



Internet use and adolescent binge drinking: Findings from the Monitoring the Future study[☆]



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ARTICLE INFO

Article history:

Received 8 June 2015

Received in revised form 4 September 2015

Accepted 4 September 2015

Available online 26 September 2015

Keywords:

Internet

Binge drinking

Adolescent

Social networking

ABSTRACT

Objective: To investigate the relation between Internet use and binge drinking during early and middle adolescence.

Methods: This is a cross-sectional study of a sub-sample of 8th and 10th graders from the Monitoring the Future (MtF) study, which annually surveys a nationally representative sample of U.S. youth on their attitudes, behaviors, and values. This study includes data from 21,170 8th and 24,362 10th graders who participated between 2007 and 2012 and were asked questions about Internet use and binge drinking.

Results: In fully adjusted models, we found a dose response relation between hours of recreational Internet use (i.e. outside work or school) and binge drinking which was stronger for 8th than 10th graders. Compared to <1 h of Internet use per week, odds ratios estimates for 1–5 h/week, 6–19 h/week, and 20 or more h/week were 1.24 (99% CI: 0.85, 1.82), 1.83 (1.28, 2.61), and 2.78 (1.99, 3.87) for 8th graders, respectively. For 10th graders, this same association was attenuated [estimated OR = 1.06 (99% CI: 0.96, 1.16); 1.20 (1.03, 1.40); and 1.30 (1.07, 1.58), respectively].

Conclusions: Drawing on a nationally representative sample of U.S. youth, we find a significant, dose–response relation between Internet use and binge drinking. This relation was stronger in 8th graders versus 10th graders. Given that alcohol is the most abused substance among adolescents and binge drinking confers many health risks, longitudinal studies designed to examine the mediators of this relation are necessary to inform binge drinking prevention strategies, which may have greater impact if targeted at younger adolescents.

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1. Introduction

Internet access has become a ubiquitous and critical aspect of life as an adolescent. Today, 95% of adolescents are online and 93% have their own computer, suggesting that adolescents in the United States have more access to the Internet than ever before (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013; Rideout, Foehr, & Roberts, 2010). Internet use among teens is diverse and extensive. On average, adolescents engage in 10 h and 45 min of media use (i.e. surfing the Internet, social networking, playing video games, watching TV, listening to music) each day, with the majority of their recreational internet use being spent on social networking sites (SNS) (Lenhart, 2012; Rideout et al., 2010). However, despite this dramatic change in how adolescents maintain social relationships and connect over

the Internet, there are relatively few studies examining how Internet use may impact risk behaviors such as the development of substance abuse.

Binge drinking among teenagers, defined as the consumption of at least five drinks on one occasion, accounts for more than 90% of alcohol consumed by 12 to 17 year-olds (Pacific Institute for Research and Evaluation, 2005). Approximately 16.5% of males and 14% of females ages 12–20 are binge drinkers, and many adolescents start to binge drink at very young ages (Substance Abuse and Mental Health Services Administration, 2014). Underage alcohol use in general contributes to the top three causes of mortality in this age group – injury, homicide, and suicide (U.S. Department of Health and Human Services, 2007) – and is associated with other high risk behaviors including suicide attempts, illicit drug use, sexual activity, increased number of sex partners, riding with a driver who has been drinking, and dating violence victimization (Miller, Naimi, Brewer, & Jones, 2007; Patrick, Ph, & Schulenberg, 2012). In addition, very early drinking, prior to age fourteen, confers additional health risks including a potential four-fold increase in the likelihood of developing alcohol dependence (Hingson, Heeren, & Winter, 2006).

Much has been made in the news about the facilitation of large binge drinking events through social networking sites. The Australian

Abbreviations: MtF, Monitoring the Future; SNS, social networking sites.

[☆] Financial Disclosure: None of the authors have any financial relationships relevant to this article to disclose.

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“Neknominate” online drinking craze that spread virally worldwide in early 2014 involved adolescents and young adults imbibing large quantities of alcohol on film and nominating their friends to do the same, leading to at least five deaths (Wilkinson & Soares, 2014 February 18). It is well-known that perceived social norms of alcohol consumption in adolescence are related to alcohol use, and this extreme “Neknominate” example may illustrate how the medium of the Internet or social media may amplify or distort this effect (Keyes et al., 2012; King, Delfabbro, Zwaans, & Kaptsis, 2013). For example, Ridout et al. observed that self-curation of an “alcohol identity” on Facebook was socially desirable and may result in further promotion of binge drinking (Ridout, Campbell, & Ellis, 2012).

Despite the prevalence of binge drinking and the ubiquity of adolescent Internet usage, only a few scientific studies have examined the relation between Internet use and binge drinking in early and middle adolescence (Lenhart, 2012; Rideout et al., 2010). Some studies have found an added risk of problematic alcohol use among Internet addicted adolescents and young adults, but very few have addressed risks associated with internet use outside of this subgroup (Ko et al., 2008; Yen, Ko, Yen, Chen, & Chen, 2009). There are no studies to our knowledge that draw on a representative sample of adolescents to test this association or that specifically focus on adolescent binge drinking. Although we are unable to deduce a causal relationship between Internet use and binge drinking due to the data's cross-sectional nature, we contribute to the current literature by drawing on a large nationally representative sample to test the hypothesis that there is a positive association between recreational Internet use and binge drinking among 8th and 10th graders.

2. Methods

2.1. Sample

The Monitoring the Future (MtF) study began in 1975 and includes a yearly cross-sectional survey of a nationally representative sample of high school students across the United States (Johnston, Bachman, O'Malley & Schulenberg, 2007). It is funded by the National Institute on Drug Abuse and conducted by the Survey Research Center, Institute for Social Research at the University of Michigan.

Approximately 130 US high schools (both public and private) participate each year and are selected using a multistage sampling design. Youth were selected via a three-stage sampling procedure: classrooms and students within schools within geographic areas, which were the primary sampling units. Sampling weights are provided to correct for selection bias occurring in any of the three stages listed above. School participation rates range between 66 and 80% over all years of the MtF study. If a school declines to participate, that school is replaced with one with similar geographic and demographic characteristics. The MtF study began in 1975 by surveying 15,000 12th grade students annually. Eighth and 10th grade students were added in 1991, including 17,000 students in 8th grade and 15,000 students in 10th grade. All questionnaires were self-administered, and typically conducted during class time with a teacher present. All data used in the present study was self-reported by the participant. The University of Michigan Behavioral Sciences Institutional Review Board approved the study and each student consented to participation.

The primary purpose of the MtF study is to estimate the prevalence of drug and alcohol use in high school aged youth. Additional questions were added to understand contextual and etiological factors associated with substance use and these questions have evolved over the years. We used 8th- and 10th-grade Surveys from the years 2007–2012 in analyses presented here because our primary predictor variable (Internet use) was added to the MtF questionnaires in 2006. We further restrict our sample to those surveyed after 2006 because, after this time point, at least 70% of children had access to a computer within their home according to the U.S. Census (U.S. Census, 2013). Eighth and 10th grade

average student response rates over these years were 90 and 88%, respectively, with less than 1% refusing to participate. Most non-response is due to absenteeism.

Our analytic sample is limited to those who were asked about Internet use, which was included on Form 1 only. This Form was given to approximately one third of participants, which were randomly selected from the larger sample (Johnston, Bachman, O'Malley & Schulenberg, 2011). Additionally, our sample was limited to those with complete data on covariates of interest as well as on our primary outcome - binge drinking.

2.2. Measures

2.2.1. Outcome: binge drinking

To measure heavy alcohol use (binge drinking), respondents were asked the number of occasions on which they consumed five or more drinks in the past two weeks, which is consistent with prior literature on binge drinking in this age group (U.S. Department of Health and Human Services National Institutes of Health, 2004). We examined this outcome dichotomously (once or more versus none).

2.2.2. Primary predictor: internet use

Recreational Internet use was assessed in the following way: “Not counting work for school or a job, about how many hours a week do you spend on the Internet e-mailing, instant messaging, gaming, shopping, searching, downloading music, etc.?” Due to the fact that response options were expanded in later years to account for higher levels of internet use, we condensed response options to less than one hour [includes none], one to five hours, six to nineteen hours, or twenty or more hours per week so that categories were consistent across years of analysis.

2.3. Covariates

Final models also included individual level sociodemographic characteristics that are associated with alcohol use in prior research (Keyes et al., 2012; Patrick et al., 2012). Covariates included sex, age (younger than 16, for grade 10 only),¹ race/ethnicity (categorized as African American, Caucasian, or other), highest level of student-reported parental education (“some college or less” or “completed college or grad school”), average grades (A- or higher, B+ to B, or C+ or lower), and whether the mother or father, both, or neither lived at home (Bachman, O'Malley, Johnston, Schulenberg, & Wallace, 2011; Keyes et al., 2012; Patrick & Schulenberg, 2014; Ruutel et al., 2014; Wallace et al., 2003). We also included working for pay (0 h/week, 1–20 h/week, more than 20 h/week) as prior research in the MtF study has demonstrated an association between binge drinking and hours worked (Safron, Schulenberg, & Bachman, 2001).

2.4. Statistical analysis

All statistical analyses were completed using StataSE 13 (StataCorp., 2013). We estimated descriptive statistics on our sample using within-year sampling weights paired with Stata's svy commands. We implemented a two-level random intercept logistic regression model clustered by study years (2007–2012) to estimate the association between Internet use and binge drinking. This regression model was fit using the user-written Stata add-on gllamm where the marginal log-likelihood was maximized using numerical integration and carried out via adaptive quadrature (Rabe-Hesketh & Skrondal, 2012; Rabe-Hesketh, Skrondal, & Pickles, 2002). Fifteen quadrature points were used to improve the precision of our estimates. We calculated robust standard errors using the Huber-White “sandwich” estimator

¹ To protect the identity of the participants, specific ages were not available in this dataset.

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