Impacts of the COVID-19 Shutdown on Gambling Patterns in Australia: Consideration of Problem Gambling and Psychological Distress

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Objectives: The COVID-19 pandemic reduced access to gambling and contributed to widespread psychological distress. Psychological distress is a known risk factor for problem gambling as it can motivate excessive gambling as a coping response. The availability of gambling is considered a factor in maintaining problems. This paper aimed to investigate the impact of the shutdown of gambling venues on Australians, particularly among those vulnerable to mental health problems and gambling disorder.

Methods: Australian adults who had gambled at least once in the past 12 months ($N = 764$, 85.2% male) completed an online cross-sectional survey. Self-report measures retrospectively assessed typical monthly gambling frequency and expenditure before and after the

COVID-19 venue shutdown, problem gambling, and psychological distress.

Results: Significant median decreases in gambling frequency were observed, both online and overall. No relationship was found between psychological distress and baseline or increases in gambling. Greater problem gambling severity was related to higher baseline gambling, but not to increases in gambling. Exploratory analysis showed that individuals engaged in moderate-risk gambling, but not problem gambling, were more likely to report increased gambling frequency compared to nonproblem and low-risk gamblers combined.

Conclusions: Findings provide important insights into how changes in availability influence gambling participation, and for understanding the effectiveness of forced restrictions and venue exclusion strategies. Most people moderated their gambling when venue-based gambling was unavailable and opportunities for sports betting were limited. However, harms experienced by individuals with some gambling problems may have been exacerbated during the period of limited access. Policies to enhance prevention and treatment of gambling problems are necessary even when availability is reduced.

Key Words: coronavirus, COVID-19, gambling, problem gambling, psychological distress

In response to the COVID-19 pandemic, Australian gambling venues were ordered to close and opportunities to bet on sporting events were restricted. Consistent with many international jurisdictions, stay-at-home orders were issued requiring individuals to cease nonessential travel. People's day-to-day lives were disrupted in diverse ways. For many individuals, the economic consequences were severe as their main source of income was either lost or substantially reduced. Economic stimulus packages were made available by the Government, potentially increasing funds available for some individuals compared to normal. An atmosphere of increased uncertainty and distress was accompanied by limited opportunities for social support due to restrictions placed on public and private gatherings of people. Mixed reports emerged from the media about the effect of the shutdown on gambling: some reported large increases in online gambling participation, whereas other anecdotal evidence suggested substantial reductions in expenditure due to gambling venue closures. The current study aimed to investigate the gambling behavior of a sample of Australian gamblers during the shutdown, and to understand the impact of psychological distress and pre-existing gambling problems on changes in gambling patterns.

Despite rapid growth in online gambling in the past decade, land-based gambling accounts for the majority of total gambling expenditure in Australia each year.[1] The COVID-19 shutdown resulted in an unexpected period of limited access to gambling venues, which typically are broadly and easily accessible to the population. Gambling options were limited to lottery products (available via retail and online outlets) and online wagering, primarily on horse races (given the limited number of domestic and international sporting events). Other online gambling activities, such as slots, casino games, and poker, are illegal in Australia and remained available only on offshore gambling sites. Early in the shutdown, various Australian sources reported increases in online gambling expenditure ranging from 20% to 142%.[2] What these figures specifically represent remains unclear as details regarding their calculation and operationalization are not publicly available in all cases. Several Australian online wagering providers subsequently confirmed that online gambling revenue had increased year-on-year.[3] However, Australia's largest wagering provider – the only company that offers online and land-based outlets as well as lotteries – reported an 11% drop in profits compared to the previous year.[4] Moreover, electronic gaming machines (EGMs; also known as poker/slot machines), which represent 50% of Australia's total gambling expenditure and have the highest association with gambling problems, were closed nationally for three months.[1] Therefore, it is unclear whether the reported increases in online gambling, which occurs at a relatively low base-rate, offset reductions in land-based gambling during the shutdown. Furthermore, it is important to understand how people at risk for gambling problems responded to the restrictions as changes in the behavior of this group likely differ from the broader gambling population.

Internationally, mixed reports have emerged regarding changes in gambling participation during COVID-19. In a UK market research survey of 537 gamblers conducted in April 2020, most respondents (68.4%) reported either reducing or maintaining their gambling at the same level during the pandemic as compared to before.[5] However, 2 in 5 regular gamblers (39%) reported increased gambling, and about 1 in 4 regular gamblers reported believing that they were either spending too much (27%) or developing an addiction (23%).[5] A Canadian survey of 2005 participants reported that those who typically gambled in land-based venues only were less likely to gamble online during the shutdown.[6] Participants classified as being at moderate risk for gambling problems had about twice the odds of gambling online during the shutdown, and those classified as high-risk gamblers had nearly nine times the odds.[6] Engagement in online gambling during the shutdown was higher among those with elevated symptoms of anxiety and depression.[6] A related market research survey of 1500 Canadian residents found that only 6% had opened a new online gambling account since the pandemic began.[7] Of those who gambled before COVID-19 and continued to gamble during the shutdown, 27% reported gambling less than usual, 47% indicated gambling at about the same level as before, and 26% reported increased gambling. Nearly 3 in 10 participants (28%) who reported gambling online agreed that they might be developing an addiction to online gambling.[7] In contrast, a 50% reduction in call volume to the Ontario Problem Gambling Helpline was recorded during the shutdown period, suggesting reduced experience of gambling problems and demand for help.[8]

In Sweden, a survey of 2016 adults found only 4% of participants reported gambling more during the pandemic.[9] Chi-square analysis indicated psychological distress was associated with increased gambling during the pandemic; however, only higher problem gambling severity and increased alcohol consumption had significant associations with increased gambling in multivariate analyses.[9] A

subsequent analysis of data from the Swedish gambling regulator showed reductions in overall gambling and online betting, and a slight increase in online casino gambling.[10] However, increases in high-intensity gambling or total online gambling were not observed.[10] Overall, these reports present a mixed pattern of evidence, indicating a need for further research investigating the impact of the pandemic on gambling behavior, especially among populations vulnerable to mental health problems and addictive disorders.

Public health emergencies, such as pandemics, and the measures used to control them, such as quarantining, have impacts on the psychological wellbeing of individuals and communities.[11] Emerging academic literature examining the impact of the COVID-19 outbreak suggests an increase in population-based anxiety, depression, and stress may result.[12–14] For some individuals, emotional reactions and unhealthy behaviors may include excessive online gambling, an activity accessible from home during isolation.[15] Some groups may be more vulnerable than others to the psychological effects of COVID-19, particularly those with pre-existing mental health disorders.[13,16] Gambling disorder is a behavioral addiction that impacts around 1% of adults and is highly comorbid with other mental health disorders, including addictions.[17] The experience of negative emotions, including clinical and sub-clinical levels of stress, anxiety, and depression, is known to motivate gambling as an emotional escape for some individuals and contribute to the development and maintenance of gambling problems.[18–20]

In the current study, 6 hypotheses were specified and preregistered with a confirmatory analysis plan on Open Science Framework (osf.io/tskdq). We expected to observe a significant decrease in overall gambling frequency (H1) and a significant increase in online gambling frequency (H2) during the COVID-19 shutdown compared to the period before the shutdown. Higher baseline and increases in time/money spent gambling were hypothesized to be associated with higher psychological distress (H3/H5) and higher problem gambling severity (H4/H6).

METHODS

Participants

Participants had to be at least 18 years of age, live in Australia, and have spent money on gambling in the past 12 months. Of the 1183 who started the survey, 414 were screened out due to not having gambled in the past 12 months ($n = 14$) or returning incomplete responses ($n = 400$). This resulted in a sample of 769 participants, corresponding to a completion rate of 65%. Participants were aged between 18 and 82 years ($M = 43.8$, $SD = 14.8$) and were mostly male (85.2%). Table 1 contains a summary of participant characteristics. Most participants (97.1%) spoke English at home. The modal gross personal income category reported was AUD $104,000 to $155,999 and the median category reported was AUD $65,000 to $77,999 for both 2019 (estimated) and 2020 (projected) calendar years.

Procedure

The study was conducted as specified in the preregistration documents. A convenience sample was obtained by

TABLE 1. Participant Characteristics (N = 764)

Variable	n	%
Sex		
Female	110	14.4
Male	651	85.2
Other	3	0.4
Marital status		
Single	227	29.7
Widowed	9	1.2
Divorced	29	3.8
Separated	18	2.4
Married	328	42.9
De facto	153	20.0
Household type		
Single person	140	18.3
Single-parent family with children	21	2.8
Couple with children	266	34.8
Couple with no children	213	27.9
Group/share household	87	11.4
Other	37	4.8
Indigenous status		
Non-Indigenous	741	97.0
Aboriginal	21	2.8
Both Aboriginal and Torres Strait Islander	2	0.3
Highest level of education completed		
High school, Year 10 or below	63	8.3
Certificate I or II	11	1.4
High school, Year 11 or 12	168	22.0
Certificate III or IV	95	12.4
Diploma or advanced diploma	103	13.5
Bachelor degree	206	27.0
Graduate diploma or graduate certificate	47	6.2
Postgraduate degree	71	9.3
Current employment status		
Employed, working full-time	438	57.3
Employed, working part-time	65	8.5
Job currently suspended due to COVID-19 but expected to resume after shutdown	79	10.3
Unemployed	50	6.5
Home duties / full-time carer	16	2.1
Retired	97	12.7
Student	19	2.5
PGSI classification (M = 4.73, SD = 5.71)		
Nonproblem gambling	177	23.2
Low-risk gambling	186	24.3
Moderate-risk gambling	237	31.0
Problem gambling	164	21.5
K6 classification (M = 4.51, SD = 4.71)		
None or low distress	481	63.0
Moderate distress	222	29.1
Severe distress	61	8.0

K6 indicates K6 screen for psychological distress; PGSI, Problem Gambling Severity Index.

posting recruitment notices on social media, websites, and via email communications with individuals who potentially fit the eligibility criteria (including a mailing list of individuals who had participated in previous studies conducted by the researchers). Twenty-six organizations, including gambling operators and support services, promoted the study to assist with recruitment. Recruitment notices directed individuals to the survey homepage, hosted on the Qualtrics survey platform, which contained information about the study to obtain informed consent. We attempted to prevent duplicate responses by using the Qualtrics function that places a cookie on the participant's browser so that the survey can only be

accessed once. Participants who submitted a complete response were eligible for entry into a prize draw for one of five AUD $50 shopping gift vouchers as reimbursement for their time. Recruitment occurred between May 1 to 22, 2020. Ethical approval was granted by the University of Sydney Human Research Ethics Committee (protocol number 2019/213).

Measures

Gambling Participation

Participants reported gambling frequency and aggregate gambling expenditure (i) during a typical month in the 12 months before the shutdown of land-based gambling venues on March 26, 2020 (baseline), and (ii) in the past 30 days. Frequency was measured across 17 categories of gambling activities, differentiated based on type (eg, EGMs, lotteries, wagering) and mode (ie, land-based vs online). Responses were recorded on a 5-point scale (*not at all* = 0 days per 30-day month; *1–3 times per month* = 2; *once a week* = 4.29; *2–6 times per week* = 17.14; *daily* = 30). Item scores were summed to yield an overall gambling frequency score (possible values ranging from 0–510 interactions per month) and an online gambling frequency score (ranging from 0–270 interactions per month).

Gambling Problems

The 9-item Problem Gambling Severity Index (PGSI) is commonly used to assess past-year gambling problems in population research.[21,22] Participants respond on a 4-point scale (*never* = 0; *almost always* = 3). Item scores were summed to yield a total score by which participants were classified: nonproblem gambling = 0; low-risk gambling = 1–2; moderate-risk gambling = 3–7; problem gambling = 8–27.

Psychological Distress

The K6 is a 6-item screening tool for indicators of clinically-relevant psychological distress.[23] Participants respond on a 5-point scale (*none of the time* = 0; *all of the time* = 4) to indicate symptoms in the past 30 days. Item scores were summed to yield a total score by which participants were classified: none/low distress = 0–4; moderate distress = 5–12; severe distress = 13–24.[24]

Demographics

Questions included gender, age, marital status, household type, citizenship/residency status, indigenous status, primary language spoken at home, prior education, employment status, and estimated gross personal income for both 2019 and 2020 calendar years.

Statistical Analysis

Data processing and analysis were conducted in RStudio using tidyverse R packages.[25–27] Examination of the data for outliers showed four cases reporting monthly gambling expenditure of AUD $1,000,000+, and one case reporting the maximum possible gambling frequency score at baseline and the minimum possible score during shutdown. These 5 cases were excluded, resulting in a final sample of 764 responses for analysis.

H1 and H2 were tested using paired Wilcoxon signed-rank tests. To test H3 to H6, we planned to perform a series of 4 multiple linear regressions, specifying baseline and changes in overall gambling frequency/expenditure as predictors, and PGSI/K6 score as the outcome variable. However, following reviewer feedback, we deviated from our preregistered analysis plan by testing H3 to H6 using tests of association. Spearman's rank-order correlation was used for associations between ordinal/continuous variables, point-biserial correlations for associations between dichotomous and continuous variables, and the phi coefficient for associations between dichotomous variables. Results relating to the preregistered linear models are contained in the supplementary materials, http://links.lww.com/JAM/A236. Changes in overall gambling frequency/expenditure were calculated as the difference score between the 2 timepoints, where positive difference scores relate to increases in gambling frequency/expenditure. Gambling participation variables were transformed using the log1p(x) function, which computes log(1+x), to reduce the influence of outliers and the skewness and kurtosis of the distribution. Increases (decreases) in overall/online gambling frequency/expenditure were computed as the log change in overall/online gambling frequency/expenditure being greater (less) than zero. Bonferroni correction resulted in a cut-off criterion of $P = 0.005$ for each of the ten confirmatory tests (1 each for H1 and H2, and 2 each for H3–H6).

Exploratory analysis was conducted to examine which factors predicted increases/decreases in overall/online gambling frequency from baseline to shutdown (Models 1–4). Modeling was performed to examine increases and decreases separately due to the inclusion of cases with no change across timepoints. To mitigate against spurious findings, a subset of 200 randomly-selected responses was used to identify potential predictors, which were then tested on the remaining subset of 564 responses. The following predictors were entered into logistic regression models: age (continuous), PGSI (categorical), regular baseline land-based EGM gambling (dichotomous), regular baseline land-based/online race betting (dichotomous), regular baseline land-based/online sports betting (dichotomous), and regular land-based/online lottery gambling (dichotomous). Regular gambling was defined as at least weekly participation.

RESULTS

Descriptive Statistics: Gambling Participation Before and During the Shutdown

Ninety-five percent of participants reported having gambled online and 82.5% having gambled in land-based venues before the shutdown. Most participants (85.2%) reported gambling regularly (ie, at least weekly) before the shutdown: 78.1% gambled regularly online, and 48.3% gambled regularly in land-based venues. During the venue shutdown, 74.2% of participants reported gambling regularly overall: 72.8% gambled regularly online, and 13.7% engaged in remaining land-based options available (ie, retail lottery outlets or private betting). Median reported monthly gambling expenditure decreased from baseline (AUD $450) to shutdown (AUD $200).
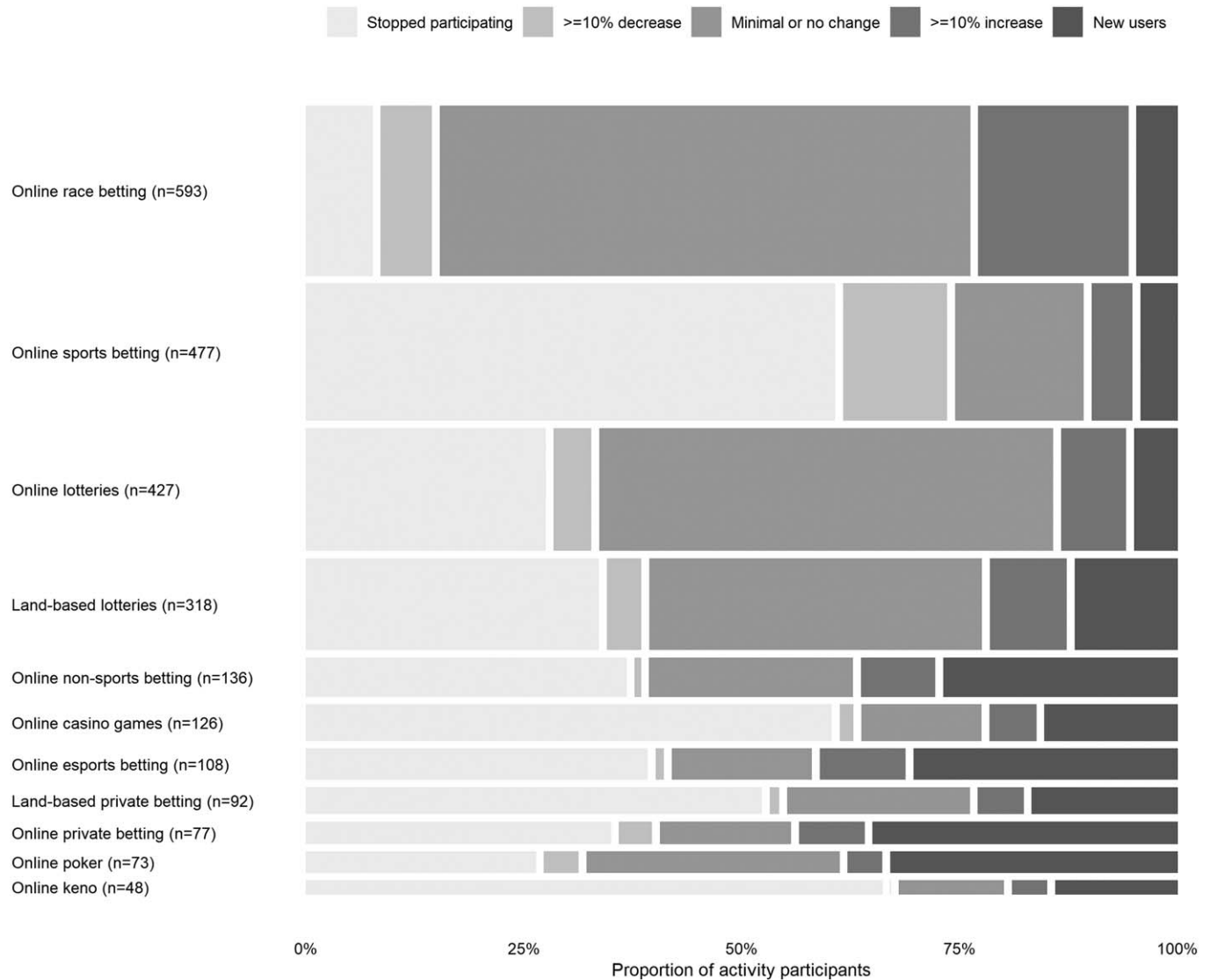
FIGURE 1. Mosaic plot of changes in gambling frequency by activity type. The height of each bar represents the relative prevalence of that group within the overall sample. Land-based gambling activities (eg, electronic gaming machines) that were forced to close during the shutdown are not shown. Online race betting refers to betting on horse or dog races online. Online sports betting refers to betting on sports (excluding esports) online. Land-based lotteries include instant scratch tickets. Online nonsports betting refers to betting on nonsporting events, such as political or weather events, online. Online casino games refer to casino table games (eg, blackjack, roulette), poker machines/slots, instant scratch tickets, or bingo online. Private betting refers to betting for real money with friends and family.

Figure 1 is a mosaic plot illustrating individual-level changes in gambling frequency by activity type. The height of each bar represents the relative prevalence of that group within the overall sample. Most participants reported maintaining their usual online race betting patterns, many reduced their online sports betting, and some started betting on esports and nonsporting events online for the first time. Most participants reported either reducing or maintaining their usual frequency of participation in lotteries.

Four in 5 participants (79.1%) reported decreased overall gambling frequency from baseline to shutdown, whereas 13.6% reported increases. Within the subset of those reporting

increased overall gambling frequency ($n = 104$), participants were aged between 20 and 80 years ($M = 40.6$, $SD = 13.9$) and were mostly male (86.5%). About 1 in 7 (15.4%) were classified as having gambling problems and 40.4% as engaging in moderate-risk gambling. Twelve percent reported K6 scores associated with severe distress, and 32.7% with moderate distress.

More than half of participants (55.1%) reported decreased online gambling frequency from baseline to shutdown, whereas 21.1% reported increases. Within the subset of those reporting increased online gambling frequency ($n = 161$), participants were aged between 18 and 80 years

TABLE 2. Correlation Matrix for Key Variables (N = 764)

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Log overall gambling frequency (baseline)	–									
2. Log overall gambling frequency (shutdown)	0.66‡	–								
3. Log change in overall gambling frequency	−0.12‡	0.59‡	–							
4. Increased overall gambling frequency	−0.16‡	0.27‡	0.50‡	–						
5. Log gambling expenditure (baseline)	0.46‡	0.29‡	−0.05	−0.07*	–					
6. Log gambling expenditure (shutdown)	0.47‡	0.63‡	0.37‡	0.13‡	0.64‡	–				
7. Log change in gambling expenditure	0.12‡	0.49‡	0.54‡	0.22‡	−0.18‡	0.53‡	–			
8. Increased overall gambling expenditure	0.05	0.28‡	0.31‡	0.24‡	−0.13‡	0.26‡	0.43‡	–		
9. Problem gambling severity	0.25‡	0.11†	−0.09*	−0.04	0.43‡	0.21‡	−0.09*	0.04	–	
10. Psychological distress	−0.05	−0.05	−0.04	0.06	0.00	−0.07	−0.09*	0.01	0.33‡	–

*$P < 0.05$.
†$P < 0.01$.
‡$P < 0.001$.

($M = 41.0$, $SD = 13.6$) and were mostly male (87.0%). About 1 in 4 (23.6%) were classified as having gambling problems and 34.8% as engaging in moderate-risk gambling. Thirteen percent reported K6 scores associated with severe distress, and 31.1% with moderate distress.

Confirmatory Analysis: Changes in Gambling Participation and Associations With Problem Gambling and Psychological Distress

In support of H1, a significant median decrease in overall gambling frequency score of 11.71 interactions per month (95% confidence intervals[CI] [−13.43, −10.57]) was observed from baseline to shutdown, $V = 31,003$, $P < 0.001$. Contrary to the expected increase in online gambling frequency (H2), the data showed a significant median decrease of 4.14 interactions per month (95% CI [−5.29, −3.14]), $V = 50,791$, $P < 0.001$.

Table 2 contains a correlation matrix for the key variables of interest. There was no evidence for associations between psychological distress and baseline or increases in gambling frequency/expenditure (all Ps > 0.05), meaning H3 and H5 were not supported. Higher problem gambling severity was significantly associated with higher baseline gambling frequency ($r_s = .25$, $P < 0.001$) and higher baseline gambling expenditure ($r_s = .43$, $P < 0.001$). However, there was no evidence for association between problem gambling severity and increases in gambling frequency ($r_{pb} = −.04$, $P = 0.286$) or increases in expenditure ($r_{pb} = .04$, $P = 0.215$). H4 and H6 were therefore only partially supported.

Exploratory Analysis: Predictors of Increases and Decreases in Overall and Online Gambling Frequency

Table 3 reports results from 2 logistic regressions performed to examine predictors of increased overall gambling frequency (13.6% of the sample; Model 1) and increased online gambling frequency (21.1% of the sample; Model 2). Moderate risk problem gambling was the only significant predictor of increased overall gambling frequency ($P < 0.05$). The odds of reporting increased overall gambling frequency for individuals classified as moderate-risk gamblers were 1.87 times (95% CI [1.06, 3.29]) those of individuals classified as nonproblem/low-risk gamblers. Regular baseline sports

betting was the only significant predictor in Model 2. Individuals who bet on sports at least weekly at baseline were significantly less likely than non-regular baseline sports bettors to have increased their online gambling frequency ($P < 0.01$).

Table 4 reports results from 2 logistic regressions performed to examine predictors of decreased overall gambling frequency (79.1% of the sample; Model 3) and decreased online gambling frequency (55.1% of the sample; Model 4). Decreases in overall gambling frequency were significantly predicted by regular baseline EGM gambling ($P < 0.01$) and sports betting ($P < .001$). The odds of reporting decreased overall gambling frequency for regular baseline EGM gamblers were 3.34 times (95% CI [1.61, 7.73]) those of nonregular baseline EGM gamblers, and for regular baseline sports bettors were 2.71 times (95% CI [1.67, 4.53]) those of nonregular baseline sports bettors. Regular baseline sports betting was the only significant predictor of decreased online gambling frequency ($P < 0.001$). Individuals who bet on sports at least weekly at baseline had 4.24 times (95% CI [2.87, 6.34]) the odds of reporting decreases in online gambling frequency compared to nonregular baseline sports bettors.

DISCUSSION

The COVID-19 pandemic provided a unique opportunity to study the effects of a complete cessation of venue-based gambling and very limited online sports betting options. Given spending on EGMs accounts for 50% of total gambling expenditure in Australia compared to 5% for sports betting, it was reasonable to anticipate that overall gambling would decline during the shutdown period.[1] Our hypothesis was supported as most participants surveyed reported a reduction in gambling during the shutdown period. Based on initial media reports, we expected to see an increase in online gambling; however, this hypothesis was not supported in our sample.[28] One-fifth of participants reported an increase in online gambling, a result largely consistent with international surveys.[7,29,30] Only 14% of participants reported increasing their gambling overall. It is possible, for example, that some individuals stopped using land-based forms and started gambling online but at a lower frequency, thereby not increasing their gambling overall.

TABLE 3. Logistic Regressions Predicting Increases in Overall/Online Gambling Frequency Based on Age, PGSI, and Baseline Gambling Frequency (N = 564)

	B	*SE*	Wald	*df*	*P*	OR	95% CI for OR	
							LL	*UL*
Model 1: Increased overall								
Constant	−0.87	0.47						
Age (continuous)	−0.01	0.01	2.19	1	0.139	0.99	0.97	1.00
PGSI: Moderate risk gambling*	0.62	0.29	4.74	1	0.030	1.87	1.06	3.29
PGSI: Problem gambling*	0.13	0.37	0.12	1	0.732	1.14	0.53	2.33
Regular baseline EGM gambling	−0.78	0.41	3.66	1	0.056	0.46	0.20	0.98
Regular baseline race betting	−0.40	0.27	2.30	1	0.130	0.67	0.40	1.13
Regular baseline sports betting	−0.48	0.28	3.02	1	0.083	0.62	0.35	1.06
Regular baseline lottery gambling	−0.14	0.33	0.19	1	0.661	0.87	0.44	1.62
Model 2: Increased online								
Constant	−0.46	0.40						
Age (continuous)	−0.02	0.01	3.67	1	0.056	0.98	0.97	1.00
PGSI: Moderate risk gambling*	0.33	0.25	1.75	1	0.186	1.39	0.85	2.25
PGSI: Problem gambling*	0.30	0.29	1.06	1	0.304	1.35	0.76	2.38
Regular baseline EGM gambling	−0.13	0.29	0.20	1	0.652	0.88	0.49	1.53
Regular baseline race betting	−0.10	0.22	0.19	1	0.665	0.91	0.59	1.41
Regular baseline sports betting	−0.61	0.23	6.85	1	0.009	0.54	0.34	0.85
Regular baseline lottery gambling	−0.01	0.26	0.00	1	0.961	0.99	0.59	1.63

Regular betting/gambling predictors relate to participating at least weekly in the activity (dichotomous).
*Reference group is combined non-problem and low-risk gambling categories.
B indicates unstandardized coefficient; CI, confidence interval; *df*, degrees of freedom; EGMs, electronic gaming machines; *LL*, lower limit; OR, odds ratio; PGSI, Problem Gambling Severity Index; *SE*, standard error; *UL*, upper limit.

A large proportion of participants stopped participating in online sports betting and land-based private betting, which is unsurprising given the restrictions on sporting events and private gatherings. However, large reductions were also observed in online gambling activities that were not restricted, such as online casino games and online keno. This may reflect some individuals moderating their gambling activity in times of economic crisis. The largest increases were seen for online race betting, which also showed the largest proportion of participants reporting minimal changes in their gambling. As this was the gambling activity least disrupted by the shutdown, it is a strong indicator of the importance of availability in driving gambling behavior. Similarly, noteworthy increases (particularly among new users) were seen for online private betting, online poker, and online wagering on non-sporting events and esports. This suggests that, for some people,

TABLE 4. Logistic Regressions Predicting Decreases in Overall/Online Gambling Frequency Based on Age, PGSI, and Baseline Gambling Frequency (N = 564)

	B	*SE*	Wald	*df*	*P*	OR	95% CI for OR	
							LL	*UL*
Model 3: Decreased overall								
Constant	0.97	0.41						
Age (continuous)	0.00	0.01	0.17	1	0.677	1.00	0.98	1.01
PGSI: Moderate risk gambling*	−0.30	0.25	1.46	1	0.227	0.74	0.45	1.21
PGSI: Problem gambling*	0.08	0.33	0.06	1	0.807	1.09	0.57	2.13
Regular baseline EGM gambling	1.21	0.40	9.31	1	0.002	3.34	1.61	7.73
Regular baseline race betting	0.09	0.23	0.15	1	0.698	1.10	0.69	1.73
Regular baseline sports betting	1.00	0.25	15.38	1	<0.001	2.71	1.67	4.53
Regular baseline lottery gambling	0.14	0.27	0.28	1	0.598	1.16	0.68	2.00
Model 4: Decreased online								
Constant	−0.16	0.35						
Age (continuous)	0.00	0.01	0.37	1	0.542	1.00	0.98	1.01
PGSI: Moderate risk gambling*	−0.23	0.22	1.16	1	0.283	0.79	0.52	1.21
PGSI: Problem gambling*	−0.35	0.26	1.82	1	0.178	0.70	0.42	1.17
Regular baseline EGM gambling	0.17	0.26	0.42	1	0.519	1.18	0.71	1.96
Regular baseline race betting	−0.03	0.20	0.02	1	0.882	0.97	0.66	1.42
Regular baseline sports betting	1.44	0.20	50.95	1	<0.001	4.24	2.87	6.34
Regular baseline lottery gambling	0.22	0.22	0.98	1	0.323	1.25	0.81	1.93

Regular betting/gambling predictors relate to participating at least weekly in the activity (dichotomous).
*Reference group is combined with nonproblem and low-risk gambling categories.
B indicates unstandardized coefficient; CI, confidence interval; *df*, degrees of freedom; EGMs, electronic gaming machines; *LL*, lower limit; OR, odds ratio; PGSI, Problem Gambling Severity Index; *SE*, standard error; *UL*, upper limit.

gambling is strongly impacted by what options are available. The extent to which these changes are stable will be examined in future research.

Psychological distress was not associated with increases in gambling, contrary to our hypotheses.[9] Previous research has shown psychological distress to be independently associated with problem gambling severity.[31,32] A Swedish study investigating gambling during COVID-19 found that psychological distress was not associated with increased gambling after accounting for problem gambling severity and alcohol consumption.[9] However, a Canadian study found anxiety and depression symptoms were related to likelihood of gambling online.[6] Previous Australian studies show that the relationship between gambling and psychological distress is stronger for individuals who gamble on land-based forms.[33,34] Therefore, our findings may indicate that individuals experiencing psychological distress may have gambled in venues if they had remained open, but did not migrate to online gambling.

Problem gambling severity was related to baseline gambling, but not to increases in gambling. Our exploratory analyses indicated that only people at moderate risk of experiencing gambling problems, but not those at high risk, were significantly more likely to increase their overall gambling relative to nonproblem and low-risk gamblers combined. Mean overall gambling frequency at baseline was substantially higher for those with high levels of gambling problems relative to the entire sample, so it is possible that a ceiling effect may have prevented any significant increase in gambling for this subgroup. Taken together, our findings suggest that a group of people vulnerable to experiencing gambling-related harms did increase their gambling, which may have exacerbated any harms experienced. Consistent with reports from several international studies, a small but notable group of higher risk gamblers appear to continue to engage in some form of gambling, even if preferred forms are unavailable.[5–7,9,29]

No clear patterns in changes in gambling behavior were observed based on type of gambling activity with 2 notable exceptions. Firstly, regular sports bettors were more likely to report decreases in online and overall gambling. This finding suggests that individuals who bet on sports did not tend to migrate to other forms of wagering or betting when sporting events were cancelled. Secondly, participants who gambled regularly on EGMs were significantly more likely to report decreases in overall gambling. This suggests that even if this group did increase (or start) gambling online during the shutdown, they did so at a lower level relative to the amount they were gambling before.

Limitations

The findings of this study should be considered as preliminary evidence only given a number of limitations. Firstly, this work does not represent a true longitudinal study as the data were collected using a cross-sectional self-report survey involving retrospective recall for the 2 timepoints. Secondly, the sample obtained was not representative of the broader population as it was heavily biased towards online gambling, which has an estimated past-year prevalence of 8% among Australian adults.[35] This bias was likely related to the

online sampling method used, which limited the scope for recruiting individuals who gamble in land-based venues only. Thirdly, the measures of baseline gambling participation related to a "typical month" timeframe, which is not exactly equivalent to a monthly rate.[36] Finally, despite our attempts to prevent duplicate responses, we cannot rule out this possibility, for example, if participants cleared their browser cookies or used a different browser to access the survey more than once.

Implications

Our findings have important implications for policies aimed towards addressing gambling harm through restrictions on availability. Overall, the restrictions on venue-based gambling appeared to reduce overall gambling, including online gambling. However, a subset of people increased their gambling despite these restrictions, and this was more common among those at moderate risk, but not high risk, of gambling problems. This finding provides some support for policies to restrict the availability of gambling as a harm minimization strategy. Gambling on offshore sites and esports has previously been associated with increased problem gambling severity.[37] Restrictive policies on regulated gambling may have the unintended consequence of increasing use of unregulated gambling forms associated with harms and therefore require careful consideration. What remains unclear is the extent to which shifts in the pattern of gambling from unavailable (land-based) to available (online) forms are stable or temporary in the post-COVID-19 landscape. This can only be ascertained by longer-term monitoring of patterns of behavior.

CONCLUSIONS

Our results suggest that most individuals surveyed 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. Online gambling has been available for over 10 years in Australia; the COVID-19 shutdown did not increase its accessibility. Consequently, any increase in engagement with online gambling suggests that restrictions on the availability of venue-based gambling may drive some people, including a subset of those vulnerable to experiencing harms, to gamble online.

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