Facebook, social media and its application to problem drinking among college students
Brad Ridout

The use of social media to address college drinking is only in its infancy, with this the first review of developments in this area. Given nearly all college students use Facebook, most research has focused on this social networking site. Evidence suggests a disproportionate amount of alcohol content is posted by students on Facebook, influencing peer drinking norms. Portraying oneself as 'a drinker' is an important and socially desirable component of online identity for many students, and a study of alcohol content can be used to identify at-risk students. Early findings suggest Facebook can also be used to deliver a personalized normative feedback intervention, resulting in clinically significant reductions in alcohol consumption. There are unprecedented opportunities to build on these findings by utilizing untested peer-to-peer sharing and geo-locating aspects of social media.

Address
University of Sydney, Sydney, Australia

Corresponding author: Ridout, Brad (brad.ridout@sydney.edu.au)

Introduction
Despite decades of research into strategies to reduce college drinking, there has been little improvement in this time, compared to an overall downward trend in alcohol consumption by 19–25-year-olds [1]. Although evidence demonstrates in-person interventions can reduce alcohol consumption and related consequences, adoption of these approaches has been limited [2**]. Efforts have therefore turned to developing web-based interventions, which have greater reach and are less expensive and difficult to implement [3].

Several reviews of the effectiveness of web-based interventions have been published [4–7], however none have focused on the use of social media, which has recently been implicated as an etiological factor in perpetuating college drinking [8,9,10*,11,12]. The intent of this article is to discuss recent examples of the use of social networking sites (SNSs) for investigating and addressing college drinking, and the exciting potential they hold for the future of alcohol interventions. Given over 97% of undergraduate students now have active Facebook accounts [13], studies utilizing SNSs have almost exclusively focused on Facebook, and have fallen into three broad categories: investigating the effect of SNSs on drinking behaviors; using SNSs to identify at-risk students; and using SNSs to deliver brief alcohol interventions.

Investigating the effect of SNSs on drinking behaviors
Addressing problematic college drinking has always been challenging given alcohol is a normative element of the university experience [14,15], and a feature of adolescent identity development [16,17]. The advent of Web 2.0 technologies (i.e. social media, blogs, video-sharing sites) has fundamentally changed the conditions under which adolescent identity development takes place. The ubiquity of SNSs such as Facebook means students now have tangible online identities to communicate personal information, brand preferences, and depictions of their online and offline behaviors.

A growing body of evidence suggests that there is a disproportionate amount of alcohol content posted by college students on Facebook [12,18–20]. Portraying oneself as 'a drinker' is an important and socially desirable component of online identity for many students, perpetuating the normalization of a binge drinking culture at college [12]. This is concerning given normative beliefs about peer drinking are one of the strongest determinants of alcohol consumption [21–25], accounting for over 60% of variance in student alcohol use.

The evidence base regarding the effect of alcohol-related social media content on drinking behavior is still being developed, however, studies have already shown that viewing alcohol content on Facebook influences not only beliefs about peer drinking, but adolescents' own decisions to drink [8,9,10*,11]. Fournier *et al.* investigated the effect of viewing fictitious Facebook profiles, with or without alcohol-related content, on college students [10*]. Immediately after viewing a Facebook profile for 10 min, participants were asked about their perceptions of the quantity and frequency of alcohol consumption by the average college student. Students who viewed alcohol-related content on

Facebook estimated significantly higher descriptive drinking norms than those who did not.

Stoddard *et al.* [11] took a different approach, asking students to report their perception of peer attitudes to the posting of alcohol and drug use online, and found that a composite item of the five questions asked (e.g. ''My friends think it's cool to post pictures of themselves drinking'') was positively correlated with both self-reported and perceived peer alcohol use. However, this composite measure failed to uniquely predict alcohol use once the actual prevalence of alcohol content was accounted for. This suggests that while perceptions of attitudes toward alcohol content on SNSs (i.e. injunctive norms) are also associated with higher alcohol use, it is the sheer quantity of SNS alcohol content (i.e. descriptive norms) that has the most significant effect on a student's own alcohol use. A recent longitudinal study by Huang *et al.* [26•] supports this view, with the amount of exposure to friends' alcohol-related photos on social media found to be significantly associated with alcohol consumption.

The influence of social media on perceived alcohol norms may be even greater than that of traditional media [27], as it presents the alcohol behaviors of *actual* peers. Alcohol content on Facebook is not only pervasive [12,18–20,28], but depicted in an overwhelmingly positive light [27,28]. Even negative consequences of drinking (e.g. hangovers) are often presented in a humorous and light-hearted manner [29]. Facebook status updates and photos posted before, during and after a heavy drinking session, are used by many young people as a prompt for positive social interaction between friends. Brown and Gregg [29] argue that alcohol and Facebook use are often inherently intertwined, allowing for the excitement of a night out to be extended after the event, memorializing it online. For these reasons, it is crucial that researchers develop strategies to combat the negative influence of SNSs on students' normative beliefs regarding alcohol.

Using SNS to identify at risk students
In the nonymous online world of SNSs, people tend to express their 'hoped-for possible self'; a socially desirable identity one would like to establish and believes is possible under the right conditions [30]. Given the ideal conditions that Facebook presents for identity analysis, Ridout *et al.* [12] proposed Facebook could be used to build upon the autophotographic essay methodology of Casey and Dollinger [31] to establish students' 'alcohol identity' (the extent to which one considers alcohol to be a defining characteristic of their identity). The innovative study tallied all alcohol-related photos and comments posted on the Facebook profiles of 158 students to operationalize their alcohol identity score (a pro-rated frequency of profile images, photos and comments containing alcohol references over the past six months), and found that alcohol

identity predicted not only excess alcohol consumption but also alcohol-related problems [12].

Support for these findings has since been provided by a number of further studies into the link between alcohol content on Facebook and alcohol behaviors. Moreno *et al.* [32] found that Facebook posts about intoxication among a sample of 224 US college students were positively associated with significantly higher AUDIT scores and greater likelihood of alcohol-related injury. Fournier and Clarke [33] and Stoddard *et al.* [11] also found significant relationships between alcohol content on Facebook and self-reported alcohol use.

These findings suggest potential to use Facebook profiles to identify students at risk of alcohol-related harm using predictive analytic techniques. While using a predictive tool to label students as 'at-risk' could be problematic and stigmatizing, this needs to be weighed up against the negative alcohol-related consequences that such students may experience if the opportunity for early intervention is missed [2••].

Using SNS to deliver personalized feedback interventions
One of the most successful approaches to addressing college drinking to date has been personalized feedback interventions (PFIs) designed to motivate students to reduce their alcohol consumption, typically by highlighting discrepancies between self-reported alcohol consumption and peer drinking norms [34]. Increasingly, PFIs are being delivered via the web, making them particularly well-suited to college students, as they allow for anonymity, and are quick and convenient to administer to large samples [35,36].

While there is a growing body of evidence to suggest web-based interventions reduce college drinking [37], they have been shown to be less efficacious than interventions delivered in-person [38]. In a recent examination of the activities and attentiveness of students during a web-based PFI, Lewis and Neighbors [39••] found most students were engaging in other activities while viewing their feedback. Furthermore, a subjective measure of attentiveness moderated the PFI effect, suggesting efficacy could be improved by increasing the attention required when viewing feedback. Delivering feedback via SNSs provides an excellent opportunity to do this by making feedback more interactive (e.g. by including post-feedback quizzes, encouraging sharing with friends).

Web-based PFIs have to date relied on either college webmail or custom-built webpages to present feedback. While the use of college webmail is rapidly declining, the use of Facebook has increased exponentially [40], and is now privileged by students as their primary form of communication [41], presenting researchers with a