Brain Injury and Problem Gambling Among Rhode Island Young Adults

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ABSTRACT

OBJECTIVES: Problem gambling has a negative impact on an individual's well-being. This study examined the association between having a history of a brain injury and problem gambling among young adults in Rhode Island.

METHODS: N=1,008, 18–25-year-olds participated in the 2024 Rhode Island Young Adult Survey. History of a brain injury and problem gambling were measured. Multivariable logistic regression assessed main effects after controlling for age, race/ethnicity, sexual and gender identity, social status, employment status, and student status.

RESULTS: 16.9% of participants reported a history of a brain injury and 4.3% reported problem gambling. Odds of problem gambling were higher in those who experienced a brain injury (AOR[95%CI]=3.81 [1.93,7.49]), but lower in participants identifying as cisgender heterosexual females and currently employed.

CONCLUSIONS: Young adults who have sustained a brain injury should be screened for problem gambling. Additional research is needed to better understand the underlying mechanisms of this relationship.

KEYWORDS: gambling; problem gambling; brain injury; young adults; Rhode Island

INTRODUCTION

Problem gambling is an emerging public health concern, particularly among young adults. Research indicates that gambling rates among young adults rise significantly between the ages of 17 and 20, and between 9–12% of young people report gambling weekly.[1] As of 2020, 62.3% of young adults in Rhode Island (RI) reported gambling in the last year, and 11.4% reported problem gambling behaviors.[2] Some known demographic risk factors for problem gambling include identifying as male or being younger than 35 years old.[3] Other high-risk young adults include sexual and gender minorities as well as individuals who identify as Black, Indigenous, or a Person of Color (BIPOC).[4]

There are various ways that young adults may engage in gambling activities. Horse racing was first approved by RI voters in 1934[5] and remained the primary mode of gambling until the Rhode Island Lottery was established in 1974.[6] Since then, dog racing, slot machines, table games, charitable gambling, and casino gaming have been legalized in the state.[7] In the 2024 fiscal year, the RI Lottery alone generated 1.6 billion dollars in revenue,[6] while commercial casinos reported a gross gambling revenue of 708 million in 2023.[8]

The legalization of sports betting has also played a significant role in expanding gambling opportunities for this population. In RI, retail sports betting was legalized in 2018, with online sports betting launching the following year.[9] Similarly, the rise of online gambling platforms has made gambling increasingly accessible, allowing individuals to engage in gambling activities regularly from virtually anywhere. A bill was passed in 2023 to legalize additional forms of online gambling in RI for those 21 and older, and later took effect in March 2024.[10] Recently, a bill was introduced into the RI Senate that seeks to end the renewal of the single sports betting vendor contract currently in place, and award at least five approved contracts in an effort to create a more competitive market for sports betting.[11] If passed, this bill will further expand opportunities for sports betting in the state.

Studies reveal that online gambling has seen the largest increase among gambling activities, likely due to the widespread use of the internet during recent years,[1] and plays an important role in problem gambling.[12,13] Further, previous data from Rhode Island suggests that sports betting[4] and gambling via a smartphone app[14] increase the risk of problem gambling among young adults.

The increasing prevalence and accessibility of gambling among young adults is a significant concern as it can lead to various negative consequences. In a 2020 study, researchers reported that moderate to high severity problem gamblers were significantly more likely to have a poor diet, poor general health, low mental wellbeing, low physical activity, and smoke cigarettes compared to non-problem gamblers.[15] Problem gambling can also lead to relationship strain, employment issues, financial strain, and mental health issues such as anxiety, depression, and suicidality.[16,17]

Some research has suggested that experiencing a brain injury is a risk factor for problem gambling. For example, one study reported that individuals who had experienced a traumatic brain injury (TBI), defined by a sudden blow to the head from an external force causing damage to the brain, had higher odds of engaging in problem gambling.[18] Another study reported that those with a prior TBI were more likely

to report problem gambling, trying to win back money they previously lost, and betting beyond their means.[19] Those who have sustained a brain injury may exhibit some of the behavioral characteristics that can present in individuals who have problem gambling, such as aggression, risk-taking, and impulsivity.[18] Brain injury and problem gambling also share similar risk factors, such as age, sex, and impulsivity.[18-20]

While there is some evidence to suggest that history of brain injury is a risk factor for problem gambling, there are significant gaps in our understanding of this relationship, particularly as it relates to young adults living in the United States. Given the variation in laws governing gambling regulations, it is important to examine these topics not only at the national level, but at the state level. As such, this study aims to examine the association between the history of a brain injury and problem gambling among Rhode Island's young adult population.

METHODS

Data

The Rhode Island Young Adult survey is a cross-sectional web-based survey conducted biennially by the Rhode Island Department of Behavioral Healthcare, Developmental Disabilities, & Hospitals (BHDDH). This study utilized data from the 2024 RIYAS collected from June through September 2024. Eligible participants were aged 18–25 and resided in Rhode Island for at least part of the year. Participants were recruited via paid targeted ads on Instagram and Spotify and supplemented with flyers and emails to students at local universities. Those who completed the survey received a $10 electronic giftcard. A total of N=1,008 young adults were recruited, all of whom provided electronic informed consent. This study was approved by the local institutional review board.

Measures

Primary Outcomes: Having experienced a brain injury was assessed with the question *Have you ever experienced a significant head injury, brain injury, or a concussion?* with response options including *No, Yes, more than a year ago,* and *Yes, in the past year*. Responses were dichotomized for analysis.

Primary Exposures: Problem gambling was evaluated using the Brief Biosocial Gambling Screen (BBGS).[21] This three-item tool is used to screen for problem gambling behaviors. Response options included *Yes* or *No*, and responding *Yes* to one or more questions was indicative of problem gambling. Questions included: *During the past 12 months: Have you become restless, irritable, or anxious when trying to stop/cut down on gambling?; Have you tried to keep your family or friends from knowing how much you gambled?*; and *Did you have such financial trouble that you had to get help with living expenses from family, friends, or welfare?* The validity and reliability of this tool have been established and its psychometric properties were retained following the update to the DSM-V.[22] Though not included in this analysis, participants were also asked about the types of gambling activities they engaged in and modalities of gambling used.

Covariates: Several demographic covariates were measured. Social status was measured using the MacArthur Scale of Subjective Social Status,[23] which requires participants to identify their social status relative to other individuals, using a scale from 1 (worst off) to 10 (best off). Race/ethnicity was measured as White non-Hispanic, Black non-Hispanic, Hispanic, Asian non-Hispanic and Other/Multiracial non-Hispanic. Sexual and gender identity was measured as cisgender heterosexual male, cisgender heterosexual female, and sexual and gender minority. Additionally, age, student status, and employment status were measured.

Statistical Analysis

Descriptive statistics were calculated using frequencies and percentages for the entire sample and stratified by problem gambling. Chi-square tests, Fischer's Exact Test, and independent two-sample t-tests were used to test relationship between the independent variable and all other variables. Multivariable logistic regression was used to assess the odds of problem gambling while controlling for all covariates. Statistical significance was determined with a p-value of <0.05 and statistical analyses were conducted using Stata, version 15.[24]

RESULTS

Participants were predominantly White non-Hispanic (57.4%), identified as a sexual and gender minority (43.9%), and students (61.7%) (**Table 1**). The majority worked at least part-time (74.2%) and 16.9% reported ever experiencing a brain injury. Any gambling behavior was reported by 38.6% of participants with, for example, 23.1% purchasing scratch tickets, 12.9% using slot machines at casinos, and 7.1% betting on sports. 4.3% of participants screened positive for problem gambling.

Problem gambling varied significantly by sexual and gender identity ($p<0.001$), employment status ($p=0.035$), and history of brain injury ($p<0.001$). Both cisgender heterosexual males and SGMs were over-represented among problem gamblers ($p<0.001$). While 25.8% of the sample was unemployed, 39.5% of problem gamblers were unemployed ($p=0.035$). Similarly, while 16.9% of the sample had a history of a brain injury, 39.5% of problem gamblers had that history ($p<0.001$) (**Table 1**). Problem gambling did not vary by age, race/ethnicity, social status, or student status.

In multivariable logistic regression, individuals with a history of a brain injury had significantly higher odds of problem gambling (AOR[95%CI]: 3.81 [1.93,7.49]) compared to those without (**Table 2**). Individuals who were

Table 1. Descriptive statistics of the total sample and by problem gambling

	TOTAL N=1,008 (%)	No Problem Gambling N=965 (95.7%)	Problem Gambling N=43 (4.3%)	P-value
Age [Mean (SE)]	21.3 (0.07)	21.1 (0.07)	21.4 (0.33)	0.422
Sexual and Gender Identity				**<0.001***
Cisgender Heterosexual Male	203 (20.1)	187 (19.4)	16 (37.2)	
Cisgender Heterosexual Female	363 (36.0)	359 (37.2)	4 (9.3)	
Sexual and Gender Minority	442 (43.9)	419 (43.4)	23 (53.5)	
Race/Ethnicity				0.196*
White, non-Hispanic	579 (57.4)	560 (58.0)	19 (44.2)	
Black, non-Hispanic	77 (7.6)	73 (7.6)	4 (9.3)	
Hispanic	197 (19.5)	188 (19.5)	9 (20.9)	
Asian, non-Hispanic	86 (8.5)	81 (8.4)	5 (11.6)	
Other/Multiracial, non-Hispanic	69 (6.9)	63 (6.5)	6 (14.0)	
Social Status [Mean (SE)]	5.7 (0.06)	5.7 (0.06)	5.4 (0.38)	0.298
Student Status				0.076
Student	622 (61.7)	601 (62.3)	21 (48.8)	
Non-Student	386 (38.3)	364 (37.7)	22 (51.2)	
Employment Status				**0.035**
Employed	748 (74.2)	722 (74.8)	26 (60.5)	
Unemployed	260 (25.8)	243 (25.2)	17 (39.5)	
History of a Brain Injury				**<0.001**
Yes	170 (16.9)	153 (15.9)	17 (39.5)	
No	838 (83.1)	812 (84.2)	26 (60.5)	

NOTE: P-values for categorical variables were computed using chi-square tests, unless denoted as * for Fisher's Exact test. P-values for continuous variables were computed using independent two-sample t-tests

Table 2. Adjusted odds of problem gambling

	AOR	95%CI
History of a Brain Injury		
Yes	**3.81**	**1.93, 7.49**
No	1.00	ref
Age		
Sexual and Gender Identity		
Cisgender Heterosexual Male	1.00	ref
Cisgender Heterosexual Female	**0.12**	**0.04, 0.38**
Sexual and Gender Minority	0.55	0.26, 1.12
Race/Ethnicity		
White, non-Hispanic	1.00	ref
Black, non-Hispanic	1.84	0.58, 5.89
Hispanic	1.25	0.54, 2.91
Asian, non-Hispanic	2.14	0.74, 6.15
Other/Multiracial, non-Hispanic	2.49	0.92, 6.76
Social Status	0.94	0.79, 1.11
Student Status		
Student	0.67	0.33, 1.40
Non-Student	1.00	ref
Employment Status		
Employed	**0.41**	**0.21, 0.82**
Unemployed	1.00	ref

employed (AOR[95%CI]: 0.41 [0.21,0.82]) and those who identified as cisgender heterosexual female (AOR[95%CI]: 0.12 [0.04,0.38]) had significantly decreased odds of problem gambling compared to those who were unemployed and cisgender heterosexual males, respectively.

DISCUSSION

In this sample of young adults, those with a history of brain injury had higher odds of problem gambling. Additionally, those who were employed had decreased odds relative to those employed, while cisgender heterosexual females had lower odds relative to cisgender heterosexual males.

Our findings suggest that experiencing a brain injury is an independent risk factor for problem gambling. While this aligns with existing research indicating that TBI increases susceptibility to gambling issues among adults, the literature lacks evidence to support these findings among US young adults specifically. For example, a 2019 study of adults in Ontario, Canada reported that individuals who sustained a TBI that resulted in loss of consciousness or a hospital stay had 2.8 times the odds of experiencing moderate to severe gambling problems.[18] A 2019 matched case-control study of 30,652 Canadian adults reported that a diagnosis of TBI independently predicted problem gambling, with an even greater risk among those who have sustained more than one TBI.[19] There is also evidence to suggest damage to specific areas of the brain that control the reward system may play a role.[19,25] Further, common neurobehavioral sequelae of brain injuries have been shown to increase risk of problem gambling, including impaired decision-making,[26] impulsivity,[27,28] disinhibition,[28] depression, anxiety, and emotional lability.[28]

In accordance with current literature, cisgender heterosexual females were significantly less likely to report problem gambling compared to cisgender heterosexual males. For example, a recent meta-analysis found that men had a significantly higher risk for problem gambling compared to women.[3] A 2016 systematic review similarly reported an increased risk among males, though researchers suggested that gender served as a proxy for other associated risk factors rather than having a direct role in the development of problem gambling.[29] Interestingly, the odds of problem gambling

for sexual and gender minority individuals did not significantly differ compared to cisgender heterosexual males. There is a sizeable gap in the literature surrounding problem gambling among sexual and gender minorities, and the existing literature is inconsistent.[30]

Finally, our findings suggest that young adults who are employed have a decreased risk of engaging in problem gambling compared to those who are unemployed. This is generally consistent with current literature, which suggests a higher risk for problem gambling among individuals who are unemployed.[31] Researchers have provided varied explanations for this relationship ranging from using gambling as a means of socialization to using it as an escape from problems.[31] Problem gambling behaviors could also potentially cause absences at work or impair work performance, leading to unemployment.[32] Additionally, those who are unemployed have the most to win from gambling and may use it as an opportunity to supplement their income.[33]

Implications

Given the growing body of evidence suggesting that brain injury is an independent risk factor for problem gambling, a public health response is necessary. It is important that healthcare providers, particularly those in primary care, rehabilitation, and mental health settings, understand the risk of problem gambling among this population.[34] To ensure early identification and prevention of long-term consequences, providers should consider implementing routine gambling screening for patients who have sustained a brain injury.[35] The BBGS, which was used in the current study and consists of only three items, may be effective for such screening programs.[21] Interventions to target problem gambling should also be developed to account for the unique needs of this population.[18] Further research is needed to concretely establish the direction of the relationship and to examine differences in gambling behaviors by mechanism, location, and severity of injury to ensure those at the highest risk are adequately identified.

Limitations

Despite the novel contributions to the literature, this study is not without limitations. The cross-sectional nature of this study limits the ability to determine causality, and the use of self-reported measures makes the study vulnerable to social desirability and recall bias. As a convenience sample was used, this study may not be representative of all young adults in Rhode Island.

CONCLUSION

The persistence of the association between brain injury and problem gambling, even after controlling for other risk factors, highlights the importance of targeted interventions to support individuals who have sustained a brain injury in managing impulsive behaviors and reducing gambling-related harm. Gambling screens should be regularly utilized in healthcare settings for early identification among individuals who have sustained a brain injury.

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