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SPECIAL SECTION

YOUNG ADULT MENTAL HEALTH CRISIS

GUEST EDITOR: SAMANTHA ROSENTHAL, PhD, MPH

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Rhode Island Young Adult Survey Reveals Mental Health Crisis

SAMANTHA R. ROSENTHAL, PhD, MPH GUEST EDITOR

INTRODUCTION

While young adult mental health involves a broad spectrum of psychosocial and environmental determinants, this special issue of the *Rhode Island Medical Journal* (RIMJ) focuses on timely and specific challenges of this population, including the mental health harms of losing a loved one to COVID-19; the role of racial discrimination in depressive symptoms; the association between brain injury and substance use; the disparities in and mental health consequences of pornography addiction or smartphone addiction, and predictors of suicide ideation among college students.

All articles leveraged data from the novel Rhode Island Young Adult Survey (RIYAS), which was first implemented in 2020. This surveillance system, though a convenience sample of Rhode Island young adults, includes the largest sample of young adults in Rhode Island relative to other commonly utilized surveillance systems to inform programming and planning for young adult health, such as the Behavioral Risk Factor Surveillance System (BRFSS) or the National Survey on Drug Use & Health (NSDUH).

This issue was made possible by a collaboration between the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities, & Hospitals (BHDDH) and the Johnson & Wales University (JWU) Center for Student Research and Interdisciplinary Collaboration. Using data from the new RIYAS, supported by BHDDH, JWU-affiliated faculty and undergraduate students have contributed their research and analytical skills to tell this important, evidence-based story of the current young adult mental health crisis.

CONTEXT: THE VULNERABILITY OF YOUNG ADULTHOOD

Young adulthood is a vulnerable developmental stage of the life course. The individual faces tremendous social and emotional challenges while growing from a dependent minor to, ideally, an autonomous adult. Developmental tasks of young adulthood include forming one's own identity, establishing financial independence, and engaging in intimate relationships. Other milestones include finding employment, enrolling in college or the military, or starting a family. Given evolving societal trends such as economic recession, inflation, rising housing costs, longer periods of education, and marriage postponed or forsworn, young adulthood has become a more complex and less linear transition.^{1,2}

In addition to burdensome environmental, social, and emotional shifts, young adulthood includes complex developmental changes in neural and hormonal stress-processing systems.³ These changes often accelerate stress-related psychopathology,⁴ and psychosocial stressors during young adulthood are strongly linked to psychopathology.⁵ About 75% of mental health disorders are established by the mid-20s,⁶ and young adulthood tends to have the highest rates of anxiety and depressive symptoms.⁷ A similar vulnerability exists for risky and addictive behaviors during young adulthood.⁸

Substance use behaviors tend to peak in early adulthood,⁹ in part due to brain development. Cognitive underdevelopment, particularly the immaturity of the prefrontal regions of the brain, has been linked to increased sensation-seeking behavior, including the initiation of substance use and shifts to more regular or dependent use.¹⁰ Recent studies suggest the start of college is an important developmental transition in terms of polysubstance use and risky sexual behaviors.^{11,12} Young adults also bear a disproportionate burden of gambling disorder¹³ and are particularly vulnerable to internet-gaming disorder.¹⁴

Even prior to the COVID-19 pandemic, the United States was facing a mental health crisis. Over the decade leading up to the pandemic, prevalence of major depressive episodes and suicidal ideation among young adults aged 18–25 almost doubled.^{7,15} Across the United States, need for mental health care outstrips supply. The Henry J. Kaiser Family Foundation estimates more than 155 million people live in designated mental health care professional shortage areas.¹⁶ Demand for mental health services pre-pandemic already was outpacing workforce capacity on and off college campuses.

While evidence suggests there is an increasing need for behavioral health treatment among young adults and that efficacious treatment exists,¹⁷ there continues to be barriers in the help-seeking process. These include stigma, difficulty recognizing the problem, and a desire to address these problems on one's own.¹⁸ Young adult college students have additional barriers, such as fear of a negative impact on occupational or academic records or a lack of knowledge about available mental health services. Female and sexual or gender minority young adults are particularly likely to report needing but not receiving mental health services.¹⁹



THE COVID-19 PANDEMIC AND YOUNG ADULT MENTAL HEALTH

On top of the usual developmental stressors of young adulthood, the COVID-19 pandemic added new stressors: social isolation, disruptions to in-person schooling and employment, limited access to health and social services, increased food and housing insecurity, as well as sickness, disability and loss of parents and loved ones from the disease. The pandemic, like prior catastrophes, has been linked to unhealthy coping mechanisms such as problematic substance use.²⁰ Evidence gathered over the course of the pandemic supports such links, showing dramatic shifts in mental health and substance use disorders among young adults. A survey from June 2020 showed 13% of adults reported increased substance use due to coronavirus-related stress, while 25% of young adults reported an increase.²¹ From February to May 2020, drug overdose mortality among young adults increased by 59%, disproportionately affecting Black young adults (79% increase) and other people of color.²²

A recent study found that over the 2020-2021 school year more than 60% of college students struggled with at least one mental health disorder,²³ a 50% increase since 2013. During the same school year, the National College Health Assessment estimated that almost 3 in 4 college students across the country experienced moderate to severe psychological distress, and more than 1 in 4 were suicidal.²⁴ Provisional data from 2021 also suggest a significant increase in the national suicide rate, especially for young adults aged 15 to 24 years. In December of 2021, well into the global pandemic, the U.S. Surgeon General issued an advisory on the youth mental health crisis, including young adults.²⁵ Evidence from prior disasters indicate that behavioral health impacts tend to outlast physical health impacts, ²⁶ suggesting these elevated rates of substance use disorder and mental illness among young adults are likely to persist.

INHERITING A WORLD OF TURMOIL

The collective trauma of the COVID-19 pandemic affected young adults and exacerbated pre-existing societal crises. As a result of the pandemic, for example, there was an increase in anti-Asian sentiment and xenophobia. In fact, the Federal Bureau of Investigation issued a warning to law enforcement in 2020 of an increase in crimes of anti-Asian bias.²⁷ High-profile cases of police brutality against Black Americans led to the popular participation in the Black Lives Matter movement and widespread protests against racial inequity, as well as continued counter-protests to the movement.²⁸ These incidents of racial discrimination have been shown to lead to traumatic stress and psychopathology.²⁹

As racial tensions intensified, so has anti-LGBTQ sentiment. Despite advancement in LGBTQ rights and marriage equality over the past 30 years, anti-LGBTQ legislation at the state level is increasing significantly. Laws restricting restroom access and participation in sports teams for transgender youth,³⁰ as well as legislation to limit discussion of sexual orientation and gender identity in schools, have become increasingly common.³¹ The targeting of sexual and gender identities has been linked to poor mental health,³² particularly among the young adult population, among whom almost 1 in 5 identify as a sexual or gender minority.³³

Young adults have also grown up in an era of an unprecedented drug overdose epidemic, perpetual gun violence and mass shootings, and the existential threat of climate change. Having a parent with a substance use disorder and experiencing or witnessing community violence have been linked to depression, anxiety, suicide ideation, and post-traumatic stress disorder.³⁴ Direct and indirect impacts of climate change and associated natural disasters have also been linked to increased anxiety and mental illness.³⁵ Ultimately, young people are transitioning to adulthood in a society experiencing ongoing collective trauma.

THE AGE OF TECHNOLOGY

Young adults have always lived in a world with internet access and smartphones. More than 90% use a smartphone and almost 98% regularly use social media.³⁶ While the digital age has provided easier and more convenient access to information, social connections, and goods and services, the persistent digital connectedness also comes with harm. Excessive smartphone and social media use among young adults has already been linked to poor mental health,³⁷⁻³⁹ although many mechanisms are still being explored. Some mechanisms established in the literature include unfavorable social comparisons, increased exposure to social harm, and social isolation.40 Recently, social engagement on smartphones has been linked to the dopamine reward system. Each notification, text, or like contributes to a variable reward schedule - positive stimuli provided at random intervals. This variable sense of reward is often short-lived, and it can lead to an intense anticipatory period awaiting the next positive stimulus, keeping young adults connected to their smartphones, similar to other behaviors with a propensity to become addictive.⁴¹ Constant digital access also exposes young adults to targeted advertisements associated with negative social and health consequences,⁴² such as for substances like alcohol and marijuana, and other potentially addictive engagements like gaming, gambling, and pornography.

And yet, despite these risks to health behaviors and mental health, technology is an important tool in addressing the mental health of young adults. Use of telehealth services for behavioral health among young adults has increased since the COVID-19 pandemic, jumping from 10% in 2019 to 33% in 2020,⁴³ and telehealth services have been shown to increase access to care for disadvantaged groups like racial/ ethnic minorities, sexual and gender minorities, and those



with low socioeconomic status.⁴⁴ Young adults have significant interest in behavioral telehealth services, but other digital mental health interventions may also be effective in addressing the current young adult mental health crisis. Evidence from a recent systematic review suggests that computerized cognitive behavioral therapy interventions for young adults have been effective in treating anxiety and depression, particularly those interventions with an in-person component. However, evidence of efficacy for other digital or mHealth (i.e., mobile health) interventions among this age group remain inconclusive.⁴⁵

WHAT'S NEXT FOR YOUNG ADULT MENTAL HEALTH

Despite additional investment in mental health care services, there are simply not enough mental health practitioners to meet the unprecedented need. Increasing the behavioral health care workforce and access to behavioral telehealth for marginalized young adults is an important step. In addition to high quality, culturally tailored, and integrated behavioral health care, young people need environments that cultivate a sense of community and care for their study, work, and living, including minority young adults, whether racial/ethnic minorities, sexual and gender minorities, or those with differing cognitive or physical abilities. This means instilling emotion-regulation skills in young people while addressing other key social determinants of health like economic and social mobility, affordable housing, healthy food access, environments that support healthy sleep habits, neighborhood safety, healthy relationships, and trauma-informed education and health care. More high-quality research on the mental health harms of technology use among youth and young adults is needed, as is examination of effective ways these harms can be mitigated and addressed. Similarly, we need better evidence-based digital or mHealth behavioral health interventions for young adults.

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The Mental Health Consequences of Losing a Loved One to COVID-19

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ABSTRACT

OBJECTIVES: This study examined the association between loss of a loved one to COVID-19 and depression, anxiety and suicide ideation among Rhode Island young adults.

METHODS: The 2022 Rhode Island Young Adult Survey recruited 1,022 young adults aged 18-25 years who lived in Rhode Island. Logistic regression models were used to estimate the odds of depression, anxiety, and suicide ideation due to experiencing a loss due to COVID-19.

RESULTS: The odds of anxiety and suicide ideation were 57% (OR[95% CI] = 1.57 [1.13, 2.18]) and 79% (OR[95% CI] = 1.79 [1.19, 2.70]) greater among participants who lost a close friend or family member due to COVID-19.

CONCLUSIONS: Losing a loved one to COVID-19 increases the risk of anxiety or suicide ideation among young adults in RI. Prevention measures such as screening for mental health symptoms and incorporating mental health awareness into college, university and workplace settings should be instituted.

KEYWORDS: mental health, suicide ideation, COVID-19, loss, depression, young adults

INTROD UCTION

Living through a pandemic creates incredible uncertainty, loss of control and routine, and loss of income, each of which can contribute to or trigger emotional distress such as anxiety or depression.¹ The most recent COVID-19 pandemic has been characterized by these attributes as well as concerns about one's health, economic security,² and loss of a loved one. In particular, losing a loved one to COVID-19 may heighten mental health symptoms, especially for young adults who experience normative developmental transitions that are already associated with mental health symptoms.³

To date, the global death toll associated with COVID-19 is over 6 million documented deaths, with 895,693 deaths occurring in the United States (US) between January 2020 and September 2021.^{4,5} Death rates were higher in US populations of color relative to the non-Hispanic White population, and populations of color died at younger ages than the

non-Hispanic White populations, according to data collected between February 1st and July 22, 2020.⁶ In the US, 95% of COVID-19 deaths occurred in individuals who were over 50 years old.⁷

In Rhode Island (RI), 3,789 deaths due to COVID-19 occurred as of January 2023.⁸ In December 2020 alone, RI had the highest COVID-19 fatality and incidence rates when compared to the rest of the US.⁹ While White individuals had the highest crude death counts when compared to residents of other races, Hispanics/Latinos, African Americans/Blacks and Asians have higher age-adjusted death rates. As with COVID-19 death rates in the US, 95% of COVID-deaths in RI were among individuals over 50 years old.¹⁰

For every COVID-19 death in the US, about nine Americans experience the loss of a close relative or loved one.11 The toll of COVID-19 deaths has led to a rise in adverse mental health consequences among individuals who have lost a loved one to COVID-19. The sudden and unexpected death of a family member or close friend can cause extreme psychological distress (i.e., depression, anxiety, suicide ideation) and require extra emotional support to grieve the unexpected loss.^{12,13} Travel limitations, group gathering restrictions, and required social isolation may have prevented some grieved individuals from seeking and receiving the support needed to adapt to their loss, prolonging the feelings of depression, anxiety, and grief.14 Bereaved individuals who had lost a loved one to COVID-19 reported guilt, anxiety, and depression due to self-blame for not making greater efforts to visit their loved one during the hospital stay or for not being present during their loved one's death.¹⁵⁻¹⁷ Lack of closure led to feelings of denial and an inability to accept their loss, both of which independently increased the risk of depression, anxiety, or other mental health symptoms.¹⁴ Further, a scoping review of qualitative studies on grief and loss during the COVID-19 pandemic revealed that inconsistencies in or lack of funeral ceremonies further exacerbated an individual's sense of loss immediately post-death, as did contemplating their loss in social isolation, due to COVID-19 restrictions, which increased the risk of suicide ideation.¹⁴

Although evidence suggests that individuals who have lost a loved due to COVID-19 experience poor mental health, there is very limited information about the prevalence of losing a loved one due to COVID-19, and even less knowledge about the mental health consequences associated with



such a loss among young adults. It is possible that the combination of losing a loved one to COVID-19 during such a formative stage of a young adult's life may increase the risk of experiencing poor mental health among this population. To our knowledge there is no available information about how young adults in RI have been affected by this issue. To address this gap, we used the 2022 RI Young Adult Survey to determine which young adults were most likely to lose a friend or family member to COVID-19, and whether this loss is independently associated with anxiety, depression, and suicide ideation.

METHODS

Sample and Data Collection

The Rhode Island Young Adult Survey (RIYAS) was a selfreport, de-identified, cross-sectional survey implemented by the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities & Hospitals. The 2022 RIYAS was a web-based survey that used Qualtrics to collect data regarding young adult behavioral health, risk behaviors, and mental and physical health outcomes. The 2022 RIYAS was administered to young adults, 18 to 25 years old, residing in Rhode Island for at least part of the year. Recruitment included targeted paid Instagram, Twitter, Facebook, and Snapchat ads and was supplemented by recruitment via Reddit, flyers, banners at the Providence Place Mall, and emails to students at an institution of higher education. Participants received \$10 Amazon gift cards as compensation for study participation. A total of n = 1,022 surveys were completed between May and August 2022 and were available for the current analysis. All participants provided electronic informed consent. This study was approved by the Johnson & Wales University Institutional Review Board.

Measures

Experiencing a loss due to the COVID-19 pandemic was assessed with a single item: Have you lost a close friend or family member to COVID-19? Response options included no, yes a friend, and yes a family member. The loss of a friend or loss of a family member were combined into an any COVID-19 loss (coded as 0) category.

The Center of Epidemiologic Studies Depression Scale, 10-item version (CES-D10) was used to assess depression.¹⁸ The CES-D10 contains 10 items that measure past week prevalence of symptoms related to the development of depression. Responses were collected on 4-point Likert scales ranging from rarely or none of the time (coded as 0) to most of the time (coded as 3). Aggregated scores (α = 0.75) across all items of \geq 10 indicated depression. Test/ re-test reliability and convergent reliability of the CES-D10 has been established.¹⁹ The Generalized Anxiety Disorder 7-item scale (GAD-7) was used to assess anxiety. The GAD-7 contains 7 items that measure past two-week experiences of nervousness, anxiousness, worrying, difficulty relaxing, restlessness, annoyance, irritability, and fear.²⁰ Responses were collected on 4-point Likert scales ranging from not at all (coded as 0) to nearly every *day* (coded as 3). Aggregated scores ($\alpha = 0.93$) across all items of ≥ 10 indicate clinically significant anxiety.²¹ Reliability and validity of the GAD-7 has been established in adolescent and adult samples.²² *Suicide ideation* was assessed with: During the past 12 months, did you ever seriously consider attempting suicide? The response options were no (coded as 1) and yes (coded as 2).

Several sociodemographic variables (i.e., age, sex, gender, sexual orientation, race/ethnicity, student status, employment status, social status) were assessed to identify disparities between population groups. Sex (male, female, intersex), gender (woman, man, non-binary, two-spirit, different identity not listed), and sexual orientation (heterosexual/straight, homosexual/lesbian or gay, bisexual, don't know, different identity not listed) were collapsed into a single variable sexual and gender identity - that categorized participants as heterosexual cis-female, heterosexual cis-male, and any sexual or gender minority. Racial and ethnic categories included African American or Black, Asian, Caucasian or White, Hispanic/Latino, Native American or Alaskan Native, Native Hawaiian or Other Pacific Islander, and different identity not listed. Participants selected all that applied. Because of low sample sizes, participants identifying as Native American or Alaskan Native, Native Hawaiian or Other Pacific Islander, different identity not listed, or more than 1 race were collapsed into a single Other category. Student and employment status were combined to classify participants as not a student/employed, student/not employed, student/ employed, or not a student/not employed. The MacArthur Scale of Subjective Social Status, which asks participants to rank themselves relative to others in the community on a 1 (worst off) to 10 (best off) scale, was used to assess social status.23

Analysis

The distribution of continuous variables (age, social status) were examined for skew and considered normally distributed. Descriptive statistics are reported for all variables. Disparities in experiencing loss due to the COVID-19 pandemic were identified using multivariable logistic regression models. All sociodemographic variables were specified as the independent variables with loss due to COVID-19 as the dependent. Heterosexual cis-males, White non-Hispanic, and not a student/not employed were the referents. Unadjusted and adjusted logistic regression models were used to estimate the odds of depression, anxiety, and suicide ideation due to experiencing a loss due to COVID-19. Adjusted models controlled for all sociodemographic variables. Analyses were completed using SPSS v28.0 (Armonk, NY: IBM Corp), and statistical significance was determined using 95% confidence intervals (CI).



RESULTS

Mean age of the sample was 21.3 (SD = 2.1), and 44.6% of participants identified as heterosexual cis-female (**Table 1**). A majority (59.8%) identified as White, non-Hispanic. A majority (55%) were students and employed, and mean social status was 5.0 (SD = 1.7). The prevalence of depression, anxiety, and suicide ideation was 51%, 37.9%, and 14.7%, respectively. Overall, 17.3% of participants lost either a friend or family member due to the COVID-19 pandemic (**Figure 1**).

There were two sociodemographic disparities noted in the multivariable logistic regression analysis. The odds of losing a friend or family member due to COVID-19 was 56% greater among participants who were Hispanic (OR[95% CI] = 1.56 [1.04, 2.33]) (**Figure 2**). Conversely, the odds significantly decreased by 11% for every one unit increase in social status (OR[95% CI] = 0.89 [0.81, 0.99]).

In the unadjusted logistic regression analysis, the odds of anxiety and suicide ideation were 57% (OR[95% CI] = 1.57 [1.13, 2.18]) and 79% (OR[95% CI] = 1.79 [1.19, 2.70]) greater among participants who lost a close friend or family member due to COVID-19 (**Table 2**). The direction and magnitude of these relationships were maintained in the adjusted analysis. There was no association between losing a friend or family member due to COVID-19 and depression.

Table 1. Descriptive statistics	of categorica	l variables ((n = 1022)
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Variable		n (%)
Sexual and Gender	Heterosexual cis-female	456 (44.6)
Identity	Heterosexual cis-male	132 (12.9)
	Sexual/gender minority	434 (42.5)
Race/ethnicity	Asian	59 (5.8)
	Black/African American	54 (5.3)
	Hispanic	210 (20.5)
	Other/More than 1 race	88 (8.6)
	White	611 (59.8)
Student/employment	Not a student, not employed	59 (5.8)
status	Not a student, employed	244 (23.9)
	Student, not employed	157 (15.4)
	Student, employed	562 (55.0)
Depression	Yes	521 (51.0)
	No	501 (49.0)
Anxiety	Yes	387 (37.9)
	No	635 (62.1)
Suicide ideation	Yes	150 (14.7)
	No	872 (85.3)









		Depression		Anxiety		Suicide Ideation	
Variable		OR	95% CI	OR	95% CI	OR	95% CI
Unadjusted Mod	lels						
Loss of a close	Yes	1.17	0.85, 1.62	1.57	1.13, 2.18	1.79	1.19, 2.70
friend OR family member	No						
Adjusted Models							
Loss of a close friend OR family member	Yes	1.14	0.80, 1.62	1.65	1.17, 2.33	1.83	1.17, 2.84
	No						



DISCUSSION

Nearly 1 in 5 young adults in RI reported having lost someone close to them due to COVID-19 and Hispanic young adults were more likely to lose a loved one to COVID-19, as were those with lower social status. Study results in combination with recent research on loss of a loved one to COVID-19² suggest that while loss to COVID-19 is universal, certain populations may be at a greater risk. National and RI trends alike indicate that populations of color have higher COVID-19 death rates than non-Hispanic White populations suggesting a possible rationale why Hispanic young adults were at a higher risk of experiencing a COVID-19 loss.^{6,10}

Social determinants of health may play a role in this loss disparity. For instance, when looking at percentages of people vaccinated in Rhode Island by race, Hispanic or Latinos are the third highest population for being partially vaccinated at 82%, while also being the lowest population for receiving a booster dose.¹⁰ Further, existing literature shows that Hispanic workers are over-represented in front-line lower status occupations and lower status occupations with high-risk exposures to COVID-19.²⁴ Greater work exposure may contribute to a higher prevalence of COVID-19 and a higher prevalence losing a loved one and/or friend among young adults of low social status and young adult members of the RI Hispanic community.

Experiencing a loss of a loved one due to COVID-19 may increase the odds of anxiety or suicide ideation among young adults in RI. Unexpected death of a loved one is often cited as a traumatic life event that elevates the likelihood of a psychiatric condition.²⁵ Thus, it is not surprising that losing someone close to COVID-19 increased the risk of anxiety and suicide ideation. Our results are consistent with other studies of pandemics. One study of mental health outcomes during the COVID-19 and SARS pandemics suggests that suicide ideation and suicide-related outcomes may be elevated during pandemics because individuals are fearful of infection, worried about others, and social isolation.²⁶ Similarly, in another study of the HIV/AIDS pandemic, the loss of a loved one left bereaved individuals with higher levels of anxiety and other depressive symptoms, which included suicide ideation.²⁷ Lastly, it is plausible that those who lost a loved one to COVID-19 may have had an existing mental health condition, which could increase the risk of suicide ideation, as mental illness increases the risk of suicide ideation.28

Limitations

This convenience sample of young adults in Rhode Island was disproportionately female, with a low-percentage of heterosexual cis-males, individuals identifying as Black/African American and Asian, and a relatively higher percentage of sexual or gender minorities and is not likely representative of the young adult population. The survey used self-reported questions, which may have led to under-reporting of mental health symptoms, and recall and social desirability bias are a concern. It is possible that those with significant mental health symptoms may not have completed this voluntary web-based survey and therefore prevalence of anxiety, depression and suicide ideation may be underreported. This was also a cross-sectional survey, and causality cannot be assumed. Despite its limitations, this study is among the few studies that examined the mental health of young adults who lost a family member or friend to COVID-19, and it offers insight into the mental health effects of losing a loved one to COVID-19 among young adults in Rhode Island.

Implications

Young adults who have lost someone to COVID-19 could benefit from interventions to manage loss and grief and thereby reduce the likelihood of developing, or exacerbating, depression, anxiety, or suicide ideation. Medical and public health practitioners should specifically consider ways to design interventions that can target Hispanic and low SES populations without increasing stigma or prejudice. Following the recommendation of the National Academic of Pediatrics, all youth 12 years and older should be screened for suicide risk through primary care offices, university and college health centers, and community health centers.²⁹ Primary care offices and community health centers should follow the recommendations of the U.S Prevention Service Task Force National Institute of Mental Health to screen for anxiety in young adults.³⁰ While simple questionnaires such as assessments for anxiety (Generalized Anxiety Disorder-7),20 suicide ideation (Ask Suicide-Screening Questions),³¹ and depression (Patient Health Questionnaire-9)³² are routinely utilized by community health clinics and Federally Qualified Health Centers (FQHCs), patients who have experienced the loss of a friend of family member to COVID-19 may benefit from receiving a referral to mental health services specifically for grief counseling. Specific actions for young adults dealing with grief recommended by the Centers for Disease Control and Prevention (CDC) include connecting with other people to honor your loved one, creating memories that have significance to them and the loved one who died, or joining support groups, hotlines, or seeking spiritual support from faith-based organizations.³³ Given the proportion of young adults in RI who have lost a loved to COVID-19 and the associated consequences, the RI Department of Health should consider launching a public education campaign to increase awareness of the associated mental health consequences of losing a loved one to COVID-19.³⁴ Likewise, college campuses and workplaces, alike, might want to consider launching similar education campaigns such as incorporating mental health literacy training to promote mental health well-being.35 College campuses should consider initiating grief counseling groups or creative programming that would give young adults an opportunity



to share their experiences of loss.³⁶ Workplaces may consider securing an Employee Assistance Program (EAP) if they do not have such a service for employees.³⁷ Workplaces with EAPs might consider working with their vendor to offer grief counseling groups or special programming for employees who have specifically experienced loss of a loved one due to COVID-19.³⁸

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Brain Injury and Substance Use in Young Adults: The Need for Integrating Care

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ABSTRACT

OBJECTIVES: This study examined sociodemographic disparities in traumatic brain injury (TBI), and the association between TBI and substance misuse among young adults in Rhode Island.

METHODS: Among this sample of N=1,022 from the 2022 Rhode Island Young Adult Survey, multivariable logistic regressions were used to examine both study objectives.

RESULTS: Black, Asian, and Hispanic young adults had 77% (95%CI: 26%, 93%), 79% (95%CI: 32%, 94%), and 58% (95%CI: 31%, 75%) lower odds of brain injury, respectively, compared to White, non-Hispanic young adults. Those having experienced brain injury were more likely to engage in hazardous alcohol use (p = 0.003), hazardous marijuana use (p < 0.001), and illicit drug use (p = 0.003), but not OTC or prescription drug misuse.

CONCLUSIONS: There is a pressing need for integrated, large-scale, multidisciplinary programs with a welltrained workforce to address TBI and substance misuse in various medical settings for behavioral health and emergency care.

KEYWORDS: Traumatic brain injury, substance use, young adult, Rhode Island

INTRODUCTION

Traumatic brain injury (TBI) is a major public health concern with approximately a 50% lifetime prevalence globally.1 TBI is defined as a jolt or a blow to the head which causes an acute disruption to brain function; this can manifest as a period of loss of consciousness, confusion, or posttraumatic amnesia. Long-term health consequences of mild TBI are memory loss, periods of confusion, tinnitus, and loss of consciousness.² Concussions are classified as a traumatic brain injury, regardless of severity.3 Mild TBIs are also associated with an increased risk of depression and anxiety.^{3,4} Severe TBIs have significant long-term health consequences such as coma, emotional problems, seizures, and death. Similarly, severe TBI is associated with an increased risk of depression, anxiety, agitation, anger, aggression, and irritability.⁴ This emotional distress can increase suicide attempts, especially in young adults with TBIs.⁵

In the United States, an estimated 1.7 million people sustain a TBI annually.⁶ In Rhode Island between 2016 and 2020, 14,300 individuals were discharged from the emergency department with a TBI diagnosis, 2,769 were admitted to the hospital, and 653 TBI-associated deaths occurred. Of these, 3,401 individuals aged 15–24 years old were admitted to the emergency department with a TBI diagnosis (23.8%), 163 were admitted to the hospital (5.9%), and 28 had TBI-associated fatalities (4.3%). The most common causes of TBI in Rhode Island young adults (15–24 years) during this time were being struck by an object (28.2%), falls (22.8%), and motor vehicle accidents (22.6%).⁷

Available data show that young adults 18–25 years old are at high risk for TBI, following only elderly adults (75+ years) and young children (<5 years).² TBIs sustained during this developmental stage can have a lasting impact. Global function, cognitive function, and motor function can decrease as a result of TBI.⁸ TBI can also cause behavioral and emotional changes.⁹ Young adults with TBIs often have trouble returning to work or higher education due to executive function and cognitive setbacks.¹⁰

Young adults are also at high risk for substance use. Physiologically, the prefrontal cortex responsible for impulse control is still developing,¹¹ and substance use is typically initiated in the teenage years and young adulthood.¹² Rates of substance use tend to be highest in young adulthood and are generally higher among Rhode Island young adults than across the nation. According to the 2019-2020 National Survey on Drug Use and Health, 41% of Rhode Island young adults binge drank compared to 32% of the national young adult population. Similar disparities were found with marijuana use (36% RI vs. 23% US), illicit drug use (34% RI vs. 24% US), and pain reliever misuse (5% RI vs. 4% US).¹³

The relationship between TBI and substance use is likely bidirectional. Substance use can be a risk factor for TBI in all age groups; however, young adults have an increased risk of long-term morbidity compared to older adults, as their brains are still developing.¹⁴ Studies have shown that those suffering from TBI were likely to be found intoxicated from alcohol upon hospital admission,¹⁵ and a history of problem alcohol use is linked to an increased risk of incurring a TBI.¹⁶ Similarly, among those with poor mental health or substance use disorder (SUD), risk of fatal and non-fatal TBI is increased while individuals are under the influence of



substances. Substance abuse also increases risk of motor vehicle accident, which can result in TBI.¹⁶

Conversely, substance use may result from a TBI.¹⁷⁻¹⁹ Some literature suggests that TBI patients have increased risk for developing alcohol use disorder within a year of injury.¹⁷ Another study shows that being a young adult and suspected substance intoxication at the time of TBI were both independently associated with post-TBI substance use disorder. Furthermore, studies examining TBI outcomes show that individuals who exhibit excessive substance abuse can have lower rates of good neuropsychological outcomes such as memory recall and recognition.^{15,20} TBI-related substance abuse is associated with long-term outcomes such as neurological dysfunction, permanent disability, emotional and financial state,²¹ an increased risk of repeated injury,²² and death.²³

There is limited information on TBIs in young adults and even less research on the relationship between TBI and substance use in young adults. The purpose of this study is to: 1) examine any sociodemographic disparities in TBI, and 2) to understand the relationship between TBI and various types of substance use among young adults in Rhode Island. This study aims to expand the knowledge of young adults with traumatic brain injuries and their relationship to substance use.

METHODS

Sample

A cross-sectional analysis was conducted with data from the web-based Rhode Island Young Adult Survey (RIYAS) from May through August 2022. A full description of RIYAS methodology has been previously published.²⁴ The survey resulted in N = 1,022 young adults aged 18–25 years who lived in Rhode Island for at least part of the year, all of whom are included in this study. This study was approved by the Johnson & Wales University Institutional Review Board.

Measures

The primary exposure of this study is having experienced a brain injury. This was assessed by the question, *have you ever experienced a significant head injury, brain injury, or a concussion*? Response options included *Yes, in the past year, Yes, more than a year ago,* and *No.* This measure was dichotomized as those having ever experienced a brain injury or never have experienced a brain injury.

The primary outcomes in this study include hazardous alcohol use, hazardous marijuana use, over the counter (OTC) drug misuse, prescription drug misuse, and any illicit drug use. Hazardous alcohol use was assessed by the Alcohol Use Disorders Identification Test (AUDIT) score generated from 10 items.²⁵ This valid and reliable assessment includes eight items about drinking behaviors with various frequency responses, for example, ranging from *never* to *daily or almost*

daily.²⁶ The final two items had response options never, yes, but not in the past year, or yes, during the past year. The assessment was scored according to scoring instructions. Scores of 8 or more were considered hazardous alcohol use. Interitem reliability was α = 0.82. Hazardous marijuana use was assessed via the Cannabis Use Disorders Identification Test - Revised (CUDIT-R).27 This valid and reliable assessment includes eight items total: seven about marijuana use behaviors with various frequency responses on a 5-point Likert scale, for example, ranging from never to daily or almost daily and the final question, Have you ever thought about cutting down, or stopping, your use of cannabis? had response options never, yes, but not in the past 6 months, or yes, during the past 6 months.²⁸ The assessment was scored according to scoring instructions. Scores of 8 or more indicated hazardous marijuana use. Interitem reliability was α = 0.82. OTC drug misuse, prescription drug misuse, and any illicit drug use were all assessed by similar questions: Have you ever used over-the-counter medication for non-medical reasons?, Have you ever used prescription drugs not prescribed to you?, or Have you ever used illegal/illicit drugs or club drugs? Response options yes, in the past month or yes, more than a month ago were both considered affirmative responses for use, and all variables were dichotomized.

Several covariates that may be associated with brain injury and substance use were included in the study. Covariates included sexual and gender identity (*cisgender heterosexual males, cisgender heterosexual females, sexual and gender minorities*), race/ethnicity (*White non-Hispanic, Black, Asian, Hispanic, Multiracial or something else*), age in years, and social status. Social status was measured using the Macarthur Scale of Subjective Social Status,²⁹ which assessed a participant's perceived social rank relative to other members of the community on a scale of 1, meaning *worst off,* to 10, meaning *best off.*

Statistical Analysis

Descriptive statistics such as frequencies and percentages were computed for all variables among the total sample. Bivariable statistics were used to compare covariates and substance use outcomes by brain injury status (**Tables 1, 2**). Particularly, two-sample t-tests were used for continuous variables, chi-square tests for categorical variables, and Fisher's exact test was used for categorical variables when a single cell had fewer than 5 observations. A multivariable logistic regression was conducted to calculate adjusted odds of brain injury for all covariates including sexual and gender identity, race/ethnicity, and social status (**Table 3**). Multivariable logistic regressions were also conducted for each of the five substance use outcomes controlling for all covariates (**Table 4**). All statistical tests were assessed at $\alpha = 0.05$. All analyses were conducted in Stata/SE 15.0.³⁰



RESULTS

Among this sample of Rhode Island young adults, 16.8% (N=172) reported having ever experienced a brain injury, with N=36 reporting the occurrence within the past year (3.5%). Those having ever experienced a brain injury were more likely to be White, non-Hispanic (p < 0.001), and older (p = 0.028). However, brain injury status did not vary by sexual and gender identity or race/ethnicity (Table 1). Substance use outcomes varied in prevalence with the highest engaging in hazardous marijuana use (18.5%), then hazardous alcohol use (15.7%), prescription drug misuse (12.1%), OTC drug misuse (9.2%), and illicit drug use (9.1%). Those having experienced a brain injury were more likely to engage in hazardous alcohol use (p = 0.003), hazardous marijuana use (p < 0.001), and illicit drug use (p = 0.003). However, brain injury status did not vary by OTC or prescription drug misuse (Table 2).

The multivariable model for brain injury showed that Black young adults, Asian young adults, and Hispanic young adults had 77% (95%CI: 26%, 93%), 79% (95%CI: 32%, 94%), and 58% (95%CI: 31%, 75%) lower odds of

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	TOTAL N=1022 (%)	Never Experienced a Brain Injury N=850 (83.2%)	Ever Experienced a Brain Injury N=172 (16.8%)	P-value
Sexual and Geno	der Identity			0.069
Cisgender Heterosexual Males	133 (13.0)	107 (12.6)	26 (15.1)	
Cisgender Heterosexual Females	456 (44.6)	393 (46.2)	63 (36.6)	
Sexual and Gender Minorities	433 (42.4)	350 (41.2)	83 (48.3)	
Race/Ethnicity				<0.001
White, non-Hispanic	611 (59.8)	482 (56.7)	129 (75.0)	
Black	54 (5.3)	51 (6.0)	3 (1.7)	
Asian	59 (5.8)	56 (6.6)	3 (1.7)	
Hispanic	210 (20.6)	190 (22.4)	20 (11.6)	
Multiracial or Something Else	88 (8.6)	71 (8.4)	17 (9.9)	
Social Status [mean (SE)]	4.99 (0.05)	5.00 (0.06)	4.98 (0.13)	0.860
Age [mean (SE)]	21.32 (0.07)	21.25 (0.07)	21.63 (0.15)	0.028

Table 1. Characteristics of Rhode Island Young Adults by Brain Injury

Note: P-values were computed using two-sample t-tests for continuous variables, chi-square tests for categorical variables, and Fisher's Exact tests for categorical variables with cell sizes < 5 $\,$

 Table 2. Substance Use Outcomes of Rhode Island Young Adults

 by Brain Injury

Substance Use Outcomes	TOTAL N=1022 (%)	Never Experienced a Brain Injury N=850 (83.2%)	Ever Experienced a Brain Injury N=172 (16.8%)	P-value
Hazardous Alcohol Use	160 (15.7)	120 (14.1)	40 (23.3)	0.003
Hazardous Marijuana Use	189 (18.5)	136 (16.0)	53 (30.8)	<0.001
OTC Drug Misuse	94 (9.2)	75 (8.8)	19 (11.1)	0.358
Prescription Drug Misuse	124 (12.1)	98 (11.5)	26 (15.1)	0.189
Illicit Drug Use	93 (9.1)	67 (7.9)	26 (15.1)	0.003

Note: P-values were computed using two-sample t-tests for continuous variables, chi-square tests for categorical variables, and Fisher's Exact tests for categorical variables with cell sizes < 5

Table 3. Adjusted Odds of Brain Injury among Rhode Island YoungAdults, N=1,022

	Adjusted Odds Ratio	95% CI
Sexual and Gender Identity		
Cisgender Heterosexual Males	1.00 ref	
Cisgender Heterosexual Females	0.66	0.39, 1.10
Sexual and Gender Minorities	0.93	0.56, 1.55
Race/Ethnicity		
White, non-Hispanic	1.00 ref	
Black	0.23	0.07, 0.74
Asian	0.21	0.06, 0.68
Hispanic	0.42	0.25, 0.69
Multiracial or Something Else	0.90	0.51, 1.59
Social Status	1.00	0.90, 1.10
Age	1.08	0.99, 1,17

Note: Adjusted odds ratios were calculated using multivariable logistic regression

 Table 4. Adjusted Associations Between Brain Injury and Substance Use

 Outcomes among Rhode Island Young Adults, N=1,022

	Adjusted Odds Ratio	95% CI
Hazardous Alcohol Use	1.72	1.14, 2.60
Hazardous Marijuana Use	2.26	1.53, 3.34
OTC Drug Misuse	1.29	0.74, 2.21
Prescription Drug Misuse	1.33	0.82, 2.15
Illicit Drug Use	1.89	1.14, 3.15

Note: Adjusted odds ratios for each substance use outcome were calculated using multivariable logistic regressions controlling for sexual and gender identity, race/ ethnicity, social status, and age.



brain injury, respectively, compared to White, non-Hispanic young adults while controlling for sexual and gender identity, social status, and age. There were no other significant associations with brain injury in the multivariable model (**Table 3**).

Multivariable logistic regressions for substance use outcomes showed that brain injury increased the odds of hazardous alcohol use by 72% (95%CI: 14%, 160%), hazardous marijuana use by 126% (95%CI: 53%, 234%), and illicit drug use by 89% (95%CI: 14%, 215%), controlling for all covariates. Brain injury was not significantly associated with OTC or prescription drug misuse (**Table 4**).

DISCUSSION

The current study suggests that older and White young adults were more likely to experience TBI. White young adults have greater access to information and health care services for TBIs, thus allowing for higher reporting of these experiences.³¹ Literature suggests that the overall rate of TBI varies by race among young adults. Black youth have been less likely to visit the emergency department for suspected TBI than White youth.³² One study found that Black Americans were more likely to acquire a TBI through violence compared to White Americans.³³

In this study, TBI in young adults was associated with hazardous alcohol use, hazardous marijuana use, and illicit drug use, but not with OTC and prescription drug misuse. The literature shows that being a young adult and suspected substance intoxication at the time of TBI was associated with post-TBI substance use disorder.34 Multiple studies have shown that TBI survivors were more likely to experience alcohol misuse post-injury which was associated with an increased risk for future TBIs.6,35-37 Substance abuse can also be a causal factor in TBIs via falls, crashes, or assaults.³⁸ A study at various Level 1 trauma centers throughout the US showed young adults were most likely to test positive for substance use via urine toxicology screening while being assessed for a suspected TBI.39 Adolescents with a history of TBI had greater rates of binge drinking, hazardous drinking, consuming illegal drugs, cannabis (aOR=2.4), and drug problems (aOR=2.1) compared to those who were never injured.⁴⁰

Limitations

While this study offers a novel examination into the association between TBI and substance use among young adults in Rhode Island, it is not without limitations. First, this is a cross-sectional study design and causality cannot be inferred. Specifically, it is not clear whether self-reported TBIs occurred before or after the assessed substance use outcomes – this is always hard to tease out given the plausible bidirectional relationship.^{1,14,41} This is also a convenience sample, and is skewed female and sexual/gender minority, likely not representative of the young adult population and may underestimate the prevalence of TBI, as many studies suggest males have higher rates.² This underestimate of concussions may be underestimates of sports- or physicalactivity-related concussions associated with low representation of males in the sample. However, prior literature suggests that sports-related concussions are significantly associated with substance use across various substances, and therefore are unlikely to bias the findings herein.⁴² Finally, given the self-report nature of the survey, it is likely minor concussions may be under-reported due to lack of awareness, and substance misuse may also be under-reported due to social desirability bias.

Implications

Since TBI and substance use disorders tend to overlap and exacerbate one another, screening, treatment, and referrals should be integrated across the continuum of care. Patients with co-morbid TBI and SUD may require adapted communication due to neurological deficits, some expected noncompliance due to executive function challenges, compensatory strategies for other cognitive challenges, and additional longterm community support.⁴ For these integrated programs to be successful, patient engagement and empowerment must be incorporated into person-centered care.¹ This highlights the pressing need for behavioral health providers to be better trained and equipped to identify TBIs and address neurologic impairments across treatment modalities.

Adapting to a patient's needs as they relate to TBI can improve patient engagement and treatment benefits; however, a TBI must first be identified.⁴³ Studies suggest TBI assessment can help delineate between mental health and neurologic symptoms, leading to better mental health referrals and improved clinical care decisions.^{39,44} While evidence-based short screening tools are available to administer during behavioral health sessions, TBIs are still underrecognized by providers.⁴³ Failure to detect TBI in SUD patients often results in misdiagnosis or inappropriate treatment and rehabilitation plans.¹⁶ Greater uptake of evidence-based TBI screening is needed.

Screenings for mental health and substance use disorders in the triage and emergency departments should also be introduced. Studies suggest that standardized data collection and review of mental health and substance use histories during initial TBI hospital presentations can aid in identifying patients at risk for developing mental illness or substance use disorder.⁴⁵ Unfortunately, this screening is not standard across medical facilities and the intervention and follow-up of substance use disorder in TBI patients is low.³⁹

CONCLUSION

While small-scale, single-program initiatives exist, there is a need for larger-scale, multidisciplinary programs to address TBI and SUD in various medical settings for behavioral



health and emergency care.¹ Increased workforce capacity with appropriate training, knowledge, and resources is needed for integrated behavioral healthcare to better address the short- and long-term needs of young adults with TBI and SUD.

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The Mental Health Burden of Racial Discrimination in Young Adults in Rhode Island

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ABSTRACT

OBJECTIVES: This study examined the association between racial discrimination and depressive symptoms among Rhode Island young adults.

METHODS: The 2022 Rhode Island Young Adult Survey recruited 1,022 young adults aged 18-25 years who lived in Rhode Island for at least part of the year. Multivariable logistic regression for depressive symptoms controlled for sexual and gender identity, race/ethnicity, social status, age, employment, and student status.

RESULTS: 23.6% of young adults reported experiencing racial discrimination in childhood and/or adulthood. Odds of depressive symptoms increased for experiences of childhood racial discrimination (+70%; 95%CI: 14%, 155%) and any racial discrimination (+56%; 95%CI: 6%, 130%), but not for racial discrimination in adulthood (+38%; 95%CI: -8%, 108%).

CONCLUSIONS: Experiences of racial discrimination increase odds of depressive symptoms among young adults. Prevention measures such as universal screening for childhood adversity, incorporating antiracism education into all institutional settings, and continued nondiscrimination policy and enforcement should be employed.

KEYWORDS: discrimination, racism, mental health, depression, young adults

INTRODUCTION

In 2019, young adults aged 18–29 in the United States exhibited a depressive symptom rate of 21%, and experienced greater increases in these symptoms from the years 2017-2020 compared to any other adult age group.^{1,2} This increasing prevalence is due mostly to the disruptions to life stemming from the COVID-19 pandemic, causing psychological, emotional, and physical harm.³ In Rhode Island, 43.2% of young adults experienced depressive symptoms in 2020, more than double the national estimate of major depressive episode.^{4,5} In addition, 11.7% of Rhode Island young adults had serious thoughts of suicide during 2017–2019, where the risk of death by suicide in racial and ethnic minority populations is highest under the age of 30.^{6,7} Of

the Rhode Island young adult population, sexual and gender minorities (SGMs) suffered a disproportionate burden of depressive symptoms (68% of those who are not heterosexual, 59% who identify as neither male nor female) compared to males and females and those who identify as heterosexual (36%, 45%, and 34%, respectively).⁴

A potential risk factor for mental illness in young adults is the experience of racial discrimination. Racial discrimination typically involves injurious, negative, unfair, or hostile treatment because of behavioral manifestations of prejudice.⁸ The Black Lives Matter movement, coupled with the COVID-19 pandemic, marked 2020 as the crux of heightened racial tensions in the United States.9,10 The spread of COVID-19 in the United States (US) was accompanied by an increase in discrimination and racism against Asian Americans, where 31% reported that they had experienced racial slurs and insults since the pandemic began.¹¹ The use of the term "Chinese virus" by prominent politicians, including former president Donald Trump, increased xenophobia, and anti-Asian sentiment.12 Concurrently, the Black Lives Matter movement made strides in advancing policies and practices to protect minority groups, and it also gave rise to multiple counter-movements and negative stances that generated hostile social environments toward Black people.13

Prior research suggests that experiencing prejudice and discrimination puts one at higher odds of experiencing depressive symptoms, and this is true for multiple racial and ethnic groups.^{14,15} For example, a scoping review reported that 81% of published studies found a clear positive association between experiencing discrimination and depressive symptoms in African Americans, and general poor mental health, depression, and anxiety were associated with experiencing racism in Aboriginal populations.^{16,17} Similar findings have been reported in individuals who identify as transgender and experiencing discrimination-related stressors was associated with suicide ideation in young adults who identify with the larger LGBT population.¹⁸

To our knowledge, no study has examined rates of racial discrimination and depressive symptoms in Rhode Island young adults, nor have they analyzed the association between racial discrimination in childhood or adulthood and depressive symptoms in this population. Therefore, the present study aims to examine the prevalence of racial discrimination among Rhode Island young adults and its



association with depressive symptoms. We hypothesize that experiencing racial discrimination increases the odds of depressive symptoms, and more so when experienced in childhood than adulthood.

METHODS

Sample

The 2022 Rhode Island Young Adult Survey (RIYAS) is a web-based, cross-sectional survey administered from May through August 2022. A full description of RIYAS methodology is in (whatever the citation is).¹⁹ The survey resulted in N = 1,022 young adults aged 18-25 years who lived in Rhode Island for at least part of the year, all of whom are eligible and included in this study. This study was approved by the Johnson & Wales University Institutional Review Board.

Measures

The primary outcome of the study was depressive symptoms. Depressive symptoms were measured using the Center for Epidemiological Study Short Depression Scale (CES-D10). The CES-D10 contains 10 items regarding past week experiences of symptoms related to the development of depression ($\alpha = 0.83$). For example, items include I felt hopeful about the future, and I felt lonely. The response options ranged from were rarely or none of the time, which was coded as 0, to all of the time, coded as 3. Reverse scoring was implemented for two of the items. Total continuous depressive symptom scores could range from 0 to 30 with higher scores suggesting greater severity of symptoms. Consistent with the literature, a cut-off of 10 or higher was indicative of having depressive symptoms. The CES-D10 has shown strong test-retest reliability and convergent validity in youth and adult populations.20 In this sample, the inter-item correlation according to Cronbach's alpha was $\alpha = 0.85$.

The primary exposures in this study were racial discrimination in childhood, racial discrimination in adulthood, or experiencing any racial discrimination. These exposures were defined by responses to a single survey question, were you treated badly or unfairly because of your race or ethnicity? Response options included Yes, in childhood, Yes, in adulthood, or No, never. Those responding Yes, in childhood or Yes, in adulthood were considered to have experienced racial discrimination in childhood and racial discrimination in adulthood, respectively. Experiencing any racial discrimination was defined by either childhood or adulthood experiences.

Other potential confounders and covariates considered in the analysis include sexual and gender identity (cisgender heterosexual males, cisgender heterosexual females, sexual and gender minorities), race/ethnicity (White non-Hispanic, Black, Asian, Hispanic, Multiracial or something else), social status, age in years, employment (None, Part-Time, Full-Time), and student status. Social status was measured using the Macarthur Scale of Subjective Social Status (Adler et al, 2000), which assessed a participant's perceived social rank relative to other members of the community on a scale of 1, meaning worst off, to 10, meaning best off.²¹

Statistical Analysis

Descriptive statistics, namely frequencies and percentages, were calculated to describe the total sample by all variables, as well as by all primary exposure variable: racial discrimination in childhood, racial discrimination in adulthood, and experiencing any racial discrimination. Frequency and prevalence of the primary racial discrimination exposure variables were described by racial/ethnic group in the total sample. Bivariable statistics such as chi-square tests for categorical variables and t-tests for continuous variables were applied to assess differences in depressive symptoms and all other covariates by each exposure variable. Crude odds ratios were computed using bivariable logistic regressions for the relationships between each of the primary exposures and depressive symptoms. Multivariable logistic regressions of depressive symptoms were conducted for each of the primary exposures separately while controlling for sexual and gender identity, race/ethnicity, social status, age, employment, and student status. All statistical tests were assessed at α = 0.05. All analyses were conducted in Stata/SE 15.0.²²

RESULTS

This sample of Rhode Island young adults was predominantly White non-Hispanic (59.8%), cisgender heterosexual female (44.6%), comprised of students (70.4%), and part-time employees (45.8%). Depressive symptoms were highly prevalent with 51.0% (N = 521) meeting the definition (**Table 1**).

Racial discrimination in adulthood was less prevalent with 18.9% reporting experiences in childhood, 16.2% reporting experiences in adulthood, and 23.6% reporting an experience at all. There was variation in racial discrimination overall, in childhood, and in adulthood by race/ethnicity. Particularly, 68.5% of Black young adults reported racial discrimination, Asian young adults 62.7%, Hispanic young adults 49.5%, Multiracial or other race 45.5%, and White non-Hispanic young adults with only 3.8% (**Figure 1**).

Any racial discrimination, racial discrimination in childhood, and discrimination in adulthood all varied significantly by race/ethnicity (p < 0.001), social status (p<=0.01), and depressive symptoms (p<=0.015). Racial discrimination in childhood was also significantly different by sexual and gender identity (p = 0.013) and employment status (p = 0.033). Similarly, experiences of any racial discrimination were different by employment status (p = 0.032). Racial discrimination in adulthood did not vary by sexual and gender identity (p = 0.326) nor employment status (p = 0.383; **Table 1**). From crude logistic regression models, odds of depressive symptoms increased for each primary exposure: racial



	TOTAL N=1022 (%)	Racial Discrimination in Childhood N = 193 (18.9%)	p-value	Racial Discrimination in Adulthood N = 166 (16.2%)	p-value	Any Racial Discrimination N = 241 (23.6%)	p-value
Sexual and Gender Identity			0.013		0.326		0.117
Cisgender Heterosexual Males	133 (13.0)	20 (10.4)		19 (11.5)		28 (11.6)	
Cisgender Heterosexual Females	456 (44.6)	73 (37.8)		68 (41.0)		97 (40.3)	
Sexual and Gender Minorities	433 (42.4)	100 (51.8)		79 (47.6)		116 (48.1)	
Race/Ethnicity			<0.001		<0.001		<0.001
White, non-Hispanic	611 (59.8)	15 (7.8)		17 (10.2)		23 (9.5)	
Black	54 (5.3)	28 (14.5)		27 (16.3)		37 (15.4)	
Asian	59 (5.8)	32 (16.6)		21 (12.7)		37 (15.4)	
Hispanic	210 (20.6)	81 (42.0)		76 (45.8)		104 (43.2)	
Multiracial or Something Else	88 (8.6)	37 (19.2)		25 (15.1)		40 (16.6)	
Social Status [mean (SE)]	6.00 (0.05)	5.71 (0.13)	0.010	5.54 (0.15)	<0.001	5.65 (0.11)	<0.001
Age [mean (SE)]	21.32 (0.07)	21.16	0.237	21.3 (0.15)	0.925	21.21 (0.13)	0.378
Employment			0.033		0.383		0.032
No	216 (21.1)	53 (27.5)		40 (24.1)		65 (27.0)	
Yes, Part-Time	468 (45.8)	87 (45.1)		78 (47.0)		106 (44.0)	
Yes, Full-Time	338 (33.1)	53 (27.5)		48 (28.9)		70 (29.1)	
Student			0.206		0.550		0.298
No	303 (29.7)	50 (25.9)		46 (27.7)		65 (27.0)	
Yes	719 (70.4)	143 (74.1)		120 (72.3)		176 (73.0)	
Depressive Symptoms			0.001		0.015		0.003
No	501 (49.0)	74 (38.3)		67 (40.4)		98 (40.7)	
Yes	521 (51.0)	119 (61.7)		99 (59.6)		143 (59.3)	

Table 1. Sociodemographic Characteristics of Rhode Island Young Adults by Any Race Discrimination, in Childhood, or Adulthood

NOTE: Bivariable tests conducted were chi-square for categorical variables and t-tests for continuous variables

Figure 1. Prevalence (%) of Racial Discrimination by Race/Ethnicity among Rhode Island Young Adults



Figure 2. Odds of Depressive Symptoms among Rhode Island Young Adults



NOTE: AORs control for sexual and gender identity, race/ethnicity, social status, age, employment, and student status



discrimination in childhood by 71% (95%CI: 24%, 135%), in adulthood by 52% (95%CI: 8%, 113%), or at all by 56% (95%CI: 16%, 108%). Findings from the multivariable logistic regressions were consistent with crude results for childhood racial discrimination (70%; 95%CI: 14%, 155%) and any racial discrimination (56%; 95%CI: 6%, 130%), but the association with racial discrimination in adulthood (38%; 95%CI: -8%, 108%) was no longer significant (**Figure 2**).

DISCUSSION

This study aimed to explore and highlight the disproportionate prevalence of racial discrimination among young adults in Rhode Island as well as examine the relationship between racial discrimination and depressive symptoms. More than 1 in 5 Rhode Island young adults reported experiencing racial discrimination, with Black and Asian young adults reporting the highest prevalence. Yet, all young adult persons of color reported much higher rates of racial discrimination compared to White non-Hispanic young adults. Interestingly, Asian young adults had the highest prevalence of racial discrimination in childhood, while Black young adults reported the highest prevalence in adulthood. A nationally-representative sample of US adults from 2016 suggests a prevalence of 44% for lifetime race discrimination experiences, with people of color reporting much higher rates (63%), including high rates for the Asian population (57%) – consistent with our study findings. The lower overall rate of race discrimination in our study was likely due to having a younger sample, and having a White, non-Hispanic population much less likely to report racial discrimination than in the national study (4% versus 30%, respectively).²³

Our study findings also suggest experiences of racial discrimination are associated with depressive symptoms - consistent with current knowledge and confirming our hypothesis.14,15 The physiological effects of discrimination are extensive, a few of which being anxiety, cardiovascular irregularities, heightened inflammation, depressive symptoms (as supported by the current study), and even shortened telomere length leading to early aging.24 Research suggests that people of color experience stress and/or trauma from individual, institutional, and cultural experiences of racism. This concept is supported by the Race-Based Traumatic Stress Injury Model. This model suggests that experiences of racism result in emotional injury or traumatic stress, much like symptomatic responses from post-traumatic stress. The extent of this emotional injury is dependent upon the individual facing racism, the extent and severity of the experience, their perception of the experience, and their ability to cope. Race-based traumatic stress injury can lead to symptoms of psychopathology and can be particularly harmful to children who tend to lack the necessary coping strategies.^{24,25}

This study found that those who experienced racial discrimination during childhood may have even higher odds of depressive symptoms than those who experienced discrimination in adulthood - also consistent with our hypothesis. Those who experience adversity during childhood are at an increased risk for abnormal variations in brain development that can result in physical, psychological, and behavioral consequences.^{26,27} This can be explained through biological embedding, whereby early life stress creates pro-inflammatory tendencies at the cellular level, hypervigilant responses to challenge, and decreased sensitivity to inhibitory signaling, all of which can be carried into adulthood.²⁸ Increases in inflammation due to adverse childhood experiences can serve as a pathway to depression later in life.29 Adults are less vulnerable to the effects of adversity because the brain's neural networks are well established and unlikely to become altered as significantly as a child's brain when experiencing stress.³⁰

Limitations

Despite its novelty, this study has some limitations. First, self-reported racial discrimination is a subjective metric, and each person's perception of discrimination, whether structural, institutional, or individual, may vary. Also, the measures of racial discrimination were lifetime experience, but did not account for severity or frequency, which likely has a dose-response relationship with poor mental health which could not be examined in this study.³¹ Second, this is a cross-sectional study and a causal relationship between discrimination and depressive symptoms cannot be inferred. Finally, despite using a valid and reliable assessment for depressive symptoms, individuals meeting the definition cannot be assumed to meet the threshold for diagnosis.

Implications

Racism is a significant social determinant of health and an adverse childhood experience. To improve health equity for all, it is imperative that society comes together to combat it.32 In order to prevent racism, changes must be made at all social-ecological levels including public policy, institutional, community, and individual. Racism prevention can likely never be absolute; therefore, we must implement measures by which the plausible causal pathway from experiences of racial discrimination, particularly in childhood, to depressive symptoms can be disrupted. Interventions on the public policy level should encourage positive youth engagement. This can be accomplished by creating strong relationships and dialogue between practitioners, policy makers, and youth to fostering stronger and healthier communities.33-35 Increased awareness and ratification of the United Nations Convention on the Rights of the Child (UNCRC), the "gold standard" for children's rights, will help ensure that every child has the right to protection from violence, an education that enables them to fulfill their potential, a healthy relationship with their parents, and the ability to express their opinions. While the United States signed the



UNCRC, it remains the only United Nations member state to have not ratified it. Children should be informed, through their teachers, parents, doctors, or other adult figures, that they have a right to advocate for themselves against racial discrimination by reporting these experiences directly to the UNCRC, and systems should be in place to make this process more accessible.³⁶

Implementing antiracism education into all institutional settings by hiring educators and workplace administrators with equity-based abilities, or the ability to identify, respond to, and remedy inequities in their subtlest forms, can help sustain environments less prone to race discrimination.37 Efforts at the clinical level should include training in culturally competent care, universal screening for childhood adversity and racism-related social determinants of health, as well as the early application of trauma-informed mental healthcare.38-40 Community-level interventions should include peer and authority engagement when witnessing or experiencing racial discrimination. Programs meant to promote bystander responses to discrimination, such as "Speak Out Against Racism" (SOAR), should be applied in schools and community-based initiatives to educate on appropriate response strategies to witnessing racism.41,42 Evidence-based practices should be implemented at the individual level to improve the individual trauma response, such as interventions to cultivate social connectedness and self-compassion, mindfulness, and resiliency.43-45

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Pornography: A Concealed Behavior with Serious Consequences

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ABSTRACT

OBJECTIVES: The purpose of the current study was to estimate prevalence of pornography use and addiction in Rhode Island young adults, identify sociodemographic disparities, and determine if use and addiction were associated with mental illness.

METHODS: Data from n=1022 participants of the Rhode Island Young Adult Survey were used. Pornography use and addiction, depression, anxiety, and suicide ideation were assessed. Multivariable logistic regressions controlled for age, social status, sex, gender, sexual orientation, and race/ethnicity.

RESULTS: 54% indicated pornography use; 6.2% met the criteria for addiction. Odds of pornography use were 5 times higher (95%CI=3.18,7.71), and addiction 13.4 times higher (95%CI=5.71,31.4) among heterosexual cis-males. Pornography addiction was associated with increased odds of depression (OR=1.92, 95%CI=1.04,3.49) and suicide ideation (OR=2.34, 95%CI=1.24,4.43).

CONCLUSIONS: Pornography use is highly prevalent, and addiction may be associated with mental illness. New screenings, media literacy training, and developing new therapeutic interventions should be considered.

KEYWORDS: Pornography, Addiction, Depression, Suicide, Young Adults

INTRODUCTION

Epidemiology

Pornography use and pornography addiction are not routinely measured in surveillance studies, and prevalence estimates are derived from either single surveys or small epidemiological investigations. For example, 54% of men, 18–39 years old, self-reported past year pornography use in the 2008-2014 General Social Survey, which was twice the rate as women (27%).¹ In the 2014 Relationships in American (RIA) survey, 69% of men and 40% of women reported past year pornography use.¹ Past week use was 46% and 16%, respectively.¹ Among 18–23 year old men, past year use was 68% and 66% in the 2012 New Family Structures Study (NFSS) and 2008 National Study of Youth and Religion (NSYR) studies, respectively.¹ Rates among women were 38% and 33%, respectively.¹ Further, 47% of men in the NFSS studies viewed pornography more than once a month, compared to 14% of men in the NSYR study.¹ In a sample of college students, 73% reported seeing online pornography before the age of 18, and the prevalence of lifetime pornography use was 57% in a separate sample of U.S. college students.^{2,3} Data from 1,565 male Italian high school seniors suggested that 22% considered pornography part of their routine schedule.⁴

Data on the prevalence of pornography addiction is scarce, potentially because pornography addiction has yet to be accepted by the American Psychiatric Association (APA) as a diagnosis and has not been listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).5 Among a sample of 1,056 adults in the United States (US) who viewed some pornography within the past year, 11% of men and 3% of women self-reported pornography addiction.⁶ Among approximately 9,000 US adults who had used the internet to access sex-related content, 8% reported problems consistent with a behavioral disorder, while 50.7% of US college students with recent pornography use displayed symptoms of problematic or addictive use.^{3,7} There is ongoing discussion on whether the development and maintenance of the disorder is similar to other behavioral addictions, such as gambling or gaming, or if it is a distinct disease, specifically because those addicted have a lack of ability in controlling their thoughts, fantasies and viewing of pornography despite its negative consequences.5

Risk Factors

There are individual, social, and structural risk factors for pornography use and addiction. Demographically, men are more likely to visit pornographic websites than women.⁸ Socially, women have reported decreased pornography use because of greater parental supervision of online behaviors, which prevented them from staying on the internet for long periods of time and limited their chances of visiting pornographic websites.⁸ Structurally, online pornography use is enhanced by the "Triple A factors."⁹ Consisting of accessibility, affordability, and anonymity, these three factors are strongly correlated to problematic online pornography use (POPU).⁹ The anonymous nature of online communications and website viewing allows pornography to be viewed



without being connected to identifying information.⁹ Online pornography is low cost, and often free, which increases the proportion of the population that can access such material, and the nature of digital media allows pornography content to be easily accessed on demand to any individual with an internet connection.⁹

Pornography and Mental Health

Research suggests that individuals who view pornography may become fixated on thoughts associated with pornographic content, which diminishes their ability to form interpersonal relationships and causes them to withdraw from social settings.¹⁰ Despite this, there are few studies that have explored the relationship between pornography use or addiction and mental health. Among US college students, depression, anxiety, and stress scores were highest among participants with recent pornography use, and the relationship was consistent among men and women.³ Pornography use has been previously associated with psychosomatic symptoms of mental illness, such as headache, stomachache, nervousness, irritation, stress, and trouble sleeping.¹¹ Pornography use may influence the development of depression symptoms in some adolescents.11 Anxiety symptoms, including feeling of irritation and agitation, may occur when pornographic material cannot be accessed as well as due to sleep deprivation caused by the continuous watching of pornography.³ Finally, problematic pornography use was associated with depression, anxiety, post-traumatic stress disorder, and insomnia, but not suicide ideation, in US veterans.12

Current Study

There is limited information on the use of pornography and prevalence of pornography addiction. There is also limited information on the mental health effects of pornography use. In response, the current study sought to a) estimate the prevalence of pornography use and addiction; b) identify sociodemographic disparities in pornography use and addiction; and c) identify associations between pornography use or addiction and mental illness in a sample of US young adults. It was hypothesized that pornography use and addiction would be higher among men, and that pornography use and addiction would be positively associated with depression, anxiety, and suicide ideation.

METHODS

Sample

A cross-sectional analysis was conducted using data from the 2022 Rhode Island Young Adult Survey (RIYAS). A full description of RIYAS methodology was previously published.¹³ Briefly, n = 1022 young adults, 18–25 years old, who lived in Rhode Island for at least part of the year, were recruited to complete a web-based survey from May through August 2022.

Measures

Pornography use was assessed by asking how many days in an average month participants viewed pornography. Because of a zero-heavy, positively skewed distribution, responses were dichotomized into those who did not view pornography in an average month and those who viewed pornography 1 or more times in an average month. Pornography addiction was assessed using the Problematic Pornography Consumption Scale (PPCS-6).14 The PPCS-6 contains 6 items, with each measure based on one component of the 6-component addiction model (i.e., salience, tolerance, mood modification, relapse, withdrawal, conflict measures).¹⁵ Responses were collected on 7-point Likert scales ranging from never (coded as 1) to all the time (coded as 7).¹⁴ Responses were aggregated across items through summation ($\alpha = 0.87$, range = 6-42). Pornography addiction was defined as having an aggregate score ≥ 20 on the PPCS-6. Previous research suggests that the PPCS-6 has a sensitivity of 84.2% and specificity of 90.1% in population-based samples.14

Depression was assessed using the Center of Epidemiologic Studies Depression Scale, 10-item version (CES-D10), which contains 10 items with responses collected on 4-point Likert scales ranging from rarely or none of the time (coded as 0) to most of the time (coded as 3).^{16,17} Responses were aggregated across items by summation ($\alpha = 0.75$), and scores ≥ 10 indicated depression.¹⁷ Anxiety was measured using the Generalized Anxiety Disorder 7-item scale (GAD-7).¹⁸ Responses were collected on 4-point Likert scales ranging from not at all (coded as 0) to nearly every day (coded as 3) and aggregated by summation ($\alpha = 0.93$).¹⁸ Scores of ≥ 10 indicate clinically significant anxiety.¹⁸ Suicide ideation was measured using a single item: During the past 12 months, did you ever seriously consider attempting suicide? with response options of no and yes.

Sociodemographic variables included age, social status, sex, gender, sexual orientation, race/ethnicity, student status, and employment status. Social status was measured using the MacArthur Scale of Subjective Social Status, which asks participants to rank themselves relative to others in the community on a scale from worst off (coded as 1) to best off (coded as 10).¹⁹ Sex, gender, and sexual orientation were collapsed into heterosexual cis-female, heterosexual cis-male, and any sexual or gender minority (SGM). Race/ethnicity categories included Asian, Black/African American, Hispanic, White, and Other or more than 1 race. Student and employment status were collapsed to categorize participants as not a student/employed, student/not employed, student/ employed.

Analysis

Descriptive statistics for key variables were computed. The analysis then proceeded in two steps. First, multivariable logistic regression models were specified to determine if any of the sociodemographic variables were associated



with pornography use and pornography addiction. Age and social status were included as normally distributed continuous variables. For the categorical variables, heterosexual cis-females, White, and not a student/not employed participants were the reference groups. Second, unadjusted and adjusted logistic regression models were specified to determine if pornography use and pornography addiction were associated with depression, anxiety, and suicide ideation. Adjusted models controlled for age, social status, sex/gender status, race/ethnicity, and student/employment status. The analysis was conducted with SPSS v28.0 (Armonk, NY: IBM Corp), and statistical significance was determined using 95% confidence intervals (CI).

RESULTS

Demographic and mental health characteristics of the sample have been previously described.¹³ Briefly, mean age was 21.3 years old (SD = 2.1); approximately 45% of the sample were heterosexual cis-females, with 43% identifying as a SGM; and the sample was predominantly White, non-Hispanic (59.8%) (**Figure 1**). A majority of participants (55%) were current students who were also actively employed, and mean social status was 5.0 (SD = 1.7). A majority (51.0%) self-reported depression, with approximately 38% and 15% reporting anxiety and suicide ideation, respectively. Among the full sample, 54% of participants indicated pornography use, and 6.2% met the criteria for pornography addiction (**Figure 2**). The prevalence of pornography use and addiction are depicted in **Figures 3 and 4**, respectively.

In multivariable analysis, there were several sociodemographic predictors of pornography use. The odds of pornography use for heterosexual cis-males were approximately 5 times (OR[95%CI] = 4.95 [3.18, 7.71]) and for SGMs 2.7 times (OR[95%CI] = 2.67 [2.02, 3.54]) those of heterosexual cis-females (**Figure 2**). Odds of pornography use increased with each one-year increase in age (OR[95%CI] = 1.14 [1.06, 1.22]). Odds of pornography use were also 93% higher among persons identifying as Asian (OR[95%CI] = 1.93 [1.07, 3.49]) and 72% higher among persons identifying as Other or more than 1 race (OR[95%CI] = 1.72 [1.05, 2.82]) relative to those identifying as White, non-Hispanic. (**Figure 5**)

The odds of pornography addiction for heterosexual cismales were approximately 13.4 times (OR[95%CI] = 13.4[5.71, 31.4]) and for SGMs 3.7 times (OR[95%CI] = 3.67 [1.64, 8.22]) those of heterosexual cis-females (**Figure 3**). No other disparities in addiction were noted. (**Figure 6**)

In the unadjusted analysis, odds of depression (OR[95%CI] = 1.36 [1.07, 1.74]) and suicide ideation (OR[95%CI] = 1.68 [1.17, 2.41]) were increased among participants with average monthly pornography use (**Table 1**). However, these relationships were not maintained after adjustment for socio-demographic variables. Conversely, pornography addiction remained significantly associated with depression and

Figure 1. Participant sociodemographic characteristics



Figure 2. Prevalence of [A] pornography use and [B] pornography addiction



Figure 3. The prevalence of pornography use by sociodemographic characteristics



Figure 4. The prevalence of pornography addiction by sociodemographic characteristics



Figure 5. Forest plot of the adjusted odds of pornography use by sociodemographic variables



Figure 6. Forest plot of the adjusted odds of pornography addiction by sociodemographic variables



[‡] relative to not a student/not employed.

*Relative to heterosexual cis-females; †relative to White, non-Hispanic; ‡ relative to not a student/not employed.

 Table 1. Unadjusted and adjusted odds of depression, anxiety, and suicide ideation by pornography use and pornography addiction status*

		De	pression	A	Anxiety	Suici	de Ideation
Variable		OR	95% CI	OR	95% CI	OR	95% CI
Unadjusted M	odels						
Pornography	Yes	1.36	1.07, 1.74	1.27	0.98, 1.63	1.68	1.17, 2.41
Use	No						
Pornography	Yes	2.34	1.35, 4.07	1.24	0.75, 2.09	2.97	1.69, 5.20
Addiction	No						
Adjusted Mod	lels						
Pornography	Yes	1.12	0.85, 1.47	1.16	0.88, 1.54	1.37	0.92, 2.02
Use	No						
Pornography Addiction	Yes	1.92	1.04, 3.49	1.20	0.68, 2.12	2.34	1.24, 4.43
	No						

*Bold indicates statistical significance

suicide, but not anxiety, after adjustment for the covariates. For those with pornography addiction, odds of depression (OR[95%CI] = 1.92 [1.04, 3.49]) and suicide (OR[95%CI] = 2.34 [1.24, 4.43]) were approximately 2 times those of their unaddicted counterparts.

DISCUSSION

Approximately half of Rhode Island's young adults in this sample viewed pornography and 1 in 16 met the criteria for pornography addiction. Use and addiction were particularly high among heterosexual cis-males and individuals who identify as a sexual or gender minority (SGM). Pornography use may also be higher in individuals identifying as Asian, more than 1 race, or Other. Of particular concern, pornography addiction was associated with depression and suicide ideation.

The current findings are consistent with, and add to, previous research. The overall rate of pornography use described here is similar to that previously reported for compulsive internet pornography use (56.6%), and the prevalence of pornography addiction in a nationally represented sample was 11% and 3% among men and women respectively.⁶ Together, the findings suggest a consistent pattern of high pornography use but lower levels of pornography addiction.⁶ Furthermore, others have reported the link between pornography and poor mental health outcomes, including increased suicide ideation.³

Young adult men may view pornography as a confidential method of accessing sex-related information, whether for information regarding the act of sex itself, for sexual curiosity, or to satisfy sexual

urges.^{8,20,21} These behaviors often start in adolescence, and the increased rates reported here among men are likely a continuation of behaviors that started in an earlier developmental period.^{20,21} Conversely, individuals identifying as SGM may see pornography and pornographic websites as a safe space to explore and confirm their sexual identities and understand new sexual activities that fit their identities.²² The confidential nature of the internet provides SGM individuals with a layer of psychological privacy and physical protection that actively engaging in sexual intercourse cannot.

The increased use of pornography, but not addiction, among some racial identities is an interesting result and there is limited relevant literature explaining this



association. For individuals identifying as Asian, the topic of sex may be a cultural taboo, and pornography use may be illegal in home countries, which suggests pornography may be used for either education purposes or as a purposefully defiant behavior.^{23,24} Additionally, Asian Americans, particularly Asian American males, may have higher rates of problematic internet use, which has been reported as a risk factor for pornography use.²⁵

The link between pornography addiction and poor mental health is alarming, and more research is needed on this connection. Because pornography is part of the entertainment industry, it is often changed to fit and capture the most interest and is unlikely to depict realistic or healthy sexual behaviors.²⁰ Consequently, excessive pornography use may lead to irrational perspectives on sex and relationships.²⁰ When the relationships and behaviors depicted in pornography are not realized in real-world dating environments, men may be more likely to experience insecure attachments, fear of being single, loneliness, and depressive symptoms.²⁶

Implications

The internet is a resource for sexual health information, and clinicians should actively discuss where young adult patients are receiving sexual health information, the role of pornography, and reliable sources of sexual health information.²⁰ Providers should consider screening for pornography addiction and other psychological constructs that are associated with pornography addiction, such as impulsivity, sexual obsession, and lack of self control.²⁷ Screening efforts should target young adult men and individuals who identify as SGM. For individuals with pornography addiction, therapeutic interventions, including mindfulness practices and self-compassion techniques, can assist with changing patient mindsets and reducing illness severity.⁵

Prior to reaching young adulthood, parents should discuss media literacy with their children to ensure greater awareness of media messages and greater critical thinking skills when coming across material that encourages unhealthy behaviors.²⁰ Community-based workshops, which build trust and create safe spaces for participants, can provide effective forums for discussions around sex, sexual health, relationship building, and pornography.

Limitations

There are several limitations. The data are cross-sectional and causality cannot be inferred. A convenience sample was used, and participants may not be representative of all young adults. For example, the percent of heterosexual cis-males was disproportionately low. Rates of pornography use, addiction, and other mental health measures are likely underreported because of social desirability bias and the stigma surrounding these topics. Data were self-reported, and recall bias is also a concern.

CONCLUSIONS

Pornography use and addiction are prevalent in Rhode Island's young adult population, particularly young men, and pornography addiction may be associated with depression and suicide ideation. Targeted screening programs should be considered.

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Smartphone Addiction and Mental Illness In Rhode Island Young Adults

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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 \ge 33 for women and \ge 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

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

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 cismales, 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%).



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	Not a student, not employed	59 (5.8)
status	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)

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

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,

Variable		OR	95% CI
Age		0.96	0.90, 1.02
Social status		0.98	0.91, 1.06
Sexual/gender	Heterosexual cis-female	0.99	0.66, 1.49
identity	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
	White		
Student/	Not a student, employed	0.95	0.53, 1.71
employment status	Student, not employed	1.04	0.56, 1.93
	Student, employed	0.78	0.44, 1.35
	Not a student, not employed		

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

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,

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							

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

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 jealously, 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 cismales 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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Risk Factors for Suicide Ideation Among Rhode Island College Students

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ABSTRACT

OBJECTIVES: This study aimed to identify individual and relational risk factors for suicide ideation among students enrolled in 2- and 4-year colleges.

METHODS: A cross-sectional analysis was conducted using N=685 college students from the 2022 Rhode Island Young Adult Survey.

RESULTS: 13.7% (N = 94) reported suicide ideation, 7.6% (N = 52) reported making a suicide plan, and 3.2% (N = 22) reported at least one suicide attempt. Sexual and gender minorities had 300% (95%CI: 47%, 987%) increased odds relative to cisgender heterosexual males, students living on campus had 56% (95%CI: 79%, 10%) lower odds compared to those living off campus with a parent, and students with insomnia had 156% (57%, 320%) increased odds of suicide ideation.

CONCLUSIONS: Interventions to 1) cultivate identityaffirming communities for sexual and gender minority students, 2) create a sense of belonging for students living off campus, and 3) improve sleep health are needed.

KEYWORDS: Suicide ideation, college students, sleep, housing, LGBTQ

INTRODUCTION

Emerging adulthood, the transition from childhood to adulthood, typically ranging from ages 18 to 25 years, is a developmentally vulnerable stage for college students marked by a new level of independence, freedom, development of personal skills, financial responsibility, social-skills development, pressure to perform academically, and often an introduction to intimate relationships.1 The imminent stress coming with entering college is prevalent, with 38.8% of male college students and 48.2% of female college students reporting having "more than average stress" within the first 12 months of enrolling. In 2019, United States (US) college students considered the following to be "traumatic or difficult to handle:" academics (42.5% of males, 54.6% of females), intimate relationships (28.2% of males, 33.6% of females), social relationships (23.4% of males, 33.3% of females), financial problems (29.5% of males, 39.6% of females), and sleep difficulties (29.7% of males, 37.0% of females).² Due to this excess stress,³ a substantial portion of college students experience suicide ideation. Suicide is the second leading cause of death among US college students and the second leading cause of death for Rhode Islanders ages 15 to 34 years.^{4,5} In 2019, the National College Health Assessment (NCHA) reported that within the last 12 months 7.5% of male college students and 8.6% of female college students had seriously considered suicide, with 1.1% and 1.4% reporting at least one suicide attempt,² respectively. Of concern, few college students are willing to seek mental health treatment.⁶

There are several risk factors for suicide ideation in college students, with major depressive disorder (MDD) and insomnia being significant contributors.⁶ For example, the odds of being classified with suicide risk as a freshman college student were approximately 6.5 times and 2.7 times greater for college students with elevated depressive symptoms and sleep problems, respectively.⁷ Others have identified sociodemographic risk factors for suicide in college students. Elevated rates of suicide ideation have been identified in bisexual college students, even when compared to lesbian or gay students, and the experience of persons who are transgender is similar.³ Additionally, students who identify with a racial or ethnic minority may have higher rates of suicide ideation or suicide attempts relative to White, non-Hispanic students.³

Despite prior studies investigating key risk factors for suicide ideation among college students, no study to our knowledge focuses specifically on students at both 2- and 4-year colleges in Rhode Island. Given the many known risk factors for suicide ideation, this study aims to identify key individual and relational risk factors for suicide ideation among a sample of Rhode Island college students to inform future prevention programming on college campuses.

METHODS

Sample

A cross-sectional analysis was conducted with data collected from the Rhode Island Young Adult Survey (RIYAS) from May through August 2022. A full description of RIYAS methodology is published elswhere.⁸ The survey resulted in N = 1,022 young adults aged 18–25 years who lived in Rhode Island for at least part of the year. This study was limited to college students, particularly those identifying as



freshman, sophomore, junior, or senior undergraduates, as well as graduate students. This yielded an analytic sample of N = 685. This study was approved by the Johnson & Wales University Institutional Review Board.

Measures

The primary outcome of this study was suicide ideation. Suicide ideation was defined by an affirmative response to the survey question, *During the past 12 months, did you ever seriously consider attempting suicide*? Follow-up questions for those responding Yes included measures of having a suicide plan (*During the past 12 months, did you make a plan about how you would attempt suicide?*) and attempting suicide (*During the past 12 months, how many times did you actually attempt suicide?*).

Both individual and relational characteristics were considered as potential explanatory variables. Individual characteristics included school year (*freshman undergraduate*, *sophomore undergraduate*, *junior undergraduate*, *senior undergraduate*, *graduate*), race/ethnicity (*White non-Hispanic*, *Black*, *Asian*, *Hispanic*, *Multiracial or something else*), social status, age in years, employment status (*none*, *part-time*, *full-time*), sexual and gender identity (*heterosexual cisgender male*, *heterosexual cisgender female*, *sexual and gender minorities*), insomnia, student status (*full-time*, *part-time*), and first-generation college status. Social status was measured was measured using the Macarthur Scale of Subjective Social Status,⁹ which assessed a participant's perceived social rank relative to other members of the community on a scale of 1, meaning *worst off*, to 10, meaning *best off*.

While these sociodemographic characteristics are often considered risk factors for suicide ideation and mental health,¹⁰ first-generation college status was included, based on its known association with poor mental health of college students,11 and insomnia due to its known association with suicide ideation since the COVID-19 pandemic.¹² First-generation college status was determined by an affirmative response to the question, Are you a first-generation college student, meaning you are the first person in your immediate family to attend college? Insomnia was measured via the Insomnia Severity Index (ISI), a 7-item self-report questionnaire of insomnia symptoms with 5-point Likert-scale responses ranging from *none* to *very severe*. Total summary insomnia symptom scores potentially ranged from 0 to 28, with higher scores reflecting greater severity of insomnia symptoms. In accordance with scoring instructions, summary scores of 15 or above indicated either moderate or severe clinical insomnia. The ISI is a valid and reliable instrument and holds excellent internal consistency with a Cronbach alpha of about 0.90.13 In this sample, the interitem correlation according to Cronbach's alpha was $\alpha = 0.89$.

Relational characteristics included living arrangement, participation in Greek life, and social support. Living arrangement was measured by responses *off-campus housing with a*

parent, off-campus housing without a parent, or on-campus housing to the question, what is your current living situation? Participation in Greek life was assessed by affirmative response to the question, Are you a member of Greek life, such as a fraternity or sorority? Social support was dichotomized in response to the question, How often do you get the social and emotional support you need? as those responding always/usually/sometimes versus rarely/never.

Statistical Analysis

Descriptive statistics such as frequencies and percentages were computed for all variables among the college student sample (N = 685). Overall frequency and percentage of suicide ideation, suicide plans, and suicide attempts were calculated. Bivariable statistics were used to compare individual and relational characteristics by suicide ideation (**Tables 1 & 2**). Particularly, two-sample t-tests were used for continuous variables, chi-square tests for categorical variables, and Fisher's exact tests were used for categorical variables when a single cell had 5 or fewer observations. A multivariable logistic regression was conducted to calculate adjusted odds of suicide ideation for all explanatory variables. All statistical tests were assessed at $\alpha = 0.05$. All analyses were conducted in Stata/SE 15.0.¹⁴

RESULTS

Among this sample of college students aged 18 to 25 years in Rhode Island, 13.7% (N = 94) reported suicide ideation, 7.6% (N = 52) reported making a suicide plan, and 3.2% (N = 22) reported at least one suicide attempt. Students in the total sample were primarily undergraduates (85.3%), a small majority White non-Hispanic (53.2%), mean age around 21 years old, majority part-time employed (55.6%), and a small portion cisgender heterosexual male (11.8%). The minority of students were part-time (17%) and first-generation college (35.1%). Insomnia was highly prevalent (46.8%).

Bivariable analyses showed suicide ideation varied by social status (p < 0.001), sexual and gender identity (p < 0.001) (0.001), insomnia (p < (0.001)), and social support (p = (0.006); Tables 1 & 2). In the fully adjusted model, sexual and gender minorities had 300% (95%CI: 47%, 987%) increased odds of suicide ideation relative to cisgender heterosexual males, students living on campus had 56% (95%CI: 79%, 10%) lower odds of suicide ideation compared to those living off campus with a parent, and students with insomnia had 156% (57%, 320%) increased odds of suicide ideation relative to those without insomnia (Figure 1). The difference between bivariable and multivariable results were likely because social status and social support are correlated (p<0.001). Post-hoc analyses, however, confirmed that with or without one or both variables in the multivariable model, living on campus was significantly protective against suicide ideation, and these other variables were not.



Table 1. Individual characteristics by suicide ideation among Rhode Island college students

	Total Sample		Suicide Ideation		P-values
	N = 685	100%	N = 94	14%	
School Year					0.238
Freshman Undergraduate	120	17.5	24	25.5	
Sophomore Undergraduate	96	14	113	13.8	
Junior Undergraduate	168	24.5	23	24.5	
Senior Undergraduate	200	29.2	23	24.5	
Graduate	101	14.7	11	11.7	
Race/Ethnicity					0.648
White, non-Hispanic	397	58	50	53.2	
Black	36	5.3	6	6.4	
Asian	41	6	4	4.3	
Hispanic	152	22.2	24	25.5	
Multiracial or Something Else	59	8.6	10	10.6	
Social Status [mean (SE)]	6.08	0.06	5.24	0.16	<0.001
Age [mean (SE)]	20.8	0.07	21.1	0.18	0.171
Employment					0.078
No	145	21.2	27	28.7	
Part-Time	381	55.6	43	45.7	
Full-Time	159	23.2	24	25.5	
Sexual and Gender Identity					<0.001
Heterosexual Cisgender Male	81	11.8	5	5.3	
Heterosexual Cisgender Female	313	45.7	23	24.5	
Sexual and Gender Minority	291	42.5	66	70.2	
Insomnia					<0.001
No	514	75	50	53.2	
Yes	171	25	44	46.8	
Student Status					0.211
Part-Time	89	13	16	17	
Full-Time	596	87	78	83	
First Generation College					0.886
No	449	65.6	61	64.9	
Yes	236	34.5	33	35.1	

Note: P-values were computed using two-sample t-tests for continuous variables, chi-square tests for categorical variables, and Fisher's Exact tests for categorical variables with cell sizes <=5

Table 2. Relational characteristics by suicide ideation among Rhode Island college students

	Total Sample		Suicide Ideation		P-values	
	N = 685	100%	N = 94	14%		
Living Arrangement						
Off Campus with Parent	334	48.8	49	52.1		
Off Campus with no Parent	208	30.4	32	34		
Campus Housing	143	20.9	13	13.8		
Greek Life						
No	645	94.2	89	94.7		
Yes	40	5.8	5	5.3		
Social Support						
No	127	18.5	27	28.7		
Yes	558	81.5	67	71.3		

Note: P-values were computed using two-sample t-tests for continuous variables, chi-square tests for categorical variables, and Fisher's Exact tests for categorical variables with cell sizes <=5

Figure 1. Adjusted odds of suicide ideation among Rhode Island college students



Note: Referents for categorical variables in multivariable logistic regression were freshman undergraduate, White non-Hispanic, no employment, heterosexual cisgender males, no insomnia, part-time student, not a first-generation college student, living off campus with a parent, not in Greek life, and no social support



DISCUSSION

This study aimed to identify individual and relational risk factors for suicide ideation among students enrolled in 2and 4-year colleges in Rhode Island. Individual characteristics independently associated with suicide ideation in this sample included identifying as a sexual and/or gender minority and experiencing insomnia. The only relational characteristic independently associated with suicide ideation in this population was living on campus, which was protective. While bivariate results suggested higher social status and social support were less common among students with suicide ideation, these did not remain independent protective factors for suicide ideation in multivariable models. These bivariate associations are consistent with other literature showing that those with lower socioeconomic status and those with more social support are less likely to report suicide ideation.9

Sexual and Gender Minorities

Our results show, as well as previous studies,¹⁵ that sexual and gender minority college students have an increased risk for suicide ideation, which may be explained by the Minority Stress Theory.¹⁶ Minority Stress Theory suggests that suicide ideation is greater in minority subgroups, including sexual and gender minorities, due to the constant and consistent exposure to stress, shame, and rejection from society.¹⁷ Here, multiple studies of young adults and/or college students have documented that transgender or gender non-conforming individuals, as well as sexual minorities, have increased rates of trauma, depression,¹⁸ and suicide ideation, which is consistent with this theory.¹⁹

Sleep Problems

Our results suggest that insomnia or sleep problems may be associated with suicide ideation, and this finding is supported by other studies. Around 60% of all US college students suffer from poor sleep quality, and 7.7% meet the criteria for an insomnia disorder. A systematic review of research in university students concluded that insomnia and nightmares were associated with elevated suicide risk as well as suicidal thoughts and behaviors within the college student population.²⁰ Furthermore, a cross-sectional research study suggested that 82.7% of individuals with elevated suicide risk also had sleep problems, and 31.3% individuals with sleep problems also had elevated suicide risk.7, 21 The relationship between sleep problems and poor mental health among college students is likely bidirectional - with sleep problems as both a cause and effect of poor mental health, since poor sleep quality can negatively impact a student's education, work ethic, daytime routine, and chronotype changes.²² Consequently, the possibility of a positive feedback loop may exist that is difficult for students to eliminate without external support.

Living in Campus Housing

A novel finding was that living on campus, relative to off campus, was independently associated with a lower risk of suicide ideation. Living in campus housing may be a proxy for having a stronger sense of belonging or community as a college student, which may provide a protective effect against suicide ideation.²³ Others have reported that a lower sense of belonging was significantly associated with greater severity of depression, hopelessness, suicidal ideation, and history of prior suicide attempt(s),²⁴ and feeling a stronger connection to a college campus was positively associated with help-seeking for suicide ideation. The association between campus connection help-seeking may be stronger among students who have a strong sense of togetherness with peers or a supportive group of friends.²³

Recommendations and Implications

Colleges are not merely educational settings, but an environment in which adolescents transition into adulthood. Therefore, colleges must create an environment and sense of community that helps young people thrive and supports well-being, which can be accomplished in several ways. First, colleges should support programming and outreach that facilitates greater inclusion of students who identify as sexual and gender minorities while also continuing to promote the acceptance of proper pronoun identification to increase social comfortability of all students.²⁵ Generally, continued work is needed at Rhode Island colleges to minimize existing barriers with mental health services, support/ create community-driven and community-based interventions, and increase suicide ideation knowledge while reducing its stigma.²⁶ College health-service programs should also refer sexual and gender minority students who seek help to professionals that support SGM-affirmative mental health practices.27

Second, colleges should consider integrating sleep-health interventions into campus health services and health education campaigns since sleep education can increase sleep knowledge and improve some sleep behaviors.²⁸ Colleges can also consider minimizing 8 a.m. classes, decreasing latenight assignment deadlines, creating safe areas where commuters or residential students can nap, enforcing dormitory quiet hours, and requiring all staff to be educated on the importance of sleep.²⁹

Finally, colleges should create programs that support the mental health of off-campus students, which can include outreach of mental health services and initiatives to create more social/community connectedness. Colleges should emphasize incorporating off-campus students in conversations on mental health, ensure that campus-wide mental health campaigns effectively reach off-campus students, and create systems to support off-campus student on an as-needed basis.³⁰



Limitations

The current study has some limitations. First, the sample is under-represented in heterosexual cis-males. Given higher rates of poor mental health among females and sexual and gender minorities,³¹ the study likely has an elevated rate of suicide ideation above and beyond the general population. This is also a convenience sample of young adult college students and therefore generalizability to the US college student population is limited. The self-reported nature of this study may also allow for social desirability bias, so suicide ideation may be under-reported. Finally, this is a cross-sectional study and temporality cannot be confirmed. Specifically, we cannot determine whether insomnia preceded or resulted from suicide ideation.

CONCLUSIONS

This study of Rhode Island young adult college students found sexual and gender minorities and students with insomnia were more likely to have suicidal ideation, but those living on campus were protected. Colleges must be safe and inclusive community environments that help students thrive. Interventions to cultivate identity-affirming communities for sexual and gender minority students and a sense of belonging for students living off campus are needed. Programming to improve sleep health should also be incorporated.

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