the lightest drinkers were those with high peer belonging and low Instagram participation. Anecdotally, because Instagram is almost exclusively a photo/video sharing platform, it caters to more public and social "scenes" that are also normatively related to alcohol use (e.g., at concerts, bars/clubs, or restaurants). Thus, one might alternatively speculate that the light drinkers are involved with tightly knit peer groups who socialize at places and events that do not usually involve drinking and are less compatible with Instagram participation (e.g., movie theaters, cafes, or video/board game nights). Future studies in this area may assess participants' social activities in greater detail to test such a hypothesis. Overall, the potential of peer belonging to sensitize individuals to SNS-facilitated effects warrants further investigation and replication in longitudinal research.

Also interesting was the significant association between peer belonging and marijuana use, over and above demographic characteristics and descriptive marijuana norms. It is possible that marijuana continues to occupy "counter-culture" status for those who use it, despite greater societal acceptance as noted above. Thus, social identity as a marijuana user may be salient for those who use frequently,[42] leading to a greater sense of belonging within one's peer group, the members of which also presumably use marijuana.

Limitations

Our findings should be considered alongside the study's methodological limitations, of which three are most critical. First, the study was cross-sectional. Although we modeled variables in our analyses based on a theoretical causal chain, whereby Instagram participation leads to substance use, neither causality nor the temporal precedence of Instagram participation can be inferred. A longitudinal comparison of Instagram users and nonusers on substance use over time may help better evaluate whether the Instagram-substance use relationship is causal. Second, all variables were based on participant self-reports; our findings should be replicated with objective measures of these variables, such as toxicology screens for substance use and coded data for SNS participation. Third, the study was a secondary data analysis resulting in (a) potentially inadequate power to detect effects given that less than half of those surveyed were Instagram users and included in this study, and (b) an inability to analyze whether exposure on Instagram to alcohol or marijuana content, specifically, was related to substance use.

Conclusion

Instagram participation may be a unique risk factor for greater alcohol use among emerging adults with high levels of peer belonging. Given its association, too, with marijuana use, peer belonging may be important to include in future studies of SNS and substance use among youth. Our study also revealed a distinct pattern of findings for marijuana relative to alcohol. Thus, the paucity of work to date on SNS participation and marijuana use appears to be a critical gap. Rigorous, longitudinal research testing the effects of emerging adults' Instagram participation on both their alcohol and marijuana use will help to strengthen the growing scientific literature examining the psychosocial contexts of SNS engagement and risk behaviors among youth.

Author Disclosure Statement

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Address correspondence to:
Dr. Brandon G. Bergman
Recovery Research Institute
& Center for Addiction Medicine
Massachusetts General Hospital
151 Merrimac Street, 6th Floor
Boston, MA 02114

E-mail: bgbergman@mgh.harvard.edu