



The impact of COVID-19 on gambling and gambling disorder: emerging data

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Purpose of review

The lockdown response to the COVID-19 pandemic has significantly impacted commercial gambling in many jurisdictions around the world. The goal of this review is to systematically identify and describe the survey data and findings to date examining the effect on individual gambling and gambling disorder.

Recent findings

Of the 17 publications meeting inclusion criteria, the majority reported cross-sectional assessments ($n = 11$, 65%) and remainder were longitudinal in that they had earlier gambling data for participants ($n = 6$, 35%). Not surprisingly given the closure of land-based gambling, an overall reduction in gambling frequency and expenditure was reported in all studies. The estimate of the proportion of participants in both the general population and the population that gambles who increased overall gambling or online gambling was variable. The most consistent correlates of increased gambling during the lockdown were increased problem gambling severity, younger age groups, and being male.

Summary

These results suggest that the impacts of the COVID-19 pandemic on gambling and problematic gambling are diverse – possibly causing a reduction in current or future problems in some, but also promoting increased problematic gambling in others. The longer-term implications of both the reduction in overall gambling, and the increase in some vulnerable groups are unclear, and requires assessment in subsequent follow-up studies. However, in the short term, individuals with existing gambling problems should be recognized as a vulnerable group.

Keywords

COVID-19, gambling, gambling disorder, lockdown

INTRODUCTION

The response to the COVID-19 pandemic has significantly impacted commercial gambling in jurisdictions around the world. Numerous land-based gambling venues such as casinos, bingo halls, horse-racing tracks, bars and clubs with electronic gambling machines (EGMs), lottery retailers, betting shops and poker rooms were forced to close, in particular during the first phase ‘lockdown’ in March and April 2020 [1–4]. Since the initial lockdown, some venues re-opened fully or in a modified fashion, some remain open and others have closed during the second wave restrictions. Like the course of the pandemic itself, the future availability of gambling is unknown and unpredictable. This paper reviews evidence to date on the impact on individuals of these effects.

At the same time that land-based gambling accessibility decreased, online gambling sites continued to operate. Some media reports indicated that business had, in fact, flourished and that the

pandemic served to promote this increasingly popular gambling format [5,6]. Online gambling sites typically include the full range of types of gambling, including lottery ticket sales, casino table games such a roulette, blackjack and craps, slot machines, online poker and sports betting. With the exception of sports betting, which was affected by the cessation or reduction of professional sports worldwide,

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KEY POINTS

- The lockdown response to the COVID-19 pandemic has significantly reduced access to commercial gambling in many jurisdictions around the world.
- Not surprisingly given the closure of land-based gambling, an overall reduction in gambling frequency and expenditure was reported in all 17 studies reported to date.
- The most consistent correlates of the subgroup of people that increased gambling during the lockdown was increased problem gambling severity, younger age groups, and being male.
- The impact of the COVID-19 pandemic on gambling and problematic gambling are diverse – possibly causing a reduction in current or future problems in some, but also promoting increased problematic gambling in others.

all other types have been continuously available from both legally regulated and unregulated site operators. Some jurisdictions, however, have taken steps such as limiting advertising [7] and imposing a daily betting cap to minimize potential harms during the pandemic [8].

Gambling, a leisure pursuit for most individuals, has the potential to cause harm to the gambler, their family and the community [9,10]. It is considered to be a potentially addictive behaviour, which for some individuals can lead to gambling disorder (GD). GD is characterized by the continuation of gambling despite negative impacts, increased priority to gambling compared with other life interests, and impairment of control over gambling involvement [11]. Individuals with GD tend to gamble more frequently on all gambling formats, although faster-paced forms of gambling such as EGMs and certain casino table games are considered particularly problematic [12].

Online gambling is considered to be a particularly problematic gambling format, given the relative lack of constraints on how and when it can be accessed, its solitary nature, and the wide variety of types of gambling available. Research consistently shows higher rates of GD among online gamblers versus individuals who only gamble at land-based venues [13,14]. However, the direction of causality is unclear. It is possible that online gambling is associated with GD mostly because it provides additional and more flexible opportunities for individuals with GD to access gambling versus directly facilitating GD. Consistent with this, online gamblers tend to gamble at land-based venues as well as online. Nonetheless, one significant concern raised with respect to the pandemic lockdown of land-

based venues is that individuals will migrate to online gambling formats for the first time, and that this involvement will increase vulnerability to negative harms and GD [15,16]. Similarly, another concern is that individuals who already gamble online will increase their engagement, which might push them into problematic gambling.

As well as affecting gambling availability, the social and financial effects of the pandemic might also influence people's desire to gamble. The stress and social isolation associated with the pandemic can lead to gambling as an emotional escape, a well-documented and frequent motivation for gambling that is linked to GD [12]. These impacts might also lead to increased relapse among people in recovery from GD [17,18]. The financial pressure of job insecurity and unemployment can motivate individuals to use gambling as a way to manage debts [19]. Speculative stock trading has been identified as an example of gambling-like behaviour. It has been reported that stock trading emerged as a popular distraction for novice investors during the lockdown and reports indicate popular trading platforms added millions of new accounts in the first four months of the year [20,21].

The closure of land-based gambling venues also potentially impacts individuals with GD in positive ways. One potential positive effect is that the reduction of gambling availability provides an impetus for people to reduce or cease gambling [22]. In Canada, calls to the Ontario gambling helpline declined after the casinos closed [23], suggesting fewer individuals were experiencing acute gambling-related problems.

The pandemic is ongoing, and any initial effects on gambling and GD may or may not be sustained as the pandemic evolves and resolves. Although numerous types of research designs including qualitative and mixed methods can help us understand the effects, surveillance in the form of cross-sectional and longitudinal surveys is crucial [15]. The goal of this review is to identify and describe the survey data and findings to date examining the effect on individual gambling and GD. Specifically, we conducted a systematic search for published journal articles, research reports and unpublished manuscripts.

METHODS

Database searches were undertaken during the first week of January 2020 to identify peer-reviewed journal articles and other relevant research reports examining changes in individuals' gambling behaviour during the COVID-19 pandemic. The bibliographic databases searched included *PsycINFO* [via OVID], *Medline* [via OVID], *PubMed* and *Web of Science Core Collection*. Supplementary sources

searched included the Gambling Research Exchange's *Evidence Centre* database, *Google Scholar* and *PsyArXiv* preprints. Searches employed a combination of keyword and controlled search terms (e.g., Medical Subject Headings) which resulted in the identification of 34 separate articles or reports. Seventeen articles and reports met the following criteria: collection of data from individual gamblers; published post-March, 2020; COVID effect assessed, and; English language.

RESULTS

Study parameters

Of the 17 publications meeting inclusion criteria, seven appeared as peer-reviewed journal articles, three were preprints and seven were online reports which did not appear to have been peer-reviewed. Table 1 provides a description of each study, and Table 2 summarizes the findings concerning the COVID-19 impact on gambling. The surveys were conducted in a range of western middle- and upper-income countries. About half were designed to be representative of the adult population ($n=9$, 53%), and five of these weighted their sample based upon demographic characteristics. A number of surveys recruited the adult population of recent gamblers ($n=3$, 18%) or subpopulations of gamblers – online gamblers ($n=1$, 6%); land-based venue gamblers ($n=1$, 6%); regular online sports bettors ($n=1$, 6%). Two studies assessed special populations, including elite athletes and individuals recovered from substance use disorder. The studies most commonly utilized existing online panels or MTurk for recruitment ($n=9$, 53%). Two samples used the customer databases of online gambling providers. Two samples used multiple recruitment methods, including social media, previous research participants, and participants recruited by other participants (snowball method).

All 17 were online surveys. The majority was cross-sectional assessments ($n=11$, 65%) and remainder was longitudinal in that they had collected earlier gambling data for participants ($n=6$, 35%). Most of the cross-sectional survey reports were silent on whether a subsequent follow-up of participants was planned. All the surveys provided specific data collection dates that aligned with the first lockdown period occurring from March to May 2020. Surveys in New Zealand [40] and Australia [26] also reported the results of a follow-up assessment to describe changes post lockdown. The Fluharty study in Great Britain [29] reported an assessment conducted in early August, which was described as an easing of lockdown.

Gambling behaviour data were collected in a variety of ways in the available surveys. One study uniquely used gambling expenditure data from an online provider. This type of behavioural data is more accurate than retrospective self-report, although it is limited in that it does not necessarily reflect all of an individual's informal gambling or gambling with other providers. All other studies relied on self-report. A number of surveys assessed gambling engagement for each type of gambling available locally using structured questions. Reports assessing recent gambling have previously been found to have good reliability [42]. A number of the cross-sectional studies used parallel questions to obtain a description of the individual's typical gambling in the time prior (e.g., 6, 12 months) to the pandemic. These reports are more subject to memory and other biases. Three longitudinal studies had self-reports from earlier time periods using the same assessment questions and, as such, assessed changes over time.

Finally, a number of surveys assessed the perception of change in gambling versus assessing actual change (e.g., did your gambling increase, decrease or stay the same?). These questions are likely to be the least reliable and valid of the options as memory is possibly influenced by popular assumptions about the impact of the pandemic. Ten of the 17 studies incorporated a measure of problem gambling severity into their survey, in all cases the Problem Gambling Severity Index [43], which is widely used in prevalence studies.

Gambling reduction

Not surprisingly given the closure of land-based gambling venues, an overall reduction in gambling frequency and expenditure was reported in all 17 studies. Two studies assessed participants' perceptions of the reasons or motives for the decrease in their gambling. In a New Zealand study, the Health Promotion Agency presented a checklist of reasons to participants. The major reason for gambling online less was financial (50%) followed by not wanting to gamble around family (15%), thinking they were gambling too much (13%) and someone suggesting that they reduce gambling (11%) [39]. A YouGov online weighted panel in Great Britain first used open-ended questions to assess reasons for gambling less and then presented a checklist [31]. Most frequently mentioned in the open-ended questions were no live sports (22%), shopping less overall (13%), only did the lotteries occasionally (9%), lack of interest (8%), and less money (8%). Within the checklist, no desire to gamble (30%), only gambling on occasion (28%), and only bet on sports events that are cancelled (28%) were most frequently mentioned.

Table 1. Parameters of studies assessing COVID-19 impact on gambling

Authors/Date	Location	Sample	Recruitment	N	Peer reviewed	Assessment date	Completion rate	Design	Follow-up plan identified?	% male	PG measure	Gambling measure
Abacus Data, 2020 [24]	Canada	Adults age 18 plus – sample weighted to population	Online panel	1 500	No	7–12 May 2020	NA	Cross-sectional online survey	No	NR	NA	Frequency of online gambling before the pandemic and past month; number opening new online gambling accounts; perceived change in gambling since COVID
Auer <i>et al.</i> , 2020 [25]	Sweden, Germany, Norway, Finland	Regular online sports bettors, betting at least 5 of 10 weeks between January 1 and March 7	All customers of online gambling operator	5396	Yes	1 January to 30 April 2020	100%	Longitudinal behavioural data	No	NR	NA	Money wagered, daily gambling activity
Biddle, 2020 [26]	Australia	Adults age 18 plus- sample weighted to population	Online panel	May 2020 – 3219; November 2020 – 3029; April 2020 – 1773; April 2019 NR	No	April 201; April, May, November 2020	May to November -94.7%; April-May 2020- 54.6%	Longitudinal online survey (4 waves of life in Australia panel)	No	Approx. 50%	PGSI	Gambling prevalence past 12 months, 11 types of gambling
Bonny-Noach and Gold, 2020 [27]	Israel	Individuals recovered from substance use disorder	Snowball convenience sample	113	Yes	April 2020	NA	Cross-sectional online survey	No	78%	NA	Likert scale of involvement in online gambling before and after pandemic outbreak
Brown and Hickman, 2020 [28]	Australia	Adults	Online panel i- Link	1 000	No	3–6 April 2020	NA	Cross-sectional online survey	No	49%	NA	Frequency of online gambling in past month, six months, 12 months. Six activities
Fluharty <i>et al.</i> , submitted [29]	UK	Adults, age 18 plus; weighted to population	Social and traditional media, previous studies, existing networks, targeted recruitment of low income, low education, unemployed	19,963 for first research question (32,559 started the gambling module); 7026 for second research question which excluded nongamblers; 556 participants for third question who had increased gambling in week 10 compared to before lockdown.	In progress	1) 28 May to 4 June 2020; 2) 30 July to 7 August 2020	Approx. 27% of entire sample	Longitudinal online study with weekly assessments – gambling assessed as part of focus on COVID impacts	Yes	26% unweighted, 51% weighted	NA	Frequency of gambling since lockdown (past 10-weeks) on 6 types; Perceived change overall during lockdown (assessment 1), and since prelockdown (assessment 2)
Gainsbury <i>et al.</i> , 2020 [30]	Australia	Adults age 18 plus; past year gamblers	Social media, previous research participants	769	Yes	1–22 May 2020	65%	Cross-sectional online survey	No	85.2	PGSI	Frequency in typical month in past year and past 30 days for 17 gambling activities
Gunstone <i>et al.</i> , 2020 [31]	Great Britain	Adults, weighted to the population	Online panel	9067	No	October, 2019 and May, 2020	69% of phase 1 and 2 baseline sample	Longitudinal online survey with qualitative substudy (n = 8)	No	48%	PGSI	Past year and past month gambling on 10 activities; gambling motivations

Table 1 (Continued)

Authors/Date	Location	Sample	Recruitment	N	Peer reviewed	Assessment date	Completion rate	Design	Follow-up plan identified?	% male	PG measure	Gambling measure
Håkansson, 2020 [32]	Sweden	Adults age 18 plus -	Online panel	2016	Yes	24 April to 3 May 2020	NA	Cross-sectional online survey	No	51%	PGSI	Perceived change in gambling during COVID; overall and for 8 gambling types; gambling expenditures
Håkansson, 2020b [33]	Sweden	Adults past year online gambler (10 plus occasions), age 18 plus	Online panel	997	Yes	5–12 May 2020	NA	Cross-sectional online survey	No	75%	PGSI	Gambling in past 30 days and past year for 11 gambling types
Håkansson <i>et al.</i> , 2020 [34]	Sweden	Elite Athletes in Ice Hockey, Soccer and handball, age 15 plus	E-Mail solicitation	327	Yes	20 May to 10 June 2020	29% [39% (soccer); 16% (ice hockey); 37% (handball)]	Cross-sectional online survey	No	62%	PGSI	Self-assessment of change in gambling overall and sports betting specifically (Likert scale)
Jenkinson <i>et al.</i> , 2020 [35]	Australia	Adult past year gambler, age 18 plus	Social media, E-Mail, word of mouth	2019	No	10 June to 31 July 2020	NA	Cross-sectional online survey	No	73%	PGSI	Frequency of gambling in past year and past 4 weeks on 18 activities
Leonard <i>et al.</i> , submitted [36]	Canada	Adults, aged 18 plus, previous gamblers	Online panel	3439	In progress	14 May to 1 June 2020	72.2% retention rate from Pre-COVID baseline	Cross-sectional and longitudinal online survey	Yes	50.7% (Pre-COVID baseline)	PGSI	past month gambling
Price, 2020 [37,38]	Ontario, Canada	Past year gamblers, age 18 plus	Online panel	2005 (including a sub-sample of 1081 online gamblers)	Yes	21–28 April 2020	NA	Cross-sectional online survey	Yes	50%	PGSI	Typical and last six-week online participation; perceived influence of COVID; perceived motives for gambling
Te Hirianga Haurua Health Promotion Agency, 2020 [39]	New Zealand	Adults, age 18 plus	Online panel	1190	No	7–13 April 2020	NA	Cross-sectional online survey	Yes	49%	NA	Self-assessment of overall gambling change during lockdown; perceived reasons for change
Te Hirianga Haurua Health Promotion Agency, 2020b [40]	New Zealand	Adults, age 18 plus; weighted to population	Online panel	925	No	10–19 June 2020 (post lockdown)	78% of baseline	Longitudinal online survey	Not indicated	49%	NA	Self-assessment of change in gambling engagement online, casino, pokie, loito and NZ TAB; self-reported worry about gambling
Xuereb <i>et al.</i> , submitted [41]	USA	Adults, age 18 plus, American citizens who gambled in past three months at land-based venue	Amazon MTurk	424	In progress	9 April 2020	66% of those starting survey	Cross-sectional online survey	No	64%	PGSI	Ever engaged in online gambling, perceived change in amount and magnitude of change, readiness to change gambling

Table 2. Results of studies assessing COVID-19 impact on gambling

Authors/Date	Impact on Gambling	Predictors of change	Author conclusions	Notes and limitations
Abacus, 2020 [24]	6% opened new online account; of previous online gamblers (24% of sample), 47% unchanged, 26% increased, and 27% decreased.	Opening online account related to younger age and previous gambling (18% of previous gamblers; 10% of age 18 to 29 versus 4% of ages 60 plus); increased gambling related to younger age.	None provided.	No discussion of results; limited description of methodology, no statistical analyses.
Auer <i>et al.</i> , 2020 [25 ^a]	Significant reductions in frequency and expenditure among sports bettors wagering in online casinos, compared to two months prior.	Highest frequency gamblers (i.e., those who reported gambling at least 9 of the 10 weeks) showed least reduction.	The findings suggest that there was a significant decrease in the amount of money wagered by sports bettors during the COVID-19 pandemic (compared with before it) and that sports bettors did not switch to playing more online casino games and that there was also a significant reduction in playing online casino games among sports bettors.	Online gambling at one company may not represent totality of individual's gambling; no demographic information available; changes after 30 April not assessed; a possibility that some accounts may have been used by more than one gambler.
Biddle, 2020 [26]	52.9% gambled at the start of the pandemic, compared to the pre-pandemic rate of 65.9%. By November, gambling rates had increased slightly to 58.7%, still significantly lower than the 12 months leading up to April 2019. All types of gambling decreased but largest for informal games, bingo and casino table games. Increases in November for 8 of 11 types with lottery and horse/dog racing returning to 2019 rates. PG rates decreased slightly from 2019 to November 2020.	Largest prevalence decline for ages 35–45 and for most disadvantaged; November increases higher for men versus women; oldest and youngest cohorts and less disadvantaged; Regional variations reported. PG declines greater for females, and better educated. Gambling during the pandemic was related to a positive change in life satisfaction. As lockdown restrictions eased, individuals of ethnic minority backgrounds, who were current smokers, and with lower education more likely to continue gambling at heightened rates.	Levels of gambling declined significantly and substantially between April 2019 and May 2020 around the height of COVID-19 restrictions, and then increased again between May and November 2020 when restrictions began to be eased. Gambling rates in November 2020 were still, however, significantly below those observed prior to the pandemic. Furthermore, there was a decline in problem gambling not only for the entire population, but also within the population who continued to gamble over the period. Declines in opportunities to gamble without any problems appear to have led to a reduction in life satisfaction over the period. However, reductions in gambling problems appear to have counterbalanced these effects	Confusing description of methodology; individual level change not examined.
Bonny-Noach and Gold, 2020 [27]	Proportion with great involvement in online gambling changes from 2% before to 11% after pandemic breakout.	Individuals addicted to drugs other than cannabis most likely to increase online gambling.	Substitution of drug addiction to other addictive behaviours such as gambling may increase when healthy activities are restricted.	Small sample, few online gambling participants ($N=16$), unvalidated gambling measure.
Brown and Hickman, 2020 [28]	11% increased and 14% decreased participation in at least one type of online gambling compared with two months prior.	Men under age 30 in full-time employment most likely to increase online gambling; betting on sports in Australia showed largest increase.	While this survey did not examine the implications of increased online gambling, the negative social impacts of gambling at a time of increased stress for many households should not be underestimated.	Small sample; no measures of consequences of increased gambling; no measure of overall online and total gambling. Most people reported both increases and decreases on different activities.
Fluharty <i>et al.</i> , submitted [29 ^a]	79% of gamblers reported no change during lockdown, 11% decreased, and 9% increased. Among those increasing their gambling during lockdown, 48% maintained or further increased (14.1% continuing with heightened frequency of gambling following the easing of lockdown restrictions) as lockdown eased.	Increased gambling frequency associated with employment, boredom, generalized anxiety disorder, major depression; men and current smokers less likely to increase gambling. Maintaining or further increasing during lockdown ease associated with ethnic background, lower education, nonstudent status, and smoking.	This analysis has indicated some groups who are at risk for turning to and/or increasing rates of gambling when met with increased stressors. These risk groups may be targeted for interventions, by providing information of financial and debt support resources to lower the risk of turning towards gambling. Therefore, these specific groups may benefit from alternative opportunities to relieve their boredom that may provide more beneficial (and in turn, less harmful) coping behaviours, such as social support or connecting people digitally or through the use of community programmes such as Mutual Aid or schemes such as social prescribing. As lockdown restrictions eased, individuals of ethnic minority backgrounds, who were current smokers, and with lower education attainment were more likely to continue gambling at heightened rates.	There was a slightly greater risk of dropout amongst individuals engaging in higher levels of gambling and it is therefore possible that the sampling was selective towards infrequent or nongamblers; no measure of problematic gambling.

Table 2 (Continued)

Authors/Date	Impact on Gambling	Predictors of change	Author conclusions	Notes and limitations
Gainsbury <i>et al.</i> , 2020 [30]	Decreased frequency and expenditure overall and online, compared to typical month in past year. 13.6% reported increase.	Moderate risk gambling associated with increased gambling frequency (not PG or other categories); Psychological distress not related to change.	Most individuals reduced their overall gambling during the COVID-19 shutdown. However, a small but notable proportion of people at risk of gambling harm increased their gambling, likely shifting to available activities when alternative gambling activities were restricted. This suggests that, for most individuals, gambling is strongly related to the availability of specific activities.	Small sample of convenience with PG and online gamblers over-represented.
Gunstone <i>et al.</i> , 2020 [31]	39% reported participating in any activity in the last four weeks in May 2020, compared with 49% in October 2019; reductions in all activities, in particular sports betting, increase in online gambling (2.3 vs 1.5%); proportion reporting increased spend is only 4%; main reason for increase was boredom, and main reason for decrease was lack of desire; increase in gambling for fun, escape boredom, relax decrease in gambling to make money, to miss opportunities to win; Small decrease in PGSI some risk (1+).	Online gambling increased for men but not women and was related to higher PG.	Most gamblers said that compared to normal, they gambled about the same amount or less during lockdown. For many gamblers this decrease was situational, with many attributing the decrease in their gambling frequency to liking different types of gambling which were not possible during lockdown e.g. sports betting or preferring to physically gamble in betting shops. Therefore, the decrease will not necessarily be sustained. A much smaller proportion of gamblers reported gambling more during lockdown, and among this group, most said this was due to relieving boredom or for something to do, followed by the prospect of winning big money. Repeating a study of this nature in the future could give insight into the impact of easing lockdown restrictions on gambling behaviour or explore the impact of stricter restrictions (e.g., a potential second lockdown).	Sampling from two overlapping baseline surveys is confusing; Attributing change to COVID is difficult.
Hakansson, 2020 [32]	38% nongamblers, 51% reported no change in gambling, 4% reported increased gambling and 7% decreased gambling.	Increased gambling associated with increased gambling problem severity and alcohol consumption; more than half of respondents reporting increased gambling were moderate-risk or problem gamblers (25% of this group had a history of self-exclusion).	While the majority of respondents did not report altered gambling habits, and the proportion reporting an increase was smaller than the proportion reporting a decrease, a significant minority of respondents still reported increasing their gambling, and a consistent finding—both for overall gambling and for specific gambling types—was that this sub-group had markedly higher gambling problems. Those increasing their gambling had increased alcohol use during the pandemic, even when controlling for several other potential risk factors. The minority of respondents reporting an increase of other gambling in response to the rapid shortfall of sports events had very high rates of gambling problems.	Nonrepresentative sample.
Hakansson, 2020 [33]	Percentage of past-year gamblers who gambled during the past 30 days (i.e., during lockdown), was the highest for online horse betting (90%), online casino (81%), online poker (74%) and online bingo (72%), as well as for the less frequent gambling within video games (86%), but lower for sports live betting (58%), nonlive sports betting (56%), electronic gambling machines (46%), land-based horse gambling (42%), and land-based casino games (26%).	Moderate risk or PGs were more likely to continue gambling for most types, except online horse bettors. Some gender differences. Those reporting sports betting even during a period with decreased sports betting occasions proved to have markedly higher gambling problems and indebtedness, not employment status.	COVID-19 may alter gambling, and online gamblers who maintain or initiate gambling types theoretically reduced by the crisis may represent a group at particular risk.	Market survey sample of frequent gamblers. Online gambling is typical of problem gamblers in Sweden so may not be generalizable.

Table 2 (Continued)

Authors/Date	Impact on Gambling	Predictors of change	Author conclusions	Notes and limitations
Hakansson <i>et al.</i> , 2020 [34]	12% gamble less; 33% unchanged, and 7% more.	Gambling change unrelated to depression, anxiety, alcohol increase, sex, other covariates, but increase related to PG severity.	A small number of respondents reported increased gambling behavior during the crisis and few reported an increase in specific other gambling types in response to the decrease in traditional sports betting during the confinement. Among those who did report an increase in gambling, rates of gambling problems were high. Individuals who increase their gambling behavior in response to an overall crisis such as the COVID-19 pandemic may need specific preventive and supporting interventions and may be a group with a more pronounced change in life style habits during the crisis than others.	Convenience sample and low response rate limits representativeness.
Jenkinson <i>et al.</i> , 2020 [35]	Proportion of people gambling decreased or stayed stable across activities. Mean number of activities decreased from 2.9 to 2.5. Overall frequency increased (weekly gambling from 79% to 83%). Median expenditure not statistically different. Online gambling increased from 62% to 78%. 30% signed up for new online account during COVID, 5% for the first time.	Males and young people (18–34) more likely to increase their gambling frequency, monthly spending, to sign up for new online account and be at risk of gambling-related harm.	Almost 1 in 3 survey participants signed up for a new online betting account during COVID-19, and 1 in 20 started gambling online; Even with limited access to venues, overall, participants gambled more often during COVID-19. The proportion who gambled 4 or more times a week increased from 23% to 32%. On average, before COVID-19, 62% of participants' gambling was conducted online; during COVID-19, this increased to 78%.	Survey occurred during the period of re-opening. Nonrepresentative sample with high PGSI scores.
Leonard <i>et al.</i> , submitted [36 ^a]	Nearly one-third of gamblers reported ceasing gambling altogether during the lockdown. For the continuing gamblers, quantitative data indicated significant decreases in gambling frequency, time spent in gambling sessions, money spent, and the number of game types played.	Gambling platform was the only gambling engagement metric where increases were found with ~17% of the gambling sample migrating to online gambling during the lockdown.	Nearly one-third of gamblers reported ceasing gambling altogether. For the continuing gamblers, quantitative data indicated significant decreases in gambling frequency, time spent in gambling sessions, money spent, and the number of game types played. Gambling online – among other biopsychosocial factors – was a significant predictor for classification as a problem gambler during the lockdown.	There were Pre-COVID and COVID-Lockdown data collection periods; study was a supplement to a longitudinal study of gambling; the current study was uniquely positioned to examine pandemic related changes in gambling for two reasons. First, this study had quantifiable baseline gambling behavioral data that was collected from this sample six month prior to the lockdown in Canada, and second, data collection for the lockdown period began one month after lockdown was instituted in all provinces and concluded prior to any land-based establishment re-opening; sample was not necessarily representative of all gamblers as there was significant attrition between the first assessment (not included in these analyses) and the second assessment (this Pre-COVID sample).
Price, 2020 [37,38]	54% gambled online compared with 23% typically. 32% of online gamblers indicated that COVID-19 influenced the decision to gamble; COVID-related financial impacts and higher anxiety and depression were associated with increased likelihood of online gambling; COVID-related employment impacts associated with PG and gambling motives; perceived or actual change in gambling not reported.	NR	Broadly speaking, this research has reaffirmed relationships articulated in past research on risky online gambling and comorbidities, including mental health concerns and substance use.	Gambling behaviour questions not clearly described or reported. Analyses focused on comparing online to other gamblers and not migration.

Table 2 (Continued)

Authors/Date	Impact on Gambling	Predictors of change	Author conclusions	Notes and limitations
Te Hiringa Hauora Health Promotion Agency, 2020 [39]	39% reported gambling, 9% more than usual, 41% same, 50% less. Of these, 23% do not gamble online, 8% for first time, 12% increase, 33% same as usual, and 24% less than usual. Most common reason for increase in online gambling was being unable to gamble in normal location. Most common reason for decrease was financial; 17% concerned about their gambling since the lockdown.	Younger people 18–24, and Maori more likely to report increase. Pacifika and ages 25–49 more likely to have started worrying about their gambling since lockdown.	NR	Market survey sample.
Te Hiringa Hauora Health Promotion Agency, 2020 [40]	Fewer report all types of gambling compared to prelockdown; proportion worrying about their gambling decreased to 11% compared to 17% during lockdown.	NR	Gambling levels are reported to be less than prelockdown across all gambling types, including online gambling.	Market survey sample; methodological details are limited; longitudinal analyses limited.
Xuereb <i>et al.</i> , submitted [41]	Overall, online gambling decreased following the onset of COVID-19 casino closures, while alcohol, tobacco, and cannabis use increased. Among gamblers who reported no online gambling prior to COVID-19, 15% reported migrating to online gambling.	Migrators to online casino gambling from land-based casinos had higher problem gambling and lower income than gamblers who had never gambled online. Migration not associated with readiness to change.	The response to COVID-19 is heterogeneous; the majority of gamblers reported reducing their online gambling but increased their substance use. A minority of vulnerable gamblers substituted land-based casino gambling with online casino gambling. Because these individuals are characterized by problem gambling symptoms and lower income, they may be considered a vulnerable group. These results are in line with previous studies that found that although only a minority of people will engage in addiction substitution, those who do are likely to be vulnerable to problematic engagement in addictions.	Nonrepresentative sample with high problem severity. Measures of perceived change only.

Gambling increase

The proportion of participants in both the general population and the population that gambles who reported an increase in overall gambling was more variable and ranged from 4 to 14% in the 4 studies providing this information. These estimates are unlikely to be precise, given the study methodologies. Two of these studies (9% [29[■]] and 14% [30] increase) used convenience samples recruited through social media and previous research participants. The other two estimates used unweighted online panels [33,39]. Neither of these designs are optimal for estimating prevalence.

A greater number of studies estimated the increase in online gambling specifically [24,28, 31[■],35,36[■],37,39,41]. The lowest estimate was provided by one of the few longitudinal studies, the YouGov weighted panel in Great Britain [31[■]] that showed an increase in online gambling from 1.5% in October 2019 to 2.3% in May 2020. In comparison, the two highest estimates, 31% [37] (USA) and 26% [24] (Canada) were derived from online panels of past year gamblers. The range of estimated increase

in online gambling was between 11 and 20% excluding the highest and lowest estimates.

Numerous studies examined the characteristics of the subgroup of people whose gambling increased during the pandemic. The most frequently identified correlate was problem gambling severity index score and four studies found an association with increased problem severity and increased gambling [31[■],33–35,41]. A single study found that moderate risk but not problem gambling status was associated with increased gambling [30]. Younger age was a significant correlate in five studies [24,26,28,35,39], one of which also found that older age was also a correlate [26]. Men were found to be at increased risk in three studies [26,31[■],35], and women in another [29[■]]. Full-time employment [28,29[■]] and higher income [41] also facilitated increased gambling. In contrast, anxiety [29[■]], depression [29[■]], alcohol consumption [33], drug addiction [27] were each significant in one sample. Finally, nonsmokers [29[■]] and individuals identifying as Maori in New Zealand [39] also were more likely to report gambling increase.

Two studies assessed participants' perceptions of the reasons or motives for the increase in their gambling. Reasons for gambling more identified in the Health Promotion Agency's New Zealand study were being unable to go to their usual places to gamble (51%), boredom (34%), financial pressure (28%) need for relaxation (25%), online social occasions (16%) and stress (15%). In Great Britain, the YouGov study found that boredom was mentioned most frequently in response to open-ended questions (12%), followed by earning money (55%). The two most frequent reasons cited when participants completed a checklist were boredom (52%) and prospect of winning money (48%).

In contrast, the Ontario survey [37,38], assessed motives for gambling online (versus change in gambling). Gambling to win back money lost gambling and gambling to earn income were associated with loss of employment and other negative financial impacts due to COVID-19. Gambling because it helps when nervous or depressed was associated with reduced work hours. Individuals who indicated that the pandemic influenced their decision to gamble online also had higher problem gambling severity in this study [37].

Gambling post wave 1 lockdown

Three studies reported a further assessment post lockdown [26,29,40]. In Great Britain, an assessment of those who had increased their gambling during lockdown (9%), conducted in early August during a period of 'relaxing of the lockdown restrictions' showed that 48% had maintained or further increased [29]. This was associated with ethnic background, lower education, nonstudent status, and smoking. In Australia, an assessment in November post lockdown found that gambling rates were increasing relative to lockdown levels for most types of gambling with some returning to 2019 levels [26]. Predictors of continued elevated gambling were similar to those identified in the Great Britain study and included ethnic minority status, smoking and lower education. Lastly, in New Zealand, a post lock down re-assessment in June 2020, found that reduction in gambling relative to pre-pandemic was maintained, and that the proportion worrying about their gambling reduced from 17% during the lockdown to 11% [26].

DISCUSSION

An impressive number of independent assessments of the impact of COVID-19 on gambling are available at this point in time, although the methodological quality varies dramatically. Despite this variability, a number of general trends are clear

across jurisdictions. First, the expected reduction in gambling frequency and expenditure occurred during the lockdown when land-based opportunities were reduced. The reasons people provided for the reduction included lack of accessibility (e.g., no live sports, closed casinos), financial pressures and lack of interest. Post-pandemic follow-ups will reveal who returns and does not return to previous levels of gambling involvement.

The results also showed that there is a subgroup of individuals who increased their gambling involvement by starting or increasing online gambling. Although there is inconsistency in results across studies, there is some convergence on vulnerabilities. A consistent predictor of the shift to increased gambling was higher problem gambling severity. Other indicators, typically correlated with problematic gambling, include younger age groups, males, and those with mental health concerns. In addition, financial pressures and boredom were also frequent motivators. Together, these indicators provide an informative profile of those at risk to whom public health messages, prevention and treatment could be targeted. Follow-up study data, though limited, identified potential predictors of those who maintain elevated gambling post lockdown, including individuals with ethnic backgrounds, lower education, nonstudent status, and smoking. Whether this elevation will continue when the pandemic stress is fully alleviated is unclear.

The majority of the studies were cross-sectional assessments that rely on retrospective reports of gambling prior to the pandemic. Some have already, or plan to complete follow-up surveys with their participants, which will provide high-quality comparative information on post-pandemic status and its implications. However, at least four longitudinal studies exist that have gambling data collected prior to COVID-19 onset. All of these are well-positioned for further follow-ups, although, with the exception of Leonard and colleagues, it is unclear whether these are planned. The investigation by Auer *et al.* [25], which focused specifically on online sports bettors, reported behavioural data from an online operator. The other three longitudinal studies [26,31,36] rely on self-report data. In all instances, gambling involvement was collected separately for each gambling activity, which is considered the best methodology [42]. The YouGov panel in Great Britain and the Biddle *et al.*'s study in Australia (Life in Australia panel) made use of existing, longstanding general population panels that were used to assess gambling among a host of other variables. These studies are likely best for estimating prevalence as they are less biased by individuals selecting in or out of participation of a survey identified as focusing on gambling. The Leonard and colleagues study [36]

used an existing Canadian online panel of people who were regular gamblers when first recruited in 2018. This type of design provides adequate subsample sizes of gamblers across all levels of involvement, which facilitates identifying differences in characteristics and trajectories.

Although there was general convergence of results across these studies, it is always advantageous to obtain additional information to help confirm and contextualize results. The YouGov panel study, for example, incorporated a qualitative component in which a small subset of individuals was interviewed in detail. In one study that was screened out of this review, the pandemic effect in Sweden was assessed using industry sales data versus individual gambling reports [44[■]]. That study also showed an overall decrease in gambling of 13% with a slight increase in online casino gambling but not online gambling overall. This triangulation is important as it is a challenge to separate period effects of the pandemic from longer-term trends like the general reduction in gambling engagement exhibited in many mature gambling markets [45]. If post-pandemic gambling continues to be relatively low, this effect may be related to lingering pandemic effects, preexisting trends or both.

CONCLUSION

These results suggest that the impacts of COVID-19 on gambling and problematic gambling are diverse – possibly causing a reduction in current or future problems in some, but also promoting increased problematic gambling in others. The longer-term implications of both the reduction in overall gambling, and the increase in some vulnerable groups are unclear, and will be better assessed in subsequent follow-up studies. The surveys reviewed in this paper were conducted at a time when land-based gambling was uniformly unavailable across jurisdictions. The gambling landscape during any follow-up studies will be more variable in terms of restriction (land-based casino openings, online betting caps) that will make examination of overall trends more complex. However, in the short term, individuals with existing gambling problems and other comorbidities need to be recognized as a vulnerable group.

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Conflicts of interest

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