Migrating from Land-Based to Online Gambling:

Who bets on *what* and *why*?

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Land acknowledgement

- In the spirit of respect, reciprocity, and truth, I would like to acknowledge that the townsite of Banff is located within the Treaty 7 region of Southern Alberta. These sacred lands are a gathering place for the Niitsitapi from the Blackfoot Confederacy, of whom the Siksika, Kainai, and Piikani First Nations are part; the Îyârhe Nakoda of the Chiniki, Bearspaw, and Goodstoney First Nations; the Tsuut’ina First Nation; the Métis Nation of Alberta, and many others whose histories, languages, and cultures continue to enrich the Southern Alberta community.

Disclosures

- The research questions presented herein were pursued with the help of colleagues and the results were first published in the *International Journal of Mental Health and Addiction* by Springer Nature*:*

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Online gambling

- Cross-sectional studies show that online gambling is the strongest correlate associated with problem gambling (PG) in the general population.[1]

[1] Allami et al. (2021)

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A meta-analysis of problem gambling risk factors in the general adult population

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Table 1 Meta-analysis estimates: odds ratios sorted from high to low, confidence intervals, number of studies, relative risk and effect size.

Correlate	*Category*	*OR*	*95% CI*	*P*	*k*	*MCGR*	*RR*	I^2	*Effect size*
Internet gambling	GA	7.59	(5.24, 10.99)	0.000	19	0.03	6.34	85%	Strong
EGM and slot machines (excluding casino)	GA	7.20	(5.82, 8.90)	0.000	52	0.02	6.40	92%	Strong
EGM and slot machines (including casino)	GA	6.78	(5.57, 8.26)	0.000	54	0.02	6.08	92%	Strong
Poker	GA	5.39	(4.27, 6.82)	0.000	12	0.03	4.77	73%	Strong
Attempted suicide	PS	4.92	(2.15, 11.27)	0.000	6	0.04	4.25	92%	Medium
Casino table games	GA	4.91	(4.34, 5.55)	0.000	22	0.03	4.39	53%	Medium
Cardrooms	GA	4.70	(2.44, 9.04)	0.000	5	0.05	3.96	89%	Medium
Daily lottery	GA	4.69	(3.45, 6.36)	0.000	8	0.04	4.08	46%	Medium
Problems due to alcohol/drugs	SU	4.66	(3.26, 6.65)	0.000	17	0.03	4.20	82%	Medium
Keno	GA	4.62	(3.42, 6.24)	0.000	10	0.04	4.04	87%	Medium
Problems due to alcohol	SU	4.53	(2.96, 6.96)	0.000	11	0.03	4.10	78%	Medium
Casino gambling (EGM, slots, table games)	GA	4.51	(3.95, 5.15)	0.000	50	0.03	4.08	78%	Medium
Suicidal thoughts	PS	4.32	(2.88, 6.50)	0.000	8	0.03	3.93	88%	Medium
Card games	GA	4.30	(3.13, 5.91)	0.000	19	0.04	3.80	81%	Medium
Pulltabs	GA	4.21	(3.23, 5.50)	0.000	12	0.04	3.73	64%	Medium
Pari-mutual (sports/races)	GA	4.06	(1.56, 10.56)	0.004	4	0.05	3.52	85%	Medium
Cocaine use	SU	3.96	(1.59, 9.86)	0.003	7	0.05	3.45	80%	Medium
Sports (all)	GA	3.90	(3.36, 4.51)	0.000	54	0.04	3.49	79%	Medium
Anxiety issues	PS	3.76	(2.90, 4.86)	0.000	7	0.04	3.38	58%	Medium
Family member ever had a gambling problem	PS	3.69	(2.98, 4.58)	0.000	32	0.04	3.33	74%	Medium
Games of skill	GA	3.68	(3.04, 4.45)	0.000	24	0.04	3.32	58%	Medium
EGM and slot machines (casino only)	GA	3.61	(2.91, 4.48)	0.000	4	0.03	3.35	27%	Medium
Ever been incarcerated	PS	3.47	(2.58, 4.68)	0.000	5	0.04	3.16	49%	Medium
Horse, harness or greyhound races	GA	3.44	(2.86, 4.13)	0.000	41	0.03	3.20	87%	Medium
Internalizing symptoms	PS	3.40	(2.86, 4.05)	0.000	19	0.03	3.17	63%	Medium
Depression issues	PS	3.29	(2.73, 3.97)	0.000	17	0.03	3.08	66%	Medium

Online gambling

- Cross-sectional studies show that online gambling is the strongest correlate associated with problem gambling (PG) in the general population.[1]

- People who engage in online gambling often do so as a way of diversifying their already intensive gambling involvement.[2]

- No longitudinal study has looked at risk factors predicting the initiation of online gambling while keeping accessibility to land-based venues constant.

[1] Allami et al. (2021)
[2] Wood et al. (2012)

Research questions

- Does starting to gamble online lead to an increase in gambling problems, above and initial PG severity and gambling involvement?
- Does the risk differ depending on the type of games?
- Which motivational and psychological risk factors explain why people start gambling online?
- Do these factors affect which type of gambling activities people start engaging in?
- Do men and women prefer different online games?

Participants

AGRI National Project
Online panel

10,199
Canadian adults who gambled at least monthly in 2018

4,707
participants completed a follow-up survey one year later

3,753
(47% men)
Gambled exclusively in land-based venues at baseline

367
(53% men)
Gambled online at follow-up

Measures

Intensity of gambling involvement	Mental health (DSM-5)[5]	Gambling motivations
• Problem and Pathological Gambling Measure (PPGM)[3] • Number of different types of gambling engaged in[4] • Total frequency reported on all types of gambling[4] • Total time reported on all types of gambling in a typical month[4]	• Major depressive disorder • Generalized anxiety disorder • Substance use disorder	• Excitement/enjoyment/fun • To win money • To develop my skills • To compete or for the challenge • To socialize • To support worthy causes • To escape, relax, or relieve stress • It makes me feel good about myself

[3] Williams et al., (2010)
[4] Williams et al., (2017)
[5] American Psychiatric Association (2013)

Analytical plan

1

Latent Class Analysis

Determine whether engagement in a particular activity is commonly associated with participation in certain other activities

2

Binary Logistic Regression

Predict PG according to the type of online gambling activities participants start engaging in one year later, controlling for baseline gambling intensity and PG scores.

3

Binary Logistic Regression

Predict online gambling one year later using sex, gambling intensity, gambling motivations, PG scores, and mental health variables as predictors.

4

Chi-square tests of independence

Compare classes of people who gamble online in terms of sex, mental health, and gambling motivations

(1) What types of online gambling did people start engaging in?

Men are more likely to start betting on sports & stocks

Women are more likely to start gambling on the lottery

(2) Does online gambling increase problem gambling?

Variables predicting PPGM score at follow-up	*B*	*p*	OR
Sex	-0.053	.729	0.948
Baseline PPGM score	**0.538**	**< .001**	**1.713**
Number of different types of gambling engaged in	**0.151**	**.049**	**1.163**
Total frequency reported on all types of gambling	0.052	.060	1.053
Total time reported on all types of gambling in a typical month	0.001	.394	1.001
Did not start gambling online	-	**< .001**	-
Lottery	**0.656**	**.027**	**1.927**
Casino and bingo	**1.614**	**< .001**	**5.022**
Sports	**1.769**	**< .001**	**5.866**
Constant	-4.081	< .001	0.017

Notes. *n* = 3,749. Statistically significant associations at the .05 level are shown in bold.
PPGM: Problem and Pathological Gambling Measure. OR: Odds ratio.

(3) Why do people start gambling online?

	Prospective associations (baseline)				Concurrent associations (follow-up)			
Variables	*β*	SE	*p*	OR	*β*	SE	*p*	OR
Sex	-0.274	0.114	0.017	0.761				
Intensity of gambling involvement								
Number of different types of gambling engaged in	0.256	0.062	< .001	1.292	0.375	0.061	< .001	1.455
Total frequency reported on all types of gambling					0.057	0.020	.005	1.059
Mental health								
Major depressive disorder					0.462	0.180	.010	1.588
Substance use disorder	0.522	0.228	.022	1.686				
Gambling motivations								
For excitement/enjoyment/fun	0.253	0.122	.038	1.288				
To escape, relax, or relieve stress	-0.334	0.158	.035	0.716				
To support worthy causes					0.768	0.145	< .001	2.156

PPGM score total	Gambling because it makes me feel good about myself	Gambling to socialize	Gambling to develop my skills
Total time reported on all types of gambling in a typical month	Gambling to compete or for the challenge	Gambling to win money	Generalized anxiety disorder

(4) What about specific types of gambling?

Lottery

Predictor	At baseline	At follow-up
Mental health		
Substance use disorder	-	
Motivations		
For excitement/enjoyment/fun		-
To support worthy causes	+	+
To escape, relax, or relieve stress	-	-

(4) What about specific types of gambling?

Casino games

Predictor	At baseline	At follow-up
Mental health		
Major depressive disorder	+	
Substance use disorder	+	+
Motivations		
For excitement/enjoyment/fun		+
To support worthy causes	-	-
To escape, relax, or relieve stress	+	+

(4) What about specific types of gambling?

Sports betting

Predictor	At baseline	At follow-up
Mental health		
Substance use disorder		+
Motivations		
For competition or the challenge		+

(5) Women and specific forms of gambling

Mood dysregulation is associated with riskier forms of gambling

Predictor	Prospective	Concurrent
Mental health		
Generalized anxiety disorder	- Lottery + Casino games	
Major depressive disorder		- Lottery + Casino games
Motivations		
To support worthy causes	+ Lottery - Casino games	+ Lottery - Casino games
To escape, relax, or relieve stress	- Lottery + Casino games	- Lottery + Casino games

Group sizes:

- Lottery, *n* = 105
- Casino games, *n* = 59
- Sports (not shown), *n* = 9

(5) Men and specific forms of gambling

Disordered substance use is associated with engaging in riskier forms of gambling

Predictor	Prospective	Concurrent
Mental health		
Substance use disorder	- Lottery + Casino games + Sports betting	- Lottery + Casino games + Sports betting
Motivations		
To support worthy causes		+ Lottery - Casino games

Group sizes:

- Lottery, *n* = 88
- Casino games, *n* = 59
- Sports, *n* = 47

Limitations

Casino games may be further divided into luck-based and skill-based table games

Gender was not assessed

Using an online panel of people who gamble monthly may have also biased sampling toward more technology-savvy individuals with other risk factors associated with online gambling

Interactions between mental health and gambling motivations could not be analysed

Take-home messages

Online gambling is not a single construct

Mental health and **motivational** risk factors can predict initiation to online gambling, **even when considering intensity of gambling involvement**.

5x

Starting to **gamble online on casino games or sports** was associated with ~5x higher odds of PG, compared to continuing to gamble in land-based venues only.

~2x higher odds of PG for **online lottery games.**

Women **with anxiety disorders or who gambled to escape** were particularly likely to migrate to riskier forms of online gambling.

Men with **substance use disorders w**ere more likely to migrate to riskier forms of online gambling.

People did not start betting online on sports to satisfy their desire to compete, but instead **developed these competitive motives *after* being exposed to sports betting.**

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Appendix

Model Fit Indicators for Latent Class Analysis (n = 367)

Model	AIC	BIC	Entropy	LMR-ALRT
2-class	2119.58	2185.97	0.818	< .001
3-class	**2058.24**	**2159.70**	**0.859**	**< .001**
4-class	2048.35	2185.03	0.878	.002
5-class	2035.25	2207.39	0.928	< .001
6-class	2020.05	2227.04	0.977	< .001

Note. Final model is shown in bold.
A 4-class model yielded a fourth class (bingo only) that comprised less than 5% of participants.
AIC: Akaike Information Criterion; BIC: Bayesian information criterion; LMR-ALRT: Lo-Mendell-Rubin adjusted likelihood ratio test.

Table taken from:
Allami, Y., Légaré, A. A., Williams, R. J., & Hodgins, D. C. (2023). Migrating from land-based to online gambling: Sex, mental health and motivational predictors. International Journal of Mental Health and Addiction. Advance online publication. https://doi.org/10.1007/s11469-023-01168-x

Probability of Engaging in Each Gambling Activity, According to Latent Class (n = 367)

Gambling type	Lottery players n = 193	Casino and bingo players *n* = 118	Sports and stocks *n* = 56	All participants combined *n* = 367
Lottery	**1.000**	0.280	0.098	0.616
Instant lottery	0.100	**0.239**	0.030	0.139
EGM	0.002	**0.477**	0.000	0.169
Casino table games	0.000	**0.173**	0.068	0.071
Sports	0.000	0.061	**1.000**	0.166
Bingo	0.014	**0.217**	0.000	0.076
Other	0.007	**0.148**	0.030	0.060
Stocks	0.063	0.149	**0.248**	0.120
Note. Defining characteristics for each class are shown in bold.				

Table taken from:

Allami, Y., Légaré, A. A., Williams, R. J., & Hodgins, D. C. (2023). Migrating from land-based to online gambling: Sex, mental health and motivational predictors. International Journal of Mental Health and Addiction. Advance online publication. https://doi.org/10.1007/s11469-023-01168-x

Class Membership Predicting Problem Gambling Status at Follow-Up (n = 3,749)

Variable	β	S.E.	Wald	df	p	OR
Sex (0 = Men, 1 = Women)	-0.053	0.153	0.12	1	.729	0.948
Baseline PPGM score	**0.538**	**0.033**	**259.91**	**1**	**< .001**	**1.713**
Number of different types of gambling engaged in	**0.151**	**0.077**	**3.86**	**1**	**.049**	**1.163**
Total frequency reported on all types of gambling	0.052	0.027	3.55	1	.060	1.053
Total time reported on all types of gambling in a typical month	0.001	0.001	0.73	1	.394	1.001
Did not start gambling online	-	-	60.65	3	< .001	-
Lottery class	**0.656**	**0.297**	**4.89**	**1**	**.027**	**1.927**
Casino and bingo class	**1.614**	**0.257**	**39.57**	**1**	**< .001**	**5.022**
Sports and stocks class	**1.769**	**0.357**	**24.54**	**1**	**< .001**	**5.866**

Note. Statistically significant associations at the .05 level are shown in bold. PPGM: Problem and Pathological Gambling Measure. OR: Odds ratio.

Table taken from:

Allami, Y., Légaré, A. A., Williams, R. J., & Hodgins, D. C. (2023). Migrating from land-based to online gambling: Sex, mental health and motivational predictors. International Journal of Mental Health and Addiction. Advance online publication. https://doi.org/10.1007/s11469-023-01168-x

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