

Sports Betting and Hazardous Alcohol Use among Young Adults: Added Risks of Betting and Drinking on the Same Day

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Abstract

Background. Sports betting is growing in popularity at alarming rates, especially among young adults. However, sports betting is not yet widely considered as a public health concern due in part to scarce examination of health correlates. The present study entailed cross-sectional examination of associations between problem sports betting and indices of hazardous alcohol use and negative alcohol-related consequences, and whether associations were moderated by same-day drinking and sports betting.

Method. The sample comprised 221 young adults aged 18-29 with representation from 36 different states in the U.S. ($M_{age}=24.4$; 77.7% male; 64.6% white). Eligibility criteria included betting on sports at least twice in the past month.

Results. Zero truncated hurdle models revealed that problem sports betting scores were significantly associated with hazardous alcohol use (i.e., AUDIT scores) for those who drank at least once in the past 3-months. Problem sports betting was also associated with any (vs. no) negative alcohol-related consequences, as well as the number of negative consequences young adults experienced. Both count models were moderated by same-day drinking and sports betting such that positive associations were amplified among those who more frequently drank and bet on sports on the same day.

Conclusions. Findings provide early-stage evidence for a link between problem sports betting and alcohol-related problems among young adults, especially among those who more frequently engage in both behaviors within the same timeframe. These results highlight the need for more research on sports betting from a public health lens as the prevalence of this addictive behavior continues to rise.

Keywords: Gambling; AUDIT; Wagering; Dependence; Negative Consequences; Hazardous Drinking.

Sports Betting and Hazardous Alcohol Use among Young Adults: Added Risks of Betting and Drinking on the Same Day

Problem gambling rates are highest among young adults aged 18-30 (i.e., 5.4% in the U.S.), and meta-analytic research indicates that younger age is among the most salient risk factors for problem gambling (Allami et al., 2021; Welte et al., 2015). As technology has innovated the gambling landscape, young adults may face unique gambling-related risks and harms given how highly engaged young people are with online digital technologies (Kolandai-Matchett & Wenden Abbott, 2022). Millennials show less interest in classic casino-style gambling compared to prior generations (e.g., slot machines, roulette, card games; Suh et al., 2016), but the gaming industry has worked to create new games and adapt existing forms of gambling to the high-paced and interactive interests of younger generations (e.g., Martinelli, 2017). One form of gambling that has undergone substantial transformation in the past decade in light of technological advancements is sports betting, which may be particularly attractive to young adults given high connectivity to smartphones with easily accessible sports betting apps (Hing et al., 2022) and because sports betting advertisements are most directly aimed at young people (Lopez-Gonzalez et al., 2017).

Sports betting is an umbrella term describing various ways to wager something of value (i.e., money) on aspects of a sporting event, either live or computer-generated (e.g., e-sports), for which the outcome is determined at least in part by chance. Various forms of sports betting have become legalized in the U.S. (Rodenberg, 2020), and the growth in popularity has been extreme; across 2021, there was an 80% increase in prevalence of those engaging in at least monthly sports betting (from 10% to 18% of adults 21+; Silverman, 2022). Sports betting is particularly prevalent among young adults and is growing rapidly (Mercer, 2022); 36% of adults aged 21-34 have bet on sports, and 19% make sports bets at least weekly (Silverman, 2022). This trend is alarming, as gambling is an addictive behavior with adverse impacts on health/well-being (Wardle et al., 2021). This is especially true for young adults who are still learning to navigate financial independence and are in a vulnerable developmental stage for the onset of addiction (Sussman & Arnett, 2014).

Sports Betting and Alcohol Use. There is strong evidence linking traditional forms of gambling to hazardous alcohol use (Cowlshaw et al., 2014; Lorains et al., 2011). Indeed, these addictive behaviors tend to cluster together (Martinac et al., 2019), a pattern which has been shown among young adults, specifically (Meisel et al., 2015). Far fewer studies have examined links between problem sports betting and hazardous alcohol use, but emerging evidence shows that higher-risk sports bettors are more likely to have alcohol-related issues (Grubbs & Kraus, 2023; Russell et al., 2019). Beyond the co-occurrence of problematic sports betting and problem alcohol use, studies show that both addictive behaviors may frequently take place at the same time (Gordon et al., 2015; Raymen & Smith, 2020). The short-term risks of betting on sports while under the influence of alcohol include impaired decision-making, increased risk-taking, and diminished impulse control (Corbin & Crouce, 2017), which can lead to wagering more money or placing more bets than intended (Bodor et al., 2006; Lamont et al., 2016; Lawrence et al., 2009). Moreover, given the social and situational risks associated with venues and contexts in which sports betting and drinking are likely to co-occur, one may consume more alcohol or experience more alcohol-related consequences when drinking while betting on sports (Pennay et al., 2021). This may enable or reinforce tendencies to increase alcohol consumption in response to gambling wins and losses (Zack et al., 2005). As such, examining the extent to which participating in sports betting and alcohol consumption simultaneously amplifies associations between problematic sports betting and alcohol use will further elucidate the processes and risk factors for co-occurrence of these addictive behaviors.

Current Study

As the prevalence of sports betting continues to rise among young adults, identifying health-risk correlates is a pressing public health priority. Young adulthood is a high-risk period for alcohol use and the onset of alcohol use disorder (AUD), but the potential links with sports betting among this demographic are understudied. The present study begins to fill the knowledge gap by estimating the association between hazardous alcohol use and problem sports betting, and testing whether this association is moderated (i.e., amplified) for those young adults who more frequently drink and bet on sports on the same day. We hypothesized that higher scores on an index of problem sports betting would

be associated with higher scores on the Alcohol Use Disorders Identification Test (AUDIT) and greater alcohol-related negative consequences, even when controlling for alcohol use frequency. Moreover, we hypothesized that associations would be amplified by more frequent betting and drinking on the same day.

Method

Participants and Procedures

Participants in the current study were young adults recruited and enrolled into a longitudinal study of sports betting and health-related correlates, but all data used presently come from the in-depth baseline assessment. Recruitment took place between June and November 2023 using social media advertisements to enroll nationwide across the U.S. An initial brief unpaid screening survey was used to filter eligible participants who had to meet the following criteria: (a) Live in the U.S., (b) be between the ages of 18-29, (c) engage in sports betting with a monetary wager at least twice in the past 30-days, (d) not in recovery or treatment for gambling disorder, (e) pass two multiple-choice items that would be easily answered by sports bettors (e.g., “What is the basic definition of an ‘over’ in sports betting”), and (f) pass a spurious attention-check item to reduce the likelihood of fraudulent respondents seeking to answer questions in a way that would make them seem eligible for the study (i.e., “Have you ever been prescribed or used Pramipexole (also known as Mirapex) to help control your gambling?”). Members of the research team called participants to verify their eligibility and provide an introduction to study procedures. Participants were then sent a personalized and confidential link to the baseline survey. Remuneration for the 20–30-minute baseline survey was a \$30 gift card. All procedures were approved by the University of Washington Institutional Review Board (STUDY00017797, approved on 4/20/2023), and participants completed an informed consent form prior to the screening and baseline surveys.

A total of 1,430 screening surveys were completed, and 221 (15%) met the criteria for inclusion with representation from 36 different states in the U.S. The sample had a mean age of 24.4 years, was 77.7% male, and 68.6% had attained a college degree. Regarding racial/ethnic diversity of the sample,

64.6% identified as white, 16.4% Asian, 9.1% Black, and 10.0% other or multiple races; 13.2% reported being of Hispanic ethnicity.

Measures

Problem Sports Betting. To assess problem sports betting behaviors, we used an adapted version of the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) that refers specifically to sports betting behaviors and consequences of sports betting in the past three months. This 9-item measure is summed to create an index of problem sports betting from items (e.g., “When you bet on sports, did you bet again another day to try to win back the money you lost?”) with response options of “Never” (0), “Sometimes” (1), “Most of the time” (2), and “Almost always” (3). From this same dataset, we recently reported evidence that this measure has strong factorial support and convergent and predictive validity (Graupensperger & Calhoun, *under review*).

Alcohol Use Indices. Hazardous alcohol use was assessed using the Alcohol Use Disorder Identification Test (AUDIT; Babor et al., 2001), a 10-item measure referencing the past 3 months (for consistency with problem sports betting). The first eight items have five ordinal response options (0 to 4), and items 9 and 10 have response options of 0, 2, or 4, from which a total score is derived, ranging from 0 to 40. The AUDIT is the most extensively validated hazardous drinking measure and had strong internal reliability in this sample ($\alpha = 0.81$).

Negative consequences of alcohol use were assessed using the 24-item Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler et al., 2005). This measure presents a checklist of potential alcohol-related consequences (e.g., “passed out from drinking”) that is summed to create an index of total negative consequences. The BYAACQ has been found to have strong structural support for college students and non-students alike (Stamates et al., 2022), and there is a precedent for using the BYAACQ in shorter time frames (e.g., past 30-days; Kahler et al., 2008). Presently, we used this checklist to assess negative alcohol-related consequences in the past two weeks to align with the larger aims of the parent study, but still found exceptional internal consistency ($\alpha = 0.90$). Alcohol use frequency

(a control variable) was assessed as number of drinking days in the past two weeks (i.e., “In the past 2 weeks (14 days), how many days did you drink alcohol?”).

Same-Day Drinking & Sports Betting. To assess the number of days in the past two weeks that participants drank alcohol and bet on sports on the same day, we used a single item: “In the past two weeks, on how many days did you drink alcohol and engage in any form of sports betting on the same day?”

Analyses

Initial model-fitting procedures were used to identify the appropriate modeling approach to address the positively skewed alcohol variables, including comparing AIC, log-likelihoods, and Vuong’s Z-statistics (Vuong, 1989). Because the sample was not screened on any alcohol use criterion, there were substantial zeros on both AUDIT scores and negative consequences, and model-fitting indicated that both outcomes were best-suited to a zero-truncated hurdle model. This entails a two-component mixture modeling approach to simultaneously model (a) logistic regressions estimating the odds of a non-zero response, and (b) truncated count regressions estimating associations among the subset of sample who did not report a zero on the outcome (Feng, 2021). In the logistic portion, coefficients represent log-odds that are exponentiated to yield adjusted odds ratios. Similarly, coefficients from count portion of the model are log-rates that are exponentiated to yield rate ratios (RR) that are interpreted similarly to odds ratios (i.e., RRs >1 indicate a positive association and RRs <1 indicate an inverse association).

To estimate main effect associations between problem gambling and alcohol use indices, we fit zero-truncated hurdle models controlling for assigned sex at birth, age, race, ethnicity, and college degree attainment. Then, in subsequent models, we added same-day drinking and sports betting as a covariate as well as a product term interaction with problem sports betting. We report the main effect models separately from the interaction models, as main effects should be interpreted without interactions in the model (Jaccard & Turrisi, 1990). For significant product-term interactions, we estimated and plotted the marginal effects at several levels of the moderator (i.e., number of same-day drinking and sports betting), as is recommended for interpreting interactions in nonlinear models (McCabe et al., 2022).

Zero-truncated hurdle models were estimated in R using the ‘pscl’ package (Zeileis et al., 2008), and the marginal effects were estimated and plotted using the ‘sjPlot’ package (Lüdtke, 2023).

Results

Descriptive statistics for study variables are shown in Table 1. Although all participants were initially screened as active sports bettors, the mean score for problem sports betting was relatively low (i.e., 4.86 out of a possible range up to 27). Participants endorsed just over three drinking days in the past two weeks, on average, and similarly reported just over 3 negative consequences in that period, on average. Notably, 16.5% of the sample reported no drinking days in the past week, and 35.8% reported zero negative consequences. The average AUDIT score was 6.39 ($SD = 5.23$), which corresponds to low-risk use, though there was notable spread with 24.9% falling into the hazardous/harmful use category, and 8.1% in the highest-risk category with indication of alcohol use disorder. On average, the sample reported same-day drinking and sports betting on 1.54 days, with 34.6% reporting zero days.

Main Effects. In the model estimating associations with AUDIT scores (Table 2), problem sports betting did not significantly predict a non-zero score on the AUDIT in the logistic portion of the model, but the count portion of the model identified a significant association ($RR = 1.03$) such that each one-unit increase in problem sports betting was associated with a 3% relative increase in AUDIT scores (on an exponential scale), for those with non-zero AUDIT scores. Moreover, each standard deviation increase in problem sports betting is associated with a 13.1% increase in AUDIT scores. For reference of magnitude, a problem sports betting score of 5 (near the sample mean) corresponds to a model-predicted AUDIT score of 7.8, which increases to a model-predicted AUDIT score of 9.2 when problem sports betting score is 10, and increases to an AUDIT score of 10.9 when problem sports betting score is 15.

In the second main effects model estimating associations with negative alcohol-related consequences while adjusting for alcohol use frequency (Table 3), problem sports betting scores were positively associated with both any negative consequences (logistic portion) and the number of negative consequences among those with ≥ 1 negative consequence (count model). In the logistic portion, each one-unit increase in problem sports betting was associated with 12% increased odds of endorsing ≥ 1 negative

consequence. In the count portion, a one-unit increase in problem sports betting was associated with a 7% relative increase in the number of negative consequences endorsed, corresponding to an increase of 32.6% for a one standard deviation increase in problem sports betting scores. To frame the magnitude, a problem sports betting score of 5 (near the sample mean) corresponds to a model-predicted 4.3 negative consequences, which increases to 5.9 negative consequences when problem sports betting score is 10, and increases to 8.2 negative consequences when problem sports betting score is 15.

Interactions with Same Day Drinking and Sports Betting. When adding same-day drinking and sports betting to the AUDIT model (lower half of Table 2), there was a significant interaction between problem sports betting scores and same-day drinking and sports betting in the count portion of the model. The interaction indicates that the association between problem sports betting and AUDIT scores is amplified by the number of days young adults engaged in both sports betting and drinking on the same day. Marginal effects are plotted in Figure 1 and model-predicted marginal effects are shown in the upper half of Table 4. Specifically, the marginal effects indicate that individuals with a lower frequency of same-day drinking and sports betting have minimal associations between problem sports betting and AUDIT. In contrast, as the number of same-day drinking and sports betting days increases, the marginal effect estimates of problem sports betting and AUDIT scores increases dramatically (upper half of Table 4).

In the negative alcohol consequences model, there was also a significant interaction between problem sports betting scores and same-day drinking and sports betting in the count portion of the model (lower half of Table 3). As shown in the plots of the marginal effects in Figure 2 and the model-predicted marginal effects shown in the lower half of Table 4, the association between problem sports betting and negative alcohol consequences is amplified for those with more frequent same-day drinking and sports betting. Those with lower frequency of same-day drinking and sports betting (e.g., 2 days in the past two weeks) exhibit a minimal association between problem sports betting scores and negative consequences. For those with more frequent same-day drinking and sports betting (e.g., 6 days in the past two weeks), this association was stronger.

Discussion

Findings from the present study provide early-stage evidence of associations between problem sports betting and indices of alcohol-related risks among young adults. That is, the results show correspondence between young adults' scores on a problem sports betting measure and both hazardous drinking (i.e., AUDIT scores) and alcohol-related consequences. For the zero-truncated hurdle model with AUDIT scores as the outcome, problem sports betting was not significantly associated with having an AUDIT score ≥ 1 , which indicates that problem sports betting is not associated with any vs. no alcohol use, given that a score of 0 on the AUDIT is only possible for abstainers. However, in the truncated count model, which only includes those with AUDIT scores > 0 , there was a significant positive association with sports betting. The second model with negative alcohol consequences as the outcome conversely identified a significant association in the logistic portion of the model, indicating that problem sports betting scores increased the odds of reporting ≥ 1 negative consequence. Problem sports betting was also associated with the number of negative consequences in the truncated count portion of the model. Finally, both associations were moderated by same-day drinking and sports betting engagement, such that those who more frequently do both behaviors on the same day exhibit stronger associations between problem sports betting and alcohol-related risk behaviors.

With the growing popularity of sports betting (Silverman, 2022), these findings address the urgent need to examine and identify public health correlates of sports betting. Although links between alcohol use and general problem gambling are found in existing literature (e.g., Martinac et al., 2019), sports betting is unique in some important ways. Alcohol use is deeply ingrained in the broader culture around sports watching and sports fandom (Merlo et al., 2011; Ostrowsky, 2018). Additionally, many young adults identify with the "Barstool Sports" prototype, which normalizes/glamorizes both sports betting and alcohol-related behaviors as key attributes of the identity. In line with social identity theories, it follows that young adults who subscribe to this type of mindset may be motivated to conform to both alcohol and sports betting norms, in conjunction, as a way of supporting their social identity (Hogg & Turner, 1987).

Although the cross-sectional findings preclude causal interpretation, there are several explanations for the clustering of problem sports betting and risky alcohol use. Gambling and alcohol use are both addictive at the neurobiological level (Gilpin & Koob, 2008; Pettorruso et al., 2020), and those with predispositions to addictive behaviors may be at risk for hazardous engagement in both behaviors. Relatedly, both gambling and alcohol use trigger dopaminergic reward processes, and people engaged in one behavior may seek additional avenues for accessing such rewards. The syndrome model of addiction considers substance use addiction and gambling addiction to be different expressions of the same underlying syndrome with shared etiological factors (Shaffer et al., 2004). Building on this perspective, the DSM-5 was revised to align gambling disorder more closely with substance use addiction diagnoses (Rash & Petry, 2016). Longitudinal analysis of trajectories of problem gambling and alcohol misuse across adolescence and into young adulthood also concluded that there are common risk factors that underlie these two addictive behaviors (Mutti-Packer et al., 2017). Taken together, the present findings extend existing research on associations between problem gambling and alcohol use to sports betting behaviors and are in line with the syndrome model of addiction.

The second key finding from the present study was that same-day drinking and sports betting amplified associations between problem sports betting and indices of risky alcohol use. That is, the association between the two behaviors was even stronger for those who more frequently engage in both behaviors simultaneously, or at least on the same day. This finding highlights the increased risk of concurrent sports betting and drinking, which seem to go hand-in-hand for many, given that alcohol use is prevalent in settings in which sports betting takes place (Pennay et al., 2021), and that alcohol use may increase the acute risks for problem sports betting behaviors, such as making new bets to chase ones losses (Bodor et al., 2006; Lamont et al., 2016; Lawrence et al., 2009). Although more granular daily-level data is needed, findings highlight the potential additive risks of same-day drinking and sports betting.

Implications and Future Directions

Sports betting is not yet widely recognized as a public health concern, but emerging evidence of associations between sports betting and widely recognized public health concerns, such as alcohol use, highlights the need for deeper investment into the study of sports betting behaviors. Young adults are in a critical developmental period for addiction (Sussman & Arnett, 2014), so identifying modifiable health correlates provides important evidence for prevention strategies. Given their association, early-stage prevention of problem sports betting may also aid in the prevention of alcohol-related harms, and vice-versa.

Pressing future directions in this line of research include identifying temporal precedent for problem sports betting and alcohol misuse, as one may precede the other, or the two may co-occur contemporaneously. Even at a daily level, it will be important to clarify whether increased alcohol use on a given day is related to increased problem sports betting behaviors or, alternatively, whether sports betting engagement is an antecedent of increased alcohol use. Furthermore, future research should identify whether drinking motives vary as a function of sports betting outcomes, such as drinking to cope with large losses or drinking to celebrate big wins. Ultimately, there is still much to be learned about the association between sports betting and alcohol use and the present findings provide critical early-stage support for deeper investigation of the two addictive behaviors.

Limitations

Despite the geographic variability of the sample within the U.S., the generalizability to other countries is limited, as is age given we only sampled young adults. The cross-sectional data preclude interpretation of causality, and not all constructs were assessed over the same period (e.g., problem sports betting and AUDIT scores refer to past three months, while negative alcohol consequences refer to past two weeks). Data were also collected between June and November, which does not include months expected to have higher sports betting engagement, such as around the NFL playoffs or the March Madness basketball tournament. Finally, the sample were all active sports bettors, per the inclusion criteria, so more representative results may be drawn from a more general sample of young adults.

Conclusion

Sports betting is growing in popularity at alarming rates for young adults, but there is very scarce examination of health correlates. The present study shows that young adults with increased problem sports betting behavior may be at heightened risk for hazardous drinking (i.e., AUDIT scores) and negative alcohol-related consequences. Establishing these associations, even cross-sectionally, provides early-stage support for further research on sports betting from a public health lens, and will propel harm reduction efforts related to this increasingly prevalent addictive behavior.

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Table 1. Descriptive statistics of study variables.

	<i>M</i>	<i>SD</i>	Possible Range	Observed Range
1. Age	24.35	3.02	18 - 29	18 - 29
2. Birth Sex (F = 0, M = 1)	0.78	0.42	0 - 1	0 - 1
3. PGSI Sports Betting (past 3 months)	4.86	4.17	0 - 27	0 - 22
4. AUDIT Score (past 3 months)	6.39	5.23	0 - 40	0 - 28
5. Negative Alcohol Consequences (past 2 week)	3.33	4.42	0 - 24	0 - 23
6. Alcohol Frequency (drinking days in past 2 week)	3.22	2.71	0 - 14	0 - 14
7. Same-Day Drinking & Sports Betting (past 2 week)	1.54	1.68	0 - 14	0 - 7

Note. PGSI refers to Problem Gambling Severity Index. AUDIT refers to Alcohol Use Disorder Identification Test.

Table 2. Zero-truncated hurdle models showing associations between problem sports betting and AUDIT scores.

Main Effects Model	Logistic regression portion			Zero-truncated count portion		
	Odds Ratio	95% CI	<i>p</i>-value	Rate Ratio	95% CI	<i>p</i>-value
Birth Sex (F=0, M=1)	1.11	[0.37, 3.40]	.850	0.87	[0.77, 0.99]	.033
Age	0.92	[0.77, 1.08]	.309	0.98	[0.96, 1.00]	.037
Race (Ref = White)						
Asian	0.64	[0.20, 2.06]	.451	0.82	[0.70, 0.96]	.015
Black	1.18	[0.22, 6.27]	.845	0.77	[0.62, 0.94]	.012
Other or Multiple Races	0.81	[0.19, 3.53]	.780	0.88	[0.73, 1.07]	.196
Hispanic Ethnicity (No=0, Yes=1)	1.21	[0.30, 4.89]	.789	1.04	[0.89, 1.22]	.649
College Degree (No=0, Yes=1)	4.27	[1.39, 13.1]	.011	0.92	[0.80, 1.05]	.214
PGSI Sports Betting Score	0.99	[0.89, 1.10]	.793	1.03	[1.02, 1.05]	<.001
Interaction Model Adding Same-Day Drinking and Sports Betting as Moderator						
	Odds Ratio	95% CI	<i>p</i>-value	Rate Ratio	95% CI	<i>p</i>-value
Birth Sex (F=0, M=1)	1.24	[0.33, 4.68]	.754	0.89	[0.78, 1.01]	.082
Age	0.80	[0.64, 1.01]	.063	0.97	[0.94, 0.99]	.001
Race (Ref = White)						
Asian	1.61	[0.36, 7.22]	.531	0.91	[0.77, 1.07]	.252
Black	2.95	[0.46, 18.75]	.252	0.88	[0.71, 1.08]	.227
Other or Multiple Races	1.37	[0.20, 9.20]	.745	0.89	[0.73, 1.08]	.250
Hispanic Ethnicity (No=0, Yes=1)	1.00	[0.16, 6.31]	.999	1.13	[0.96, 1.32]	.146
College Degree (No=0, Yes=1)	6.56	[1.43, 30.01]	.015	0.93	[0.81, 1.07]	.315
PGSI Sports Betting Score	0.90	[0.79, 1.03]	.133	0.99	[0.96, 1.01]	.189
Same-Day Drinking and Sports Betting	7.08	[0.29, 172.79]	.230	1.08	[1.03, 1.14]	<.001
PGSI Sports Betting Score × Same-Day Drinking and Sports Betting	1.38	[0.57, 3.31]	.477	1.01	[1.01, 1.02]	<.001

Note. The logistic regression portion estimates associations with the outcome being binary (AUDIT score = 0 vs. AUDIT score >0). The zero-truncated count portion estimates associations with AUDIT as a count score including only participants with AUDIT scores >0.

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Table 3. Zero-truncated hurdle models showing associations between problem sports betting and negative alcohol consequences (BYAACQ).

Main Effects Model	Logistic regression portion			Zero-truncated count portion		
	Odds Ratio	95% CI	p-value	Rate Ratio	95% CI	p-value
Birth Sex (F=0, M=1)	1.38	[0.61, 3.14]	.438	0.88	[0.73, 1.05]	.148
Age	0.92	[0.80, 1.06]	.252	0.96	[0.93, 0.99]	.009
Race (Ref = White)						
Asian	1.67	[0.62, 4.52]	.310	0.98	[0.79, 1.22]	.880
Black	1.52	[0.44, 5.21]	.508	1.17	[0.9, 1.51]	.242
Other or Multiple Races	1.16	[0.38, 3.50]	.796	1.00	[0.76, 1.33]	.982
Hispanic Ethnicity (No=0, Yes=1)	1.19	[0.45, 3.16]	.729	1.03	[0.81, 1.31]	.813
College Degree (No=0, Yes=1)	1.31	[0.54, 3.13]	.550	0.87	[0.73, 1.05]	.160
Alcohol Use Frequency	1.81	[1.49, 2.20]	<.001	1.11	[1.08, 1.14]	<.001
PGSI Sports Betting Score	1.12	[1.02, 1.24]	.021	1.07	[1.05, 1.09]	<.001
Interaction Model Adding Same-Day Drinking and Sports Betting as Moderator						
	Odds Ratio	95% CI	p-value	Rate Ratio	95% CI	p-value
Birth Sex (F=0, M=1)	1.25	[0.55, 2.83]	.597	0.90	[0.74, 1.09]	.283
Age	0.93	[0.81, 1.06]	.280	0.96	[0.93, 0.99]	.011
Race (Ref = White)						
Asian	1.94	[0.71, 5.36]	.199	1.05	[0.84, 1.32]	.647
Black	1.69	[0.48, 5.94]	.413	1.29	[1.00, 1.67]	.054
Other or Multiple Races	1.21	[0.39, 3.76]	.738	0.94	[0.70, 1.26]	.673
Hispanic Ethnicity (No=0, Yes=1)	1.31	[0.47, 3.66]	.603	1.02	[0.80, 1.31]	.851
College Degree (No=0, Yes=1)	1.22	[0.50, 2.98]	.668	0.86	[0.72, 1.04]	.131
Alcohol Use Frequency	1.55	[1.24, 1.94]	<.001	1.07	[1.03, 1.10]	<.001
PGSI Sports Betting Score	1.08	[0.96, 1.22]	.199	1.02	[0.99, 1.05]	.233
Same-Day Drinking and Sports Betting	1.38	[0.83, 2.29]	.213	1.01	[0.93, 1.09]	.804
PGSI Sports Betting Score × Same-Day Drinking and Sports Betting	1.02	[0.94, 1.11]	.670	1.01	[1.01, 1.02]	.008

Note. The logistic regression portion estimates associations with the outcome being binary (Zero negative consequences vs. 1+ negative consequences). The zero-truncated count portion estimates associations with negative consequences as a score including only participants with >0 negative consequences.

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Table 4. Model-predicted AUDIT scores by PGSI sports betting scores and number of same-day drinking and sports betting to probe interaction shown in Figure 1.

PGSI Sports Betting Score	AUDIT Scores (Interaction Shown in Figure 1)			
	Same-Day Drinking and Sports Betting (past 2 weeks)			
	0 days	2 days	4 days	6 days
0	6.01 [5.06, 7.14]	7.06 [6.13, 8.12]	8.29 [7.01, 9.80]	9.73 [7.72, 12.27]
5	5.58 [4.84, 6.43]	7.38 [6.53, 8.34]	9.76 [8.56, 11.12]	12.91 [10.98, 15.17]
10	5.18 [4.29, 6.25]	7.72 [6.69, 8.91]	11.50 [10.01, 13.20]	17.12 [14.36, 20.41]
15	4.81 [3.66, 6.32]	8.07 [6.67, 9.76]	13.54 [11.26, 16.28]	22.71 [17.50, 29.49]

PGSI Sports Betting Score	Negative Alcohol-Related Consequences (Interaction Shown in Figure 2)			
	Same-Day Drinking and Sports Betting (past 2 weeks)			
	0 days	2 days	4 days	6 days
0	3.84 [2.95, 5.01]	3.89 [3.18, 4.75]	3.93 [3.09, 5.01]	3.98 [2.80, 5.66]
5	4.19 [3.42, 5.12]	4.81 [4.07, 5.68]	5.52 [4.58, 6.67]	6.35 [4.93, 8.17]
10	4.56 [3.57, 5.83]	5.95 [4.93, 7.18]	7.76 [6.42, 9.38]	10.12 [7.88, 13.00]
15	4.97 [3.47, 7.10]	7.36 [5.73, 9.45]	10.89 [8.53, 13.91]	16.14 [11.41, 22.81]

Note. All other covariates held at the sample mean. 95% confidence intervals shown in brackets.

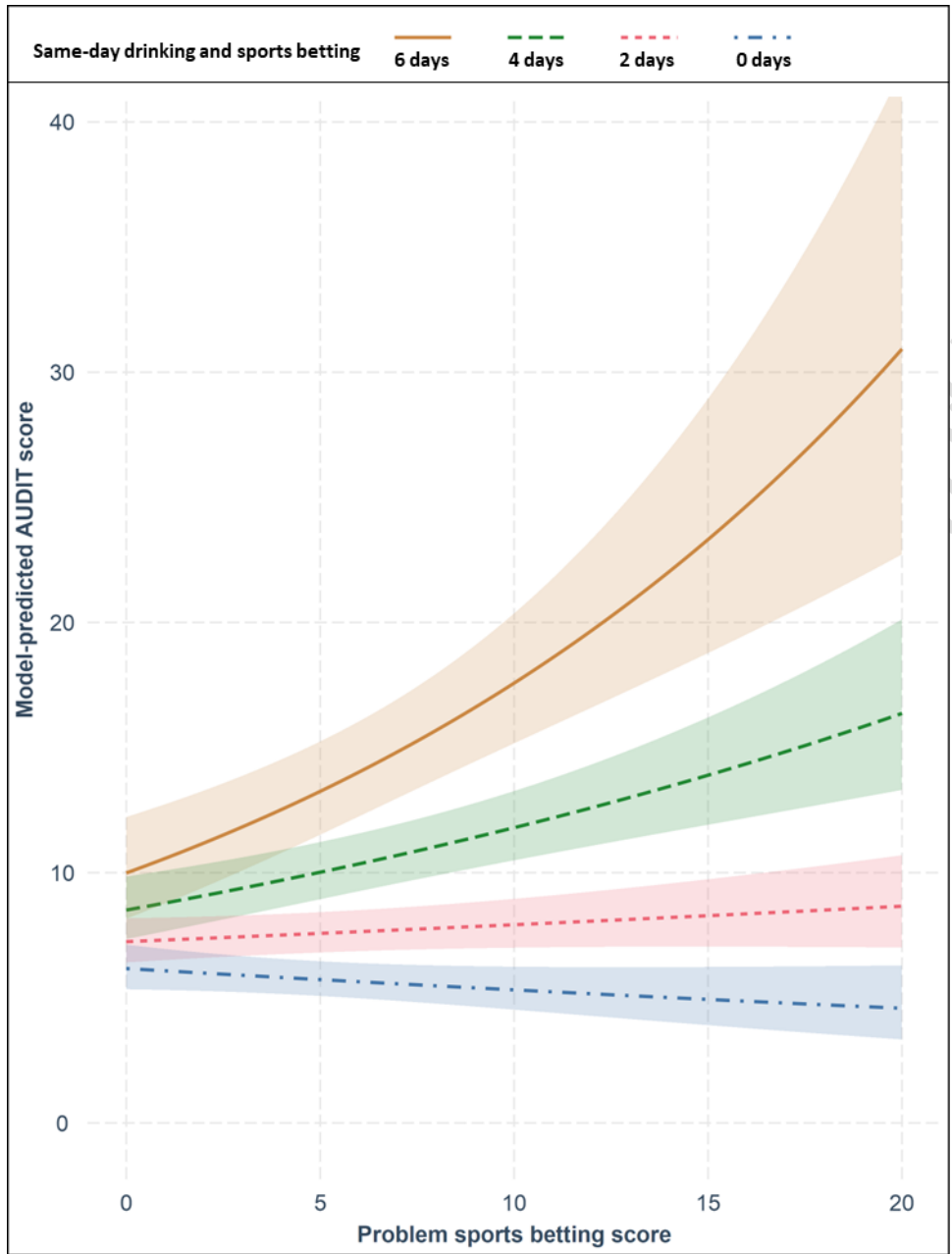


Figure 1. Marginal effect plots of association between problem sports betting and AUDIT scores at various levels of same-day drinking and sports betting (probing the interaction shown in count-portion of model in Table 2).

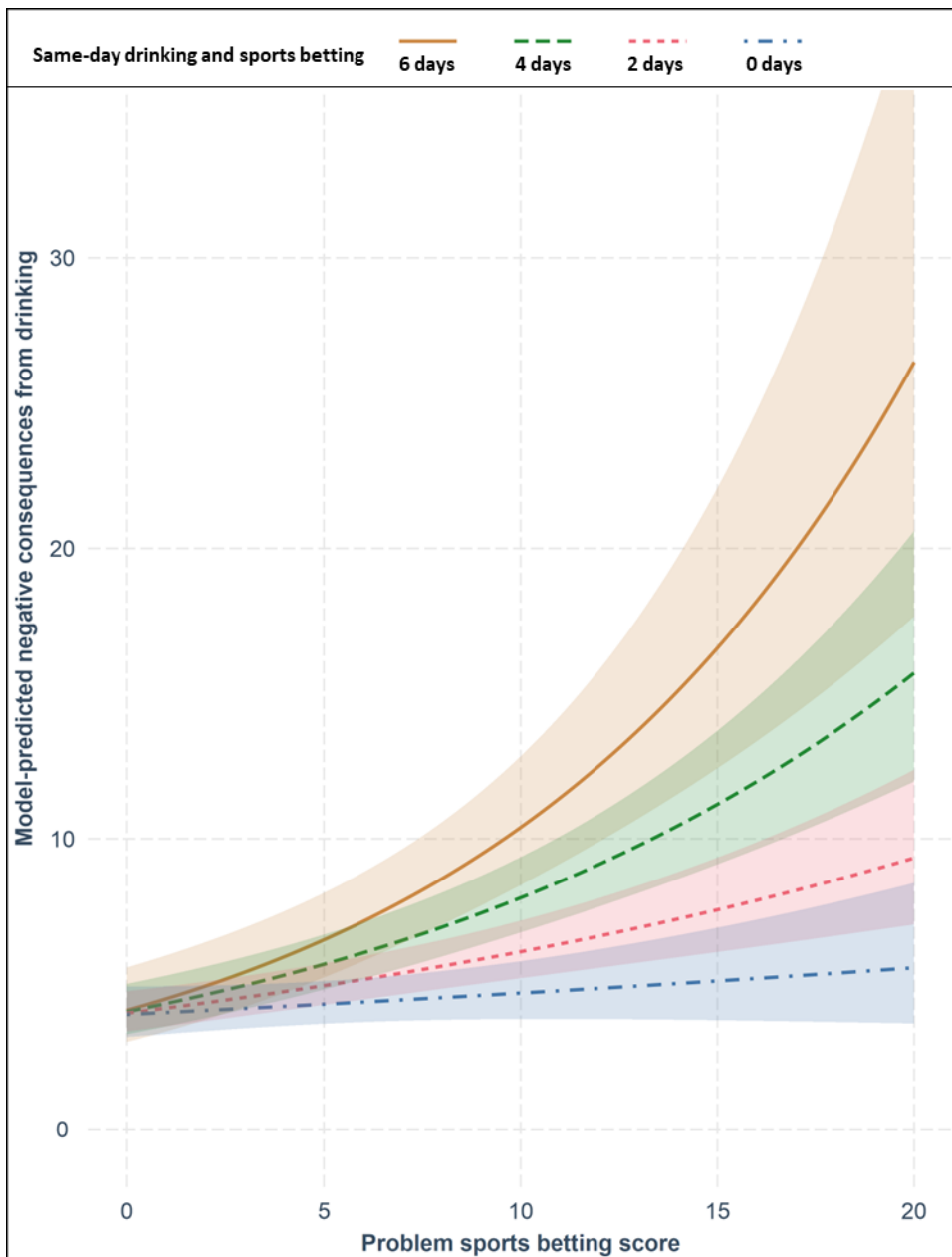


Figure 2. Marginal effect plots of association between problem sports betting and negative alcohol-related consequences at various levels of same-day drinking and sports betting (probing the interaction shown in count-portion of model in Table 3).