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Testing young adults' reactions to Facebook cues and their associations with alcohol use

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Abstract

Background: Alcohol cues on social media may influence young adults' drinking patterns, these cues may be pro-social or pro-alcohol in nature. The influence of individual Facebook cues on young adults' drinking intentions and behaviors remains unknown.

Objectives: The purpose of this study was to assess how Facebook cues influence intention to drink, and how intention was associated with Theory of Reasoned Action (TRA) constructs including alcohol-related attitudes and norms, and future behavior.

Methods: Incoming university students completed a pre-college and a 2-year follow-up phone interview. A vignette presented individual Facebook cues representing "pro-social" or "pro-alcohol" sentiments. Participants indicated intention to drink alcohol and their rationale for this intention after each cue. Additional measures included TRA constructs of alcohol-related attitudes and norms, and problem alcohol use. Analyses included a qualitative approach to examine rationales for intention to drink in response to Facebook cues, and linear mixed effects models.

Results: Of 338 participants, 56.1% were female, 74.8% were Caucasian. Alcohol-related attitudes and norms were positively associated with intention to drink in response to pro-social and pro-alcohol Facebook cues. Participants' intention to drink in response to pro-alcohol cues was positively associated with problem alcohol use two years later.

Conclusions/Importance: Findings illuminate the influence of social media on alcohol-related behaviors and highlight potential future screening approaches.

Keywords

Facebook; social media; college students; alcohol use; vignette; mixed methods

Facebook is among the most ubiquitous websites used by young adults (Duggan, Ellison, Lampe, Lenhart, & Madden, 2014). One behavior commonly displayed on Facebook profiles

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of young adults is alcohol use (Moreno, Cox, Young, & Haaland, 2015), these displays may be influential to peers. Problem alcohol use, such as binge drinking, remains a major cause of morbidity and mortality for this population (R. W. Hingson, W. Zha, & E. R. Weitzman, 2009). The Theory of Reasoned Action (TRA) proposes that attitudes, social norms and intention to drink contribute to alcohol use; this theory has successfully been applied to understand and predict collegiate alcohol use (Montano, 2002).

The influence of Facebook on adolescent and young adults' alcohol-related intentions is supported by previous work (Litt & Stock, 2011; Moreno, Briner, Williams, Walker, & Christakis, 2009). In previous studies, a key design challenge has been understanding the impact of individual Facebook posts. To tease apart the influence of these individual cues on TRA constructs of alcohol-related attitudes, norms, intentions or future behavior, investigators need methodologies to systematically examine specific cues.

Facebook use and Influence among Adolescents and Young Adults

Facebook is used to maintain social connections, explore new friendships, express one's identity, and compare oneself to others (Lewis & West, 2009; Ross, Orr, Arseneault, Simmering, & Orr, 2009). This social media platform has been described as highly persuasive and capable of combining the influential power of peers with that of media (Fogg, 2008). The Facebook Influence Model describes constructs representing unique avenues by which Facebook may be influential (Moreno, Kota, Schoohs, & Whitehill, 2013). These constructs include such concepts as establishing social norms, contributing to identity development and reaching global communities. However, little is known about the influences of individual posts or displays on Facebook.

Facebook Alcohol Displays: Common and Influential

Previous studies have supported the high prevalence of alcohol posts on social media (Cavazos-Rehg, Krauss, Sowles, & Bierut, 2015; Moreno, Parks, Zimmerman, Brito, & Christakis, 2009). Alcohol displays may include text (e.g. "I got drunk last night"), photographs depicting alcohol consumption, or links to alcohol-related groups or companies (Moreno et al., 2010).

A previous focus group study illustrated that adolescents who viewed alcohol references on their peers' Facebook profiles found these to be believable and influential sources of information (Moreno, Briner, et al., 2009). Another study found that adolescent participants who viewed mock Facebook profiles with alcohol were more likely to report interest in initiating alcohol use (Litt & Stock, 2011). These studies support Facebook as an influential platform, but a notable gap in the literature is understanding the contributions of individual posts on alcohol-related attitudes and norms, intentions and behavior.

Alcohol and College Students

Understanding the influence of social media sites such as Facebook on alcohol use is important as alcohol represents a major national public health issue, particularly among college students. While drinking rates among high school students have declined in recent

years, rates among college students remain high, and consistently higher compared to non-college attending peers (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2013). Problem alcohol use such as binge drinking is a major cause of both morbidity and mortality among college students (R. Hingson, W. Zha, & E. Weitzman, 2009).

Theory of Reasoned Action

One theory that has been applied to understand collegiate alcohol use is the Theory of Reasoned Action (TRA). This theory supports the importance of attitudes, norms and intentions in predicting behavior. Initially developed in the 1970s (Fishbein & Ajzen, 1975), this theory has continued to be incorporated into studies and public health approaches today (Gibbons, Houlihan, & Gerrard, 2009). According to this theory, development of more positive attitudes and norms towards a behavior can influence intentions to engage in a behavior, which are a precursor for performing the behavior. Figure 1 illustrates the TRA. In the context of this study, one may postulate that engaging with Facebook content promoting alcohol use may impact a college student's attitudes towards alcohol use as well as perceptions that alcohol use as a social norm. A positive attitude and perceived social norms may thus influence intentions to use alcohol, which may lead to alcohol use.

Innovative Methods Needed to Understand Facebook's role in Collegiate Alcohol Use

Given the importance of alcohol as a public health issue for college students, the popularity of Facebook, and the frequent alcohol displays on Facebook, understanding how individual alcohol-related posts, or cues, on Facebook may influence alcohol behavior is a critical research question. Facebook has been proposed as a complementary tool to identify at-risk college students, and as a novel intervention approach (Moreno, Grant, Kacvinsky, Egan, & Fleming, 2012). However, testing Facebook as a source of influence on alcohol behavior presents methodological challenges. A first challenge is controlling the number and type of cues presented at once. The Facebook platform presents a viewer with a variety of information simultaneously. As presenting a research participant with individual Facebook cues is not possible in the naturalistic Facebook environment, alternative research designs must be utilized. A second challenge is understanding the influence of cues that promote alcohol versus cues that promote other social activities among college students. Pro-alcohol cues might include photos depicting parties with alcohol or statements discussing favorite alcohol brands. Cues may also be "pro-social," such as photos depicting volunteer work or statements discussing study groups. These pro-social cues may promote the character of the person posting, and if that person also engages in alcohol use, these cues may indirectly promote intention to use alcohol. These different types of cues may be presented independently and individually via a vignette.

Vignettes provide a valid and comprehensive method for assessing people's perceptions, beliefs and meanings about specific situations (Young, Dilworth, & Mott, 2011). Vignettes have been successfully used to understand complex relationships and tease apart the individual influences of multiple cues on human behavior and decision making (Spalding & Phillips, 2007). Studies using a vignette allow for avoidance of observer effect and many

ethical dilemmas, as well as control of confounding effects (Dresselhaus, Peabody, Luck, & Bertenthal, 2004).

Objectives of the Present Study

In summary, while Facebook is recognized as a source of influence, little is known about the influences of individual posts or displays on Facebook. Understanding the influence of social media posts promoting alcohol use is important given that alcohol represents a major health issue for college students. Thus, the purpose of this study was to examine college students' intention to drink alcohol in response to both pro-social and pro-alcohol Facebook cues as representations of individual Facebook posts, and determine how this intention was associated with TRA constructs of alcohol-related attitudes, social norms and future problem alcohol use. We used a vignette methodology as a novel way to investigate the influence of Facebook cues on alcohol-related intentions and these related outcomes. Our goal is that this study will contribute an understanding of the mechanisms through which Facebook cues influence collegiate drinking. Our specific research questions included:

Research Question 1 (RQ1). In what ways do pro-alcohol and pro-social cues on Facebook affect college students' intention to drink alcohol?

Our goal was to understand whether and how Facebook cues influenced intention to drink at baseline, just after arriving to college. For this question, we used qualitative approaches that were not hypothesis driven.

Research Question 2 (RQ2). Which Theory of Reasoned Action variables were associated with reporting greater intention to drink in response to pro-social and pro-alcohol Facebook cues?

Our goal was to examine baseline data to understand what TRA variables were associated with responses to Facebook cues. We hypothesized that there would be a positive association between intention to drink alcohol in response to Facebook cues, and participants' alcohol-related attitudes and perceived norms. We evaluated intention to drink in response to pro-alcohol and pro-social cues separately to assess if there were differences in associations by cue type.

Research Question 3 (RQ3). Were participants' intentions to drink in response to the Facebook cues presented at baseline associated with future problem alcohol use?

Our final research question in this study was whether participants' baseline intentions to drink in response to the Facebook cues were associated with future problem alcohol use. Similar to RQ2, we tested pro-alcohol and pro-social cues separately to evaluate whether responses pro-alcohol cues were more likely to be associated with future problem alcohol use compared to pro-social cues.

Methods

Study design

This study used a longitudinal cohort design to examine the associations between intention to drink alcohol in response to Facebook cues presented through a vignette and alcohol-related attitudes and norms, and future problem alcohol use. Mixed methods of data collection were used to obtain information for this study.

Setting

This study included incoming college students from two US universities, one in the Midwest and one in the West. Data collection took place between May 2011 and September 2013 and received approval from the two relevant Institutional Review Boards.

Participants

Potential participants were randomly selected from the registrar's lists of incoming first-year students from both universities for recruitment. Participants were eligible if they were between the ages of 17 and 19 years and enrolled as a full-time first-year student for fall 2011 at one of these two universities.

Students were recruited through several steps, beginning with a pre-announcement postcard followed by emails, phone calls or Facebook messages. Potential participants were provided study information and informed consent was conducted over the phone. Students were excluded if they had already arrived on campus for early-enrollment programs, were an age other than 17–19, were non-English speaking or did not have a Facebook profile.

Interview procedure

Interviews were conducted prior to college (baseline). The second interview was after experiencing the first two years of college. All interviews used the same measures and were conducted by trained research assistants; interviews lasted between 40 and 60 minutes.

Vignette development

The vignette was designed to address two methodologic challenges; the first design challenge was isolation of cues on Facebook. To overcome potential confounding and allow understanding of the impact of individual Facebook cues, we developed the vignette to be auditory. Reading participants a single auditory cue allowed attribution of response to a cue and to that cue alone, overcoming the challenge of Facebook profiles that are cluttered with multimedia information including text, images, videos, and pop-ups. The auditory nature of the cue was also designed to overcome potential confounding by visual factors such as gender, race or attractiveness of the profile owner's photographs, or whether a particular message had external validation through Facebook "likes." Participants were read a description of each cue verbatim from a written script by a trained research assistant. Participants provided a response after hearing each cue.

The second challenge was to present cues that were distinguishable by students as pro-social or pro-alcohol. We developed draft pro-social and pro-alcohol cues by reviewing data from

previous studies, including text, photographs and Facebook likes/groups (Moreno et al., 2010). Using a modified Delphi procedure, several experts with backgrounds in alcohol research were asked to review all draft cues and identify the best representations of pro-alcohol or pro-social cues (Dalkey, 1969). An example of a pro-alcohol cue was a status update stating *I'm planning to get totally wasted tonight*, an example of a pro-social cue was a *photograph of a family vacation*. Figure 2 displays the vignette and all cues.

Vignette setting.—The vignette was designed to assess participants' views of how displayed Facebook content would affect intention to drink in a particular setting. To determine the optimal vignette setting, we reviewed relevant literature regarding early college alcohol use for typical settings in which college students encounter alcohol (Neighbors et al., 2011). We pilot tested these settings with a separate group of undergraduate students and found that the college party was viewed as a universally understood and accessible setting for collegiate alcohol use. Thus, we selected this as the setting for the vignette.

Participants were asked to place themselves in the hypothetical situation of attending a party with a new acquaintance, a senior student, that evening. The vignette described a senior student as it was hypothesized that accompanying an older, more experienced student to a party would be an attractive and influential scenario for an incoming first-year student. The vignette was designed to avoid specification of the senior student's gender or race. Participants were asked to imagine that they were viewing that senior student's Facebook profile to get to know him or her better prior to the party. Facebook cues were then presented one at a time to participants to assess their responses. Pro-social and pro-alcohol Facebook cues were randomly ordered within the vignette.

Vignette testing.—First, Facebook cues were pilot tested with a separate sample of college students. Cues were tested to ensure they were consistent with a typical Facebook status update, only cues that were determined to be typical, appropriate and understandable were used in this study. Second, we evaluated participant responses to Facebook cues at baseline to ensure pro-alcohol cues and pro-social Facebook cues generated different responses. We analyzed the difference between pro-social and pro-alcohol cue responses indicating intention to drink using paired t-tests, the difference was statistically significant with a p value of <0.001. The final vignette is included as Figure 2.

Interview measures

Measures were designed to be consistent with the Theory of Reasoned Action, which supports that positive alcohol-related attitude and norms are associated with intention to drink alcohol, and intention to drink alcohol predicts alcohol behaviors.

Intention.—Behavioral intention is defined as the person's perceived likelihood to engage in a particular behavior (Century, 2002). Accordingly, responses to each Facebook cue presented in the vignette represented the participant's reported intention to drink by asking: *"on a scale of 0–5 how likely is it that you will drink tonight, with 0 being not at all likely to drink to 5 being extremely likely to drink at the party."* This Likert intention item has been

used for alcohol assessment in previous work (Devos-Comby & Lange, 2008). Responses to each type cue (pro-alcohol and pro-social) were summed to create an overall intention score for each type. In addition, participants were asked to explain their rationale for their response to each Facebook cue.

Attitude.—Alcohol-related attitudes were measured with the question, “On a scale between 0 and 6, with 0 as very negative, 3 as neutral, and 6 as very positive, what would you say your own attitude towards alcohol is?” (Devos-Comby & Lange, 2008). Participants’ responses to this question were scored as they appeared on the Likert scale.

Perceived norms.—Perceptions of drinking norms were measured in reference to participants’ friends, as the proximity of this reference group renders it more influential than distal reference groups such as typical college students (Festinger, 1954). Injunctive norms indicate whether a person considers the behavior acceptable in society (van den Putte, Yzer, & Brunsting, 2005); to assess injunctive norms, participants were asked, “What percentage of your friends approve of the use of alcohol?” Descriptive norms indicate what a person thinks other people actually do (van den Putte et al., 2005); this was measured by asking participants: “What percentage of your friends use alcohol currently?” These questions were open-ended such that participants could provide an estimated percentage of friends as the response.

Drinking behavior.—We assessed two drinking behavior outcomes: past 28-day binge episodes and problem drinking.

Past 28-day binge episodes. Interviews assessed current, past 28-day, alcohol use by asking participants: “in the past 28 days, have you consumed any alcoholic beverages?” For participants who reported current alcohol use, we used the TimeLine Follow Back (TLFB) (Sobell & Sobell, 1992). During this validated procedure, the interviewer works with the participant to review each of the past 28 days to assess how many standard alcohol drinks were consumed, from which one can calculate number of binge drinking episodes defined as consuming 4 or more drinks for females and 5 or more drinks for males in one episode (Zywica & Danowski, 2008).

Problem drinking. We assessed problem drinking behaviors using the Alcohol Use Disorder Identification Test (AUDIT), which has been validated among college students (Kokotailo et al., 2004). A previous study in college students found the AUDIT to have a sensitivity of 0.84 and specificity of 0.71 for identifying problem alcohol use (Fleming, Barry, & MacDonald, 1991). The AUDIT is a 10-question scale with most answers on a 0–4 Likert scale assessing consumption, dependence and harm/consequences of alcohol use (Fleming et al., 1991).

Analysis

Qualitative content analysis was conducted using Dedoose software (Dedoose 7.1, Los Angeles, CA). Statistical analyses were conducted using Stata version 12 (StataCorp,

College Station, TX). All statistical analyses were two-sided and $p < 0.05$ was used to determine significance.

RQ1: In what ways do pro-alcohol and pro-social cues on Facebook affect college students' intention to drink alcohol?—To explore participants' responses to individual cues we used qualitative content analysis. First, three investigators read and independently coded a sample of interview transcripts, selected by random number allocation. Investigators entered codes into individual spreadsheets; one investigator then merged the coding files, reviewed all coding, renamed codes with different spellings but identical meanings. Investigators then met to review and discuss, and agreed upon specific definitions and codes to use in future coding rounds. Two investigators then reviewed a subset of vignette responses and applied the coding scheme; an open-coding approach was again applied so that new categories that emerged could be documented. All discrepancies were discussed, and the investigators came to consensus upon specific definitions and codes. The remaining transcripts were then divided evenly amongst two investigators and coded. Inter-coder agreement was calculated at 95%.

Research Question 2 (RQ2). Which Theory of Reasoned Action (TRA) variables were associated with reporting greater intention to drink in response to pro-social and pro-alcohol Facebook cues?—To evaluate factors that were associated with the outcome of intention to drink alcohol we used a linear mixed effects model given that these models allow response variables from different distributions. We applied this modeling approach to baseline data. Consistent with the TRA, our independent variables of interest included alcohol-related attitudes and norms. Because of the high likelihood that previous experiences with alcohol would affect reported intention to engage in alcohol use, we included lifetime and current alcohol use at baseline as adjustment variables in our models. We included gender, race and university as adjustment variables. We conducted separate models for pro-alcohol cues and pro-social Facebook cues.

RQ3. Were participants' intentions to drink in response to the Facebook cues presented at baseline associated with future problem alcohol use?—In these analyses, intention to drink in response to Facebook cues at baseline was our independent variable and problem alcohol use measured two years later was our dependent variable. We used generalized linear effects models to account for both fixed effects and random effects, particularly given that we had repeated measurements over time. We used this modeling approach to examine 2 different outcomes reflective of alcohol-related behavior: past 28-day binge episodes and AUDIT score. As with RQ2, we constructed two models to examine intention to drink in response to pro-social and pro-alcohol Facebook cues separately. In order to focus on the effects of intention on future alcohol behavior within the context of the TRA, we included TRA variables of alcohol-related attitudes and norms as adjustment variables. We included demographic variables as fixed effects for gender, race/ethnicity and university.

Results

A total of 338 participants completed the baseline interview, 56.1% were female, 74.8% were Caucasian, and 58.8% were from the Midwestern university. Our initial response rate was 54.6% and after two years our retention rate was 93.8%. There were no differences in gender, race or university in response rate. Demographic data is provided in Table 1.

RQ1: In what ways do pro-alcohol and pro-social cues on Facebook affect college students' intention to drink alcohol?

All 338 participants provided a verbal response describing how each of the 8 Facebook cues influenced their intention to drink alcohol, yielding a total of 2704 responses. Four main thematic categories arose from content analysis of this data: 1) evaluation and assumptions about the senior student, 2) personal alcohol-related views and experiences, 3) identity introspection, 4) the role of Facebook. Table 2 describes categories and example participant quotes.

Participants most frequently cited evaluation and assumptions about the senior student derived from each Facebook cue as influential on intention to drink. For the pro-social cues, the participants most often described assumptions that the senior student was “responsible.” Participants also frequently described that a senior student who posted about running or study clubs on Facebook would be a good partner for a first drinking experience in college. Example quotes included: “This person is making smart choices and has goals”, and “I would think this person is responsible.” In contrast, pro-alcohol cues often generated different assumptions and judgments about the senior student. Some students described the senior student as a “bad host.” Example quotes included, “I don’t want to be with a person who is wasted,” and “I worry I would end up babysitting this person.”

Another common category of response was reflection on personal alcohol-related views and experiences. Some participants described themselves as alcohol abstainers and thus Facebook cues would not influence their plans at a particular event. Other participants indicated that they were experienced with alcohol so neither type of Facebook cue would alter the decision to attend a party or drink alcohol, an example quote was: “I have drank at parties before, I know what to expect.”

Many participants engaged in identity introspection in describing influences on alcohol intention. Some participants described how their own personal character would be a primary driver in the situation and overshadow any influence of Facebook cues. An example quotes was, “I know I can handle social pressure and choose how much I want to drink.” Other participants acknowledged their own anxieties about arriving to college or being with a senior student. Some students described using the Facebook cue to consider similarities with one’s own identity. For example, one pro-social Facebook cue described going running, one participant stated: “I’m a runner too, so I wonder if this person would be a good person to get to know.”

A final common category of response was that participants reflected on Facebook. Some students felt negatively towards posting about alcohol on Facebook, an example quote was:

“It’s just stupid to post about alcohol on Facebook.” Other participants described hoping that the senior student might post on Facebook about the participant, which might raise their social status. Other students felt that Facebook had no influence on their perceptions or decisions.

Research Question 2 (RQ2). Which Theory of Reasoned Action (TRA) variables were associated with reporting greater intention to drink in response to pro-social and pro-alcohol Facebook cues?

A key factor that was significantly and positively associated with greater intention to drink in response to pro-social and pro-alcohol Facebook cues at baseline was alcohol-related attitudes. Magnitudes of this association were similar for both cue types: 0.36 (95% CI: 0.28–0.44) for pro-social cues and 0.37 (95% CI: 0.29–0.45) for pro-alcohol cues.

Perceived norms were also significantly and positively associated with intention to drink in response to pro-social Facebook cues. Intention to drink in response to pro-social Facebook cues was positively associated with injunctive norms (0.01, 95% CI: 0.01–0.02, $p < 0.001$) but not with descriptive norms. In contrast, intention to drink in response to pro-alcohol Facebook cues was positively associated with descriptive norms (0.01, 95% CI (0.00–0.01, $p = 0.004$).

Additional findings were that reporting lifetime or past 28-day alcohol use were positively associated with responses to pro-social Facebook cues, and past 28-day alcohol use was positively associated with pro-alcohol Facebook cues. Gender was also significant across both types of cues, with males more likely to respond with intention to drink for both types of cues. Table 3 illustrates these findings.

RQ3. Were participants’ intentions to drink in response to the Facebook cues presented at baseline associated with future problem alcohol use?

Participants’ intention to drink in response to pro-social cues was not significantly associated with either past 28-day binge episodes or AUDIT scores. There were no significant relationships with intention, demographic variables or perceived norms for pro-social Facebook cues. Only alcohol-related attitudes were positively associated with past 28-day binge episodes (0.6, 95% CI: 0.06–1.14). For the AUDIT score, positive associations were found with alcohol-related attitudes, descriptive norms, university and current alcohol use.

Participants’ intention to drink in response to pro-alcohol cues was positively and significantly associated with both binge episodes (0.55, 95% CI: 0.16–0.96) and the AUDIT score (0.82, 95% CI: 0.43–1.0). For past 28-day binge episodes, intention was the only significant predictor of this outcome. For AUDIT scores, additional positive predictors included University, alcohol-related attitudes and current alcohol use. Table 4 illustrates findings for pro-social and pro-alcohol Facebook cues.

Discussion

Our study findings indicate that intention to drink in responses to pro-alcohol Facebook cues was associated with future problem alcohol behavior, suggesting that predicting which students may experience risky drinking behavior is feasible via a Facebook vignette. In addition, students in our study provided thoughtful rationales for how Facebook cues influence their intention to drink, such as by presenting information on which to evaluate a potential drinking partner. Given the burden of morbidity and mortality of alcohol use in college (R. W. Hingson et al., 2009), study findings present a comprehensive mixed-methods approach to understanding potential mechanisms through which Facebook cues may influence collegiate alcohol use.

Our finding of greatest clinical and public health importance was in response to RQ3, where we found that positive intention to use alcohol in response to pro-alcohol Facebook cues at baseline was associated with future problem drinking. This finding was robust across both problem drinking outcomes, past-28 day binge episodes and problem alcohol behaviors measured via the AUDIT. This major finding is supported by information gleaned from RQ2. We found significant positive associations between intention to drink in response to Facebook cues and both alcohol-related attitudes and descriptive norms in RQ2. These findings suggest that participants who responded to pro-alcohol cues on Facebook with greater intention to drink may have been filtering these cues through their existing positive attitudes towards alcohol, as well as more likely to have a peer group of alcohol users. Study findings suggest that participants who arrived at college with these similar attitudes or peer groups were more at risk for problem alcohol use two years later.

In contrast, we found that intention to drink in response to pro-social Facebook cues was not significantly associated with future problem alcohol use. This finding is also supported by information gleaned from RQ2 in which we found that intention to drink in response to Facebook cues was positively associated with both alcohol-related attitudes and injunctive norms. Thus, participants who responded to pro-social cues on Facebook with greater intention to drink may have had a peer group who approved of alcohol use, though this peer group was not significantly more likely to be alcohol users themselves. This suggests a different set of peer norms may have been present among participants who responded in this manner. Our findings in RQ1 suggest that many participants evaluated the pro-social Facebook cues for clues to whether the hypothetical senior student would be a safe or responsible drinking partner. This response pattern may reflect participants who intended to drink in college, but wanted to do so safely. Thus, findings suggest that participants who arrived at college with this framework for alcohol use were not significantly likely to be at risk for future problem alcohol use.

There are several limitations to this study. First, the validity of college students' responses to vignettes in relation to alcohol behaviors has not been established prior to this study. However, previous work has illustrated correlations between responses to vignettes and actual behavior in similar contexts (Peabody et al., 2004), and work established that students' responses to the two cue types did in fact differ. Second, vignettes presented an auditory description of viewing Facebook, assessed via a phone interview. We chose to use

auditory cues to avoid participants responding to visual Facebook cues, such as attractiveness, that may have biased responses. Support for using auditory cues may be provided by consideration that Facebook profiles are no longer just an online platform, they are discussed in person using a conversational audio channel (D'Angelo, Zhang, Eickhoff, & Moreno, 2014). However, we recognize that elements of how the information is presented on Facebook, such as through images, text or video, can also impact its influence and thus intentions to use alcohol. Future studies are needed to isolate Facebook cues visually and determine if influence on alcohol intention is similar and predictive of later alcohol use. Third, there are numerous influences on alcohol behaviors that our study did not assess, such as genetics, family influences and campus cultural norms.

Finally, this study focused on the social networking site Facebook, as this site has maintained popularity for almost a decade (Lenhart, Purcell, Smith, & Zickuhr, 2010). It remains unclear whether the findings in this study would generalize to other social media experiences. However, our use of auditory cues provides a way to isolate and standardize provision of individual cues that can be applied to a variety of social media sites.

Conclusions

There are many challenges in predicting which incoming college students will have problem alcohol use, including potential social desirability bias in response to personal alcohol use questions. Findings indicate that responses to pro-alcohol Facebook cues presented through a vignette predicted later problematic alcohol use. Our results support associations between intention to drink in response to vignette clues and TRA variables including alcohol-related attitudes and norms. Thus, findings support that contextual factors such as friends' drinking attitudes and behaviors may serve as lenses through which college students interpret Facebook posts.

Finally, results include an understanding of the complex mechanisms through which Facebook cues influence collegiate drinking, including inferences about the person posting, the content posted and one's own character. Together, our study findings suggest that using a vignette could someday be a complementary approach to identifying college students who may be at risk. A vignette approach could be integrated into assessments or orientation activities for incoming students to provide a safe framework for discussion. Integrating Facebook cues into social norms interventions may increase efficacy by addressing a common platform in which alcohol norms may be experienced. Finally, a vignette approach could be used in future studies to understand how young adults respond to other types of cues, such as substance use, presented on social media.

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Figure 1. The Theory of Reasoned Action
Adapted from Fishbein and Ajzen, 2011

Introductory text read to participants:

“For this vignette, imagine yourself as you are now. You have just met a senior student in one of your classes. You find that you have some common interests. This senior student has invited you to attend a party tonight at their friend’s house. Let’s assume there will be alcohol at this party. OK, now imagine that you are currently looking at this person’s Facebook profile to learn a little more about him or her before you go out tonight. We will present a series of things that you see on the person’s Facebook profile, such as messages or photos. Given this situation, for each item, consider how likely you think you would be to drink alcohol at the party on a scale of 0 to 5, with 0 being not at all likely to 5 being extremely likely, and then I’ll ask for any thoughts on why that might be.”

Vignette cues:

- 1.If you saw the status update “I’m planning to get totally wasted tonight” (*pro-alcohol*)
2. If you saw the status update “Can’t wait to run another marathon” (*pro-social*)
3. If you saw personal pictures of the person on a family vacation (*pro-social*)
4. If you saw personal pictures of the person at parties doing keg stands (*pro-alcohol*)
5. If you saw they were a member of the Facebook group “Mothers against drunk driving” (*pro-social*)
6. If you saw “Getting ahead in life” in their interests section (*pro-social*)
7. If you saw multiple wall posts by person’s friends describing times that person was intoxicated (*pro-alcohol*)
8. If you saw multiple wall posts by person’s friends describing plans for a study group (*pro-social*)

Figure 2:
Vignette

Table 1:

Participant information for incoming college students from two US universities

n=338		n (%)
Gender		
	Female	190 (56.1%)
	Male	148 (43.9%)
University		
	Midwest	199 (58.8%)
	Northwest	139 (41.2%)
Ethnicity		
	Caucasian/White	253 (74.8%)
	Asian	39 (11.6%)
	More than One	21 (6.2%)
	Hispanic	13 (3.9%)
	African American/Black	5 (1.5%)
	East Indian	3 (0.8%)
	Native American/Alaskan	2 (0.6%)
	Other	2 (0.6%)

Table 2. Young adults' rationale for ways in which Facebook cues influence intention to drink alcohol

Response categories	Example subcategories and quotes
Evaluations and assumptions about the senior student	<p>Responsible: "I think this person would know their limits," in response to pro-social cue</p> <p>Bad host: "I'm concerned this person wouldn't be fun to be with if he was drunk," in response to pro-alcohol cue</p> <p>Outside interests: "This person has interests other than drinking," in response to pro-social cue</p> <p>Intimidating: "Being with a senior would be intimidating," in response to pro-alcohol cue</p> <p>Partier: "This person looks like a partier, looks like fun," in response to pro-alcohol cue</p>
Personal alcohol-related views and experiences	<p>Not a drinker: "I'm not a drinker so I wouldn't drink at the party regardless of what the senior did," in response to pro-alcohol cue</p> <p>Drinker: "I like to drink at parties so I would do it anyway," in response to pro-social cue</p> <p>Not going to get drunk: "I like to drink but wouldn't get drunk," in response to pro-alcohol cue</p> <p>Non-partier: "I don't like to go to parties, I'd rather drink in small social gatherings," in response to pro-social cue</p>
Identity introspection	<p>Identity alignment: "I didn't think I'd be a person to go to parties, but if I could be like someone who goes running and to parties....." in response to pro-social cue</p> <p>Personal values: "I am really against drunk driving, I'd need to think about how I'd get home," in response to pro-social cue</p> <p>Personal susceptibility: "If I go to this party with this person, people will be drinking, and I will drink too," in response to pro-alcohol cue. Additional example: "I'm someone with a lot of self-control so I could stop myself from drinking too much," in response to pro-alcohol cue.</p>
The role of Facebook	<p>Skepticism about Facebook: "I don't believe everything on Facebook," in response to pro-social cue</p> <p>Facebook is public: "It's dumb to post about alcohol on Facebook," in response to pro-alcohol cue</p> <p>Social endorsement on Facebook: "If I go to the party with this senior maybe he will post about me later," in response to pro-social cue</p> <p>No influence: "Facebook has no influence on me," in response to pro-social cue</p>

Table 3:

Associations between intention to drink alcohol in response to Facebook cues and Theory of Reasoned Action (TRA) variables alcohol-related attitudes and norms

Variable	Response to pro-social Facebook cues			Response to pro-alcohol Facebook cues		
	Estimate	95% CI	p-value	Estimate	95% CI	p-value
TRA: Alcohol-related attitudes	0.36	(0.28, 0.44)	<0.001	0.37	(0.29, 0.45)	<0.001
TRA: Injunctive norms towards alcohol	0.01	(0.01, 0.02)	<0.001	0.01	(-0.00, 0.01)	0.074
TRA: Descriptive norms towards alcohol	0.00	(0.00, 0.01)	0.724	0.01	(0.00, 0.01)	0.004
Gender: Male referent	-0.30	(-0.51, -0.09)	0.006	-0.41	(-0.63, -0.20)	<0.001
Race: White	0.02	(-0.25, 0.28)	0.913	-0.05	(-0.31, 0.21)	0.713
University: Northwest referent	0.17	(-0.07, 0.40)	0.167	0.44	(0.21, 0.67)	<0.001
Lifetime alcohol use	0.48	(0.21, 0.74)	<0.001	0.23	(-0.03, 0.49)	0.082
Past 28-day alcohol use	0.63	(0.45, 0.82)	<0.001	0.60	(0.42, 0.78)	<0.001

Table 4:

Association between intention to drink in response to Facebook cues and problem alcohol use two years later

<i>Pro-social Facebook cues</i>						
	Past 28-day binge episodes			AUDIT score *		
Variables	Estimate	95% CI	p-value	Estimate	95% CI	p-value
Intention to drink alcohol	0.28	(−0.08, 0.63)	0.13	0.13	(−0.21, 0.47)	0.46
University (Northwest referent)	0.52	(−0.49, 1.54)	0.31	1.46	(0.56, 2.37)	0.002
Gender (Female referent)	0.63	(−0.25, 1.51)	0.16	0.62	(−0.20, 1.43)	0.14
Race (White referent)	−0.30	(−1.50, 0.9)	0.63	−0.67	(−1.71, 0.37)	0.21
Alcohol-related attitudes	0.60	(0.06, 1.14)	0.029	0.97	(0.51, 1.42)	<0.001
Injunctive norms towards alcohol	0.003	(−0.04, 0.04)	0.90	0	(−0.03, 0.04)	0.87
Descriptive norms towards alcohol	0.02	(−0.01, 0.05)	0.25	0.03	(0, 0.06)	0.047
Current Alcohol Use	0.812	(−0.37, 2)	0.18	2.60	(1.50, 3.69)	<0.001
<i>Pro-alcohol Facebook cues</i>						
	Past 28-day binge episodes			AUDIT score		
Variables	Estimate	95% CI	p-value	Estimate	95% CI	p-value
Intention to drink alcohol	0.55	(0.16, 0.94)	0.006	0.82	(0.43, 1.2)	<0.001
University (Northwest referent)	0.28	(−0.73, 1.28)	0.59	1.22	(0.33, 2.11)	0.007
Gender (Female referent)	0.52	(−0.36, 1.39)	0.25	0.45	(−0.35, 1.25)	0.27
Race (White referent)	−0.27	(−1.45, 0.91)	0.65	−0.69	(−1.70, 0.32)	0.18
Alcohol-related attitudes	0.46	(−0.08, 1.00)	0.10	0.71	(0.27, 1.16)	0.002
Injunctive norms towards alcohol	0.01	(−0.03, 0.05)	0.78	0.00	(−0.03, 0.03)	0.88
Descriptive norms towards alcohol	0.01	(−0.02, 0.05)	0.52	0.02	(−0.01, 0.05)	0.17
Current Alcohol Use	0.8	(−0.36, 1.96)	0.18	2.12	(1.05, 3.19)	<0.001

* AUDIT: Alcohol Use Disorders Identification Test