Journal of Gambling Issues

Open Access Original Research

Factors Associated with Gambling Behaviors After Legalization of Online Sports Wagering and Fantasy Sports

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Citation: Park, K.H., Radunzel, J., Endres, K. (2025). Factors Associated with Gambling Behaviors After Legalization of Online Sports Wagering and Fantasy Sports. Journal of Gambling Issues.

Editor-in-Chief: Nigel Turner, Ph.D.

Received: 05/25/2025
Accepted: 09/16/2025
Published: 10/17/2025

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Abstract. Many U.S. states have recently legalized online sports wagering (SW) and fantasy sports (FS). This study investigated the gambling behaviors of adults in relation to their demographic characteristics and other behaviors following the expansion of gambling opportunities in Iowa, U.S.A. The study used probability and non-probability samples with a mixed-mode survey that was completed by *n*=4,055 adults, 18 years or older, between August 2021 and January 2022. Participants were asked about their gambling and substance use behaviors within the past 30 days. After weighting to the state adult population, it was estimated that 24.8% of adults engaged only in traditional casino or lottery gambling, while 7.4% engaged in new gambling behaviors of SW or FS. Multinomial regression analyses suggested that males, younger adults (18-34 years old), and those who engaged in other risky behaviors such as binge drinking, methamphetamine use, opioid use, or not having health insurance were significantly more likely to report participating in SW or FS over exclusively playing the lottery or casino games or not engaging in gambling behaviors. In comparison, reported participation in lottery or casino gambling was more likely to occur among older adults (55 years and older), non-heterosexuals, less educated, employed, adults with lower quality of life scores, and those who used alcohol or methamphetamines. To inform responsible gambling strategies, states with newly legalized online SW should compare the demographic characteristics and attitudinal/behavioral attributes of online sports wagers to those who exclusively participate in casino or lottery gambling and those who do not gamble.

Keywords: Sports Wagering, Fantasy Sports, Casino Gambling, Lottery Gambling, Online Gambling.

Introduction

Legalization of online gambling—such as sports wagering (SW) and fantasy sports (FS)—in the United States (U.S.) started shortly after the Supreme Court decision in 2018 that permitted states to regulate these gambling behaviors (Murphy v. National Collegiate Athletic Assn, 2018). Currently, SW has been legalized and is operational in 38 states and the District of Columbia (American Gaming Association, 2025). Given the relative newness of legalized online gambling in the U.S., we seek to develop a better understanding of which adults are engaging in SW/FS by answering the following research questions: (1) What demographic characteristics are associated with SW/FS? (2) What behavioral characteristics are associated with SW/FS? We not only examine these questions in relation to not gambling, but also in comparison to lottery and casino gambling.

In the short period since the 2018 Supreme Court decision, studies evaluating the attributes of adults who participate in SW/FS in the U.S. are very limited. For example, in a recent systematic review on sociodemographic, personality-related, and other behavioral factors associated with SW (Valenciano-Mendoza et al., 2023), only 10 of the 54 articles reviewed were based on U.S. samples. Moreover, eight of the 10 U.S. articles focused on SW among youth and/or college students or athletes, and only one of these college student studies (Wang et al., 2021) used data collected after the 2018 U.S. Supreme Court decision. Other recent U.S. studies on SW/FS that were not incorporated in the Valenciano-Mendoza et al. (2023) review include a few national studies that recruited participants via opt-in online panels (Grubbs & Krauss, 2022; 2024) and Massachusetts-specific studies (MAGIC (Massachusetts Gambling Impact Cohort) Research Team, 2021; Volberg et al., 2022) although for the latter most of the data were collected prior to August 2022 when SW was legalized in Massachusetts. Given the small number of U.S. studies available on the topic, there is a need for more current U.S.-based studies that evaluate data from a general population sample of adults.

To better understand the demographic and behavioral characteristics of adults who engage in SW/FS, we report findings from an original, large-scale statewide survey fielded two years after SW/FS was legalized in the state of Iowa. The attributes of adults who engage in the newly legalized SW/FS are compared to those who participate in traditional gambling involving lotteries and casino games, as well as adults who report no gambling.

Background

The current study was conducted in Iowa, which legalized online SW and internet FS in May 2019 with the first sportsbook apps going live in August 2019. The state was an early adopter as it was the 11th state in the U.S. for legalized online SW to become operational (Volberg et al., 2022). State revenue based on a 6.75% tax rate has increased from $42 million in 2020 to $202 million in 2023 for SW and remained steady at $1.2 million for FS (Iowa Racing and Gaming Commission, 2024). According to the law, SW and FS in the state must be through a sportsbook licensed with the state's Racing and Gaming Commission, and individuals must be within the state borders when placing their bet. There are currently 19 state-licensed casinos and 18 sports betting apps such as Fan Duel and DraftKings available in the state (Iowa Racing and Gaming Commission, 2024), plus four Native American casinos. The state's minimum age to make a gambling wager (including lottery purchases, charitable gambling, tribal and commercial casino gambling, and pari-mutuel betting) is set at 21 years of age. Prop bets on individual collegiate athletes' performances are not legal. The restrictions on authorized operators, the minimum gambling age, and bet types vary across U.S. states (Volberg et al., 2022) and countries across the globe (Etuk et al., 2022; Table 1); these contextual and cultural differences have the potential to influence gambling behaviors and the profiles of those who are likely to engage in gambling. In fact, Valenciano-Mendoza et al. (2023) called for more research on SW and FS from different geographic locations and cultural backgrounds for these reasons.

From past studies or reviews of general gambling studies (many involving data prior to when SW/FS was legalized in the U.S.), several sociodemographic, personality- related, and other behavioral characteristics have been found to be associated with engaging in gambling behaviors including SW and FS – though not all were examined within the same studies. First, for the demographic attributes, males, younger, single and college-educated adults generally have a higher likelihood of participating in SW and FS (Grubbs & Kraus, 2022; Nower et al., 2018; Volberg et al., 2022; Winters & Derevensky, 2019; Williams et al., 2021).

There have been less consistent findings for other demographic characteristics. Some researchers have found Black, indigenous, and other people of color to be more likely than White people to participate in gambling behaviors (Noel et al., 2023; Venne et al., 2020), including SW and FS (Grubbs & Kraus, 2022; Nower et al., 2018). In some studies, higher annual income has been found to be associated with the likelihood of engaging in SW and FS (Dwyer et al., 2022; Grubbs & Kraus, 2022), while others have found individuals from lower socioeconomic positions to be

more affected by online sports gambling (Granero et al., 2020). Relatedly, results for employment status have been mixed with some studies finding SW/FS players being more likely to be employed for wages (Nower et al., 2018; Hing et al., 2016), while others have found no relationship with gambling behaviors (Noel et al., 2023) or problem gambling (MAGIC Research Team, 2021). Another characteristic for which there has been mixed results includes gambling prevalence by sexual orientation; this topic was recently highlighted in a systematic review by Lee and Grubbs (2023) where the authors advocated for more studies examining the relationship between sexual orientation and gambling behaviors.

In terms of other attitudes and behaviors being associated with gambling behaviors, a few studies have found that mental health issues or suicidal ideation are related to participating in daily FS (Nower et al., 2018) or being at-risk of problem gambling, especially among females (Venne et al., 2020). Relatedly, another study found that gambling urge, erroneous gambling cognitions, and severity of gambling scores were each negatively correlated with quality of life (QoL) scores (Loo et al., 2016). Another behavior that has been found to be associated with an increased risk of problem gambling is misusing alcohol or other substances (MAGIC Research Team, 2021; Russell et al., 2019). And, in relation to SW and FS, Grubbs and Kraus found significant positive associations between the frequency of engaging in these gambling activities and the frequency of using substances such as alcohol (including binge drinking), tobacco, and other drugs (2023, 2024).

This study was exploratory in nature, yet it was informed by a statewide survey of gambling behavior, prior to the legalization of SW in Iowa, in 2018 (Park et al., 2019). Accordingly, we expected SW to be associated with the typical demographic and behavioral attributes of being young male adults and engaging in binge drinking, though we were uncertain about the extent of the impact on these associations after the legalization of SW. Therefore, the current study aims to contribute to the literature by understanding gambling behaviors among a general population sample of Iowa adults two years after online SW and FS became legal in the state. Specifically, we examined demographic characteristics and other attitudes and behaviors such as substance use, mental health, and quality of life simultaneously in relation to gambling type behaviors that include newly legalized gambling (SW and FS), traditional gambling (casinos and lotteries), and no gambling behaviors. Thus, results from these analyses can help the state gain a better understanding of the attributes associated with the different gambling types and determine whether these attributes are in agreement with those reported elsewhere or are unique to the state due to the

changing legal environment. Given that some researchers (Etuk et al., 2022; Grubbs & Kraus, 2022; MAGIC Research Team, 2021; Noel et al., 2023) have suggested that individuals who participate in SW and FS compared to those who do not are at an increased risk of developing gambling addictions and problems, findings from this study can be used to help inform responsible gambling strategies.

Methods

Participants and Procedures

We designed and fielded a mixed-mode survey to assess the health and wellbeing, substance use and gambling behaviors, mental health, and risk of suicide of state adults who were 18 years or older. A mixed-mode survey was used that combined a dual-frame (landline and cell) random digit dial probability telephone sample, a probability address-based sample, and an opt-in online panel sample. Data were collected across three modes: an online questionnaire, a self-administered mail-back paper questionnaire, and a computer-assisted telephone interview. Data collection began with a mailed invitation to complete the online questionnaire in August 2021 and ended in January 2022. Follow-up to those who did not complete the online questionnaire included up to two additional mailings approximately two and seven weeks after the initial mailing followed by telephone outreach. The mailings and telephone interviews were conducted in both English and Spanish. An overwhelming majority of all participants (99.7%) completed the survey in English. A $10 electronic gift card was offered to respondents from the probability-based samples who completed the survey and provided an email address. This project was approved by the Institutional Review Board at the first author's affiliated university (study number = 22-0008; date of approval = 08-13-2021). Participants provided informed consent before answering any questions. Committee approval is in accordance with ethical guidelines detailed in the 1964 Helsinki Declaration or any of its succeeding amendments.

A total of 4,055 adults 18 years of age or older from the state completed the survey – 3,324 from the probability samples and 731 from the non-probability sample. The overall response rate for the probability samples was 23% (American Association for Public Opinion Research, 2023; see response rate 3). Calibration adjustment items related to social media usage, surveys for reward, and early adoption of apps were included on all surveys to combine responses from the probability and non-probability samples according to the methods described by Fahimi et al. (2015). The combined dataset was weighted to known population benchmarks from the latest American Community Survey (U.S. Census

Bureau, 2019) and adjusted according to the distribution of the calibration items for the combined weighted probability sample. More details about the weighting and calibration methods used to combine the probability and non-probability samples have been provided elsewhere (Park et al., 2022, see pages 66 to 71). Prior to determining the weights, missing values for variables used in the weighting (age, sex, race, ethnicity, education, marital status, annual income, and place of residence) were imputed based on a hot-deck algorithm (Mukhopadhyay, 2016). The percent of values imputed for these eight demographic characteristics ranged from 0.5% for sex to 3.2% for income with a median of 1.1%.

Table 1 provides the weighted and unweighted percentages for the participant characteristics where the sample was weighted to represent the state population. The weighting corrected for the overrepresentation of the following subgroups in the sample: females, adults aged 55 and older, married adults, and adults who earned a bachelor's degree or higher. Based on the weighted sample, there was a fairly even split between males (47.3%) and females (52.7%). The majority of respondents were White (92.8%) and non-Hispanic ethnicity (95.4%). For age, 26.5% were 18-34 years old, 31.9% were 35-54 years old, and 41.5% were 55 and older. We note that 1.5% of the respondents were less than 21 years old and 11.7% of them indicated they had engaged in gambling behaviors despite the legal minimum age for gambling being 21 in the state.

Table 1

Weighted and Unweighted Participant Characteristics

Participant characteristics and categories		*n*	Unweighted %	Weighted %
Sex	Male	1,591	39.7	47.3
	Female	2,418	60.3	52.7
Age group	18-34 years	732	18.3	26.5
	35-54 years	1,265	31.6	31.9
	55+ years	2,012	50.2	41.5
Race	Black	90	2.2	3.4
	Other (including Asian)	98	2.4	3.8
	White	3,821	95.3	92.8
Ethnicity	Non-Hispanic	3,894	97.1	95.4
	Hispanic/Latino	115	2.9	4.6
Marital status	Married	2,368	59.1	55.4
	Separated, divorced, or widowed	833	20.8	18.9
	Never married	808	20.2	25.8
Annual household income	Less than $25K	754	18.8	16.5
	$25K to less than $50K	871	21.7	19.6
	$50K to less than $100K	1,307	32.6	34.6
	$100K to less than $150K	634	15.8	17.7
	$150K or more	443	11.1	11.7
Location of residence	Rural (<5K pop)	1,563	39.0	40.1
	Town in rural area (5-50K pop)	1,208	30.1	27.9
	Urban (>50K pop)	1,238	30.9	32.0
Education level	Grade 12/GED/Less	730	18.2	33.8
	Some college or associate's degree	1,416	35.3	36.7
	Bachelor's degree or higher	1,863	46.5	29.5
Casino gambling	Yes	362	9.0	10.8
	No	3,647	91.0	89.2
Lottery gambling	Yes	982	24.5	25.1
	No	3,027	75.5	74.9
SW gambling	Yes	181	4.5	6.3
	No	3,828	95.5	93.7
FS gambling	Yes	137	3.4	5.0
	No	3,872	96.6	95.0

Note. For the weighted percentage, the data were weighted to mirror the state's adult population and adjusted for calibration items to combine the probability and non-probability samples. GED = General Education Development credential to indicate a grade 12 education. SW = sports wagering and FS = fantasy sports.

Measures

Gambling type. The survey asked participants about the number of days they had engaged in gambling behaviors in the past 30 days for each of the following types of games: casino, lottery, SW, and FS. The casino games specified multiple gambling behaviors such as slot machines and table games such as blackjack, poker, and roulette. And the lottery item referenced games such as scratch tickets and numbers (e.g., Powerball). The SW item asked about SW through state casinos' mobile apps, telephone lines, or in their sports books. The FS item referenced FS or daily FS through internet sites such as DraftKings or FanDuel. Given that the survey asked a single question for each of the four gambling categories, respondents could indicate they engaged in multiple gambling types within the past 30 days. Each gambling type was dichotomized as engaging in that type of gambling at least once in the past 30 days vs. not at all.

To focus on the newly legalized gambling type behaviors in the state, namely SW and FS, and how they compare to the traditional gambling type behaviors of casino and lottery play, the outcome variable for this study was based on classifying respondents into one of the following three gambling type groups: SW/FS (representing newly legalized gambling in the state) regardless of whether or not participation in lottery or casino games was reported, lottery/casino (representing traditional gambling in the state), and no gambling behaviors in the past 30 days. These categorizations are partly based on findings from previous studies (e.g., Grubbs and Kraus, 2022) and our own evaluation (discussed more in the results section).

Substance use. Participants were asked about the number of days in the past 30 days that they had used each of the following substances: alcohol, marijuana, methamphetamine, opioids, prescription drugs, and over-the-counter (OTC) medication (the latter two in ways other than directed). They were also asked the number of times they had engaged in binge drinking in the past 30 days. Many of the substance use items were adapted from other general population questionnaires used at the national and state levels that include the National Survey on Drug Use and Health and Behavioral Risk Factor Surveillance System. Binge drinking was defined as "5 or more drinks of alcohol for men and 4 or more drinks for women on any occasion within a two-hour period." Alcohol use was categorized as no alcohol use, alcohol use but no binge drinking, and binge drinking in the past 30 days. Other substances were dichotomized as used vs. not used.

Mental health. Participants were asked two mental-health related questions adapted from another general population questionnaire (e.g., Youth Risk Behavior Survey) used at the national and state levels, and consistent with how the state typically asks about mental health on surveys

across age groups. The first was whether they had felt so sad or hopeless that they stopped doing some of their normal activities during the past 30 days. The second was whether they had thought about killing themselves in the past 30 days. Each was dichotomized as yes vs. no. Findings from a study by Verlenden et al. (2024) provide validity evidence for the use of the "sad or hopeless" question as a measure of mental health in population studies.

Quality of life (QoL). A modified EUROHIS-QOL eight-item index was used to measure QoL (Schmidt et al., 2006). Specifically, participants were asked how satisfied or dissatisfied they were with regards to the following six dimensions: the quality of their life, their health, their ability to perform daily activities, their self, their personal relationships, and the conditions of their living place. Possible responses for these items ranged from 1=very dissatisfied to 5=very satisfied. For the two remaining items, participants were asked about their level of agreement with the statements that they have enough energy for everyday life and that they have enough money to meet their needs. Possible responses for these options ranged from 1=strongly disagree to 5=strongly agree. Higher mean scores indicate respondents were more satisfied with their QoL. For the study sample, the internal consistency (Cronbach's alpha) was .90. The weighted mean QoL was 3.95 with a standard error of 0.02.

Other sociodemographic attributes. Sexual orientation, current employment status, and health care status were other variables considered in this study. Sexual orientation was dichotomized as heterosexual vs. non-heterosexual. Non-heterosexual included lesbian, gay, and bisexual/pansexual. Current employment status was dichotomized as employed vs. not employed. The employed group included those who indicated they were employed for wages or self-employed. The not employed group included those who indicated that they were out of work, unable to work, or that they were retired, a homemaker, or a student. Health care status was included as another measure of socioeconomic status and determined based on a participant's response to whether they were currently covered by any kind of health insurance or healthcare plan.

Data Analysis

IBM SPSS Statistics 24 (IBM Corp., 2016) was used for initial data management and descriptive analyses. SAS software version 9.4 (SAS Institute Inc., 2023) was used to conduct weighted analyses to assess the statistical significance of proportional differences in bivariate analyses, and to estimate multinomial regression models employing a logit link for the three-category outcome variable. For the multinomial gambling type outcome, three adjusted odds ratios (AOR) are reported: the AOR of

reporting newly legalized gaming (SW/FS) over no gambling behaviors, the AOR of reporting traditional gambling (lottery/casino) over no gambling behaviors, and the AOR of newly legalized gaming (SW/FS) over traditional gambling (lottery/casino). The 95% confidence intervals (CI) for the AORs provide an indication of whether the relationship is statistically significant (that being when the interval does not include the null value of 1.0). If the overall test for a predictor is not significant, then the individual pairwise comparisons among the predictor categories are interpreted as "not significant" regardless of whether the 95% CIs for the AORs do not include 1.0. The significance level was set at 0.05.

Given the focus of the study was on gambling behaviors, the data analyses focused on the 4,009 respondents (98.9% of survey participants) for whom their gambling type was provided or could be inferred. Some of the other characteristics that were not used in determining the weights had missing data that ranged from 0.3% (for alcohol use) to 1.9% (for sexual orientation). The multivariate analyses included 3,829 participants with complete data for all variables in the models, representing 94.4% of all survey respondents.

Results

Gambling Type

The most reported gambling behavior was lottery gambling (25.1%) followed by casino gambling (10.8%), as shown in Table 1. About one in 20 adults reported that they wagered on sports through state casinos' mobile apps, telephone lines, or in their sports books (6.3%) or in fantasy sports contests through internet sites (5.0%) in the past 30 days.

Gambling Type and Participant Characteristics

Table 2 provides a comparison of the demographic characteristics for each of the four gambling types to the no gambling group to provide evidence supporting our decision to combine the traditional gambling types (lottery/casino) and new gambling types (SW/FS) in subsequent analyses. Respondents who played casino games or purchased lottery tickets generally shared similar demographic characteristics to the respondents who did not report any gambling behaviors in the past 30 days, except primarily for sex, age group, education, and employment status. Specifically, adults who reported playing casino games or purchasing lottery tickets were significantly more likely than those who reported no gambling behaviors to be males, 35-54 years old (lottery only), and employed, and they were less likely to have earned a bachelor's degree or higher.

Table 2

Percentage of Participant Demographic Characteristics by Individual Gambling Types

Participant characteristic	No gambling (67.8%)	Casino (10.8%)	Lottery (25.1%)	SW (6.3%)	FS (5.0%)
Sex	[χ^2=]	[8.55**]	[17.48***]	[77.70***]	[50.59***]
Male	43.3	54.1	53.4	86.9	83.7
Female	56.7	45.9	46.6	13.1	16.3
Age group	[χ^2=]	[11.49**]	[14.04***]	[45.34***]	[73.87***]
18-34 years	26.9	33.7	21.7	53.6	66.6
35-54 years	30.0	34.4	38.4	31.0	28.3
55+ years	43.1	31.8	39.9	15.4	5.0
Race	[χ^2=]	[0.54]	[6.60*]	[3.18]	[1.71]
White	93.0	93.1	93.0	90.5	88.8
Black	2.9	3.6	4.7	6.9	6.8
Other (including Asian)	4.2	3.4	2.3	2.6	4.4
Ethnicity	[χ^2=]	[0.11]	[0.61]	[3.32]	[3.87*]
Non-Hispanic/Latino	95.5	94.9	94.5	89.0	86.9
Hispanic/Latino	4.5	5.1	5.5	11.0	13.1
Marital status	[χ^2=]	[0.44]	[1.82]	[9.51**]	[28.95***]
Married	54.4	52.0	57.6	49.1	53.7
Divorced, widowed, or separated	19.3	20.0	18.5	11.6	5.0
Never married	26.3	28.0	23.9	39.3	41.3
Sexual orientation	[χ^2=]	[1.10]	[0.23]	[21.95***]	[10.57**]
Heterosexual	93.2	95.0	92.5	98.4	97.9
Non-heterosexual	6.8	5.0	7.5	1.6	2.1
Income	[χ^2=]	[7.96]	[10.37*]	[11.11*]	[15.20**]
Less than $25K	17.8	12.8	14.3	9.5	8.3
$25K to less than $50K	19.0	20.1	21.0	22.5	28.4
$50K to less than $100K	34.2	33.8	34.9	30.9	32.2
$100K to less than $150K	16.9	22.8	20.3	20.1	24.4
$150K or more	12.1	10.4	9.5	16.9	6.8

Participant characteristic	No gambling (67.8%)	Casino (10.8%)	Lottery (25.1%)	SW (6.3%)	FS (5.0%)
Location of residence	[χ^2=]	[1.17]	[5.78]	[0.07]	[2.56]
Rural (<5K pop)	40.0	39.6	42.0	38.8	40.7
Town in rural area (5-50K pop)	27.1	30.4	30.3	28.0	33.3
Urban (>50K pop)	32.8	30.0	27.7	33.2	26.1
Education level attained	[χ^2=]	[22.99***]	[18.93***]	[0.79]	[5.61]
Grade 12/GED/Less	33.2	45.0	37.5	33.2	42.2
Some college or associate degree	35.2	35.8	38.7	35.5	35.8
Bachelor's degree or higher	31.6	19.2	23.8	31.3	22.0
Employment	[χ^2=]	[24.01**]	[37.77***]	[48.61***]	[45.54***]
Not employed	42.4	26.4	28.7	13.7	11.3
Employed	57.6	73.6	71.3	86.3	88.7

Note. The survey asked each of the four gambling categories separately, which means respondents could indicate they engaged in multiple gambling types within the last 30-day period. For each row that identifies the participant characteristic, the [chi-square test statistic] is provided for comparing the specific gambling group to the no gambling group on the characteristic. Percentages were weighted to state population and adjusted for calibration items to combine the probability and non-probability samples. Cramer's V (effect size) ranged from <.001 for ethnicity to 0.024 for employment when Casino was compared to the no gambling group, ranged from 0.008 for sexual orientation to 0.101 for employment when Lottery was compared to the no gambling group, ranged from 0.005 for location to 0.162 for sex when SW was compared to the no gambling group, and ranged from 0.030 for location to 0.159 for age when FS was compared to the no gambling group. SW = sports wagering, FS = fantasy sports, and GED = General Education Development credential to indicate a grade 12 education. * $p < .05$, ** $p < .01$, and *** $p < .001$.

Respondents who engaged in SW or FS shared similar demographic characteristics with each other but appeared different from respondents who played casino games or purchased lottery tickets. The differences were more pronounced in comparisons of sex, age group, and marital status. Specifically, more than eight of 10 respondents who reported SW or FS were male compared to around half of respondents who played casino games or the lottery.

As shown in Table 2, compared to adults who did not report gambling behaviors in the past 30 days, the SW and FS groups were significantly more likely to be males, 18 to 34 years old, Hispanic/Latino (FS only), employed, and never been married. They were also less likely to be non-heterosexual and to earn an annual income less than $25,000.

Based on the shared demographic characteristics illustrated in Table 2, respondents were classified into three gambling type groups such that one in four participants (24.8%) engaged exclusively in traditional gambling behaviors (lottery/casino games), 7.4% engaged in new gambling behaviors of SW/FS with or without traditional gambling, and 67.8% of participants had not engaged in any gambling behaviors in the past 30 days. For those who had engaged in SW/FS, 22.0% only engaged in either SW or FS, 28.4% engaged in two of the four gambling types asked about on the survey, 25.9% engaged in three types, and 23.6% engaged in all four gambling types. Additionally, nearly two-thirds (63.7%) of those who engaged in SW/FS also participated in casino gambling, lottery gambling, or both. For all the comparisons shown in Table 2, each Cramer's V value was less than 0.20 indicating small effect sizes (IBM, Corp., 2025; Matthay et al., 2021).

Gambling Type Groupings and Participant Characteristics

As shown in Table 3, the following participant characteristics were significantly associated with gambling type in bivariate analyses: sex, age group, marital status, sexual orientation, annual household income, education level, employment status, health insurance status, and use of individual substances including: alcohol, marijuana, methamphetamine, opioids, and misuse of prescription drugs or OTC medications. For example, a significantly higher percentage of males than females engaged in new gambling behaviors of SW/FS (13.2% vs. 2.2%, respectively, $\chi^2(2)=83.76$, $p < .001$). On the other hand, the following participant characteristics were not significantly associated with gambling type in bivariate analyses: race, ethnicity, location of residence, experiencing feelings of sadness or hopelessness, and having suicidal thoughts (each $p > .05$). For the bivariate comparisons shown in Table 3, all of the Cramer's V values were less than 0.20 indicating small effect sizes (IBM, Corp., 2025; Matthay et al., 2021).

Table 3

Gambling Type Percentages by Participant Characteristics

Participant characteristics and categories		Total n	Total Weighted %	Weighted % No gambling behavior	Weighted % Traditional gambling (Lottery/ casino)	Weighted % New gambling (SW/FS)	Chi-square test
Total		4,009	100.0	67.8	24.8	7.4	
Sex	Male	1,591	47.3	62.0	24.7	13.2	83.76***
	Female	2,418	52.7	72.9	24.9	2.2	
Age group	18-34 years	732	26.5	68.8	15.7	15.5	95.06***
	35-54 years	1,265	31.9	63.5	29.3	7.1	
	55+ years	2,012	41.5	70.4	27.2	2.4	
Race	Black	90	3.4	57.5	29.0	13.4	4.06
	Other (including Asian)	98	3.8	73.6	19.9	6.6	
	White	3,821	92.8	67.9	24.9	7.2	
Ethnicity	Non-Hispanic	3,894	95.4	67.8	25.1	7.0	3.74
	Hispanic/Latino	115	4.6	66.1	18.9	15.0	
Marital status	Married	2,368	55.4	66.5	26.5	6.9	20.15***
	Separated, divorced, or widowed	833	18.9	69.4	26.3	4.3	
	Never married	808	25.8	69.2	20.1	10.7	
Sexual orientation	Heterosexual	3,714	93.2	67.5	24.6	7.9	16.60***
	Non-heterosexual	220	6.8	68.1	29.3	2.6	
Annual household income	Less than $25K	754	16.5	73.3	23.1	3.6	20.50**
	$25K to less than $50K	871	19.6	65.9	25.5	8.5	
	$50K to less than $100K	1,307	34.6	67.1	25.9	7.0	
	$100K to less than $150K	634	17.7	64.7	26.1	9.2	
	$150K or more	443	11.7	69.7	21.2	9.1	
Location of residence	Rural (<5K pop)	1,563	40.1	67.6	25.0	7.3	2.20
	Town in rural area (5-50K pop)	1,208	27.9	66.0	26.4	7.7	
	Urban (>50K pop)	1,238	32.0	69.5	23.2	7.3	

Participant characteristics and categories		Total		Weighted %			
		n	Weighted %	No gambling behavior	Traditional gambling (Lottery/ casino)	New gambling (SW/FS)	Chi-square test
Education level	Grade 12/GED/Less	730	33.8	66.6	25.7	7.6	17.66**
	Some college or associate's degree	1,416	36.7	65.1	27.4	7.5	
	Bachelor's degree or higher	1,863	29.5	72.4	20.5	7.0	
Employment	Not employed	1,683	38.1	75.3	22.0	2.7	64.67***
	Employed	2,290	61.9	63.1	26.6	10.4	
Health insurance coverage	Yes	3,798	94.7	68.4	25.7	6.0	25.26***
	No	154	5.3	51.7	13.3	35.0	
Alcohol use	No alcohol use	1,482	36.5	76.0	20.9	3.0	88.63***
	Alcohol use, no binge drinking	1,831	42.4	68.8	26.9	4.3	
	Binge drinking	683	21.1	51.4	27.4	21.3	
Marijuana use	Yes	376	11.3	49.8	27.2	22.9	34.52***
	No	3,597	88.7	70.2	24.4	5.5	
Meth use	Yes	81	2.8	22.8	23.4	53.9	27.25***
	No	3,901	97.2	69.2	24.7	6.1	
Opioids use	Yes	85	2.7	22.0	23.6	54.4	25.25***
	No	3,891	97.3	69.1	24.7	6.1	
Prescription drug misuse	Yes	219	6.4	51.3	36.3	12.5	13.67**
	No	3,764	93.6	69.0	23.9	7.1	
OTC misuse	Yes	121	3.4	47.1	39.3	13.6	10.46**
	No	3,862	96.6	68.6	24.2	7.2	
Feelings of sadness or hopelessness	Yes	862	22.9	67.9	24.8	7.3	0.02
	No	3,131	77.1	67.7	24.9	7.5	
Suicidal thoughts	Yes	254	7.1	67.6	19.7	12.6	4.81
	No	3,733	92.9	67.7	25.3	7.0	

Note. SW = sports wagering, FS = fantasy sports, GED = General Education Development credential to indicate a grade 12 education, OTC = over-the-counter medications, and meth = methamphetamine. Percentages were weighted to state population and adjusted for calibration items to combine the probability and non-probability samples. Cramer's V (effect size) ranged from 0.002 for feelings of sadness or hopelessness to 0.145 for sex.

* $p < .05$, ** $p < .01$, and *** $p < .001$

Multivariate Analyses of Gambling Type

Table 4 provides the AORs and their corresponding 95% CIs for all the participant characteristics included in the multinomial model for gambling type. Accordingly, the following participant characteristics were significantly related to gambling type in multivariate analyses: sex, age group, sexual orientation, education level, employment status, health insurance status, alcohol use, methamphetamine use, opioids use, and QoL; their results will be described in more detail. On the other hand, the following characteristics were not significantly associated with gambling type in multivariate analyses (each overall $p > .05$): race, ethnicity, marital status, annual household income, location of residence, marijuana use, prescription and OTC medication misuse, feelings of sadness or hopelessness, and having suicidal thoughts. The pseudo-R^2 for model fit is .25 (Nagelkerke, 1991). In comparison, the largest pseudo-R^2 value from the bivariate analyses shown in Table 3 was .09 for alcohol use.

Gambling Type and Sex. Based on the multinomial regression model, reported engagement in SW/FS compared to not engaging in any gambling behaviors in the past 30 days was more than 5 times as likely to occur among males than females (AOR=5.40, CI: 3.42-8.51). A similar finding was also observed for reported engagement in SW/FS over lottery/casino gambling, where males were nearly 5 times as likely as females to do so (AOR=4.91, CI: 3.07-7.86). Sex was not significantly associated with lottery/casino gambling over no gambling behavior.

Gambling Type and Age Group. Reported engagement in SW/FS over indicating no gambling behaviors was 3 times more likely to occur among younger adults 18-34 years old (AOR=3.14, CI: 1.57-6.25) compared to adults 55 and older. Additionally, younger adults 18-34 years old were 7 times more likely than adults 55 and older to report engaging in SW/FS over lottery/casino gambling (AOR=7.45, CI: 3.63-15.27), and adults 35-54 years old were 2 times more likely than adults 55 and older to do so (AOR=1.89, CI: 1.01-3.53).

On the other hand, younger adults 18-34 years old were 58% less likely than adults 55 and older to indicate engaging in lottery/casino gambling over no gambling behaviors (AOR=0.42, CI: 0.30-0.59). There was no difference in engaging in lottery/casino gambling over no gambling behaviors between adults 35-54 years old and adults 55 and older.

Table 4

Gambling Type Percentages by Participant Characteristics

Participant characteristics and categories		New gambling (SW/FS) vs. No gambling behavior			Traditional gambling (Lottery/casino) vs. No gambling behavior			New gambling (SW/FS) vs. Traditional gambling (Lottery/casino)			Overall significance Wald *F* test
			95% CI			95% CI			95% CI		
		AOR	LL	UL	AOR	LL	UL	AOR	LL	UL	
Sex	Male	5.40***	3.42	8.51	1.10	0.90	1.34	4.91***	3.07	7.86	
	Female	1.00			1.00			1.00			26.33***
Age group	18-34 years	3.14**	1.57	6.25	0.42***	0.30	0.59	7.45***	3.63	15.27	
	35-54 years	1.66	0.90	3.05	0.88	0.68	1.13	1.89*	1.01	3.53	
	55+ years	1.00			1.00			1.00			11.24***
Race	Black	2.95	1.15	7.60	1.42	0.78	2.60	2.08	0.79	5.50	
	Other (including Asian)	0.97	0.33	2.82	0.73	0.35	1.52	1.33	0.43	4.14	
	White	1.00			1.00			1.00			1.53
Ethnicity	*Non-Hispanic*	1.00			1.00			1.00			0.12
	Hispanic/Latino	0.86	0.42	1.76	1.05	0.58	1.90	0.82	0.36	1.86	
Marital status	*Married*	1.00			1.00			1.00			0.71
	Separated, divorced, or widowed	1.03	0.55	1.95	0.86	0.66	1.13	1.20	0.62	2.29	
	Never married	0.94	0.50	1.75	0.79	0.58	1.07	1.19	0.62	2.28	
Sexual orientation	*Heterosexual*	1.00			1.00			1.00			4.62**
	Non-heterosexual	0.35*	0.12	0.995	1.57*	1.01	2.45	0.22**	0.08	0.65	
Annual household income	Less than $25K	0.63	0.26	1.53	0.94	0.67	1.33	0.67	0.27	1.66	
	$25K to less than $50K	1.14	0.65	2.02	1.08	0.82	1.43	1.06	0.58	1.93	
	$50K to less than $100K	1.00			1.00			1.00			0.73

Participant characteristics and categories		New gambling (SW/FS) vs. No gambling behavior			Traditional gambling (Lottery/casino) vs. No gambling behavior			New gambling (SW/FS) vs. Traditional gambling (Lottery/casino)			Overall significance Wald
			95% CI			95% CI			95% CI		
		AOR	LL	UL	AOR	LL	UL	AOR	LL	UL	*F* test
	$100K to less than $150K	1.10	0.62	1.98	1.01	0.75	1.34	1.10	0.60	2.00	
	$150K or more	1.56	0.77	3.16	0.80	0.57	1.14	1.95	0.90	4.20	
Location of residence	*Rural (<5K pop)*	1.00			1.00			1.00			0.88
	Town in rural area (5-50K pop)	1.15	0.71	1.86	1.20	0.95	1.52	0.96	0.58	1.58	
	Urban (>50K pop)	1.13	0.70	1.84	0.98	0.77	1.25	1.16	0.70	1.92	
Education level	*Grade 12/GED/Less*	1.00			1.00			1.00			4.99***
	Some college or associate's degree	1.88*	1.01	3.49	0.94	0.72	1.23	2.00*	1.05	3.80	
	Bachelor's degree or higher	1.46	0.77	2.77	0.63**	0.47	0.85	2.32*	1.20	4.51	
Employment	*Not employed*	1.00			1.00			1.00			8.00***
	Employed	1.56	0.85	2.86	1.57***	1.25	1.98	0.99	0.54	1.83	
Health insurance coverage	*Yes*	1.00			1.00			1.00			3.88*
	No	2.32*	1.12	4.81	0.56	0.30	1.05	4.14**	1.52	11.26	
Alcohol use	*No alcohol use*	1.00			1.00			1.00			13.46***
	Alcohol use, no binge drinking	1.30	0.72	2.36	1.41**	1.13	1.77	0.92	0.50	1.70	
	Binge drinking	4.53***	2.54	8.08	2.00***	1.49	2.69	2.26**	1.23	4.16	
Marijuana use	Yes	1.33	0.73	2.44	1.31	0.91	1.90	1.01	0.53	1.95	
	No	1.00			1.00			1.00			1.29
Meth use	Yes	5.79***	2.05	16.39	2.41*	1.03	5.66	2.40	0.84	6.92	
	No	1.00			1.00			1.00			5.79**
Opioids use	Yes	4.11**	1.55	10.87	2.12	0.94	4.77	1.94	0.74	5.08	
	No	1.00			1.00			1.00			4.27*

Participant characteristics and categories		New gambling (SW/FS) vs. No gambling behavior			Traditional gambling (Lottery/casino) vs. No gambling behavior			New gambling (SW/FS) vs. Traditional gambling (Lottery/casino)			Overall significance Wald
			95% CI			95% CI			95% CI		
		AOR	LL	UL	AOR	LL	UL	AOR	LL	UL	*F* test
Prescription drug misuse	Yes	1.77	0.76	4.10	1.41	0.87	2.27	1.26	0.55	2.86	
	No	1.00			1.00			1.00			1.39
OTC misuse	Yes	1.54	0.54	4.38	1.62	0.85	3.08	0.95	0.33	2.73	
	No	1.00			1.00			1.00			1.18
Feelings of sadness or hopelessness	Yes	0.72	0.39	1.31	0.90	0.68	1.19	0.80	0.43	1.49	
	No	1.00			1.00			1.00			0.75
Suicidal thoughts	Yes	0.95	0.44	2.05	0.62	0.39	1.00	1.53	0.70	3.36	
	No	1.00			1.00			1.00			2.01
QoL		0.90	0.68	1.20	0.82**	0.72	0.93	1.10	0.82	1.48	4.61*

Note. Reference category is italicized. AOR = adjusted odds ratio, CI = confidence interval, LL = lower limit, UL = upper limit, SW = sports wagering, FS = fantasy sports, GED = General Education Development credential to indicate a grade 12 education, meth = methamphetamine, OTC = over-the-counter medications, and QoL = quality of life. * $p < .05$, ** $p < .01$, and *** $p < .001$

Gambling Type and Sexual Orientation. Non-heterosexual adults were more likely than heterosexual adults to participate in lottery/casino gambling over no gambling behaviors (AOR=1.57, CI: 1.01-2.45). Additionally, non-heterosexual adults compared to heterosexual adults were 65% less likely to indicate participation in SW/FS over no gambling behaviors (AOR=0.35, CI: 0.12-0.995), and 78% less likely over lottery/casino gambling in the past 30 days (AOR=0.22, CI: 0.08-0.65).

Gambling Type and Education Level. Adults who earned a bachelor's degree or higher were 37% less likely than adults who completed high school or less to report lottery/casino gambling over no gambling behaviors (AOR=0.63, CI: 0.47-0.85) in multivariate analyses. On the other hand, adults who earned a bachelor's degree or higher were 2 times more likely than adults who completed high school or less to indicate SW/FS over lottery/casino gambling in the past 30 days (AOR=2.32, CI: 1.20-4.51).

Additionally, adults with some college experience or who earned an associate's degree were 2 times as likely to report participating in SW/FS over no gambling behaviors (AOR=1.88, CI: 1.01-3.49) and over lottery/casino gambling (AOR=2.00, CI: 1.05-3.80).

Gambling Type and Current Employment. Adults who were currently employed were more likely than those who were not currently employed to report lottery/casino gambling over no gambling behaviors (AOR=1.57, CI: 1.25-1.98). On the other hand, there was no significant difference in engaging in SW/FS over no gambling behaviors and over lottery/casino gambling.

Gambling Type and Health Insurance Status. Reported engagement in SW/FS compared to indicating no gambling behaviors was 2 times more likely to occur among adults who indicated that they were not covered by any kind of health insurance than those who indicated some type of coverage (AOR=2.32, CI: 1.12-4.81). A similar finding was also observed for reported engagement in SW/FS compared to participating in lottery/casino gambling, where those without health insurance were 4 times as likely as those with health insurance to do so (AOR=4.14, CI: 1.52-11.26). Health insurance status was not significantly associated with traditional gambling over no gambling behaviors.

Gambling Type and QoL. As an adult's QoL score increased, the odds of reporting lottery/casino gambling over indicating no gambling behaviors decreased (AOR=0.82, CI: 0.72-0.93). QoL score was not significantly associated with engaging in SW/FS over no gambling behaviors (AOR=0.90) or over lottery/casino gambling (AOR=1.10).

Gambling Type and Substance Use. In terms of other behaviors, SW/FS compared to no gambling behaviors was 4 to 6 times more likely to occur among adults who reported binge drinking over no alcohol use (AOR=4.53, CI: 2.54-8.08), adults who reported methamphetamine use over not using methamphetamines (AOR=5.79, CI: 2.05-16.39), and adults who used opioids over not using opioids (AOR=4.11, CI: 1.55-10.87). SW/FS compared to no gambling behaviors was not significantly associated with alcohol use without binge drinking, marijuana use, prescription drug misuse, or OTC misuse.

On the other hand, lottery/casino gambling compared to no gambling behaviors was more likely to occur for adults who reported alcohol use without binge drinking over not using alcohol (AOR=1.41, CI: 1.13-1.77), adults who reported binge drinking over not using alcohol (AOR=2.00, CI: 1.49-2.69), and adults who reported methamphetamine use over not using methamphetamines (AOR=2.41, CI: 1.03-5.66). Lottery/casino gambling compared to no gambling behaviors was not significantly associated with marijuana use, opioid use, prescription drug misuse, and OTC misuse.

Additionally, SW/FS compared to lottery/casino gambling was more than 2 times as likely to occur among adults who reported binge drinking over no alcohol use (AOR=2.26, CI: 1.23-4.16) but not among adults who reported alcohol use without binge drinking over no alcohol use (AOR=0.92, CI: 0.50-1.70). SW/FS over lottery/casino gambling was not significantly associated with use of any of the other individual substances (each $p > .05$).

Discussion

This study provides insights into the demographic characteristics and behaviors associated with gambling type based on a statewide sample of Iowa adults, two years after online SW and daily FS were legalized. The gambling type outcome was classified into SW/FS (representing 7.4% of adults regardless of their participation in lottery or casino games), lottery/casino gambling exclusively (representing 24.8% of adults), and no gambling behaviors in the past 30 days (representing 67.8% of adults). The three-category outcome helps to differentiate among the demographic characteristics and other behaviors associated with the traditional gambling and the newly legalized gambling in the state, and how these compare to those who have not gambled in the past 30 days.

Comparisons of Demographic Characteristic Findings

Males and younger adults in the state were more apt to engage in SW/FS over no gambling behaviors as well as over lottery/casino gambling,

when simultaneously controlling for other demographic characteristics, behaviors, and attitudes. For example, males were 5 times more likely than females to report participating in SW/FS over no gambling behaviors (AOR=5.40) as well as over engaging in lottery/casino gambling only (AOR=4.91). Additionally, younger adults 18-34 years old were 3 times as likely as adults 55 and older to indicate SW/FS over no gambling behavior (AOR=3.14) and 7 times more likely over lottery/casino gambling (AOR=7.45). These findings are consistent with those reported in other gambling behavior studies conducted in the U.S. on national samples (e.g., Dwyer et al., 2022; Grubbs & Kraus, 2022) and single state samples (e.g., Nower et al., 2018, Volberg et al., 2022) as well as in other countries (Constandt et al., 2022; Russell et al., 2019). Interestingly, a recent study by Malkin and Stacey (2024b) involving gamblers seeking help from Gambler's Anonymous suggests that even though sex helps to identify who is likely to engage in gambling behaviors, there are very few differences by sex in the percentages of gamblers experiencing social, economic, or criminal gambling-related harms.

Results from the current study also suggest that once other demographic characteristics and behavior attributes are statistically adjusted for in multivariate analyses, marital status is not significantly associated with gambling type. This finding is consistent with those reported elsewhere on SW/FS (Jiménez-Murcia et al., 2021 and Russell et al., 2019). In contrast, Nower et al. (2018) found that gamblers who were single or never married were more likely than gamblers who were married to play daily FS, even after statistically controlling for age, sex, race, different types of substance use, and various gambling activities.

There were also no significant associations between gambling type and race or ethnicity in this study. In contrast, a recent study of young adults in Rhode Island (Noel et al., 2023) found that Blacks, indigenous people, and people of color compared to Whites were more likely to participate in casino tables, but not in race betting, sports betting, or poker machines. Additionally, Nower et al. (2018) found that Hispanic gamblers were significantly more likely than White gamblers to play daily FS. Given that the state's population is less diverse with a majority of the sample (92.8%) being White, the result in the current study could be due to a lack of statistical power.

In the current study we also found that non-heterosexual adults compared to heterosexual adults were more likely to engage in lottery/casino gambling over no gambling behaviors (AOR=1.57), and non-heterosexuals were 78% less likely to indicate participation in SW/FS over lottery/casino gambling. In comparison, Lee and Grubbs (2023) found

mixed results across 12 academic articles on the topic; some studies suggested no differences in gambling prevalence between heterosexuals and non- heterosexuals while others found differences, but the differences were not consistently in the same direction. As suggested by Malkin and Stacey (2024a), future research should further explore this topic.

Education level was another significant predictor found in the current study. More specifically, adults who earned a bachelor's degree or higher were 37% less likely than adults who completed high school or less to report lottery/casino gambling over no gambling behaviors (AOR=0.63), but they were 2 times more likely than adults who completed high school or less to indicate SW/FS over lottery/casino gambling (AOR=2.32). These results are in line with those reported in other studies. For instance, results from the Massachusetts survey conducted by Volberg et al. (2022) suggested that participants with a college degree or higher are more likely to bet on sports than those from lower education levels. Moreover, Grubbs and Kraus (2022) found that individuals with some college experience or who completed at least an associate's degree were more likely than those who finished high school without any college experience to participate in SW. Additionally, other researchers (Williams et al., 2021) studying the Canadian population found that individuals involved in SW tended to have higher education levels than the general population.

In multivariate analyses, there was not a significant association between gambling type and socioeconomic status when it was defined by annual household income. On the other hand, there was a significant association with employment status such that adults currently employed were more likely than those not employed to report lottery/casino gambling over no gambling behaviors but not SW/FS over no gambling behaviors. In comparison, Dwyer et al. (2022) found in bivariate analyses that individuals involved in SW in the U.S. tended to have higher household incomes on average than non-sports bettors. Additionally, Grubbs and Kraus (2022) found in multivariate analyses that as income increased so did the chances of engaging in SW in the U.S. after statistically controlling for age, sex, race/ethnicity, education, religiousness, and state legality of SW. Nower et al. (2018) found daily FS players were more likely to be employed for wages than non-daily FS gamblers in bivariate analyses but not in multivariate analyses. The mixed results for the association between household income and gambling behaviors could be due to the differences in the samples, as well as the variables controlled for in the models.

Interestingly, in multivariate analyses, reported engagement in SW/FS compared to indicating no gambling behaviors or lottery/casino gambling was nearly 2 to 4 times more likely to occur among adults who

indicated no health insurance coverage than those with some type of coverage. In supplemental analyses (results not shown), we found those indicating no health coverage were more likely than those with coverage to be younger males who were more apt to engage in binge drinking and other substance use in the past 30 days. Perhaps, instead of measuring SES, health coverage is more of a proxy for having a greater propensity to engage in risk-taking behaviors. For example, Mishra et al. (2010, 2017) found positive correlations between measures of personality traits associated with risk and behavioral measures of risk preference with gambling involvement and problem gambling. Future research should investigate this topic further.

Comparisons of Findings for Other Attributes

This study further documents a significant relationship between substance use and gambling type for the following substances: alcohol, methamphetamines, and opioids. For example, adults who reported binge drinking compared to those who indicated no alcohol use in the past 30 days were not only 2 times more likely to indicate lottery/casino gambling over no gambling behaviors, but they were also nearly 5 times more likely to indicate SW/FS over no gambling behaviors. The finding of an association between gambling and substance use aligns with those reported in other general gambling behavior studies. For instance, based on a Massachusetts' study conducted from September 2013 to September 2019 (MAGIC Research Team, 2021), the authors found in multivariate analyses that having problems with drugs or alcohol within the past 12 months was significantly related to concurrent and future problem gambling status. In a more recent study, Grubbs & Kraus (2024) found in a national U.S. sample that daily or almost daily binge drinking occurred more often among sports gamblers than nongamblers for both males and females, as well as among non-sports gamblers when compared to nongamblers. In an earlier study, Grubbs and Kraus (2023) also found significant associations between engaging in SW or daily FS over the past year and using/misusing each of the following substances: alcohol, tobacco, cannabis/tetrahydrocannabinol-related products, prescription drugs, and other illegal/illicit drugs.

Another finding from our multivariate analyses in the current study was that as an adult's QoL score increased, the odds of reporting traditional gambling (lottery/casino) over no gambling behaviors decreased (AOR=0.82). This is consistent with another study that found that gambling disorder is correlated to lower quality of life (Loo et al., 2016). We note that although the QoL scores were included as a predictor of gambling type in this study, it is often considered an outcome in other studies that can be influenced by respondents' attributes and behaviors (Kelly et al., 2018).

The mental health indicators (sadness or hopelessness and suicide ideation in the past 30 days) were not significantly associated with gambling type in this study. In comparison, Venne et al. (2020) found that females with mental health problems in the past 12 months were nearly 2 times more likely than females without mental health problems to engage in at-risk gambling over recreational gambling. Additionally, Nower et al. (2018) found that gamblers with suicide ideation in the past 12 months were 4 times more likely than gamblers without suicidal thoughts to participate in daily FS over the past year. The differences in the mental health findings among studies might be due to the time frame being evaluated (within the past 30 days vs. 12 months).

Limitations, Implications, and Future Studies

While there are numerous strengths associated with this study that include the use of a mixed-mode survey with probability samples, weighting to the state's adult population, and multivariate multinomial analyses, the study is not without limitations. First, the study was conducted in a single state where gambling regulations are somewhat different than those in other U.S. states and countries. However, the results were generally consistent with those reported elsewhere on gambling behaviors. Second, the survey included items that could be viewed as sensitive in nature and could possibly be impacted by social desirability bias, though, most of this data (94.2%) was collected using a self-administered web or paper questionnaire, which is less prone to social desirability bias than interviewer-administered surveys (e.g., Endres et al., 2023). Third, due to the number of topics, design, and implementation costs of the survey, questions related to gambling and substance use problems and harm were not asked on the questionnaire. This precluded us from being able to compare the groups on gambling problems and harm. Fourth, given the number of comparisons made in this study and the use of a significance level of 0.05, it is possible that some of the significant associations may be spurious findings. Additionally, given the prevalence rate was small for some of the substances (e.g., meth or opioids), some of their corresponding confidence intervals especially those involving the SW/FS participants were quite wide. Finally, this survey was collected during the second year of the COVID-19 pandemic, and some of the behaviors reported in this survey may be linked to experiences during these difficult years which may have impacted reported (and actual) gambling behaviors and substance use.

Nonetheless, the current study provides an initial investigation on participant characteristics associated with gambling type behaviors two years after online SW and FS became legalized in the state. Additionally, the

study findings support that problem gambling screening may be implemented alongside substance use treatment. Because the likelihood of engaging in gambling behaviors is higher among adults using and misusing substances, screening for problem gambling while the patients are being admitted to substance use treatment could uncover underlying behavioral conditions that affect patients' wellbeing. This implementation might be easier if the state or the treatment agency has an integrated behavioral health treatment plan that brings together substance use, mental health, and problem gambling under a common framework for treatment and recovery. In addition, public service announcements that focus on the key demographic characteristics of individuals (e.g., young adult males) who engage in SW and FS may increase awareness about the risks associated with these types of gambling behaviors.

Given that Iowa was among the initial states to legalize online SW and FS shortly after the 2018 U.S. Supreme Court decision, more studies of this nature are needed from other states that have recently legalized online SW and FS. Future studies should consider including questions related to gambling and substance use problems and harm. Additionally, larger sample sizes should be used to help improve the precision of the estimates. Longitudinal studies should also be conducted to examine how gambling behaviors and the prevalence of gambling disorders may change over time following the expansion of legalized gambling in these states – overall and in relation to participant characteristics – as this type of research can help inform state gambling policies and responsible gambling strategies. Future studies could also explore the associations between participant attributes and the frequency with which individuals are engaging in these gambling behaviors as well as more details about the specific types of casino games (such as slot machines vs. table games of blackjack, poker, or roulette), lottery items, SW, and FS that gamblers are engaging in, areas of research this study did not explore.

Conclusions

Conducted in a U.S. state that recently legalized online SW and FS, this study found that engaging in SW/FS over playing lottery/casino games or not engaging in any gambling behaviors in the past 30 days was more likely to occur among males than females, younger adults than older adults, heterosexuals than non-heterosexual adults, and more highly educated adults than less educated adults (over lottery/casino gambling only). SW/FS was also more likely to occur among participants who engaged in other risky behaviors such as binge drinking, using methamphetamines or opioids in the past 30 days, or not having health coverage. Lottery/casino gambling

over no gambling was more likely to occur among older adults than younger adults, non-heterosexuals than heterosexuals, less educated adults than more educated adults, adults who were currently employed than those not employed, adults who used alcohol (with or without binge drinking) or used methamphetamines than those not using these substances, and adults with lower quality of life scores than those with higher ones. These findings suggest that the profile of adults who engage in newly legalized games in the state differs from that of those who participate exclusively in traditional gambling. As such, it will be important for the state to continue evaluating the implications of legalizing these online games, and the extent to which it poses public health concerns.

Statement of Competing Interest

None declared

Ethics approval

The University of Northern Iowa Institutional Review Board for Human Ethics approved the project, "2021 Iowa Health, Wellbeing, Use of Substances and Gambling Survey", on August 08, 2021 (approval IRB 22-0008).

Acknowledgements and funding sources

Data collection for the project was partially funded by the Iowa Department of Health and Human Services (contract #: 5882BH11). The authors thank Mary E. Losch, Erin Heiden, and Rod Muilenburg from the University of Northern Iowa Center for Social and Behavioral Research for their assistance with various stages of project planning and data collection, and Pat McGovern from the Iowa Department of Health and Human Services for his feedback on the questionnaire content.

Research Promotion

This study investigated the gambling behaviors of adults in relation to their demographic characteristics and other behaviors following the legalization of online sports wagering and internet Fantasy Sports in a midwestern U.S. state. Findings suggest that the profile of adults who engage in newly legalized gambling in the state differs from that of those who participate in traditional gambling involving lotteries and casino games, as well as adults who reported no gambling behaviors in the past 30 days. Results can be used to help inform responsible gambling strategies in the state.

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