Journal of Family Medicine

Open Access

Austin Publishing Group

Research Article

High Social Media Use among Adolescents Associated with Increased High-Risk Behaviors and Poor Academic Outcomes

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Received: June 27, 2022; **Accepted:** September 07, 2022; **Published:** September 14, 2022

Abstract

Purpose: With the marked increase in social media apps over the last two decades and teens' dramatic increase in screen time, research examining the impacts of social media on teenage health outcomes is urgently needed. The purpose of this study is to examine the relationship between adolescent social media use and high-risk behaviors (alcohol use, tobacco, vaping, sexual activity) and academic outcomes (ability to get good grades and complete homework).

Methods: 234 adolescents were recruited via convenience sampling at two suburban/rural clinics. A survey assessed hours of social media use, participation in high-risk behaviors, and impact on academic outcomes. Variables were re-coded into bivariate categories and multiple logistic regressions were conducted using SPSS, controlling for age, gender, race, and insurance status.

Results: High users of social media (4+ hours/day) were 3.4 and 3.0 times more likely to use alcohol ($p<0.05$) and tobacco ($p<0.01$), respectively. High-users were also 3.2 and 3.0 times more likely to report that their social media use impacted their ability to get good/acceptable grades ($p<0.01$) and complete homework ($p<0.01$), respectively.

Conclusions: High levels of social media use were associated with increased likelihood of alcohol and tobacco use and had a negative effect on youth's academic performance. Screening of adolescent social media use will better identify youth at risk for potentially harmful effects of excess social media use, allowing providers to intervene with the proper education for youth and their guardians.

Keywords: Social media use, Alcohol use, Tobacco use, Academic performance

Introduction

In 2018, 95% of teenagers were found to have access to a smart phone, with 45% of teens saying they are online "almost constantly" [1]. With the marked increase in social media apps over the last two decades and teens' dramatic increase in screen time, research examining the impacts of social media on teenage health outcomes is urgently needed. When determining media's impact on adolescent high-risk behaviors, previous literature has looked specifically at the relationship between social media habits and use of a particular substance. Multiple studies found that the type of media consumed, whether used for professional or personal use, impacted the levels of substance use among youth [2,3]. Increases in high-risk behaviors such as alcohol use, [2,4-8] tobacco and vaping, [5,9,10] and sexual activity [11] were found to be associated with exposure to media related to that specific activity. However, there is more limited research looking at general, everyday social media use (posts from friends and families, influencers, or accounts already followed) and its impact on these high-risk behaviors. Furthermore, very little research has examined the relationship between social media use and school performance. A 2018 study found that higher social media use predicted a decrease in school performance, [12] but additional research is needed to understand this association.

The current study examined the relationships between overall time spent on social media (no specifications on media content) and four high-risk behaviors (alcohol use, vaping, tobacco use, and sexual activity) in a suburban/rural adolescent population. Additionally, the impact of social media use on academic performance is uniquely studied by assessing youth's perception of their social media use on their own grades and homework completion. By studying a wide range of adolescent outcomes, this study can provide further information on the impact of social media use and inform interventions to mitigate the impact of excessive social media use.

Methods

This study was approved by the East Tennessee State University IRB through an expedited review. A convenience sample of 234 adolescents was recruited from pediatric clinics at East Tennessee State University Quillen College of Medicine and Western Michigan University Homer Stryker M.D. School of Medicine. Data were collected via a paper survey during regular healthcare visits. Caregiver consent and youth assent were required for participation. The survey used in this study was adapted from previously administered

Citation: Yoders AM, Ray SA, Quinn MA, Phalen K, Cabral MD, Shrestha M, et al. High Social Media Use among Adolescents Associated with Increased High-Risk Behaviors and Poor Academic Outcomes. J Fam Med. 2022; 9(6): 1310.

questionnaires. The independent variable of social media use was assessed using questions adapted from the "Common Sense Census: Media Use by Tweens and Teens", conducted by *Common Sense Media*, [13] stating "If you had to guess, how many total hours per day do you spend on any form of social media?" Social media use was coded into low use (0-3 hours/day) and high use (4+ hours/day). These categories were chosen due to Common Sense Media's description of "light media users" spending an average of about 3.5 hours/day on media.

Outcome variables included high-risk behaviors and academic outcomes, such as the ability to complete homework and achieve good grades. Questions assessing youth participation in high-risk behaviors were adapted from the validated Center for Disease Control and Prevention's (CDC) Youth Risk Behavior Survey [14] and included alcohol use, tobacco use, vaping, and sexual activity, with all coded as "ever used/ever engaged" or "not used/never engaged." Finally, to assess the impact of the youth's social media use on academic outcomes, each youth was asked "how often do social media keep you from doing the following: (1) completing homework, (2) making good/acceptable grades in school." They responded using a 4-point categorical scale with options of "never," "rarely," "sometimes," or "often." These responses were coded into categories of "no effect" and "any effect" (included responses of rarely, sometimes, or often).

Co-variates of age, gender, race, and insurance status were included for regression analyses. Age was kept as a continuous variable (12-17 years old) for a majority of analyses. However, categories of younger teens (12-14 years old) and older teens (15-17 years old) were used for comparison. Gender included male and female. Due to the small number of participants who identified as 'non-binary' or 'prefer not to say,' those participants were removed from the regression analyses. Race was coded into "White" and "Non-White" (Black or African American, Hispanic or Latinx, Native American or American Indian, Asian/Pacific Islander, or Other) due to the large majority of participants who identified as "White." Insurance status, used as proxy for income level, was coded as "Medicaid" or "not Medicaid."Survey data were entered into RED Cap and all analyses were completed using SPSS version 26.

Descriptive statistics were conducted and included frequencies, percentages, means, and standard deviations, where appropriate, for each variable. A series of regression analyses were completed to determine if social media use was independently associated with youth health outcomes. First, simple binomial logistic regressions were completed between social media use and each of the dependent variables. Then, multiple logistic regressions were completed to determine the most predictive model of the primary predictor, social media use, the covariates, and each dependent variable. The final multiple regression model, including odds ratios and confidence intervals, are reported.

Results

Demographic Information

Frequencies of demographic information of youth participants are presented in (Table 1). A majority of participating youth (78.6%) are high-school aged (14-17 years old). There was almost equal participation of male and female youth, with predominantly White participants (73.6%), followed by Hispanic or Latinx participants (12.1%) and Black or African American participants (8.2%). The remaining categories of race made up smaller percentages: Native American or American Indian (2.2%), Asian/Pacific Islander (1.3%), other (2.6%). 74% of participants reported Medicaid insurance, a metric for lower socioeconomic status.

Table 1: Demographic Information (n = 234).

Variable	n (%)
Gender	
Male	114 (48.7%)
Female	120 (51.3%)
Race	
White	172 (73.6%)
Black or African American	19 (8.2%)
Hispanic or Latinx	29 (12.1%)
Native American or American Indian	5 (2.2%)
Asian/Pacific Islander	3 (1.3%)
Other	6 (2.6%)
Age	
12 years old	17 (7.3%)
13 years old	33 (14.2%)
14 years old	48 (20.3%)
15 years old	52 (22.0%)
16 years old	43 (18.5%)
17 years old	41 (17.7%)
Insurance Status	
Medicaid	172 (73.7%)
Non-Medicaid	62 (26.3%)

Variable Frequencies

Table 2 shows the frequency of the independent and dependent variables. Close to 40% of youth reported high social media use (4+ hours/day). Among the various social media platforms, Youtube was found to be the most highly used with 87% of participants reporting use at least every other day, if not more frequently. Youtube was followed by Instagram (67%), Snapchat (63%), and TikTok (55%) as the most frequently used platforms. For the high-risk behaviors, 17.8%, 17.0%, 23.5%, and 22.0% reported any alcohol use, smoking, vaping, and sexual activity, respectively. With academic outcomes,

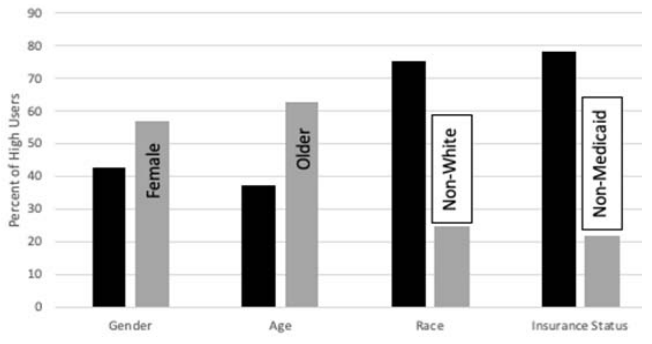

Figure 1:

Table 2: Measures of Social Media Use and Dependent Variables (n = 234).

Variable	n (%)
Social Media (SM) Use by Time	
Low (0-3 hr/day)	141 (60.2%)
High (4+ hr/day)	93 (39.8%)
Social Media (SM) Use by Platform	
Youtube	204 (87.2%)
Instagram	156 (66.7%)
Snapchat	147 (62.8%)
TikTok	128 (54.7%)
Facebook	75 (32.0%)
Twitter	48 (20.5%)
Other, not listed	73 (31.2%)
Alcohol Use	
None	192 (82.2%)
Any	42 (17.8%)
Smoking	
None	194 (83.0%)
Any	40 (17.0%)
Vaping	
None	179 (76.5%)
Any	55 (23.5%)
Sexual Activity	
None	183 (78.0%)
Any	51 (22.0%)
Youth's perception that SM Use affected their ability to Complete Homework	
No Effect	126 (53.7%)
Any Effect	108 (45.3%)
Youth's perception that SM Use affected their ability to Get Good Grades	
No Effect	156 (66.8%)
Any Effect	78 (33.2%)

more than 45% of participants reported that social media affected their ability to complete homework and more than 33% reported it affected their ability to get good grades.

Figure 1 outlines the breakdown of each demographic category among the high users of social media. 57% of high social media users identified as female; 63% were older teens (15-17 years old), 75% identified as white, and 78% had Medicaid insurance. None of these relationships were significant.

Simple Logistic Regression Analyses

Bivariate logistic regressions between social media use and high-risk behaviors and academic outcomes (ability to complete homework and make good grades) are presented in (Table 3). Compared to low social media users (0-3 hours/day), high social media users (4+ hours/day) were 3.8 times more likely to report any alcohol use (p=0.006), 3.3 times more likely to report any smoking (p=0.016), and 2.5 times more likely to report any vaping (p=0.024). There was not a significant association between social media use and youth report of sexual activity. With academic outcomes, high social media users were 3.3 times more likely to report that their social media use affected their ability to complete homework (p=0.000) and 2.8 times more likely to report that their social media use affected their ability to get good grades (p=0.003) compared to low social media users.

Table 3: Bivariate logistic regression analyses between social media use and health outcomes (reference group = low [0-3 hr/night] social media use).

Dependent Variable	Odds Ratio	Lower Confidence Interval	Upper Confidence Interval
Alcohol Use	3.78**	1.45	9.83
Smoking	3.29*	1.25	8.70
Vaping	2.49*	1.13	8.49
Sexual Activity	2.21	0.97	5.02
Youth's perception that SM Use negatively affected their ability to Complete Homework	3.27**	1.71	6.23
Youth's perception that SM Use negatively affected their ability to Get Good Grades	2.78**	1.41	5.49
* p <0.05 ; ** p < 0.01			

Multiple Logistic Regression Analyses

Multiple logistic regression analyses between social media use and high-risk behaviors and academic outcomes (ability to complete homework and make good grades), controlling by age, gender, race and insurance status, are presented in (Table 4). Using the backwards selection method, the strongest model for each dependent variable was created. Race and insurance status were removed from each model and not included in the final models due to non-significant findings. Gender was removed from all models except the model between social media use and sexual activity.

With alcohol use, smoking, and vaping, age, and social media remained in the strongest models. High social media users were 3.4 times more likely to report any alcohol use compared to low social media users when controlling for co-variates (p=0.017). Alcohol use was directly associated with age; older individuals were more likely to report alcohol use (p=0.008). High social media users were 3.0 times more likely to report any smoking compared to low social media users when controlling for co-variates (p=0.034). Smoking was directly associated with age; older individuals were more likely to report smoking (p=0.017). The association between vaping and social media was no longer significant when controlling for co-variates. However, vaping continued to be directly associated with age; older individuals were more likely to report vaping (p=0.025). Sexual activity was directly associated with age; older individuals were more likely to report engaging in sexual activity (p=0.000). Sexual activity remained non-significantly associated with social media use after controlling for co-variates.

All co-variates were removed from the strongest model in the relationship between social media use and youth report of social media affecting the ability to complete homework. When controlling for co-variates, high social media users remained 3.2 times more likely to report their social media use affected their ability to complete homework when compared to low social media users (p=0.000). Regarding the relationship between social media use and youth report of social media's effect on getting good grades, all co-variates were

Table 4: Multiple logistic regression analyses between social media use and health outcomes controlling by age, gender, race and insurance status (STRONGEST MODEL).

Dependent Variable	Independent Variables and Co-Variates	Odds Ratio	Lower Confidence Interval	Upper Confidence Interval
Alcohol Use	Age	1.65**	1.14	2.38
	Social Media Use	3.36*	1.24	9.07
Smoking	Age	1.57*	1.08	2.28
	Social Media Use	2.96*	1.08	8.09
Vaping	Age	1.38*	1.04	1.83
	Social Media Use	2.23	0.99	5.04
Sexual Activity	Gender (ref: male)	2.60	0.99	6.81
	Age	2.54**	1.67	3.87
Youth's perception that SM Use negatively affected their ability to Complete Homework	Social Media Use	3.20**	1.67	6.14
Youth's perception that SM Use negatively affected their ability to Get Good Grades	Age	0.77*	0.61	0.98
	Social Media Use	3.03**	1.49	6.17
* p <0.05 ; ** p < 0.01				

removed from the strongest model except age. When controlling for co-variates, high social media users remained 3.0 times more likely to report their social media use affected their ability get good grades when compared to low social media users (p=0.002). Youth's report of social media's effect on getting good grades was indirectly associated with age; older individuals were less likely to report their social media use affected their ability to get good grades compared to younger individuals (p=0.030).

Discussion

Recently, Instagram and Facebook have made headlines as researchers found time spent on those apps negatively impacted the mental health and self-image of teenagers [15,16]. As social media has become more engrained in our society, especially in the lives of adolescents, determining the possible negative impacts on health has become essential. In this study of adolescents in two suburban/rural clinics, high social media users were found to have significantly higher rates of both alcohol and tobacco use. High use of social media was also found to be associated with increased likelihood of vaping; however, this finding was of borderline significance when adjusted for demographic characteristics. These results highlight the negative impact social media, of any content and not just substance-specific content can have on youth's early engagement in substance use. Moreover, this study also found that high users of social media were more likely to report that their social media use negatively affected their ability to complete homework or their ability to get good/acceptable grades.

Recognizing the impact of substance use on adolescent development and outcomes, *Healthy People 2030* have listed multiple objectives regarding the reduction of adolescent alcohol and drug use [17]. The emphasis on early intervention has resulted in increased screening for these high-risk behaviors during routine adolescent care using standardized instruments such as the CRAFFT [Car, Relax, Alone, Forget, Friends, Trouble] [18]. However, *Healthy People 2030* provide no specific recommendations on screening for social media use. As this study reinforces the association between social media use and high-risk behaviors among adolescents, it is necessary to increase screening for and education about the risks of excessive social media use. Screening for social media use among middle-school and early high-school aged youth can help predict which youth may be at a greater risk for participating in these potentially harmful behaviors. Furthermore, gaining knowledge of the adolescent's social media habits will allow providers to provide targeted education to both youth and their guardians regarding safe social media habits and the benefits of monitoring youth social media activity.

The screening and intervention regarding social media among adolescents become even more important when we take into account the data regarding academic outcomes. Youth's self-assessment of social media's impact on their schoolwork is negative. Despite acknowledging that their social media use is problematic and interfering with their academic performance, youth continue to spend large amounts of their days on these apps. Incorporating screening into well-child checks would allow clinicians to identity youth whose social media use puts them at risk for academic problems and open the door for education on the potential risks of excess social media use.

The American Academy of Pediatrics released a policy guideline recommending no more than two hours of media time for children and teenagers [19]. 54% of the participants in this study reported using more than two hours of social media per day, not even accounting for other types of media like television or video games. This level of excess use re-emphasizes the need for adequate education to youth and their guardians. The AAP recommends developing a Family Media Plan which can personalize the situation and take into account the needs of each individual and the family as a whole [20]. By helping families create this plan, physicians can work together with guardians and adolescents in limiting the negative impacts of social media overuse.

This study had several strengths such as youth's own assessment of their social media use on academic outcomes, the use of validated questions for high-risk behaviors, and a large pediatric sample size from two suburban/rural clinics which increases the generalizability to similar pediatric populations. There were also several limitations. First, the study utilized a convenience sampling technique; however,

the refusal rate was extremely low (<5%), reducing the likelihood of selection bias. Second, due to the cross-sectional nature of the study, causal relationships could not be established. Finally, the use of youth self-report could be biased by youth's underestimation of social media use, its impact on their academic performance, or in reporting high-risk behaviors.

In a discussion on social media, it would be remiss to not also acknowledge the addictive nature social media can have on its users. Recent literature has found that social media use among adolescents and young adults can reach an addictive level, comparable to the addiction of substances like alcohol, vaping, and marijuana [21-24]. While validated measures have been developed for the screening of various substance use and addictions (National Survey on Drug Use and Health [NSDUH] or CRAFFT), there is no validated screening tool for social media use or its potential addiction. It is possible that the screening tools previously used for substance use could be adapted and applied to social media use. Future studies can further examine the addictive potential of social media, develop validated screening tools to better equip providers in assessing youth social media use, and create interventions and educational material for youth and their guardians regarding safe and healthy social media practices.

In summary, we found that excessive social media use of any kind was strongly associated with an increased likelihood of initiating use of alcohol and tobacco use, as well as negatively impacting academic performance. We recommend that adolescents be screened for their use of social media at well-child visits, incorporating it as another "S" in the HEADDSS survey.

Conclusion

High use of social media can be associated with adolescent alcohol and tobacco use, as well as poor academic outcomes like getting good grades or completing homework. Screening for social media use during adolescent well-child checks can help identity at-risk youth and allow providers to educate and intervene regarding excessive and unhealthy social media use.

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