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Problematic gambling among the LGBTQIA2S + population in Canada: A quantitative study

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ABSTRACT

Background and Aims: LGBTQIA2S + populations are believed to be at higher risk of problem gambling due to their elevated rates of mental disorders and substance abuse compared to heterosexual and cisgender populations. However, little is known about these populations regarding their gambling practices in the Canadian context.

Methods: We conducted an online survey among Canadian residents 18 years or older who self-identify as sexually and gender-diverse (i.e., LGBTQIA2S +) and have gambled at least once in the preceding year (N = 1,519). We used descriptive analysis to portray the sample's gambling habits and a logistic regression model to identify potential factors associated with moderate-to-high-risk gambling.

Results: The prevalence of problematic gambling among our sample was 19.6%. This proportion did not vary according to sex or gender identity. Simultaneously, there was a negative relationship between age group and problematic gambling, and a positive relationship existed with gambling involvement. Logistic regression showed factors associated with higher odds of problematic gambling, including gambling frequency, gambling on slot machines, video lottery machines or poker, presenting other behavioral addictions, and poor mental health. Increasing age, identifying with White ethnicity, higher household income, and identifying as pansexual or queer were inversely correlated factors.

Discussion and Conclusions: Sociodemographic factors associated with problematic gambling likely have complex underlying relationships that merit further research. Gambling formats with faster reward responses presented the highest prevalence of problematic gambling. Further analysis by identity subgroups, and research on their experiences with gambling harm, health and social services, and discrimination could provide insight into the needs and challenges of this population.

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1. Introduction

Gambling is a common habit among the Canadian population (Rotermann & Gilmour, 2022). The most recent Canadian national prevalence study of gambling and problem gambling (also known as disordered gambling) indicated that 64.5 % of Canadians aged 15 or older reported engaging in one or more types of gambling in a year (Rotermann & Gilmour, 2022). Most people who gamble have low-risk gambling behaviors and experience few to no adverse consequences associated with gambling (Potenza et al., 2019). In Canada, 1.6 % of people who gamble are at moderate or severe risk of experiencing gambling-related-problems (Rotermann & Gilmour, 2022), and worldwide, the prevalence rate of moderate-to-high-risk gambling is estimated at 3.72 % (Gabellini et al., 2022). These individuals experience harm in the form of disruptions to their social, occupational, or psychological functioning (Abbott et al., 2004), including financial harm, relationship disruption and conflict, cultural harm, and reduced performance at work or school, among others (Langham et al., 2015).

Existing literature has identified sociodemographic characteristics associated with a greater risk of problem gambling, such as sex (male), age (young adulthood), level of education (low), socioeconomic status (low), and psychiatric history, among others (Hing et al., 2016; Johansson et al., 2009; Moreira et al., 2023; Shaffer et al., 1999). Psychiatric comorbidity, including substance use disorders, mood disorders, and anxiety disorders (American Psychiatric Association, 2022), is also highly prevalent among individuals with problem gambling (Dowling et al., 2015). Moreover, specific populations that experience high rates of discrimination, violence, and rejection—such as lesbian, gay, bisexual, transgender, queer, intersexual, asexual, and two-spirit (LGBTQIA2S +) populations—tend to display higher rates of mental disorders, substance abuse, and suicide compared to heterosexual and cisgender populations (Wicki et al., 2021; Goffnett & Goldbach, 2020; King et al., 2008; Hendricks & Testa, 2012; Meyer, 2003); these factors are all associated with the development of addictive behaviors, such as problem gambling.

Throughout the literature, studies have examined specific groups within the LGBTQIA2S + umbrella, such as sexual minority men (e.g., Bush et al., 2021; Grant & Potenza, 2006; Wicki et al., 2021), sexual minority women (e.g., Broman et al., 2022; Hershberger & Bogaert, 2005; Richard et al., 2019), and gender minority individuals (e.g., Malkin & Stacey, 2023; Mathy, 2003; Rider et al., 2019). Despite some evidence that LGBTQIA2S + individuals are more vulnerable to present with problematic gambling compared to the general population (Birch et al., 2015; Lee & Grubbs, 2023; Stanmyre et al., 2023), literature reviews on the subject have reported mixed findings with limited evidence regarding certain sub-populations (notably, sexual minority men and transgender individuals) and the overall prevalence of problem gambling among the LGBTQIA2S + population (Bailey et al., 2024; Devault-Tousignant et al., 2023; Lee & Grubbs, 2023). Expanding knowledge regarding gambling habits and identifying specific factors associated with problem gambling among LGBTQIA2S + populations is essential to prevent and reduce gambling harms in this group.

1.1. Objectives

This study aims to examine the habits of the LGBTQIA2S + population who gamble and identify factors associated with moderate-to-high risk gambling among this population in the Canadian context.

2. Method

2.1. Ethics statement

This research study constitutes a cross-sectional correlational study that is part of a more extensive mixed explanatory and sequential study (Brodeur et al., 2023). This research project has been ethically and scientifically approved by the Research Ethics Committee and by the CIUSSS de l'Estrie – CHUS scientific evaluation committee (#2022–4633). All participants provided informed consent prior to their participation and were informed of their right to withdraw at any time.

2.2. Recruitment and sampling

The inclusion criteria for potential participants included self-identifying as sexually and gender-diverse (i.e., LGBTQIA2S +), having gambled at least once in the past 12 months, being 18 years of age or older, speaking English or French, and residing in Canada. A stratified random sampling technique for age, gender, and region was used to match the demographic distribution of the general Canadian population. This was done by generating a sample representative of the Canadian population (according to Statistics Canada) and asking filter questions based on the variables mentioned above to the participant pool, ultimately identifying our target population. The target sample size (N = 1,500) was determined to obtain the minimum number of participants needed to develop a regression model with enough statistical power and composed of 10 variables (i.e., 10 participants per variable with a minimum of 100; Peduzzi et al., 1996).

2.3. Data collection

An online questionnaire was used to examine the gambling habits of individuals belonging to LGBTQIA2S + communities in Canada. Web panel participants were recruited by email through a Canadian firm specializing in online surveys to complete the online questionnaire on a secure platform. The questionnaire collected data on the participants' sociodemographic profiles (including sex, gender, sexual orientation, education, income, etc.), their gambling practices/habits, problem gambling severity, and their general health profile. As compensation for their time, participants completing the questionnaire received credits redeemable for cash through the web panel firm's website or application.

2.4. Measures

The online questionnaire contained several validated measures. Problem gambling severity, the dependent variable under study, was assessed using the Problem Gambling Severity Index (PGSI). This instrument was chosen as it is a widely used tool in population surveys, including Canadian national data (Rotermann & Gilmour, 2022) and it is validated in English and French (Ferris & Wynne, 2001a, 2001b). The PGSI consists of nine questions on a Likert scale. A score between 0 and 3 was established for each response and summed to give a total score between 0 and 27. The results were used to determine the participants' gambling severity: non-problem (0), low-risk (1–2), moderate-risk (3–7), and high-risk gambling ($\geq$8). For the purpose of this paper, the term "problematic gambling" is used, following Costes (2016), who defined problematic gambling as the grouping of moderate-risk (3–7) and high-risk ($\geq$8) gambling. Thus, when referring to the moderate-to-high risk category, the term "problematic gambling" will be used. A general mental health profile was assessed using the Patient Health Questionnaire-4 scale (PHQ-4; Kroenke et al., 2009), composed of two items addressing depressed mood and anhedonia and two items addressing anxiety symptoms. Scoring for the PHQ-4 ranges between 0 and 12, with the following categories of psychological distress: none (0–2), mild (3–5), moderate (6–8), and severe (9–12). The measure has been validated in English and French (Arthurs et al., 2012; Todorović et al., 2023).

2.5. Data analysis

Descriptive analyses (e.g., proportions, means, standard deviation, medians) were used to describe participant characteristics and their

gambling habits. To ensure the sample was representative of the target population, data were weighted according to sex at birth, age, province, first language, education, and presence of minor children in the household. Problematic gambling was assessed based on the participants' PGSI scores. It was grouped into two categories: no-risk-to-low-risk gambling (PGSI score 0–2) and moderate-to-high-risk gambling, or problematic gambling (PGSI score ≥ 3). The characteristics of the participants were compared according to the previous groupings. Chi-square and Fisher's exact tests were used for categorical variables. A Monte Carlo simulation was used for variables with multiple categories, such as province of residence. Additionally, a Mann–Whitney test was computed to compare continuous variables with the risk of problematic gambling.

A multivariate logistic regression model was used to identify variables associated with problematic gambling as a function of participants' PGSI score (Bursac et al., 2008; Harrell et al., 1996). Given the sample size for moderate-to- high-risk gambling ($n = 298$) and considering the general rule for regression models of 10 participants per variable (Peduzzi et al., 1996), we considered up to 30 predictors in the model. This selection was made based on what was observed in the literature and considering variable significance during bivariate analysis: age, ethnicity, education, occupation, household income, gambling format (including scratch tickets, slot machines, video lottery machines, sports betting, horse racing, poker, bingo, and casino games) and gambling frequency in the last 12 months, self-reported problematic behaviors (problematic use of alcohol or cannabis, problematic video gaming, pornography viewing, and Internet use), and psychological distress (PHQ-4 score) (Allami et al., 2021; Buth et al., 2017; Hing et al., 2016; Stanmyre et al., 2023). Sexual orientation (categorized as homosexual, bisexual, pansexual, queer, and other sexual orientation), current gender identity (categorized as cisgender men, cisgender women and other gender identity), and access to a family doctor were included in the model as exploratory predictors. Indigenous identity was initially considered for the model but was later removed to avoid collinearity issues with the variable for White ethnicity. Gambling debts were not included since most participants without problematic gambling habits rarely reported having debts. All pre-selected variables were entered in the model in a single step and reported in the output, regardless of significance, which was considered at $p < 0.05$ (i.e., Enter method). Descriptive analyses and regression models were performed using IBM SPSS Statistics version 28. Figures were created using GraphPad Prism version 9.

3. Results

3.1. Sample

The total sample size for this study was 1,519 people. Most participants reported residing in Ontario (38 %) or Quebec (25 %). The participants' ages ranged from 18 to 81, with an average age of 41 ($SD = 15.86$). A proportion of 52 % reported their sex at birth as male, 93 % of individuals identified as cisgender, and 7 % identified as transgender, non-binary, or other gender identity. Most of the sample identified as bisexual (41 %) or gay (33 %). Other demographic characteristics are described in Table 1.

3.2. Prevalence of problematic gambling among LGBTQIA2S + individuals who gambled in the last year

The prevalence of moderate-risk and high-risk gambling within our sample of LGBTQIA2S + individuals having gambled in the last year (hereafter "prevalence of problematic gambling") was 9.7 % and 9.9 %, respectively, for a total 19.6 % of the sample being categorized as presenting problematic gambling (i.e., moderate-to-high risk). The prevalence of problematic gambling decreased significantly as the age group increased ($p < 0.001$), being highest at 25 % among young adults aged 18–24 and lowest at 11 % among adults aged 65 and older. Regarding biological sex, both males-at-birth and females-at-birth presented a similar prevalence of problematic gambling (20 % and 19 %, respectively, $p = 0.553$). Equally for current gender identity, no differences were observed across cisgender men, cisgender women, trans, and non-binary individuals ($p = 0.216$). Concerning sexual orientation, pansexual and queer individuals had both a significantly lower prevalence (13 %, $p = 0.034$, and 8.3 %, $p = 0.001$, respectively) than those not identifying as such. Besides those identifying with White ethnicity (16 %), all other groups had a problematic gambling prevalence above 20 %, with the highest being those identifying as South Asians (48 %, $p < 0.001$) and Chinese (42 %, $p < 0.001$). Individuals in the 'Other' category for ethnicity include those identifying as South-East Asian, Middle Eastern, Korean, Japanese, and individual cases. Nevertheless, these estimates should be interpreted with caution, given only 22 % of the sample identified as non-White, which might inflate the estimates for these subgroups. For occupation, the prevalence of problematic gambling varied between 10.8 % for retired individuals and 36.8 % for people currently enrolled in social aid programs ($p < 0.001$). For education, the prevalence was significantly higher in individuals attaining a high school diploma or less (25.9 %) compared to those with a college or university degree (14.9 % and 19.3 %, respectively, $p < 0.001$).

In terms of gambling habits, as evidenced in Fig. 1, there was a positive relationship between the number of gambling activities practiced by individuals in the last month and the prevalence of problematic gambling, which varied between 6.8 % and 58 % ($p < 0.001$). The most popular gambling forms were lottery tickets (75 %) and scratch-off tickets (68 %). However, the highest prevalence of problematic gambling was found for poker, video lottery machines, and horse racing (53 %, 51 %, and 50 %, respectively). In the online questionnaire, the participants were not asked to specify whether the gambling activities practiced were in-venue or online. Participants also reported whether they thought they had problems with other addictive behaviors, such as Internet/screen usage or drug consumption. Participants who self-reported more behavioral addictions displayed a higher prevalence of problematic gambling ($p < 0.001$). Finally, self-reports of problematic gaming and problematic use of cannabis had the highest prevalence of problematic gambling (50 % and 51 %, respectively).

3.3. Factors associated with problematic gambling – Logistic regression model

Logistic regression analysis was performed to identify the factors associated with problematic gambling. The complete list of predictors, their estimates and significance are presented in Table 2. Consistent with what was observed in the bivariate analysis, age was found to be inversely associated with problematic gambling for the sample population; as age increased (per year), an individual had fewer odds of presenting problematic gambling practices (OR = 0.98, $p < 0.001$). Regarding sexual and gender identity, those identifying as pansexual or queer had lower odds of a problematic gambling outcome (OR = 0.44, $p = 0.024$; OR = 0.38, $p = 0.018$, respectively). No other sexual orientation variables, and none of the gender identity variables were significant in the model's output. With regards to ethnicity, those identifying as White had lower odds of presenting with problematic gambling compared to those identifying with a non-White ethnicity (OR = 0.38, $p < 0.001$). Financially, participants with a household revenue greater than $40,000 CAN had lesser odds of presenting with problematic gambling, however this relationship was no longer significant at $100,000 CAN and above.

On the other hand, the model identified various factors associated with a higher risk of problematic gambling. First, a positive relationship was evidenced between gambling frequency in the last 12 months and risk of problematic gambling, such that the more frequent reports of gambling presented higher odds of a problematic gambling outcome (few times per year, OR = 2.48, $p = 0.010$; few times per month, OR =

Table 1
Demographic characteristics of the study sample and their risk of problematic gambling.

	Risk level					*p*	% of problematic gambling [95 % CI]
	No-to-Low Risk		Moderate-to-High Risk		Total		
	(n = 1,221)		(n = 298)		(N = 1,519)		
	n	%	n	%	n		
Sex at birth							
Male	630	51.6	160	53.7	790	0.553	20.3 [17.5, 23.1]
Female	591	48.4	138	46.3	729		18.9 [16.1, 21.8]
Age group							
18–24	186	15.2	63	21.1	249	< 0.001	25.3 [19.9, 30.7]
25–34	306	25.1	97	32.4	403		24.1 [19.9, 28.2]
35–44	244	20.0	63	21.1	307		20.5 [16.0, 25.0]
45–54	166	13.6	33	11.0	199		16.6 [11.4, 21.8]
55–64	182	14.9	26	8.7	208		12.5 [8.0, 17.0]
≥ 65	136	11.1	17	5.7	153		11.1 [6.1, 16.1]
Gender identity							
Cisgender man	600	49.1	148	49.5	748	0.216	19.8 [16.9, 22.6]
Cisgender woman	538	44.1	130	43.5	668		19.5 [16.5, 22.5]
Trans [a]	24	2.0	1	0.3	25		–
Non-binary	29	2.4	11	3.7	40		27.5 [13.7, 41.3]
Other	30	2.5	9	3.0	39		23.1 [9.9, 36.3]
Sexual orientation [b]							
Heterosexual [c]	34	2.8	14	4.8	48	0.082	29.2 [16.3, 42.0]
Gay	407	33.8	93	32.0	500	0.567	18.6 [15.2, 22.0]
Lesbian	118	9.8	28	9.6	146	0.896	19.2 [12.8, 25.6]
Bisexual	489	40.6	127	43.6	616	0.318	20.6 [17.4, 23.8]
Pansexual	134	11.1	20	6.9	154	0.034	13.0 [7.7, 18.3]
Queer	121	10.0	11	3.8	132	0.001	8.3 [3.6, 13.0]
Asexual	51	4.2	6	2.1	57	0.083	10.5 [2.6, 18.5]
Two-Spirit	9	0.7	6	2.1	15	0.053	40.0 [15.2, 64.8]
Questioning	65	5.4	22	7.6	87	0.152	25.3 [16.2, 34.4]
Other	23	1.9	9	3.1	32	0.211	28.1 [12.5, 43.7]
Province							
British Columbia	191	15.6	56	18.7	247	0.400	22.7 [17.5, 27.9]
Alberta	113	9.3	32	10.7	145		22.1 [15.3, 28.8]
Prairies	64	5.2	9	3.0	73		12.3 [4.8, 19.9]
Ontario	476	39.0	108	36.1	584		18.5 [15.3, 21.6]
Quebec	311	25.5	75	25.1	386		19.4 [15.5, 23.4]
Atlantic Canada	66	5.4	19	6.4	85		22.4 [13.5, 31.2]
Ethnicity [b]							
White/European	1005	82.3	191	63.9	1196	< 0.001	16.0 [13.9, 18.0]
South Asian	21	1.7	19	6.4	40	< 0.001	47.5 [32, 63.0]
Chinese	42	3.4	30	10.1	72	< 0.001	41.7 [30.3, 53.1]
Black	31	2.5	16	5.4	47	0.005	34.0 [20.5, 47.6]
Latinx	21	1.7	13	4.4	34	0.006	38.2 [21.9, 54.6]
Indigenous	68	5.6	31	10.4	99	0.003	31.3 [22.2, 40.4]
Other	49	3.9	22	8.6	71	0.001	31.0 [20.2, 41.7]
Marital status							
Single	596	49.0	140	46.8	736	0.093	19.0 [16.2, 21.9]
Common Law	276	22.7	78	26.1	354		22.0 [17.7, 26.4]
Married	236	19.4	45	15.1	281		16.0 [11.7, 20.3]
Divorced/Separated	79	6.5	24	8.0	103		23.3 [15.1, 31.5]
Widowed	21	1.7	6	2.0	27		22.2 [6.5, 37.9]
Other	9	0.7	6	2.0	15		40.0 [15.2, 64.8]
Main occupation							
Salaried Employee	646	53.3	147	49.2	793	< 0.001	18.5 [15.8, 21.2]
Autonomous worker	92	7.6	29	9.7	121		24.0 [16.4, 31.6]
Student	121	10.0	46	15.4	167		27.5 [20.8, 34.3]
Retired	189	15.6	23	7.7	212		10.8 [6.7, 15.0]
Unemployed	65	5.4	19	6.4	84		22.6 [13.7, 31.6]
Social Aid	48	4.0	28	9.4	76		36.8 [26, 47.7]
Other	51	4.2	7	2.3	58		12.1 [3.7, 20.5]
Education							
High School Diploma or less	343	28.1	120	40.1	463	< 0.001	25.9 [21.9, 29.9]
Collegial Diploma	480	39.3	84	28.1	564		14.9 [12.0, 17.8]
University Degree	397	32.5	95	31.8	492		19.3 [15.8, 22.8]
Household income (K $CAN)							
0 to $39,9	150	18.6	59	27.3	209	< 0.001	28.2 [22.1, 34.3]
$40 to $79,9	239	29.7	66	30.6	305		21.6 [17, 26.3]
$80 to $99,9	133	16.5	32	14.8	165		19.4 [13.4, 25.4]
$100 to $149,9	172	21.3	34	15.7	206		16.5 [11.4, 21.6]
≥ $150	112	13.9	25	11.6	137		18.2 [11.8, 24.7]
Access to a family doctor							
Yes	959	78.5	208	69.6	1167	0.001	17.8 [15.6, 20.0]
No	238	19.5	87	29.1	325		26.8 [22.0, 31.6]
Unknown	24	2.0	4	1.3	28		14.3 [1.3, 27.2]

[a] Prevalence not calculated for this group due to insufficient subjects in the 'Moderate-to-High Risk' category.
[b] Multiple response item, as participants could identify with one or more groups. Percentage columns may not add to 100. *p*-values represent differences between the specified group and all others.
[c] All heterosexual individuals were either 1) not exclusively heterosexual (i.e., identified with more than one sexual orientation) or 2) identified with a current gender that differed from their sex-at-birth.

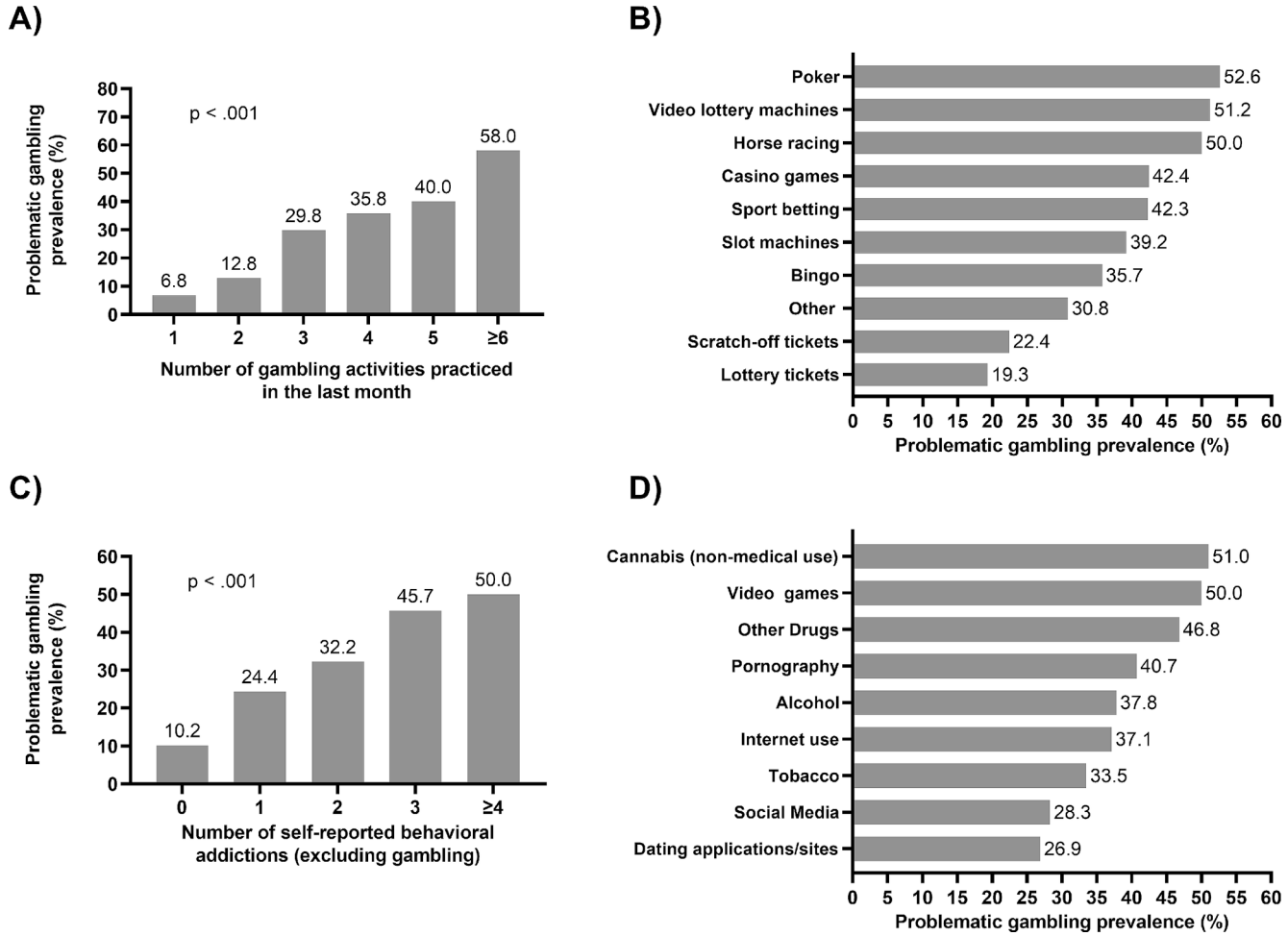

Fig. 1. Problematic gambling prevalence relative to gambling involvement (A), type of gambling activity (B), and number (C) and type of other self-reported problematic behaviors (D) among LGBTQIA2S + individuals having gambled in the last year.

5.25, $p < 0.001$; few times per week or more, OR = 18.99, $p < 0.001$). Certain gambling formats were also associated with a higher risk of problematic gambling. Specifically, those gambling on slot machines ($p < 0.001$) and video lottery machines ($p < 0.001$) had approximately three times higher odds of being problematic gamblers, while poker players had almost twice higher odds ($p = 0.038$). No other gambling formats were significant in the output of the model. Furthermore, certain self-reported problematic behaviors, such as problematic use of alcohol (OR = 1.98, $p = 0.004$), problematic use of cannabis (OR = 2.31, $p = 0.008$), problematic use of the Internet (OR = 1.84, $p = 0.016$), problematic video gaming (OR = 2.52, $p = 0.023$), and problematic pornography viewing (OR = 2.14, $p = 0.006$), represented significant factors associated with problematic gambling. Depressive and anxiety symptoms, as measured by the PHQ-4 scale, indicated that higher scores were associated with higher odds of presenting problematic gambling practices (OR = 1.09, $p = 0.001$).

4. Discussion

This study aimed to examine the gambling habits of LGBTQIA2S + individuals that gambled in the last year and to identify factors associated with problematic gambling among this population in Canada. The current study's results indicated that 9.7 % of LGBTQIA2S + adults having gambled in the last year were moderate −risk gamblers, and 9.9 % were high-risk gamblers.

Contrary to previous literature on the general population suggesting males are at higher risk of presenting with problem gambling (Hing et al., 2016; Johansson et al., 2009; Shaffer et al., 1999) and studies in sexual and gender minority populations suggesting similar conclusions regarding biological males (Malkin & Stacey, 2023; Rider et al., 2019), we did not find evidence of any significant differences regarding sex assigned at birth in the prevalence of problematic gambling among this sample. Despite being included in the logistic regression model, current gender identity was not significantly associated to problematic gambling. This finding is similar to what was observed in a *meta*-analysis of risk factors for problem gambling in the general adult population (Allami et al., 2021), in which the effect sizes for sociodemographic characteristics, including sex (which they referred to as "gender"), were small. The authors hypothesized that these characteristics could represent proxies for other causal factors. For example, impulsivity has been found to be an important risk factor for problem gambling in previous research (Browne et al., 2019; Dowling et al., 2017; Nower et al., 2004),

Table 2
Factors associated with problematic gambling – Logistic regression (n = 1,394).

	B	SE	Wald	*p*	Odds Ratio [95 % CI]
Age (years)	**−0.022**	**0.009**	**5.876**	**< 0.001**	**0.98 [0.96, 1.00]**
Gender identity					
Cisgender man					1.00
Cisgender woman	0.288	0.224	1.651	0.199	1.33 [0.86, 2.07]
Other (transgender, non-binary, other)	0.437	0.393	1.234	0.267	1.55 [0.72, 3.34]
Sexual orientation					
Homosexual	0.355	0.330	1.155	0.282	1.43 [0.75, 2.72]
Bisexual	−0.294	0.307	0.916	0.339	0.75 [0.41, 1.36]
Pansexual	**−0.810**	**0.359**	**5.090**	**0.024**	**0.44 [0.22, 0.90]**
Queer	**−0.957**	**0.406**	**5.562**	**0.018**	**0.38 [0.17, 0.85]**
Other (heterosexual, asexual, Two-Spirit, questioning, other)	0.259	0.322	0.647	0.421	1.30 [0.69, 2.44]
Education					
High School Diploma or less					1.00
Collegial Diploma	−0.350	0.223	2.466	0.116	0.70 [0.45, 1.09]
University Degree	−0.154	0.236	0.426	0.514	0.86 [0.54, 1.36]
White ethnicity	**−0.960**	**0.216**	**19.807**	**< 0.001**	**0.38 [0.25, 0.58]**
Main occupation					
Salaried Employee					1.00
Autonomous worker	0.424	0.312	1.841	0.175	1.53 [0.83, 2.82]
Student	0.536	0.296	3.277	0.070	1.71 [0.96, 3.06]
Retired	−0.448	0.390	1.318	0.251	0.64 [0.3, 1.37]
Unemployed	−0.182	0.433	0.177	0.674	0.83 [0.36, 1.95]
Social Aid	0.342	0.407	0.704	0.402	1.41 [0.63, 3.13]
Other	−0.172	0.509	0.114	0.735	0.84 [0.31, 2.28]
Household income (K $CAN)					
0 to $39,9					1.00
$40 to $79,9	**−0.552**	**0.230**	**5.755**	**0.016**	**0.58 [0.37, 0.90]**
$80 to $99,9	**−0.775**	**0.301**	**6.646**	**0.010**	**0.46 [0.26, 0.83]**
$100 to $149,9	−0.484	0.295	2.705	0.100	0.62 [0.35, 1.10]
≥ $150	−0.632	0.359	3.098	0.078	0.53 [0.26, 1.07]
Gambled on:					
Scratch-off tickets	0.275	0.205	1.805	0.179	1.32 [0.88, 1.97]
Slot machines	**1.165**	**0.215**	**29.232**	**< 0.001**	**3.20 [2.10, 4.89]**
Video lottery machines	**1.137**	**0.256**	**19.799**	**< 0.001**	**3.12 [1.89, 5.14]**
Sports betting	0.215	0.265	0.659	0.417	1.24 [0.74, 2.08]
Horse racing	0.029	0.463	0.004	0.950	1.03 [0.42, 2.55]
Poker	**0.607**	**0.292**	**4.323**	**0.038**	**1.83 [1.04, 3.25]**
Bingo	−0.030	0.226	0.017	0.895	0.97 [0.62, 1.51]
Casino games	−0.036	0.240	0.022	0.881	0.96 [0.60, 1.55]
Gambling frequency (last 12 months)					
Once					1.00
Few times per year	**0.908**	**0.353**	**6.625**	**0.010**	**2.48 [1.24, 4.95]**
Few times per month	**1.658**	**0.373**	**19.776**	**< 0.001**	**5.25 [2.53, 10.89]**
Few times per week or more	**2.944**	**0.403**	**53.302**	**< 0.001**	**18.99 [8.61, 41.85]**
Problematic:					
Alcohol use	**0.681**	**0.237**	**8.245**	**0.004**	**1.98 [1.24, 3.15]**
Tobacco use	0.204	0.269	0.575	0.448	1.23 [0.72, 2.08]
Cannabis use	**0.837**	**0.316**	**7.022**	**0.008**	**2.31 [1.24, 4.29]**
Psychoactive substance use	0.538	0.386	1.945	0.163	1.71 [0.80, 3.65]
Pornography viewing	**0.762**	**0.279**	**7.450**	**0.006**	**2.14 [1.24, 3.71]**
Social media use	−0.350	0.262	1.790	0.181	0.71 [0.42, 1.18]
Video gaming	**0.925**	**0.406**	**5.185**	**0.023**	**2.52 [1.14, 5.59]**
Internet use	**0.612**	**0.253**	**5.842**	**0.016**	**1.84 [1.12, 3.03]**
PHQ-4 score	**0.083**	**0.025**	**11.186**	**0.001**	**1.09 [1.03, 1.14]**
Access to a family doctor					
Yes					1.00
No	0.333	0.205	2.637	0.104	1.39 [0.93, 2.08]

(*continued on next page*)

Table 2 (*continued*)

	B	SE	Wald	*p*	Odds Ratio [95 % CI]
Unsure	−0.673	0.774	0.757	0.384	0.51 [0.11, 2.32]
Intercept	−2.566	0.653	15.449	< 0.001	–

Note. $R^2 = 0.303$ (Cox & Snell), 0.475 (Nagelkerke). Lines in bold are significant predictors.

a trait in which males are often overrepresented (Cross et al., 2011). Regarding LGBTQIA2S + people and impulsivity, very few studies have addressed this matter and only sexual minority individuals have been investigated. For instance, Trocki et al., (2009) observed higher rates of sensation seeking and impulsivity among lesbians, bisexuals, and heterosexual women reporting same-sex partners compared to exclusively heterosexual women. Similarly, Blum et al., (2020) observed significant correlations between same-sex attraction and impulsive and compulsive traits.

Additionally, we observed three specific sexual orientations that were inversely associated with problematic gambling, namely pansexual and queer individuals. Interestingly, these constitute plurisexual identities (as opposed to monosexual, like gay or lesbian orientations). Though not an extensive body of literature exists on the subject, previous research has observed that differences in the experience of plurisexual individuals compared to monosexual individuals may exist, particularly in how they label their sexual identity, its transcendence or change over time, and how they connect overall to the LGBTQIA2S + community (Balsam & Mohr, 2007; Galupo et al., 2017). Replication of these results is imperative to further pursue this line of research, however it remains interesting to uncover how these different experiences may have an indirect effect in their wellbeing and the onset of different problematic behaviors for certain individuals, including problem gambling.

Furthermore, our results were consistent with previous studies in the general population indicating that young adults are at higher risk of presenting with problem gambling, especially between the ages of 18 and 24 (Hing et al., 2016). The multivariate model indicated that as age increases, individuals have lower odds of presenting with problematic gambling. Similarly, as with sex-at-birth, impulsivity is believed to have a mediating role between age and gambling problems (Browne et al., 2019), as it a trait that tends to decrease across the lifespan (Hammond et al., 2012). However, Stanmyre et al. (2023) found in an epidemiological sample that "age moderated the relationship between sexual minority status and problem gambling, such that the risk for high-risk problem gambling increased with age for sexual minority individuals". Replication of these findings are necessary to better understand if age has a distinct relationship to problematic gambling across certain LGBTQIA2S + groups.

Ethnicity was also shown to be a significant factor in the present model. This corresponds with previous studies suggesting that being part of an underrepresented ethnic group (i.e., not being of White ethnicity) is a significant factor associated with problem gambling (Johansson et al., 2009; Sacco et al., 2011; Welte et al., 2004). In our sample, those not identifying as White found themselves at the intersection of at least two minority identities (i.e., due to their ethnic identity and their sexual and/or gender identity). This may comprise unique challenges in building a sense of self and integrating into the community (Enno et al., 2022). Furthermore, experiences of discrimination and marginalization stemming from various aspects of their multifaceted identity, coupled with limited opportunities—whether in professional, social, or cultural spheres— puts members of these communities at risk of lower socioeconomic status, psychological distress, and, in some cases, addictive behaviors (Flett et al., 2023). Indeed, our data shows significantly more problematic gambling among participants who were less educated, unemployed, or on social aid programs, of lower household incomes, as well as for those presenting with higher psychological distress and who engage in other problematic behaviors. Future research should aim to untangle the relationships between problem gambling and its many associated factors, including important mediator and moderator variables, while keeping in mind their interdependence (Bowleg, 2012). This could bring researchers closer to identifying causal risk factors and addressing ways to overcome the unearned disadvantages experienced by underrepresented populations in the system.

Despite scratch-off tickets and lottery tickets being the most popular forms of gambling among the sampled population, the highest proportion of problematic gamblers was found among poker and video lottery machine players, and the logistic regression analysis suggested a significant association between these formats and problematic gambling outcomes. In Allami et al.'s (2021) metanalysis, electronic gambling machines and poker were found to be risk factors with large effect sizes. Existing evidence also suggests that video lottery terminals are one of the most harmful gambling activities in Canada in terms of the money spent by gamblers and their association with moderate and high-risk gambling (MacLaren, 2016). Due to their characteristic high rate of play and short delay between the wager and outcome, gambling modalities like poker and video lottery machines have a more addictive potential than lottery tickets. In the latter form of gambling, there is little involvement on the gambler's end (just purchasing the ticket and waiting) and a longer delay until the outcome is known (e.g., a weekly or monthly lottery). Furthermore, our results showed that those engaging in multiple forms of gambling have a significantly higher prevalence of problematic gambling, and higher gambling frequency in a year significantly increased the odds of presenting problematic gambling practices. Altogether, our findings support previous research indicating that the gambling format, gambling involvement, and gambling frequency all have strong associations with problem gambling (Binde et al., 2017).

4.1. Limitations

The present study has certain limitations. First, according to the eligibility criteria, our sample was composed solely of people who reported gambling in the past year, which limits the scope of generalizability to the entirety of LGBTQIA2S + communities (i.e., those who do not gamble). Second, prevalence estimates should be interpreted with caution. We encountered issues with statistical power regarding the sample sizes for certain demographics, given not enough individuals comprised certain comparison groups (e.g., certain sexual and gender minority groups, as well as certain ethnicity groups), prevalence estimates may seem inflated. These values should not be regarded as generalizable prevalence estimates. This also limited our ability to conduct subgroup analyses. Future research should aim to further explore differences within sexual and gender minority groups, as they have only been examined as a whole and compared with their heterosexual and/or cisgender counterparts. Another limitation lies in that our questionnaire did not distinguish between online and in-venue/in-person gambling practices. Given the recent technological advances that have led to the transition to online activities, it remains essential to understand the effect of online gambling on this group. Moreover, the cross-sectional nature of this project phase does not allow us to conclude that factors associated with problematic gambling are causal; therefore, longitudinal studies on this matter are imperative. As a quantitative study, we encountered limitations when addressing the nuances of gender identity and sexual orientation within our sample. Recognizing the fluidity and overlapping nature of these constructs, we hope that the qualitative phase of this project will allow us to gain a deeper understanding of the nuanced gambling experiences of the LGBTQIA2S + population and the role of their identities, if any, in these associations. In addition, our data collection was solely based on self-reports, which can result in some degree of self-report bias and social desirability effects.

Finally, only participants speaking English or French were eligible to participate.

5. Conclusion

To our knowledge, this research project is the first pan-Canadian study to examine LGBTQIA2S + individuals who gamble. Our data revealed that 9.7 % of the sample were moderate-risk gamblers and 9.9 % were high-risk gamblers, highlighting a significantly higher proportion of problematic gambling among young adults and non-White individuals. Moreover, individuals gambling more frequently, those gambling on slot machines, video lottery machines or poker, and those reporting engaging in other problematic behaviors may be at an elevated risk of presenting with problematic gambling. However, further research on this population is needed to better understand their experiences leading directly or indirectly to the onset of a gambling problem, the challenges encountered when trying to seek support for an existing problem, and the implementation of comprehensive measures to better prevent and reduce the harms associated with problem gambling.

6. Author agreement

We certify that all authors have seen and approved the final version of the manuscript being submitted. We warrant that this article constitutes original work and has not received prior publication nor is under consideration for publication elsewhere.

CRediT authorship contribution statement

Magaly Brodeur: Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization. **Natalia Muñoz Gómez:** Writing – review & editing, Writing – original draft, Visualization, Validation, Formal analysis, Data curation. **Nathalie Carrier:** Writing – review & editing, Writing – original draft, Visualization, Validation, Formal analysis, Data curation. **Pasquale Roberge:** Writing – review & editing, Validation, Methodology, Conceptualization. **Julie-Christine Cotton:** Writing – review & editing, Validation, Methodology, Conceptualization. **Eva Monson:** Writing – review & editing, Validation, Methodology, Conceptualization. **Adèle Morvannou:** Writing – review & editing, Validation, Methodology, Conceptualization. **Marie-Ève Poitras:** Writing – review & editing, Validation, Methodology, Conceptualization. **Anaïs Lacasse:** Writing – review & editing, Validation, Methodology, Conceptualization. **Didier Jutras-Aswad:** Writing – review & editing, Validation, Methodology, Conceptualization. **Yves Couturier:** Writing – review & editing, Validation, Methodology, Conceptualization. **Christine Loignon:** Writing – review & editing, Validation, Methodology, Conceptualization. **Olivier Simon:** Writing – review & editing, Validation, Methodology, Conceptualization. **Catherine Hudon:** Writing – review & editing, Validation, Methodology, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Magaly Brodeur reports financial support was provided by Canadian Institutes of Health Research. Dr. Jutras-Aswad has held research grants and contracts in the areas of substance use, health, policy from public funding and government organizations (i.e., public-only sources) in the last five years. He has received study materials from Exka and Cardiol Therapeutics for publicly funded clinical trials examining the behavioral, cognitive, and biological effects of cannabinoids. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data will be made available on request.

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