

Smartphone Addiction and Mental Illness In Rhode Island Young Adults

JONATHAN K. NOEL, PhD, MPH; CARA J. SAMMARTINO, PhD, MSPH; MARGARET JOHNSON;
JENNIFER E. SWANBERG, PhD, MMHS, OTR/L; SAMANTHA R. ROSENTHAL, PhD, MPH

ABSTRACT

BACKGROUND: Smartphone addiction is a rising problem in the United States. The current study estimated the prevalence of smartphone addiction in Rhode Island young adults and its associations with mental illness.

METHODS: The 2022 Rhode Island Young Adult Survey measured smartphone addiction, depression, anxiety, and suicide ideation. Covariates included age, sex/gender minority status, race/ethnicity, and social status.

RESULTS: The prevalence of smartphone addiction was 34%. Odds of experiencing depression (OR[95%CI]=2.69 [2.05,3.52]), anxiety (OR[95%CI]=2.06 [1.58,2.69]), and suicide ideation (OR[95%CI]=1.55 [1.08,2.20]) were greater in participants with smartphone addiction. The relationship between smartphone addiction and depression was strongest in heterosexual cis-males (OR[95%CI] = 8.45 [3.53, 20.3]).

DISCUSSION: Smartphone addiction is prevalent among Rhode Island's young adults and may be associated with depression, anxiety, and suicide ideation. Heterosexual cis-males may be particularly vulnerable. Screening programs and interventions to reduce smartphone use for all young adults, and particularly young men, should be considered.

KEYWORDS: young adults, Rhode Island, smartphone addiction, mental health

INTRODUCTION

Smartphone addiction is a rising problem in the United States (US) as 96 percent of young people own a smartphone,¹ and up to 85% of U.S. adults spend 20 hours or more a week on a digital device.² Between 2015 and 2021, the prevalence of smartphone addiction significantly increased, and overall, approximately 25% of smartphone users may meet the clinical definition of addiction, with the prevalence consistent across countries.³

Several risk factors for smartphone addiction that focus on how and when users use their smartphones have been identified. Smartphone addiction often correlates with the amount of time spent per day on a smartphone as well as the time of day a smartphone is used.⁴ There also may be a threshold

effect where smartphone screen time only exerts an effect on mental health after approximately 5 hours of use.⁵ Furthermore, consistent routine smartphone usage, addictive behaviors, weekend use, and usage in social settings are all risk factors for smartphone addiction.⁶ Fewer studies have reported on non-behavioral risk factors of smartphone addiction, such as socioeconomic or demographic variables. Identifying as female is a commonly reported risk factor, although other studies have reported higher smartphone addiction scores in males and still others report no differences.⁷ Similarly, some studies in adolescents have reported higher rates in older adolescents, while others report higher rates in younger individuals. Mixed findings have also been reported for family income and addiction status.

Smartphone addiction has been strongly linked with negative mental health effects, including increased risk of anxiety, depression, stress, and attention deficit hyperactivity disorder.^{3,6,8-10} These results have been consistent in studies of university students, young adults, and adolescents.^{9,11-12} For example, a study of college students reported that participants who had a smartphone addiction were almost a third more likely than non-addicted participants to have a serious mental illness,¹³ and others have linked smartphone screen time with experiencing co-morbid mental illness.¹⁴

Current Study

The rate of smartphone addiction among Rhode Island's young adults is currently unknown, and existing literature is mixed on whether addiction rates vary by sociodemographic variables. Moreover, the association between smartphone addiction and mental health on young adults in the state has not been explored. Using a sample of young adults that lived in Rhode Island, the current study a) estimated the prevalence of smartphone addiction; b) assessed sociodemographic disparities in smartphone addiction; and c) identified associations between smartphone addiction and depression, anxiety, and suicide ideation. Based on previous literature, it was hypothesized that at least one quarter of participants would meet the definition of smartphone addiction; smartphone addiction would be most prevalent in females and older young adults; and smartphone addiction would be positively associated with experiencing depression, anxiety, and suicide ideation.

METHODS

Sample and Data

Data were obtained from the 2022 Rhode Island Young Adult Survey (RIYAS). The 2022 RIYAS was a cross-sectional survey of young adults (n = 1,022) who lived in Rhode Island for at least part of the year. Full details of RIYAS sampling and data collection methodology are published elsewhere.¹⁵

Measures

Smartphone addiction was measured using the Smartphone Addiction Scale – Short Version (SAS-SV).¹⁶ The SAS-SV had a sensitivity of 87% and a specificity of 89% in a sample of adolescents. The SAS-SV contains 10 items that assess the addiction process within the context of smartphone use. Example items include *I cannot stand not having my smartphone* and *I use my smartphone longer than I had intended* (Table 1). Responses are captured on 6-point Likert scales ranging from *strongly disagree* (coded as 1) to *strongly agree* (coded as 6). Responses were aggregated by summation across items ($\alpha = 0.86$). Smartphone addiction was defined as scores ≥ 33 for women and ≥ 31 for men. Since SAS-SV scores are only validated for men and women, one person was excluded from the analysis because they indicated their sex at birth was *intersex*, and the final sample size for this analysis was n = 1,021.

The dependent variables included depression, anxiety, and suicide ideation. Depression was measured using the Center of Epidemiologic Studies Depression Scale, 10-item version (CES-D10), which has strong test/re-test and convergent reliability.^{17,18} A 4-point Likert scale, ranging from *rarely or none of the time* (coded as 0) to *most of the time* (coded as 3) was used for all 10 items. Responses were aggregated ($\alpha = 0.75$), and scores ≥ 10 indicated depression. Anxiety was

measured using the Generalized Anxiety Disorder 7-item scale (GAD-7).¹⁹ A 4-point Likert scale ranging from *not at all* (coded as 0) to *nearly every day* (coded as 3) was used for all 7 items. Responses were aggregated ($\alpha = 0.93$), and scores ≥ 10 indicated clinically significant anxiety. The single question: *During the past 12 months, did you ever seriously consider attempting suicide?*, with response options *no* and *yes* was used to assess suicide ideation.

Sociodemographic variables included age, sex, gender, sexual orientation, race/ethnicity, student status, employment status, and social status. Sex, gender, and sexual orientation were combined to categorize participants as *cis-heterosexual female*, *cis-heterosexual male*, or *any sexual or gender minority*. Race/ethnicity included *Asian*, *Black/African American*, *Hispanic*, *White*, and *all others* (including *Native American/Alaskan Native*, *Hawaiian and other Pacific Islander*, and more than 1 race). Student and employment status were combined to categorize participants as *not a student/employed*, *student/not employed*, *student/employed*, or *not a student/not employed*. Social status was measured using the MacArthur Scale of Subjective Social Status in which respondents report how their social status compares to their peers on a scale from 1 (worst off) through 10 (best off).²⁰

Analysis

Age and social status were considered normally distributed continuous variables. All others were considered categorical variables. The analysis was conducted in two stages. First, demographic and socioeconomic disparities in smartphone addiction were assessed using a series of univariable logistic regression models. Each sociodemographic variable measured was specified as an independent variable in separate unique models with smartphone addiction as the dependent variable. For the categorical variables, heterosexual cis-males, White, not a student/not employed, and not addicted to smartphones were the referents. Second, the association of smartphone addiction with depression, anxiety, and suicide ideation was assessed using multivariable logistic regression models. Both unadjusted and adjusted models were specified. Adjusted models controlled for all measured sociodemographic variables. In a *post-hoc* analysis, Wald χ^2 tests were used to determine if sexual and gender identity moderated the association of smartphone addiction with depression, anxiety, or suicide ideation. If significant, the adjusted analysis was repeated after stratification by SGM status. Analyses were conducted using SPSS v28.0 (Armonk, NY: IBM Corp), and 95% confidence intervals (CI) and p-values ≤ 0.05 were used to determine statistical significance.

RESULTS

Mean age was 21.3 years old (SD = 2.1), and the sample disproportionately identified as a sexual/gender minority (42.4%) (Table 2). A majority identified as White (59.7%).

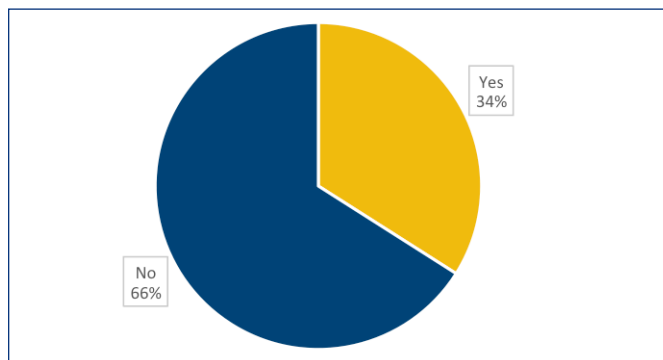
Table 1. Elements of the Smartphone Addiction Scale – Short Version (SAS-SV)¹⁶

Based on your current situation, to what extent do you agree with the following statements?
I have missed planned work due to my smartphone use.
I have a hard time concentrating in class, while doing assignments, or while working due to my smartphone use.
I feel pain in my wrist or at the back of my neck while using my smartphone.
I cannot stand not having my smartphone.
I feel impatient or fretful when I am not holding my smartphone.
I always have my smartphone on mind even when I am not using it.
I will never give up using my smartphone even when my daily life is already greatly affected by it.
I am constantly checking my smartphone so as to not miss conversation between people on social media.
I use my smartphone longer than I had intended.
The people around me tell me that I use my smartphone too much.

Table 2. Descriptive statistics of categorical variables (n = 1021)

Variable		n (%)
Sexual/gender identity	Heterosexual cis-female	456 (44.7)
	Heterosexual cis-male	132 (12.9)
	Sexual/gender minority	433 (42.4)
Race/ethnicity	Asian	59 (5.8)
	Black/African American	54 (5.3)
	Hispanic	210 (20.6)
	Other/More than 1 race	88 (8.6)
	White	610 (59.7)
Student/employment status	Not a student, not employed	59 (5.8)
	Not a student, employed	244 (23.9)
	Student, not employed	157 (15.4)
	Student, employed	561 (54.9)
Depression	Yes	521 (51.0)
	No	500 (49.0)
Anxiety	Yes	387 (37.9)
	No	634 (62.1)
Suicide ideation	Yes	150 (14.7)
	No	871 (85.3)

Figure 1. Prevalence of smartphone addiction (n = 1021)



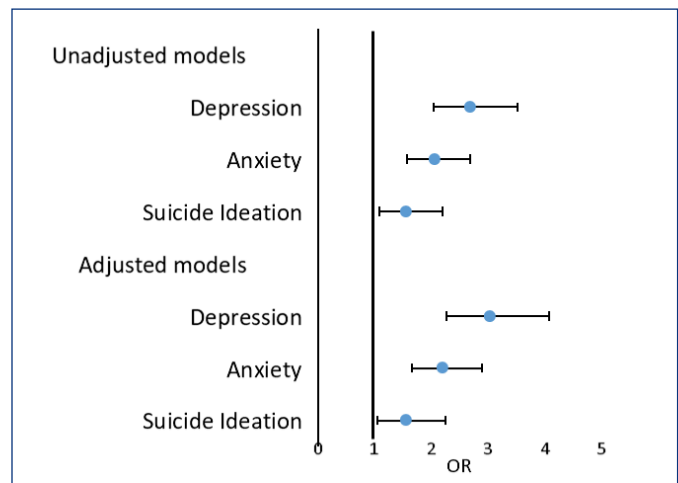
Mean social status was 5.0 (SD = 1.7), and a majority were both students and employed (54.9%). Approximately half (51.0%) the sample met the criteria for depression; more than one-third (37.9%) met the criteria for anxiety; and 14.7% seriously considered suicide in the past year. In all, 34% of participants met the criteria for smartphone addiction (Figure 1). Interestingly, there were no statistically significant demographic or socioeconomic disparities to note in the series of univariable logistic regression models (Table 3)

In the unadjusted analysis, smartphone addiction was significantly associated with the odds of experiencing depression (OR[95%CI] = 2.69 [2.05, 3.52]), anxiety (OR[95%CI] = 2.06 [1.58, 2.69]), and suicide ideation (OR[95%CI] = 1.55 [1.08, 2.20]) (Figure 2). The odds of experiencing depression, anxiety, and suicide ideation were approximately 2.7 times,

Table 3. Univariable logistic regression models showing odds of smartphone addiction by sociodemographic variables.

Variable		OR	95% CI
Age		0.96	0.90, 1.02
Social status		0.98	0.91, 1.06
Sexual/gender identity	Heterosexual cis-female	0.99	0.66, 1.49
	Sexual/gender minority	1.08	0.72, 1.63
	Heterosexual cis-male	.	.
Race/ethnicity	Asian	1.70	0.99, 2.92
	Black/African American	0.93	0.51, 1.69
	Hispanic	1.01	0.72, 1.41
	Other/More than 1 race	1.10	0.69, 1.76
Student/employment status	Not a student, employed	0.95	0.53, 1.71
	Student, not employed	1.04	0.56, 1.93
	Student, employed	0.78	0.44, 1.35
	Not a student, not employed	.	.

Figure 2. Unadjusted and adjusted odds of experiencing depression, anxiety, and suicide ideation among persons with smartphone addiction. Models adjusted for age, sex, gender, sexual orientation, race/ethnicity, student status, employment status, and social status



2 times, and 55% greater, respectively, among persons with smartphone addiction. The direction and strength of these relationships were maintained in the adjusted analysis.

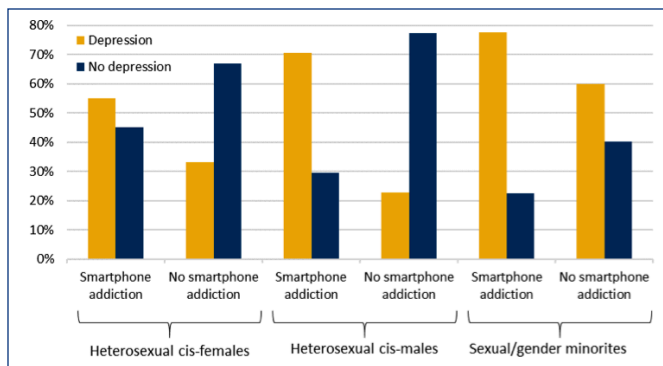
The *post-hoc* analysis suggests that sexual and gender identity significantly moderated the relationship between smartphone addiction and depression (Wald $\chi^2_{(2)} = 6.083$, $p = 0.048$), but not anxiety (Wald $\chi^2_{(2)} = 1.529$, $p = 0.465$) or suicide ideation (Wald $\chi^2_{(2)} = 0.113$, $p = 0.945$). After stratification by sexual and gender identity, the strength of the relationship appeared to be strongest among heterosexual cis-males (Table 4; Figure 3). Among these participants,

Table 4. Adjusted odds of depression by smartphone addiction, stratified by SGM status

Variable		AOR	95% CI
Cis-gender heterosexual females			
Smartphone addiction	Yes	2.59	1.70, 3.95
	No	.	.
Cis-gender heterosexual males			
Smartphone addiction	Yes	8.45	3.53, 20.3
	No	.	.
Sexual/gender minorities			
Smartphone addiction	Yes	2.85	1.76, 4.62
	No	.	.

NOTE: Adjusted models controlled for age, social status, sexual/gender identity, race/ethnicity, and student/employment status.

Figure 3. Prevalence of depression stratified by smartphone addiction and SGM status



the odds of experiencing depression was approximately 8.5 times greater among persons with smartphone addiction (OR[95%CI] = 8.45 [3.53, 20.3]).

DISCUSSION

The results suggest that smartphone addiction is common among Rhode Island’s young adults, and the burden of disease is shared equally across young adult sub-groups. Moreover, smartphone addiction may be associated with depression, anxiety, and suicide ideation. Interestingly, the relationship between smartphone addiction and depression may be strongest among heterosexual cis-males, although the association remains significant in heterosexual cis-females and sexual or gender minorities.

Smartphone Addictions and Mental Health

The prevalence of smartphone addiction in the current sample is similar to that reported in other samples of U.S. college students,¹¹ and smartphone addiction’s relationships with depression and anxiety have been previously reported.^{12,21} However, the increased odds of suicide ideation in U.S.

young adults with smartphone addiction is a novel finding. A cross-sectional study of Korean adolescents also found a relationship between smartphone addiction and an increased risk of suicide ideation and suicide attempts, although the study participants were considerably younger.²² Suicidality was also associated with smartphone addiction in smaller studies of Malaysian and Egyptian university students,^{23,24} which suggests the impact of smartphone addiction on mental health may be universal and not culturally dependent.

Smartphone addiction may be associated with poor mental health through several plausible mechanisms. First, smartphone addiction is often characterized by extensive smartphone use that disrupts normal sleep patterns. A meta-analysis of 41 studies suggested smartphone addiction was strongly associated with poorer sleep quality,¹² and in a cross-sectional survey of young adults in the United Kingdom, approximately 69% of participants with smartphone addiction reported poor sleep quality.²⁵ Consistent poor sleep quality and sleep irregularities are symptoms of clinical depression and anxiety, and predictive of later diagnoses.²⁶

Second, smartphone addiction may increase exposure to harmful or hateful digital content. Cyberbullying victimization was previously identified as a mediator between smartphone addiction and depression and between digital screen time and suicide ideation.^{27,28} Exposure to hate speech, violence, cyberbullying, sexual content, and profanity has also been associated with suicide ideation and self-harm in adolescents, and synergistic effects have been reported whereby exposure to multiple forms of negative digital content increases the risk of self-harm exponentially.²⁹ While explicitly harmful content is one plausible pathway, another potential pathway has been proposed: increased time on mobile social media increases upward social comparisons and the evocation of jealousy, leaving young adults feeling inferior to their peers and/or role models, leading to depressive symptoms.³⁰ More mobile screen time, teamed with low self-esteem, has also been shown to increase risk of depression.^{30,31}

Finally, because of the cross-sectional nature of the data, it is possible that participants with depression, anxiety, or suicide ideation are more likely to be addicted to their smartphones, and use of online connections as a form of digital social support to relieve symptoms of mental illness has been reported.³² Social media, in particular, provides an opportunity for those with a mental illness to seek support through both public and anonymous methods, and these virtual forms of social support may be as effective as physical forms of social support.³³

Smartphone Addiction in Young Adult Men

The stronger than expected relationship between smartphone addiction and depression among heterosexual cis-males was unexpected and may be a novel finding. We speculate the current finding may have occurred because

there are fewer social risk factors for depression among heterosexual cis-males, relative to the other sexual/gender groups, which allows smartphone addiction to explain a much larger proportion of the variance in depression among this population group. Moreover, heterosexual cis-males are more likely to engage in socially isolating smartphone use such as gaming, gambling, and pornography compared to their female counterparts.³⁴ Prior research indicates that males who participate in mobile gaming are more likely to suffer from reduced self-esteem and other negative mental health impacts attributable to internet gaming disorders.³⁵ Additionally, heterosexual cis-males have 2.3 times the risk of being problem gamblers,³⁶ which is another socially isolating activity when occurring on a smartphone.³⁷ Compulsive internet pornography use has also been linked to social impairment and poor mental health and is much more prevalent among heterosexual cis-males.^{38,39}

Implications

Smartphone use is widespread among young adults, with no evidence of predicted decline over time. The findings should serve as a call to action for both the mental health and technology industries. Mental health clinicians who treat young adults with mental illness should discuss the known risks of smartphone addiction with their patients. Previous research recommends taking a harm reduction approach to smartphone use by suggesting a decrease total amount of time spent on smartphone apps and other social media sites.⁴⁰ In addition to reducing screen time, individuals can participate in more “non-screen time” activities that may include physical activity or meeting friends in person.⁴¹

The technology industry plays a major role in smartphone addiction and can also play a role in delivering psychological interventions for young adults who suffer from mental health disorders. Mobile apps, referred to as “mHealth applications,” now provide a variety of health-related needs, and dozens of apps focus on major and mild neurocognitive disorders, personality disorders, anxiety disorders, bipolar and related disorders.⁴² Mental health app development allows young adults to access psychological care when and where they need it without disrupting daily routines.⁴³ mHealth apps to address smartphone addiction and mental health should be made accessible to young adults; reducing accessibility barriers includes reduced subscription fees along with shorter treatment modules.⁴⁴

Simple screen time monitoring and notifications for excessive use are likely ineffective in reducing smartphone addiction.⁴⁵ Public health interventions developed for smartphone addiction need to be focused on the type of app category the user is most likely to use, and app development can include features such as content warnings, access to accountability partners or communities, or a reward system for progress with reducing use of specific apps over time.⁴⁶

Limitations

This study is not without its limitations. This was a cross-sectional study and causality cannot be determined. Furthermore, the sample was a convenience sample and limited to young adults in Rhode Island. The sample may not be representative of all young adults, which limits the generalizability of the findings. Specifically, the sample underrepresents cis-heterosexual males, which may result in overestimated prevalence rates and greater uncertainty in identifying effects in this sub-group. The data collected through this survey is based on self-report, resulting in potential recall and social desirability biases. Finally, information about anxiety and depressive disorders were collected through validated screening instruments and not through clinical diagnostic evaluations.

CONCLUSIONS

Smartphone addiction is prevalent among young adults and may be associated with depression, anxiety, and suicide ideation. Screening and interventions integrated into clinical care and smartphone apps are needed, with particular attention to socially isolating apps that young men are more likely to use.

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Authors

Jonathan K. Noel, PhD, MPH, Department of Health Science, College of Health & Wellness, Johnson & Wales University, Providence, RI.

Cara J. Sammartino, PhD, MSPH, Department of Health Science, College of Health & Wellness, Johnson & Wales University, Providence, RI.

Margaret Johnson, Department of Health Science, College of Health & Wellness, Johnson & Wales University, Providence, RI.

Jennifer E. Swanberg, PhD, MMHS, OTR/L, Department of Health Science, College of Health & Wellness, Johnson & Wales University, Providence, RI.

Samantha R. Rosenthal, PhD, MPH, Department of Health Science, College of Health & Wellness, Johnson & Wales University, Providence, RI; Department of Epidemiology, Brown School of Public Health, Providence, RI.

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Correspondence

Samantha R. Rosenthal, PhD, MPH
8 Abbott Park Place, Providence, RI 02903
401-598-1253
srosenthal@jwu.edu