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FULL-LENGTH REPORT

Who makes in-play bets? Investigating the demographics, psychological characteristics, and gambling-related harms of in-play sports bettors

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ABSTRACT

Background and aims: Sports betting has increased markedly in recent years, in part due to legislative changes and the introduction of novel forms of sports betting (e.g., in-play betting). Some evidence suggests that in-play betting is more harmful than other types of sports betting (i.e., traditional and single-event). However, existing research on in-play sports betting has been limited in scope. To address this gap, the present study examined the extent to which demographic, psychological, and gambling-related constructs (e.g., harms) are endorsed by in-play sports bettors relative to single-event and traditional sports bettors. *Methods:* Sports bettors (N = 920) aged 18+ from Ontario, Canada completed an online survey containing self-report measures of demographic, psychological, and gambling-related variables. Participants were classified as either in-play (n = 223), single-event (n = 533), or traditional bettors (n = 164) based on their sports betting engagement. *Results:* In-play sports bettors reported higher problem gambling severity, endorsed greater gambling-related harms across several domains, and reported greater mental health and substance use difficulties compared to single-event and traditional sports bettors. There were generally no differences between single-event and traditional sports bettors. *Discussion:* Results provide empirical support for the potential harms associated with in-play sports betting and inform our understanding of who may be at risk for increased harms associated with in-play betting. *Conclusions:* Findings may be important for the development of public health and responsible gambling initiatives to reduce the potential harms of in-play betting, particularly as many jurisdictions globally move towards legalization of sports betting.

KEYWORDS

sports betting, in-play sports betting, single-event sports betting, gambling-related harms

INTRODUCTION

The proliferation of modern technology and expanding legalization efforts (Bengel & McCarriston, 2022; Evans, 2021) have facilitated a marked increase in sports betting engagement among North Americans in recent years (Lopez-Gonzalez & Perez, 2022; Statista, 2018). To illustrate, a 2021 report revealed that the proportion of United States citizens who regularly bet on sports increased by 80% from the beginning to end of the year (Silverman, 2022). Unfortunately, while many people consider sports gambling to be a less harmful form of gambling (Nyemcsok, Pitt, Kremer, & Thomas, 2022; Seal et al., 2022), studies have identified numerous harms associated with sports betting, including heightened problem gambling severity (Nyemcsok et al., 2022), mental distress (Hing, Li, Vitartas, &

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Russell, 2017; Mestre-Bach et al., 2022; Nower, Caler, Pickering, & Blaszczynski, 2018), and financial consequences (Gathoni, Munayi, Wanjira, & Inyega, 2021).

Several types of betting are subsumed under the overarching category of sports gambling, each possessing discrete rules and characteristics. Parlay betting, for example, involves selecting multiple picks as part of one single wager and requires the bettor to correctly select all their picks to win, presenting low odds of winning but high payout (De Saro, 2022). Conversely, single event or *fixed odds* sports betting simply involves selecting one specific outcome to bet on prior to the start of the event (e.g., which team will win the soccer game) (Hartmann, Keen, Dawczyk, & Blaszcznski, 2016). These two activities can be considered discrete forms of sports betting. In contrast, in-play betting is a continuous form of sports betting given that it presents up to hundreds of opportunities to place wagers throughout the duration of a sporting event (Newall, Russell, & Hing, 2021). In-play betting encompasses the placement of any bet once a sporting event has started; in other words, bets can be placed while the event is ongoing (e.g., which team will score the next point) rather than only on its outcome (Killick & Griffiths, 2019). In-play betting may be a relatively popular form of sports betting, with previous studies suggesting that 25–45% of sports bettors place in-play bets (Gainsbury, Abarbanel, & Blaszczynski, 2020; Gambling Commission, 2016). Given that players can bet continuously when engaging in in-play betting, it has been suggested that in-play sports betting shares similar structural characteristics to electronic gaming machines (EGMs; Newall et al., 2021) that may promote and reinforce excessive gambling (Killick & Griffiths, 2019). Specifically, the continuous nature of in-play betting may encourage the placement of bets in rapid succession with minimal forethought as well as present increased opportunities for immediate reward, which can serve to reinforce and potentially increase betting behavior (Killick & Griffiths, 2019). Importantly, game speed and frequency, two structural characteristics that are embedded within in-play betting, have been proposed to contribute to the development and progression of problem gambling (Auer & Griffiths, 2022; Griffiths & Auer, 2013).

There is some evidence to suggest that in-play sports betting may be linked to greater risks relative to other forms of sports betting. For example, in-play sports bettors have endorsed greater gambling frequency and problem gambling severity compared to sports bettors who do not place in-play bets (Gainsbury et al., 2020; Lopez-Gonzalez, Griffiths, & Estévez, 2018). Preliminary evidence also suggests that individual-level demographic and psychological characteristics are important determinants of who places in-play bets, including younger age (Gainsbury et al., 2020), being a man (Hing et al., 2017), impulsivity (Killick & Griffiths, 2019), and increased substance use while gambling (Lopez-Gonzalez et al., 2018). Specific motives may also promote in-play betting among some individuals, with those of increased excitement and demonstration of skill having been identified in a previous qualitative study (Killick & Griffiths, 2020).

Despite a growing pool of evidence suggesting that in-play betting is associated with a distinct profile of individual-level characteristics and gambling-related harms, the existing body of literature is limited in scope. Research on the predictors of in-play sports betting has mostly centered on demographic correlates (Russell, Hing, Browne, Li, & Vitartas, 2018), and studies examining the harms of in-play sports betting have typically focused exclusively on gambling frequency and severity (Gainsbury et al., 2020; Lopez-Gonzalez et al., 2018). Consequently, less is known regarding the psychological risk factors of in-play betting, and whether in-play betting is associated with greater gambling-related harms (e.g., financial, interpersonal) beyond problem gambling severity. Further, to our knowledge, no studies to date have directly compared the individual characteristics and harms endorsed by in-play bettors to those of other specific groups of sports bettors, such as those who bet on single-event or parlay. This gap raises questions regarding the extent to which the characteristics and harms identified by previous studies are unique to in-play betting or simply linked to sports betting more broadly.

The present study sought to address these gaps in the literature by exploring the extent to which a range of demographic (e.g., age, gender), psychological (e.g., emotion dysregulation, impulsivity), and gambling-related constructs (e.g., problem gambling severity, harms) are endorsed by in-play bettors relative to single-event and traditional bettors. The overarching goal of this research is to obtain a clearer understanding of the extent to which these characteristics and experiences may be uniquely associated with in-play betting.

METHODS

Participants

Participants were recruited via AskingCanadians, a large online panel that is representative of the general Canadian population. To be eligible to participate, individuals were required to 1) be 18 years of age or older, 2) reside in the province of Ontario, Canada, 3) have gambled at least once within the past three months, and 4) have bet on sports at least once within the past three months. A total of 1,229 participants met eligibility criteria, of which 309 were excluded following data collection due to a response style that indicated lack of attention and/or substantial missing data on key measures of interest. Following these exclusions, the final sample consisted of 920 Ontarian adults who had bet on sports in the past three months.

Measures

Demographics. Demographic data regarding age in years, gender identity, ethnicity, education level, employment status, and annual household income were collected via a self-report questionnaire.

Gambling-related variables

Sports betting Timeline Follow-Back. The Gambling Timeline Follow-Back (G-TLFB; Weinstock, Whelan, & Meyers, 2004) was modified for sports betting and used to obtain a detailed assessment of participants' engagement in sports betting activities over the past three months. Using an interactive calendar, participants were asked to consult their sports betting accounts to aid recall and select all days during which they had engaged in sports betting in the past three months. For each of the selected days, they were further asked to indicate the specific type(s) of sports betting they had engaged in (in-play, single-event, parlay, systems, micro, prop, and/or daily fantasy sports). This measure was used to categorize participants as either in-play, single-event, or traditional bettors.

Problem Gambling Severity Index (PGSI). The Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) is a nine-item (α = 0.95) self-report measure of problem gambling in the general population. Higher scores reflect greater problem gambling. Instructions were modified such that participants were asked to reflect on the past three months while completing the measure, to be consistent with the timeframe assessed by the G-TLFB (Weinstock et al., 2004).

18-Item Short Gambling Harm Screen (SGHS-18). The 18-Item Short Gambling Harm Screen (SGHS-18; Latvala, Browne, Rockloff, & Salonen, 2021) is a self-report measure of gambling-related harms experienced over the past 12 months within six domains: financial, work, health, emotional/psychological, relationships, and social deviance (α = 0.73 to 0.82). Higher scores indicate greater gambling-related harms. Instructions were modified such that participants were asked to reflect on the past three months while completing the measure, to be consistent with the timeframe assessed by the G-TLFB (Weinstock et al., 2004).

Sports Betting Motivation Scale (SBMS). The Sports Betting Motivation Scale (SBMS; Gökce Yüce, Yüce, Katırcı, Nogueira-López, & González-Hernández, 2021) is a 37-item self-report measure of motives for engagement in sports betting within seven domains: make money, fun, socialization, recreation/escape, knowledge of the game, interest in the sports, and being in the game (α = 0.84 to 0.97). Higher scores indicate greater endorsement of a particular sports betting motive.

Psychological correlates

Adverse Childhood Experience Questionnaire (ACE). The Adverse Childhood Experience Questionnaire (ACE; Dong et al., 2004) is a 29-item (α = 0.85) self-report measure of exposure to 10 types of potentially traumatic experiences prior to the age of 18 years: emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, interparental violence, household substance use, parental separation or divorce, mental illness in household, and crime in household. Items were coded dichotomously to produce scores on 10 subscales, each reflecting endorsement of a particular ACE assessed (0 = *No* and 1 = *Yes*), and were summed to obtain a total score reflecting the number of ACE types an individual experienced. Higher scores indicate exposure to a greater number of ACEs.

Brief Version of the Difficulties in Emotion Regulation Scale (DERS-18). The brief version of the Difficulties in Emotion Regulation Scale (DERS-18; Victor & Klonsky, 2016) is an 18-item (α = 0.92) self-report measure of emotion dysregulation. Higher scores indicate greater difficulties in emotion regulation.

Short UPPS-P Impulsive Behavior Scale (SUPPS-P). The Short UPPS-P Impulsive Behavior Scale (SUPPS-P; Cyders, Littlefield, Coffey, & Karyadi, 2014) is a 20-item self-report measure of five facets of impulsivity: negative urgency, positive urgency, lack of perseverance, lack of premeditation, and sensation seeking (α = 0.66 to 0.85). Higher scores indicate greater impulsivity within a particular facet.

Mental health and addiction

Depression Anxiety Stress Scales–21 (DASS-21). The Depression Anxiety Stress Scales–21 (DASS-21; Lovibond & Lovibond, 1995) is a 21-item self-report measure of depression, anxiety, and stress symptoms experienced over the past week. Items form three subscales, each reflecting one of the types of symptoms assessed (i.e., depression, anxiety, stress; α = 0.94 to 0.95). Higher scores indicate greater symptom severity.

The Brief Screener for Substance and Behavioral Addictions (SSBA). The Brief Screener for Substance and Behavioral Addictions (SSBA; Schluter, Hodgins, Wolfe, & Wild, 2018) is a self-report measure of addiction problems experienced in relation to several substances and addictive behaviors in the past 12 months. Only items related to alcohol (α = 0.92) and cannabis (α = 0.94) were used in the present study to capture substances that are most commonly used by individuals who gamble (Barnes, Welte, Tidwell, & Hoffman, 2015). For each substance, participants are asked to rate the extent to which four statements apply to them regarding whether their use of this substance is excessive, uncontrollable, and/or persistent despite negative consequences. Scores on the four items are summed to produce a total score, with higher scores reflecting greater problematic use.

Procedure

Eligible participants were redirected to Qualtrics to complete an online survey containing the above-noted self-report questionnaires and were compensated reward points of their choosing (e.g., VIA Rail, PetroPoints) via AskingCanadians. Following data collection, participants were categorized into one of three groups depending on the specific type of sports

betting they reported having engaged in at least once in the past three months. Specifically, participants were categorized as either in-play bettors (n = 223) if they had made an in-play bet,[1] single-event bettors (n = 533) if they had made a bet on the outcome of single event but not an in-play bet, or traditional bettors (n = 164) if they had made a parlay, systems, and/or daily fantasy sports bet but not an in-play or single event bet. The present study was not pre-registered; as such, the results should be considered exploratory. The data underlying the present study as well as the materials are available on OSF (https://osf.io/85whc/).

Statistical analysis. Analyses were conducted using IBM SPSS Statistics, Version 28. The assumption of normality was violated for most dependent variables of interest, as indicated by the Shapiro-Wilk test of normality (p's < 0.05). Consequently, Kruskal-Wallis H tests were used to examine group differences between in-play, single-event, and traditional bettors in all continuous dependent variables. To follow-up on significant between-group differences identified by Kruskal-Wallis H tests, post-hoc analyses were conducted using Dunn's procedure and adjusted for multiple comparisons using Bonferroni correction. Chi-square tests of independence and Fisher's Exact tests (when expected cell counts <5) were used to investigate between-group differences in all categorical dependent variables.[2]

Ethics

Ethics approval was obtained from the Toronto Metropolitan University and York University Research Ethics Boards prior to data collection, and all participants provided informed consent prior to completing the online survey.

RESULTS

Demographics

In-play bettors were younger than both single-event and traditional bettors, and no significant difference was observed between single-event and traditional bettors. Traditional bettors were more likely than both in-play and single-event bettors to be men; further, in-play bettors were more likely than single-event bettors to be men. Single-event bettors were more likely than both in-play and traditional bettors to be women; further, in-play bettors were more likely than traditional bettors to be women.

A Fisher's exact test revealed a significant association between group and ethnicity. A post-hoc test further revealed that in-play bettors were more likely than single-event bettors to identify as South Asian. A Fisher's exact test also revealed a significant association between bettor group and annual household income; however, a post-hoc test revealed no significant pairwise differences between the groups. No significant differences in education level nor employment status were observed. Frequencies, test statistics, and p-values for demographics can be found in Table 1.

Gambling-related variables

Medians, test statistics, and p-values for each dependent variable (gambling-related, psychological) stratified by bettor group can be found in Table 2. In-play bettors reported greater problem gambling severity compared to both single-event and traditional bettors. There was a significant difference in median financial, emotional/psychological, health, relationships, work, and social deviance harms with in-play bettors reported greater gambling-related harms within each of the six domains compared to both single-event and traditional bettors. Single-event and traditional bettors did not differ in problem gambling severity or in any domains of gambling-related harms.

There was a significant difference in median SBMS fun subscale scores between in-play, single-event, and traditional bettors. In-play bettors were more likely to endorse sports betting for fun compared to single-event bettors, whereas no significant difference was observed between in-play and traditional bettors nor between single-event and traditional bettors. Further, there was a significant difference in median interest in the sports, knowledge of the game, make money, recreation/escape, and socialization subscale scores between in-play, single-event, and traditional bettors. In-play bettors were more likely to endorse each of these five motives compared to both single-event and traditional bettors, and no significant differences were observed between single-event and traditional bettors. No significant difference in being in the game subscale scores was observed between the three groups.

Psychological correlates

In-play bettors reported having been exposed to greater childhood adversity compared to both single-event and traditional bettors. In-play bettors also reported greater emotion dysregulation compared to both single-event and traditional bettors. Regarding impulsivity, in-play bettors endorsed greater negative and positive urgency compared to both single-event and traditional bettors. Further, in-play bettors endorsed greater lack of premeditation compared to single-event bettors, while no significant differences were observed between in-play and traditional bettors. In-play bettors also endorsed greater sensation seeking compared to traditional bettors, while no significant differences were observed between in-play and single-event bettors. No significant difference in perseverance subscale scores were observed between the three groups.

The single-event and traditional bettor groups did not differ in childhood adversity, emotion dysregulation, or facets of impulsivity.

[1]Participants who had made both an in-play and single-event bet were classified as in-play bettors.

[2]Analyses were conducted twice, with outliers both included and excluded. As results remained the same across both sets of analyses, the decision was made to retain outliers to maximize our data and sample size.

Table 1. Frequencies, test statistics, and *p*-values for demographic characteristics among in-play, single-event, and traditional bettors.

Demographic characteristic	In-play bettors (n = 223)		Single-event bettors (n = 533)		Traditional bettors (n = 164)			
	n	%	*n*	%	*n*	%	χ^2	*p*
Gender							6.43	0.040
Man	178	80.5	394	74.2	134	82.2		
Woman	43	19.5	137	25.8	29	17.8		
Ethnicity								<0.001
East Asian	0	0.0	1	0.2	2	1.4		
Latino	5	2.8	7	1.6	3	2.0		
Black	4	2.2	7	1.6	6	4.1		
White	123	68.3	355	79.2	108	73.5		
South Asian	27	15.0	22	4.9	10	6.8		
Middle Eastern	6	3.3	12	2.7	4	2.7		
Indigenous	1	0.6	4	0.9	4	2.7		
Mixed	11	6.1	16	3.6	3	2.0		
Education level							18.15	0.200
Less than high school	2	0.9	6	1.1	2	1.2		
High school diploma	18	8.1	42	7.9	15	9.1		
One or two year post high school but not college	2	0.9	10	1.9	7	4.3		
One or two year diploma from a trade or professional school but not college	8	3.6	31	5.8	12	7.3		
Some college or university education	35	15.7	67	12.6	28	17.1		
College or university degree (Bachelors)	109	48.9	270	50.7	76	46.3		
Post graduate work	7	3.1	29	5.4	8	4.9		
Post graduate degree	42	18.8	78	14.6	16	9.8		
Employment status							9.30	0.054
Working full-time	163	78.7	356	72.2	98	67.1		
Working part-time	21	10.1	45	9.1	15	10.3		
Not working	23	11.1	92	18.7	33	22.6		
Annual household income								0.001
Less than $20,000	3	1.3	12	2.3	0	0.0		
$20,000–$39,999	17	7.6	34	6.4	18	11.0		
$40,000–$59,999	35	15.7	52	9.8	21	12.8		
$60,000–$79,999	24	10.8	57	10.7	30	18.3		
$80,000–$99,999	37	16.6	67	12.6	23	14.0		
$100,000–$149,999	51	22.9	124	23.3	36	22.0		
$150,000–$199,999	29	13.0	82	15.4	20	12.2		
Over $200,000	23	10.3	69	12.9	8	4.9		

Mental health and addiction

In-play bettors endorsed greater depression, anxiety, and stress symptoms compared to both single-event and traditional bettors. In-play bettors also endorsed greater problem alcohol and cannabis use compared to both single-event and traditional bettors. The single-event and traditional bettor groups did not differ in mental health or addictions.

DISCUSSION

The results of our research corroborate and extend previous findings on the characteristics of in-play sports bettors and increased harms associated with in-play betting. In the present study, nearly a quarter (24.2%) of the sample had placed an in-play bet in the past three months, highlighting the popularity of this novel form of sports betting. Moreover, individuals who placed in-play bets reported significantly higher levels of problem gambling severity, as well as greater harms within the financial, work, health, emotional/psychological, relationship, and social deviance domains compared to those who had placed traditional and single-event bets. To our knowledge, this study is the first to have demonstrated that the risks of problem gambling and related harms are not merely associated with sports betting in general, but appear to be the greatest for in-play betting. By extension, this study is also the first to present empirical evidence that the ability to bet continuously throughout a sporting event carries greater risks than making a single bet.

Table 2. Medians, means, standard deviations, test statistics, and *p*-values for continuous dependent variables separated by in-play, single-event, and traditional bettors.

Variable	In-play bettors (n = 223)			Single-event bettors (n = 533)			Traditional bettors (n = 164)				
	Median	M	*SD*	Median	M	*SD*	Median	M	*SD*	*H*	*p*
Age	41.00	42.97	11.77	48.00	48.64	13.96	52.00	50.81	13.69	37.08	<0.001
PGSI	3.00	5.09	5.29	0.00	2.26	3.78	1.00	2.75	3.89	81.18	<0.001
SGHS-18											
Financial	1.00	1.19	1.25	0.00	0.65	1.04	0.00	0.79	1.12	36.05	<0.001
Emotional/psychological	0.00	0.85	1.14	0.00	0.45	0.87	0.00	0.46	0.82	26.34	<0.001
Health	0.00	0.72	1.06	0.00	0.34	0.77	0.00	0.37	0.74	26.20	<0.001
Relationships	0.00	0.80	1.11	0.00	0.36	0.83	0.00	0.88	0.40	38.62	<0.001
Work	0.00	0.72	1.07	0.00	0.35	0.81	0.00	0.38	0.81	27.27	<0.001
Social deviance	0.00	0.33	0.67	0.00	0.11	0.40	0.00	0.14	0.46	41.13	<0.001
SBMS											
Fun	3.75	3.74	0.69	3.63	3.51	0.75	3.63	3.57	0.67	14.30	<0.001
Interest in the sports	4.00	3.65	0.86	3.33	3.31	1.02	3.67	3.38	0.84	20.26	<0.001
Knowledge of the game	3.67	3.65	0.83	3.33	3.26	1.01	3.67	3.33	0.88	22.27	<0.001
Make money	3.00	2.88	1.12	2.10	2.25	1.10	2.10	2.20	1.04	54.24	<0.001
Recreation/escape	3.00	3.01	1.00	2.40	2.44	1.03	2.40	2.39	0.94	56.17	<0.001
Socialization	3.00	3.03	0.99	2.67	2.59	0.98	2.50	2.42	0.92	43.65	<0.001
Being in the game	4.00	4.01	0.82	4.00	4.05	0.73	4.00	4.04	0.74	0.20	0.907
ACEs	2.00	3.35	3.25	1.00	2.34	2.65	2.00	2.24	2.52	13.46	0.001
DERS-18	38.00	39.89	14.52	30.00	34.30	12.23	31.00	34.26	12.25	24.98	<0.001
SUPPS-P											
Negative urgency	2.50	2.38	0.79	2.00	2.14	0.77	2.00	2.04	0.75	22.10	<0.001
Positive urgency	2.25	2.25	0.83	1.75	1.91	0.77	1.75	1.83	0.72	34.32	<0.001
Premeditation	1.75	1.78	0.52	1.75	1.66	0.51	1.75	1.69	0.53	9.19	0.010
Perseverance	1.75	1.82	0.52	1.75	1.75	0.49	1.75	1.83	0.49	4.25	0.120
Sensation seeking	2.75	2.68	0.64	2.50	2.54	0.69	2.50	2.46	0.59	9.93	0.007
DASS-21											
Depression	5.00	9.71	10.57	2.00	5.38	7.96	2.00	6.20	8.44	29.53	<0.001
Anxiety	4.00	9.19	10.11	1.00	4.41	7.06	2.00	5.14	7.20	45.71	<0.001
Stress	8.00	10.80	9.87	4.00	6.36	7.69	4.00	7.54	8.30	38.16	<0.001
SSBA											
Alcohol	3.00	4.27	4.49	1.00	2.28	3.24	1.00	2.23	3.30	35.56	<0.001
Cannabis	1.00	3.76	4.81	0.00	1.56	3.23	0.00	1.59	3.30	37.06	<0.001

Note. PGSI = Problem Gambling Severity Index; SGHS-18 = 18-Item Short Gambling Harm Screen; SBMS = Sports Betting Motivation Scale; ACE = Adverse Childhood Experience Questionnaire; DERS-18 = Brief Version of the Difficulties in Emotion Regulation Scale; SUPPS-P = Short UPPS-P Impulsive Behavior Scale; DASS-21 = Depression Anxiety Stress Scales–21; SSBA = Brief Screener for Substance and Behavioral Addictions

Indeed, as noted previously, in-play betting may be associated with greater risk of problem gambling and related harms due to sharing structural characteristics with EGMs, which have been identified as a particularly risky form of gambling (Newall et al., 2021).

In-play betting was also associated with a range of demographic features, psychological characteristics, and sports betting motives in the present study. For example, in-play bettors presented with consistently greater psychosocial vulnerabilities, including childhood adversity, emotion dysregulation, affective impulsivity (i.e., positive and negative urgency), mental health symptoms (e.g., anxiety, depression), and problem alcohol and cannabis use. The concept of the *slot machine zone* (i.e., absorptive cognitive state; see Murch & Clark, 2021 for a review) may help to explain why individuals with greater psychosocial vulnerabilities may be drawn to in-play betting. Dissociative experiences have been conceptualized as a strategy used to cognitively escape psychological distress (Lanius, 2015) and have been associated with EGM use (Schluter & Hodgins, 2019). Given that there is substantial overlap between the structural characteristics of EGMs and in-play betting, it is plausible that individuals with greater psychosocial vulnerabilities may similarly be drawn to in-play betting to escape mental distress.

In-play bettors were also more likely than both other types of bettors to endorse engaging in sports betting to socialize, to make money, for recreation and/or escape, due to their interest in the sports, and due to their knowledge of the game. Notably, the sports betting motives assessed by the SBMS (Gökce Yüce et al., 2021) differ from those that apply to gambling in general. Interest in the sports and knowledge of the game motives are particularly unique to sports betting and were endorsed to the greatest extent by in-play bettors in the present study. It is possible that in-play bettors are

more interested in sports than the average sports bettor and consequently, they may be more engaged and immersed in the sporting events they spectate. This heightened interest and engagement could encourage them to place a greater number of in-play bets, especially given that placing bets continuously may further enhance their immersion in the event. In-play bettors were also more likely to endorse sports betting to verify and demonstrate their knowledge of the game, and as such, it is possible that in-play bettors perceive themselves as more knowledgeable about sports than the average sports bettor. Importantly, a previous study found that sports bettors commonly believed their knowledge of the game assisted in their betting and financial success, which in turn appeared to lower their perception of the risks associated with sports betting (Nyemcsok et al., 2022). In-play bettors may therefore be at greater risk of placing bets impulsively and with minimal forethought given their value for knowledge of the game.

Taken together, these results suggest that in-play betting may be a particularly attractive form of sports betting among those who are most vulnerable to experiencing problem gambling, mental health challenges, and substance use. However, the directionality of these relationships is unclear; in other words, it is unknown whether engaging in in-play bets leads to these increased vulnerabilities, or whether individuals who are already experiencing these vulnerabilities are attracted to in-play sports betting given its aforementioned structural characteristics. For example, individuals who are already experiencing mental health- and addiction-related challenges may be drawn to in-play betting because it is a fast-paced activity that encourages the placement of multiple bets in rapid succession and consequently, may render the sporting event more immersive (i.e., sports betting zone). Conversely, in-play betting may encourage problem gambling and increase the severity of mental health symptoms due to the risks associated with its structural characteristics. For instance, in-play betting may encourage *loss-chasing*, a hallmark feature of problem gambling (Zhang & Clark, 2020), as it presents individuals with the opportunity to place additional bets immediately after experiencing a loss (Newall et al., 2021). These unanswered questions highlight the need for longitudinal studies to examine the pathways into in-play sports betting and elucidate whether in-play sports betting is a causal risk factor for experiencing problem gambling and related harms.

It is also unclear whether the results observed in the present study may be attributable in part to the novelty of in-play betting as a product. According to adaptation theory (Shaffer, LaBrie, & LaPlante, 2004), the characteristic of novelty tends to stimulate new and widespread interest in a social activity (e.g., gambling). However, a process of social learning occurs overtime whereby those who engage in the activity eventually adapt to its novelty and either reduce or cease their participation in it, leading its effects (e.g., problem gambling and associated harms) to be limited. Providing support for adaptation theory, Shaffer et al. (2004) reviewed evidence that new Nevada residents endorsed higher rates of gambling disorder relative to residents who had been in Nevada for 10 or more years, and that casino employees who were younger and had been working for a shorter period of time endorsed higher rates of gambling disorder relative to older, longer-term employees. In other words, individuals who had been exposed to gambling for a longer period of time appear to have adapted to its novelty and in turn, demonstrated less gambling engagement and associated harms.

Considering in-play betting in the context of adaptation theory (Shaffer et al., 2004), the relatively high proportion of individuals who are currently attracted to in-play betting may be due to in-play betting being a novel product. In Canada specifically, in-play betting only recently became available to the general public, having been legalized in 2021 (Evans, 2021). As in-play betting becomes increasingly normalized and its novelty diminishes, it is possible that individuals will reduce their engagement in this activity, and in turn, demonstrate lower rates of problem gambling and associated harms identified in the present study. Future longitudinal studies that examine whether the prevalence of in-play betting among Ontarian adults decreases overtime would be informative. In addition, future studies may investigate whether in-play betting intensity and associated problem gambling and harms are elevated among individuals who are new to in-play betting relative to those who have been placing in-play bets for a longer period of time.

The results of the present study may have important implications for public policy and responsible gambling guidelines. Concerted efforts to address in-play betting and mitigate its associated risks are imperative, as the ongoing legalization of sports betting is likely to increase its availability in the coming years and thereby the prevalence of its harms (Bengel & McCarriston, 2022; Evans, 2021). Several general responsible gambling (RG) strategies have been implemented with positive outcomes (e.g., reduced problem gambling severity), such as self-exclusion programs, through which individuals can voluntarily ban themselves from both land- and Internet-based gambling venues (Ladouceur, Shaffer, Blaszczynski, & Shaffer, 2017). However, few studies have examined the effectiveness of RG strategies that have been developed for sports bettors and, more specifically, in-play bettors. Some demographic characteristics such as education and income level did not differ between in-play and other types of sports bettors in the present study, diverging from previous research suggesting that individuals with greater problem gambling severity tend to have lower education (Welte, Barnes, Tidwell, & Wieczorek, 2017) and income (Williams et al., 2021). Considering the unique characteristics associated with in-play betting, it is possible that existing RG strategies may not be applicable to or helpful for in-play bettors.

However, given that the structural characteristics of in-play betting share considerable overlap with those of EGMs (Newall et al., 2021), it may be fruitful to examine whether RG strategies for EGMs may also have utility for in-play betting. One RG strategy that has received empirical attention in relation to EGMs is reducing speed of play, or how

quickly an individual can wager bets while gambling (Harris & Griffiths, 2018). Several studies have found that reducing speed of play on EGMs is associated with less time spent gambling. For instance, Linnet, Rømer Thomsen, Møller, and Callesen (2010) found that relative to an EGM that allowed 30 games per minute, setting an EGM to allow 20 games per minute (i.e., lower speed of play) led to a decrease in the desire to play again and time spent gambling among pathological gamblers. Further, Hopfgartner, Auer, Santos, Helic, and Griffiths (2022) found that in a comparison of 90-second, five-minute, and 15-minute mandatory play breaks, a 15-minute mandatory play break led to a longer voluntary pause in gambling among individuals who engaged in online sport betting, slot machines, and bingo. A recent study also found that imposing a speed of play limit on an online roulette game led to a reduction in gambling expenditure on this game, which occurred due to a reduction in the mean number of spins players were able to make (Newall et al., 2022).

As noted previously, fast speed of play has been implicated in the development and progression of problem gambling (Auer & Griffiths, 2022; Griffiths & Auer, 2013) and is a shared structural characteristic of both EGMs (Harris & Griffiths, 2018) and in-play betting (Newall et al., 2021). Consequently, speed of play limits may also be beneficial for reducing problem gambling and other harms associated with in-play betting, as suggested by Newall (2023). Specifically, imposing a speed of play limit on in-play betting may lead to a reduction in the number of in-play bets an individual is able to place during a given sporting event, which may in turn reduce their overall expenditure on in-play bets during this event. This would directly target the financial harms associated with in-play betting in the present study, similar to previous findings by Newall et al. (2022) in an online roulette task.

The risks associated with the continuous, high-speed nature of in-play betting may be further reduced by the implementation of a system whereby individuals can only place an in-play bet by making a telephone call, rather than via mobile app. North American policymakers and gambling operators can refer to Australia as an example of a region where this system is already in place (Hing et al., 2022). Whereas mobile gambling apps allow for instant, easy access to repeated betting opportunities (Hing et al., 2022), it may be less convenient to place a bet via telephone call while simultaneously spectating and focusing on the outcome(s) of a sporting event, discouraging individuals from placing multiple in-play bets. Future studies that directly examine RG strategies adapted for sports betting, and in particular, in-play sports betting, would be highly informative.

Limitations and future directions

The present study is characterized by several limitations. First, the G-TLFB was used to assess in-play betting behavior. While this measure has been proposed to improve accuracy of recall compared to one-item questions regarding frequency and quantity of gambling behavior (Weinstock et al., 2004), it nonetheless relies on retrospective recall and may thus have led to recall bias. Although participants were asked to consult their sports betting accounts while completing the survey, the extent to which they followed these instructions cannot be ascertained. Second, the cross-sectional nature of the present study precludes conclusions regarding the directionality and causal nature of associations between in-play betting, psychological vulnerabilities, problem gambling severity, and related harms. Lastly, the landscape of sports betting is rapidly changing, and the increased availability of sports betting may lead to the emergence of different profiles of individuals who bet on in-play sports. Therefore, ongoing research aimed at understanding the characteristics of individuals who place in-play bets will be important as this activity continues to evolve.

Conclusion

The results of the present study add support to the growing literature suggesting that in-play sports betting may be a particularly risky form of sports betting, potentially due to its structural characteristics. Furthermore, they suggest that individuals with increased psychosocial vulnerabilities (e.g., childhood adversity, emotion dysregulation) and risk factors for problem gambling may be particularly attracted to in-play betting, though the directionality of these associations requires further investigation. As jurisdictions around the world continue to seek the legalization of sports betting, it is important to further understand the characteristics and potential negative impacts associated with in-play betting to inform the development of public health and RG initiatives to reduce the potential harm of this novel form of sports betting.

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