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Facebook Displays as Predictors of Binge Drinking: From the Virtual to the Visceral

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Abstract

Given the prevalence of social media, a nascent but important area of research is the effect of social media posting on one's own self. It is possible that an individual's social media posts may have predictive capacity, especially in relation to health behavior. Researchers have long utilized concepts from the Theory of Reasoned Action (TRA) to predict health behaviors. The theory does not account for social media, which may influence or predict health behaviors. The purpose of this study was to test a model including Facebook alcohol displays and constructs from the TRA to predict binge drinking. Incoming college freshmen from two schools (312 participants between the ages of 18 and 19) were interviewed prior to (T1) and one year into college (T2), and their Facebook profiles were evaluated for displayed alcohol content. Path modeling was used to evaluate direct and indirect paths predicting binge drinking. Path analysis suggested that Facebook alcohol displays at T1 directly predict binge drinking at T2, while alcohol attitude both directly and indirectly predicts binge drinking. Based on these results, a preliminary model of social media presentation and action is discussed.

Keywords

Facebook; alcohol; college students; identity; self-presentation

College Students, Facebook, and Alcohol

Today's young adults live in a digital society. Phrases such as “Facebook friend,” the humor of memes, and the importance of Reddit karma would have been incomprehensible a decade ago, but today such concepts serve as a foundation in the cultural lingo of young adults. Since the advent of social media, young adults have been early adopters and voracious users of these tools (Purcell, Smith, & Zickuhr, 2010). Whether the tool is Twitter, Tumbler, or Tinder, there is now often a digital interface involved in communication between the self and others.

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Of these social media tools, Facebook is currently the most popular. Facebook is prevalent across demographic groups and remains the most popular social networking site among older adolescents and college students (Duggan & Brenner 2013; Madden 2013). Facebook allows users to create an online profile including displayed personal information via text, video, surveys or photographs, to communicate with other profile owners via messaging, and to build an online social network by “friending” profile owners. Nearly all college students have a social networking site (SNS) profile on Facebook and most report daily use (Buffardi & Cambell, 2008; Christofides, Muise, & Desmarais 2009; Ellison, Steinfield, & Lampe, 2007; Lenhart, 2010; Lewis, Kaufman, & Christakis, 2008; Ross et al., 2009). In addition to using the site to keep in touch with existing friends, Facebook has become an important part of the friendship formation process (Courtois, All, & Vanwynsberghe, 2010). Simply put, Facebook is part of the architecture that shapes collegiate social life for many students.

Social media brings together two forms of influence that are recognized as contributors to behavior in adolescents and young adults: peers (Gardner & Steinberg, 2005) and media (Huesmann, Moise-Titus, Podolski, & Eron, 2003). These combined powers, interpersonal persuasion with the reach of mass media, may produce an environment with significant effects. The concept of “mass interpersonal persuasion” has been described as “the most significant advance in persuasion since radio was invented in the 1890s” (Fogg, 2008). It is likely that users of Facebook learn of cultural norms from the peer displays on this website. In fact, recent research suggests that social media depictions of tobacco use predict future smoking tendency over other media (TV & Movie) depictions of smoking (Dupe, Southwell, Betzner, & Walsh, 2014).

Beyond the impact on others, there may be a relationship between one's own social media displays and one's own behavior. Previous research suggests that when an individual portrays a particular trait publically online, he or she tends to internalize this trait (Gonazels & Hancock, 2008). This effect was conceptualized as identity shift. Importantly, this phenomenon was uncovered in an experimental setting in which the researchers focused on changes in the idea of self-concept, specifically extraversion and introversion, utilizing self-report. While there is some evidence that posting online impacts self-concept, little is known about to what extent it influences the self: does posting online predict future attitudes, intentions, and behaviors, or just general self-concept? Research has established that viewing one's own Facebook page can enhance self-esteem (Gonzales & Hancock, 2011) and produce feelings of self-affirmation (Toma & Hancock, 2013), but little is known about the relationship between posting content and future behavior. Will posting about studying make an individual study in the future, or just see himself or herself as a more diligent individual? Questions like these point to the relative lack of research on the effects of social media posts on the self.

The possible consequences of Facebook influence emerge more clearly when considering the posting behavior of college students. One behavior of concern is binge drinking, which is defined as defined as consuming 4 or more drinks for females and 5 or more drinks for males in one day. College students frequently post references to alcohol use on Facebook, including references to excessive alcohol use or binge drinking behaviors (Egan & Moreno,

2011). Studies suggest that up to 80% of college student Facebook profiles include displayed references to drinking, binge drinking behaviors, and problem drinking behaviors such as driving while drunk (Egan & Moreno, 2011; Moreno et al., 2009). Underage drinking remains a major public health challenge in the college student population (NIAAA, 2003; White & Hingson, 2014). For some first-year students, experimentation with alcohol use begins with arrival at college. Among students who did not drink heavily in high school, approximately 20% initiate this behavior in college (Wechsler et al., 2002). For other students, arrival at college may prompt a transition from experimentation to frequent alcohol use (Johnson, O'Malley, Bachman, & Schulenberg, 2007). While up to 80% of college students drink alcohol at some point during college, this common behavior is not without consequences (Boyd, McCabe, & Morales, 2005). Drinking to excess, or binge drinking, is a particular concern among college students as it is a common behavior and often associated with significant negative consequences (Hartzler & Fromme, 2003; Reifman & Watson, 2003). Concerns such as accidents, unwanted sexual encounters and injuries are all associated with binge drinking (Abby, 2002; Chartier & Caetano, 2012).

Given the popularity and potential influence of Facebook on college students' binge drinking, efforts are needed to understand what role new communications such as social media play in existing behavioral models. If writing about oneself online in an extraverted way can lead to more extraverted self-concept (Gonazels & Hancock, 2008), we wonder if portraying oneself as a drinker on social media can lead to more drinking behaviors. Thus, the purpose of this study was to understand the role that one's own Facebook alcohol displays (e.g., a positive comment or picture about alcohol) play predicting binge drinking. Towards this purpose we applied constructs from the Theory of Reasoned Action to determine whether and where the construct of Facebook alcohol displays fits in predicting binge drinking as an outcome among a longitudinal sample of college students from two universities.

Theory of Reasoned Action and Alcohol Use

Previous health behavior models have been applied to health risk behavior such as alcohol use (Gibbons, Houlihan, & Gerrad, 2009). One theory of behavior change that can be applied to alcohol use is the Theory of Planned Behavior (TPB) (Ajzen, 1985; Ajzen, 1991). This theory states that attitude toward the behavior, perceived subjective norms, and perceived behavioral control shape an individual's behavioral intentions and intentions predict behaviors. Previous work suggests empirical support for constructs within the Theory of Planned Behavior; the model accounts for between 22% and 65% of the variation in binge-drinking behaviors (Armitage & Conner, 2001; Armitage & Conner, 2002). Importantly, this theory emerged out of the Theory of Reasoned Action (TRA) (Fishbein & Azjen, 1975). The theory of reasoned action only differs from TPB in that it does not utilize perceived behavioral control as an indicator of intention, relying only on attitude and subjective norm as predictors of intention, which in turn predicts behavior. Regardless of one less predictor, the TRA has received strong empirical support for its predictive utility (Sheppard, Hartwick, & Warshaw, 1988). Thus, in developing the most parsimonious model, some predictions can be made just focusing on only the constructs present in the TRA. It is important to note here that we are not trying to replicate the TRA, but rather

utilizing well documented constructs as a first step towards building a predictive model that includes social media posts.

First, the Theory of Reasoned Action (Fishbein & Azjen, 1975) suggests that the perceived subjective norm of a behavior and an individual's attitude towards a behavior predict behavioral intention at that time. For instance, assessing an incoming college student's attitude toward alcohol and perception of subjective norms before they enter college should be predictive of their intention to drink at that time. Consequently, in the context of first-year college student drinking predictions can be made:

> **H1:** Greater perceived approval of alcohol by friends prior to freshman year (T1) is associated with a greater intention to drink at that time (T1).

> **H2:** Greater attitude towards alcohol in the summer prior to freshman year (T1) is associated with a greater intention to drink at that time (T1).

Further, an individual's intention is important, for in this model intention is a sole predictor of behavior. Subsequent meta-analyses have indicated that change in intention leads to change in behavior (Webb & Sheeran, 2006). Importantly, according to the TRA, intention is meant to predict behavior at a later time. However, the time-frame between initial measurements and behavioral measurements has varied in the literature, and generally speaking measuring attitude, subjective norm, and intention closer to the time of predicted behavior is considered more advantageous (Sheppard, Hartwick, & Warshaw, 1988). In fact, Ajzen & Fishbein (1980) did intend for intention to be measured close to time of behavior. However, there is also evidence that suggests the strength of the relationship intention and behavior is not affected by the time interval between these measures (Randall & Wolff, 1994). Thus, we expect intention to remain predictive of binge drinking behavior even over a longer term. Hence, we posit:

> **H3**: Greater intention to drink alcohol in the summer prior to freshman year (T1) is associated with increased episodes of binge drinking at the conclusion of freshman year (T2).

Additional Connections for Predicting Binge Drinking

While the theory of reasoned action has evidence of validity, there remains variance unaccounted for by these concepts alone. As such, researchers have sought to identify additional predictors or re-conceptualize the paths described by the model. One proposed path is the influence of attitude directly on behavior. Put another way, having a positive attitude towards a behavior may lead to that behavior, regardless of intention. Previous work has evaluated models of attitude and intention on drinking behaviors and found both direct and indirect paths from attitude to behavior (Elliot & Ainsworth, 2012; Cooke, Sniehotta, & Schuz, 2007).

Moreover, direct paths between attitude and behavior have face validity, as it is likely that binge drinking is not an activity that is always intended by students. Put another way, it is unlikely that all binge drinking students deliberately think “This is it I'm gonna get plastered” (Mancini-Peña & Tyson, 2007, p. 38). Rather, binge drinking may be the combined product of a favorable attitude towards alcohol, a culture known for alcohol use,

and a context that provides access. Binge drinking can likely occur without any specific intention on the part of an individual. Thus, an additional hypothesis can be posited:

> **H4**: Greater attitude towards alcohol in the summer prior to freshman year (T1) is associated with increased episodes of binge drinking at the conclusion of freshman year (T2).

The Theory of Reasoned Action, Binge Drinking, and Facebook

While health behavior models, and the Theory of Reasoned Action, have contributed much to our understanding of mechanisms involved in behaviors, patterns of human thought are not stagnate over time. Rather, human thought evolves with the onset of new technology and tools (Donald, 1993). Thus, it is likely that incoming college students see the world differently those even a decade ago – they interact with the world though a technological lens comprised of mediums such as Facebook, Instagram, and Twitter.

As such, arguments have surfaced that models need to adapt to newer influences on behaviors and their antecedents. In particular, one area possibly fertile for this investigation is that of incoming college freshmen and drinking activity. McCreanor et al. (2013) argue that “currently research is preliminary and descriptive, and we need innovative methods and detailed in-depth studies to gain greater understanding of young people's mediated drinking cultures and commercial alcohol promotion” (McCreanor et al., 2013). Additionally, a recent summit convened by Rand concluded that new evaluation of existing behavioral health models is needed to understand the role of technologies such as social media (Collins, Martino, & Shaw, 2011).

One such product of technology that is omnipresent and may have much use as a component of theory is the Facebook post. A Facebook post is the presentation of some aspect of self on one's own virtual profile for viewing by select friends, a whole network, or even the entire web. While research has considered the content of these posts, their association with activity, and considered their possible influence (Moreno et al., 2010; Moreno, Briner, Williams, Walker, & Christakis, 2009; Moreno et al., 2014; Litt & Stock, 2011) little research has considered the predictive power of a Facebook post within a theoretical framework. It is possible, as Facebook posts may be indicative of attitude or normative expectations, that such posts operate in a similar manner as norms and attitude in predicting behavior. Thus, a final hypothesis considers Facebook alcohol displays and their influence on binge drinking among college freshman:

> **H5**: A greater number of Facebook alcohol displays in the period prior to starting freshman year of college is associated with a greater intention to use alcohol freshman year.

Method

Setting

The data for this study was collected between May 2011 and September 2012 and received approval from the two relevant university Institutional Review Boards.

Participants

Graduated high school seniors who were planning to attend one of the two targeted study universities were recruited the summer prior to beginning college. Participants were eligible if they were between the ages of 17 and 19 years and enrolled as first-year fulltime students for fall 2011 at one of these two universities. A subset of approximately 600 potential participants were randomly selected from the full registrar's lists of incoming first-year students from both universities for recruitment with a goal of recruiting 300 students.

Recruitment

Students were recruited through several steps, beginning with a pre-announcement postcard. Over a 4-week recruitment period potentially eligible students were recruited through up to 4 rounds of emails, phone calls and Facebook messages. Students were excluded if they were outside the age range for this study. Students were also excluded if they had already arrived on campus for summer early-enrollment programs, as baseline measures were intended to measure pre-college experiences.

Consent process and Facebook friending

During the consent process potential participants were informed that this was a longitudinal study involving a baseline phone interview as well as evaluation of Facebook profiles, and that friending our research team profile was a requirement of the study. Participants were informed that Facebook content would be viewed, but that no one on the research team would post any information to the participant's profile. Participants were asked to maintain open security settings with our research team during the study. Students who provided consent to enroll in the study were sent a Facebook friend request from one of our research assistant Facebook profiles designated for use in this study.

Codebook and variables—An existing codebook was used to evaluate displayed alcohol references. This codebook has been described in previous publications and studies (Egan & Moreno, 2011; Moreno, Egan, & Brockman, 2011). This research codebook was initially designed to evaluate displayed alcohol references on Facebook that represented alcohol behaviors. For the purposes of this study, the definition of displayed alcohol content was expanded applying the theory reasoned action as a conceptual framework (Ajzen & Fishbein, 1980). This theory supports the importance of attitudes and intentions predicting behaviors. Thus, displayed alcohol content referring to attitudes, intentions or behaviors regarding alcohol were considered displayed alcohol references.

Example references included personal photographs in which the profile owner was drinking from a beer bottle, or text references describing drinking vodka at a party. Only text references that explicitly mentioned the profile owner's attitudes, intentions or behaviors towards alcohol or photographs that included the profile owner with a clearly labeled alcoholic beverage were coded as an alcohol reference. For example, a status update such as “Needs a drink after this week, and its only Monday” would be coded as an alcohol reference. The codebook was designed to be conservative in approach; thus, while a red solo cup may be indicative of alcohol beverages to some college students it would not be counted

in our coding approach, unless coders were able to view and confirm the presence of an alcoholic beverage in a cup.

Coding procedure—The Facebook profile of each participant was initially evaluated at the time of enrollment in the study by a trained coder. This baseline evaluation included a 3-month period toward the end of the participant's senior year of high school. Researchers recorded displayed alcohol reference data, including the coder's typewritten description of any image references or verbatim text from profiles, as well as Facebook use data. If present, identifiable information was removed from text references. Sections of the Facebook profile that were evaluated included the wall, photographs, groups and likes/interests.

A total of 7 coders evaluated profiles in this study, and all had undergone a minimum 3 month training period. A 20% random subsample of profiles were evaluated by all coders to test interrater reliability. Fleiss' Kappa statistic was used to evaluate the extent to which there was overall agreement in the coding of the presence or absence of alcohol references on a profile, as well as agreement among coders for the number of references on a profile. Fleiss' kappa was 0.82 for the presence or absence of alcohol references present on profiles indicating strong agreement, and 0.74 for the agreement among all coders for the number of alcohol references indicating substantial agreement.

Interview procedure

Phone interviews were conducted with all participants at the time of enrollment as a baseline evaluation, and then again at the conclusion of the student's freshman year of college. Phone interviews were used because many participants were more than an hour away from the primary research site, and because phone interviews have been used successfully in the past as a way to investigate stigmatizing topics such as risky health behaviors (Fortney et al., 2004; Meyer, Rossano, Ellis, & Bradford, 2008). Interviews were scheduled at a time of convenience for the participants. Interviews lasted approximately 30-40 minutes and included other questions relevant to the larger context of the study not reported here. Participants received $30 as an incentive for completing the interview.

Measures

Exogenous Variables

Alcohol attitude and perceived peer approval were measured during the baseline phone interview. Attitudes toward alcohol 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?" This question was developed based on previous work that developed Likert scales to assess young adults' attitudes towards alcohol (Benevene & Scopelliti, 2012; Devos-Comby & Lange, 2008; O'Callaghan, Chang, Callan & Baglioni, 1997). Participants' responses to this question were scored and categorized exactly as they appeared on the Likert scale, with 0=very negative, 1=negative, 2=somewhat negative, 3=neutral, 4=somewhat positive, 5=positive, and 6=very positive (M = 3.05, SD = 1.25).

The concept of social norms was considered through peer approval. Peer approval was assessed by considering how an individual viewed their friends' approval of alcohol. Specifically, participants were asked what percentage of their friends approve of alcohol use (M = 62.63, SD = 28.83)

Facebook displays of alcohol were also measured at baseline. This process (described in 3.4 – 3.6 above) evaluated three months' worth of posts for each participant in the time frame just prior to entering freshman year of college. Specifically, any Facebook posts that referenced alcohol were counted, leading to a sum total for each student (M = .33, SD = .9).

Endogenous Variables

Additionally, intention to drink alcohol was assessed at baseline. We used an innovative approach to assess intention of students: vignettes. Vignettes are systematically elaborated descriptions of concrete situations and are considered valid and comprehensive method for assessing people's perceptions, beliefs and meanings about specific situations (Alexander & Becker, 1978; Barter & Renold, 1999; Dresselhaus, Peabody, Luck & Bertenthal, 2004; Peabody, Luck, Glassmam, Dresselhaus & Lee M, 2000; Peabody et al., 2004; Young, Dilworth & Mott, 2003). Vignettes allow for avoidance of observer effect and many ethical dilemmas, and control of confounding effects (Dresselhaus et al., 2004; Gould, 1996; Peabody et al., 2000; Spalding & Phillips, 2007).

The vignette was designed to assess participant views of how displayed Facebook content would impact intention to drink in a particular setting. Participants were asked to place themselves in the hypothetical situation of attending a party. Students were then asked the likelihood that they would drink at that party ranging from (1) "Not at all likely," to (5) "Very likely" (M = 1.87, SD = 1.42). While this vignette represents an intention more specific than the more global intention measures typically to predict behavior, it was done so with reason. This is not meant to be a replication of the TRA, but rather a model based on the concepts well established within the TRA. By presenting participants with a more specific situation likely to occur in college and asking about a specific outcome, as necessitated by the vignette methodology, we intend to access more accurate feeling of drinking intention that are free from observer effects or other confounding effects that a more general question may produce.

Finally, binge drinking behaviors were assessed at the end of the study period. This variable was examined by phone interview after completion of the freshman year of college. If a participant reported current use of alcohol, we used the TimeLine Follow Back (TLFB) method to determine quantity and frequency in the last 28 days (Sobell & Sobell, 1992). During this validated procedure the interviewer works with the participant to review each day of the past 28 days to assess how many standard alcohol drinks were consumed. This procedure leads to the following measured outcomes total calculated number of binge drinking episodes in the past 28 days.

All drinking assessments defined a drink as: a 10–12 ounce can or bottle of 4%–5% alcohol beer, a 4 ounce glass of 12% alcohol table wine, a 12 ounce bottle or can of wine cooler, or a 1.25 ounce shot of 80-proof liquor either straight or in a mixed drink (Devos-Comby &

Lange, 2008). Consistent with previous studies, a binge drinking episode was defined as consuming 4 or more drinks for females and 5 or more drinks for males in one day. Thus a final number of was reached for the number of binge drinking episodes for each participant in the 28 days prior to the interview (M = 1.81, SD = 3.08).

Analysis

Utilizing LISREL 8.8, a maximum likelihood path analysis was conducted in order to examine the hypothesized model. In order to assess the model a number of measures of good fit were evaluated, as there is no single accepted standard for evaluating the fit of a path model (Kline, 2005). First, general statistical significance was considered with a significant X^2 (p = <.05) indicating poor fit. Secondly, two fit indices were considered as suggested by (Hu & Bentler, 1999). Specifically, the model was considered to be a good fit if the Standardized Room Mean Squared (SRMR) was below .08 and the Root Mean Square Error of Approximation (RMSEA) was below .06.

Upon testing of the hypothesized model, post-hoc tests were planned. To achieve the strongest statistical model, analysis was conducted to see if statistically and theoretically informed revisions might produce a better fitting model. This process of revision involved deleting any non-significant paths and adding paths based LISREL modification indices, and theoretical reasoning.

Results

Participants

A total of 338 participants were recruited (54% response rate) and 312 participants completed the interview at the end of their first-year (92.3% retention rate). All participants were between the ages of 18 and 19 at baseline.The sample was 57% Female, 75% White, and approximately 60% of the sample attended University A.

Preliminary analysis

Correlations between exogenous and endogenous variables are presented in Table 1.

Theoretical model overall fit

As a whole, the proposed theoretical model was approaching acceptable fit, but would not in this version be considered to fit the data, X^2 (df = 2) = 5.22, p = .07. The model fit indices indicated levels just above what would be considered cutoffs for good fitting model: while SRMR = .03, which was below the .08 cutoff indicated by Hu & Bentler (1999), the RMSEA was .07 and above the .06 cutoff. Thus, while approaching fit, there were some misspecifications within this model, as will be seen in examining the pathways.

Model pathways

Most of the pathways in this model were significant, and support the hypotheses backing them. Friend alcohol approval at baseline was a positive predictor of intention to use at baseline (γ = .29, t = 6.13, p < .05) thus supporting H1. Additionally, alcohol attitude at baseline was a positive predictor for intention to use (γ = 0.50, t = 10.60, p < .05) supporting

H2, and binge drinking episodes during the first-year of school (γ = .22, *t* = 3.50, *p* < .05) supporting H4. Also, as expected by H3, intention at baseline was also a positive predictor of first-year binge drinking (β = .34, *t* = 5.38, p < .05). However, one pathway was found to be non-significant. Specifically, Facebook alcohol displays at baseline were not necessarily positive predictor of intention to drink during the first-year of college (β = .03, t = .08, *ns*). H5 was not supported.

Post Hoc Analysis

Upon viewing the fit of the proposed model, and its near fit, researchers conducted a post-hoc analysis. One thing that became clear at this stage was the misplacement of Facebook alcohol displays within the model. It was clear that more Facebook alcohol displays did not indicate a greater intention to drink. At this point it was considered that Facebook alcohol displays may act in a similar manner to attitude, and be predictive more of actual behaviors than intention. In this scenario, the identity portrayed on Facebook may be not necessarily an indicator of intention, but rather behavior itself.

Thus, the pathway from Facebook alcohol displays to intention was removed, and Facebook displays were allowed to load directly onto binge drinking episodes. The resulting model fit very well, X^2 (*df* = 2) = 1.84, *p* = .38, SRMR = .014, RMSEA = .00. Additionally, in this model all pathways were significant further indicating the strong fit of this model: friend alcohol approval at baseline was a positive predictor of intention to use at baseline (γ = .29, *t* = 6.72, *p* < .05), alcohol attitude at baseline was a positive predictor for intention to use (γ = 0.50, *t* =10.72, *p* < .05) and binge drinking episodes during the first-year of school (γ = .21, *t* = 3.34, *p* < .05). Also, intention at baseline was a positive predictor of first-year binge drinking (β = .33, *t* = 5.24, p < .05). Finally, Facebook alcohol displays at baseline were a positive predictor of first-year binge drinking (γ = .10, *t* = 2.02, *p* < .05).

Discussion

Summary of findings

Findings illustrate a predictive model of first-year students binge drinking that incorporates traditional elements of the TRA with the inclusion of Facebook alcohol displays. In this model, positive attitude towards alcohol predicted binge drinking through a direct path as well as through intention to drink. Notably, this model had improved overall fit with the inclusion of Facebook alcohol displays as a direct predictor of alcohol behavior compared to a model without this path. Findings suggest that Facebook posts predict future binge drinking behavior directly, in a manner not mediated by intention.

Incorporation of Facebook into model

Findings indicate that Facebook alcohol displays before college best fit as a direct predictor of binge drinking toward the conclusion of freshman year rather, as opposed a predictor of binge drinking that is moderated by intention. Similar to positive attitude towards alcohol, Facebook alcohol displays may indicate a willingness to binge drink. By displaying such activities on one's Facebook page, a young college student may not actively indicate their intention to seek out alcohol, but rather make it clear that they consider alcohol a part of

their own identity. While this action itself is possibly common (Moreno et al., 2009) and socially desirable (Ridout et al., 2012), it is not without consequence: students who post more alcohol references before college binge drink more during college.

There are two possible reasons for this connection. The first is that Facebook displays may be a form of measuring behavior (likely in addition to attitude and norms). In this instance then, we have a measure of drinking behavior at T1 used to predict a measure of drinking behavior at T2, which explains the direct connection. This finding, while not necessitating nuanced theory to explain, is nonetheless an important contribution to the understanding of social media posting. It is evidence that an individual's Facebook posts may serve as a predictor for not only future behavior, but future behavior that may be a degree more intense or problematic than it appears on Facebook. That is, for these students basic alcohol references (pictures, comments) before college acted significant predictors of binge drinking toward the end of the first year of college. Thus, there is clear evidence that Facebook and other social media posts may be a unique tool when it comes to predicting health behavior.

There is, however, and additional reason why we see this direct connection between Facebook posts and future activity: Facebook may have a subtle and underestimated effect on identity. These findings may be further explained by the phenomenon of identity shift in computer-mediated communication. Previous work suggests that when an individual portrays a particular trait publically online, he or she tends to internalize this trait, whereas those who portray themselves with the trait in a private document do not see this effect (Gonazels & Hancock, 2008). Additionally, this identity shift has been found to be even stronger when the trait presented received consistent positive feedback (Walther et al., 2011). As such, displaying oneself as a drinker online may lead to more drinking behavior in real life regardless of the motivation for such display. If such Facebook alcohol displays receive positive or consistent feedback, this effect of identity shift may be even greater. Thus, it is possible that, along with baseline attitudes and social norms, public displays online are an important predictor of future behavior.

Bypassing intention

In contrast to the Theory of Reasoned Action, this model indicated attitude as a direct predictor of behavior in addition to a predictor of intention. This finding is consistent with recent research (Cooke, Sniehotta, & Schuz, 2007; Elliot & Ainsworth, 2012) in which college student attitude towards alcohol may not necessarily indicate their intention to drink, but rather may be predictive of actual binge drinking behaviors. As such, attitude may be reflective of not a concept so directed as intention, but may be indicative of a *willingness* to engage in binge drinking. When considered this way, it becomes clear how an individual may engage in binge drinking without ever really intending to. While one might not go out of their way to find context in which to drink, should the opportunity to party arise it may not be automatically turned down.

Theoretical implications

This paper represents a first step towards understanding how traditional theories interact with emergent constructs within the age of social media. Previous work supports the need to

re-examine and when necessary update traditional theories of behavior change to account for these new influences (Collins, Martino, & Shaw, 2011). Findings from this study indicate incoming college students who post more about alcohol on Facebook were more likely to engage in binge drinking behaviors during their freshman year of college. Conceptually, the finding reflects itself in a connection between displays in social media and future behaviors. Thus, findings support a model that utilizes traditional aspects of TRA, but incorporate social media practices.

The model presented here is not necessarily a successor to the Theory of Reasoned Action (Fishbein & Azjen, 1975), but offers another way to predict behavior utilizing additional important variables. In both models norms and attitudes predict intention, which predict behavior. Our new model suggests that online presentations also predict behavior. Thus, this new model accounts for the almost ever-present online identity that individuals are cultivating. In an experimental study Knutzen & Kennedy (2012) found that adolescents who developed a representational avatar and socialized it changes in how they think about themselves. It may be that everyone who uses Facebook is doing this to some degree as they choose what personal traits to highlight on their profiles. Thus, almost all internet users are likely consistently experiencing some degree of identity shift, albeit small or large. Thus, the model presented here is intended to be the first step towards the development of a theoretical model that may account for this ongoing process, and the behavioral outcomes possibly associated with this process. Our hope is this model can be used towards developing more accurate behavioral predictions and designing targeted health interventions.

Limitations

While providing a predictive model based on longitudinal data, this study does have important limitations to consider about the generalizability of such a model. Although the sample is representative of the colleges from which the data was drawn, the sample is not representative of all colleges, especially those with more racially and ethnically diverse students. Future research should further test the model in more diverse contexts.

Additionally, there are limitations to the variables that were considered. Our ascertainment of all interview variables, including alcohol use, was limited to self-report, creating the possibility for recall and social desirability bias. However, The TimeLine Follow Back method used in the research interviews is validated to minimize recall bias (Sobell & Sobell, 1992). Additionally, while Facebook alcohol displays were collected as behavioral data, it is possible that students utilized privacy settings to control what the researchers were able to view, or moderated what they posted due to knowledge of being watched. However, participants were informed that we obtained a federal certificate of confidentiality for the study, which we hope helped participants feel comfortable accurately reporting behaviors related to alcohol use and displaying Facebook content to the research team. Finally, the variables of social norms and intention were operationalized in a manner different from previous studies utilizing the TRA and these variables. This was a deliberate choice – this model is meant to be based off of the TRA, not an exact replication. Thus, some liberty was taken in developing measurements more specific to the outcome focus of collegiate drinking. We believe that by providing participants more careful consideration of the context

college drinking operates in (hence, the vignette), we would be able to access more accurate intentions and norms. Thus, while this model is based off of the TRA, it cannot necessarily be compared to other iterations of the model that utilize more traditional measurements.

Practical implications

Just as important as the theoretical steps forward are the practical implications of this study. First and foremost, it is important for both collegiate students and the university administration to understand the tacit effects that alcohol displays may have on actual behavior. As such, it might be beneficial for colleges to consider discussions of displayed alcohol content on social media as part of media literacy training or orientation materials to try to reduce the influence of these displays on the self and social norms. Further, there might be benefits from tailoring pop-up advertisements to Facebook alcohol displays to provide alcohol education *and* important elements of social media literacy linked to displayed content. Additionally, this research provides thought provoking implications for health campaigns. Perhaps aiming at identity cultivation, through actual actions or posts on Facebook, may lead to behavioral change. At its most basic, the message that these findings illustrate is clear: what you post about yourself online matters – what you post may be who you become.

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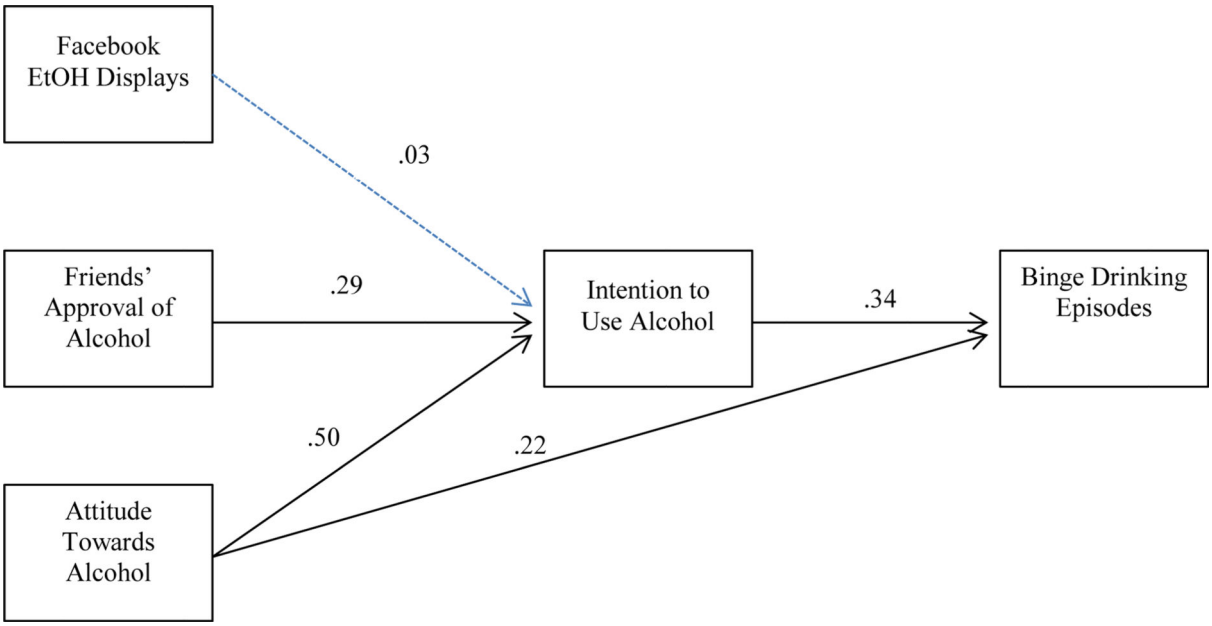

Figure 1.

Hypothesized Model Testing: X^2 (df = 2) = 5.22, p = .07, SRMR = .03, RMSEA = .07. Dotted line indicates non-significant pathway.

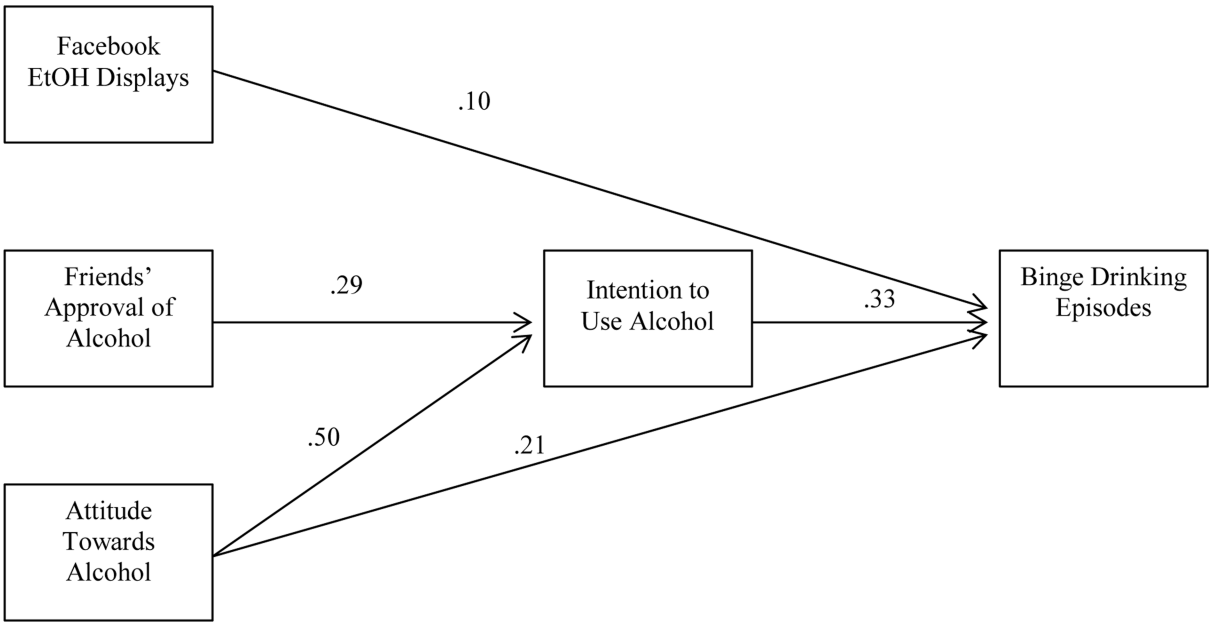

Figure 2.

Best Fitting Model, X^2 (df = 2) = 1.84, p = .40, SRMR = .01, RMSEA = .00. All pathways significant at p = < .05.

Table 1

Correlation matrix.

Variables		Baseline EtOH Displays	Baseline Intention	Baseline EtOH Attitude	Baseline EtOH Approval	Binge Episodes Year	Drinking Freshman
Baseline Displays	EtOH	1					
Baseline Intention		.176*	1				
Baseline Attitude	EToH	.176*	.638*	1			
Baseline Approval	EtOH	.193*	.529*	.474*	1		
Binge Episodes	Drinking	.194*	.481*	.438*	.337*	1	

* $p < .01$

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