AKADÉMIAI KIADÓ

Journal of Behavioral Addictions

13 (2024) 1, 146–162

DOI:
10.1556/2006.2023.00085

FULL-LENGTH REPORT

The COVID-19 lockdown experience suggests that restricting the supply of gambling can reduce gambling problems: An Australian prospective study

NERILEE HING[1*], ALEX M.T. RUSSELL[2], VIJAY RAWAT[3], GABRIELLE M. BRYDEN[1], MATTHEW BROWNE[1], MATTHEW ROCKLOFF[1], HANNAH B. THORNE[4], PHILIP NEWALL[5], NICKI A. DOWLING[6], STEPHANIE S. MERKOURIS[7] and MATTHEW STEVENS[8]

[1] Experimental Gambling Research Laboratory, School of Health, Medical and Applied Sciences, CQUniversity, 6 University Dr, Branyan, QLD 4670, Australia

[2] Experimental Gambling Research Laboratory, School of Health, Medical and Applied Sciences, CQUniversity, 400 Kent St, Sydney, NSW 2000, Australia

[3] Experimental Gambling Research Laboratory, School of Health, Medical and Applied Sciences, CQUniversity, 120 Spencer St, Melbourne, VIC 3000, Australia

[4] Experimental Gambling Research Laboratory, School of Health, Medical and Applied Sciences, CQUniversity, 44 Greenhill Rd, Wayville, SA 5000, Australia

[5] School of Psychological Science, University of Bristol, 12a Priory Road, Bristol, BS8 1TU, United Kingdom

[6] School of Psychology, Deakin University, 1 Gheringhap St, Geelong, VIC 3220, Australia

[7] Deakin University, Geelong, Australia, School of Psychology, 1 Gheringhap St, Geelong, VIC 3220, Australia

[8] STRS Consultant Services, Brinkin, NT, 0810, Australia

Received: July 17, 2023 • Revised manuscript received: November 9, 2023; December 17, 2023 • Accepted: December 22, 2023
Published online: February 12, 2024

ABSTRACT

Background and aims: COVID-19 lockdowns limited access to gambling but simultaneously elevated psychosocial stressors. This study assessed the relative effects of these changes on gambling risk status during and after the Australian COVID-19 lockdown from late-March to late-May 2020. *Methods:* The study administered three surveys to people who had gambled within the past year at T1. Wave 1 asked about before (T1, $N = 2{,}125$) and during lockdown (T2, $N = 2{,}125$). Subsequent surveys focused on one year (T3; $N = 649$) and two years after lockdown (T4, $N = 458$). The dependent variable was changes in reporting any problem gambling symptoms (PGSI 0 vs 1+). Bivariate analyses and multinomial logistic regression tested for significant associations with: demographics, psychosocial stressors (perceived stress, psychological distress, loneliness, health anxiety about COVID, financial hardship, stressful life events), gambling participation and gambling frequency. *Results:* Gambling participation and at-risk gambling decreased between T1 and T2, increased at T3, with little further change at T4. When gambling availability was curtailed, decreased gambling frequency on EGMs, casino games, sports betting or race betting, and lower psychosocial stress, were associated with transitions from at-risk to non-problem gambling. When gambling availability resumed, increased EGM gambling frequency, decreased online gambling frequency, and higher psychosocial stress were associated with transitions from non-problem to at-risk gambling. *Discussion and conclusions:* Gambling availability appears a stronger influence on gambling problems, at the population level, than psychosocial risk factors. Reducing the supply of high-risk gambling products, particularly EGMs, is likely to reduce gambling harm.

*Corresponding author.
E-mail: n.hing@cqu.edu.au

KEYWORDS

COVID, pandemic, gambling harm, problem gambling, gambling disorder, longitudinal

INTRODUCTION

Two key drivers of gambling problems are the availability and use of high-risk gambling products, and psychosocial stressors. A meta-analysis of 104 studies found that online gambling and continuous-play gambling products are the strongest risk factors for gambling problems, followed by psychosocial factors including anxiety, depression and other mental health issues (Allami et al., 2021). Early in the COVID-19 pandemic, lockdowns limited access to many high-risk gambling products, including electronic gaming machines (EGMs), casino games, sports betting and race betting. At the same time, psychosocial stressors were elevated in the community due to concerns about the pandemic and the effects of restrictions. These circumstances presented an opportunity to assess how changing gambling availability and psychosocial stressors impacted on gambling problems during COVID-19. This study was conducted in Australia, which has the highest per capita gambling expenditure worldwide (Letts, 2018), but also a more limited range of legalised online gambling products compared to Europe and North America where, unlike in Australia, the provision of online EGMs and casino games is legal.

Gambling availability in Australia during COVID-19

In Australia, a national COVID-19 lockdown from late-March to late-May 2020 effectively closed land-based gambling venues, including casinos, clubs, hotels and betting shops. This curtailed access to products which are normally easily accessible to the public, such as EGMs, casino games, keno and bingo, and in-person betting on races and sports. Nearly all professional sporting events were suspended worldwide, substantially reducing sports betting markets. Gambling options were limited to lottery products and online betting on races and novel forms, including esports (professional video game competitions) and fantasy sports where participants compete for prize pools by assembling virtual teams of professional sports players whose performance is based on their real-world play. In addition, novel forms of gambling-like activities remained available, including loot boxes (digital containers within many popular video games) that can be purchased with real money, and skin gambling where in-game items (skins) acquired in video games, can be used to gamble via skin gambling websites on esports, games of chance and other competitive events (Hing, Russell, Bryden, et al., 2021; Hing, Rockloff, et al., 2022). In Australia, licensed gambling operators cannot offer online gaming products, including EGMs and casino games, but these products are readily available on illegal, offshore gambling platforms. One year after lockdown, gambling availability had largely returned to pre-pandemic conditions; although with some restrictions, such as proof-of-vaccination, social distancing and mask-wearing. Two years after lockdown, no COVID-19 restrictions on gambling availability remained in place. Some Australian regions had intermittent lockdowns in 2020–21, but these did not occur during the study's assessment periods.

Psychosocial stressors during COVID-19

The pandemic heightened numerous psychosocial stressors in the population, particularly during its first year. Meta-analyses indicate that mental health issues increased across age and gender groups, including psychological distress, anxiety, depression, post-traumatic stress symptoms, sleep issues and loneliness (Cénat et al., 2021; Dettmann, Adams, & Taylor, 2022; Ernst et al., 2022; Nochaiwong et al., 2021). Self-reported stressful life events also increased in the domains of work/finances, home life, social activity, health and healthcare, with elevated rates among women, manual workers and those with less wealth (Jean-Baptiste, Herring, Beeson, Dos Santos, & Banta, 2020; Mousavi, Hooshyari, & Ahmadi, 2020; Thomas et al., 2022). Perceived stress early in the pandemic was also greatest among women, as well as in youth, students and those at high-risk from infection (Gamonal-Limcaoco et al., 2022). Similarly, women, young adults, students, and those with chronic illness and mental health problems reported higher levels of health anxiety about COVID-19 (Canli & Karaşar, 2020; Özdin & Bayrak Özdin, 2020). Financial impacts from the lockdown depended on income continuity and receipt of government financial support, with people variously reporting their financial situation improved, worsened or was unaffected (Swanton, Burgess, & Blaszczynski, 2021). In sum, the pandemic had a range of social, psychological and financial impacts, but these effects were heterogeneous in the population. Individuals facing these types of stressors are more vulnerable to gambling problems (Allami et al., 2021; Williams et al., 2022).

Changes in gambling problems during COVID-19

International reviews highlight trends early in the pandemic when restrictions limited access to gambling (Barbato, Bruch, Giglio, & Tohoff, 2021; Brodeur, Audette-Chapdelaine, Savard, & Kairouz, 2021; Hodgins & Stevens, 2021). Trends included a reduction in gambling frequency and expenditure, a decrease in land-based gambling and an increase in online gambling. Where measured, most studies found that gambling problems declined. In Australia, a cross-sectional analysis of population-weighted data found that those reporting any symptoms of problem gambling (score of 1+ on the Problem Gambling Severity Index [PGSI]) decreased from 13.6 to 10.3% between May and November 2020 (Biddle, 2020). Prospective studies also highlighted downward trends in gambling problems. A Canadian study (Shaw et al., 2021, 2022) observed a decrease in problem gambling from 7% pre-lockdown to 4.6% during lockdown, with no significant change post-lockdown. In a longitudinal study in New Zealand (Bellringer & Garrett, 2021), the PGSI 1+ rate was 43.5% in 2015 compared to 25.6% in 2020/21. Based on a nationally representative sample in Great Britain, 67% of those scoring PGSI 1+ in October 2019 had lower PGSI scores in May 2020, while only 18% had increased their score (Gunstone, Gosschalk, Joyner, Diaconu, & Sheikh, 2020).

Predictors of gambling problems during COVID-19

Several cross-sectional studies examined factors associated with gambling problems during COVID-19 (e.g., Close et al., 2022; Gainsbury, Swanton, Burgess, & Blaszczynski, 2021; Salerno & Pallanti, 2021; Savolainen, Vuorinen, Sirola, & Oksanen, 2022; Sirola, Nyrhinen, & Wilska, 2023; Wardle et al., 2021). In line with known risk factors for gambling problems (Allami et al., 2021; Williams et al., 2022), these findings point to increased risk associated with young men, higher gambling engagement, online gambling, and financial and psychosocial problems, including anxiety, depression, perceived stress, pandemic-related anxiety and loneliness. Three prospective COVID studies illuminated predictors of gambling problems over time. A small 3-wave study conducted in Sweden in 2020 ($N = 139$; Månsson, Wall, Berman, Jayaram-Lindström, & Rosendahl, 2021) found that gambling on a high-risk form and concerns about mental health due to the pandemic were significantly associated with increased monthly gambling problems from Wave 1 to Wave 2. An Australian study found that males and less educated people were more likely to experience increased gambling problems between pre- and post-lockdown assessments (Biddle, 2020). In a larger weighted Canadian sample ($N = 3,449$; Shaw et al., 2021), from pre-lockdown to during lockdown, predictors of PGSI category included gambling behaviour (online gambling, gambling fallacies, total gambling losses, gambling frequency, time spent gambling, types of gambling engaged in), as well as bio-psychosocial factors (impulsivity, tobacco use, stress, younger age).

The current study

The literature exploring gambling throughout COVID-19 implicates the availability of high-risk gambling products and psychosocial vulnerabilities as contributors to gambling problems. However, these two factors potentially had opposite effects during the pandemic. During lockdown, one would expect that the decreased availability of high-risk products would reduce gambling problems, while increased psychosocial stressors in the community would amplify gambling problems. After lockdown, the reinstatement of gambling availability would be expected to increase gambling problems again, while reduced psychosocial stressors would be expected to have a dampening effect. The current study sought insights into these effects. Specifically, it aimed to examine demographic, psychosocial and behavioural characteristics of gamblers associated with transitions in at-risk gambling during and after the national COVID-19 lockdown in Australia. It extends on previous Australian studies of gambling during COVID-19 (Biddle, 2020; Black, Swanton, Burgess, & Gainsbury, 2021; Brown & Hickman, 2020; Gainsbury et al., 2021; Jenkinson, Sakata, Khokhar, Tajin, & Jatkar, 2020) by including 4 assessment points (T1, T2, T3 and T4) over a two-year timeframe, a wider range of psychosocial measures, and consideration of transitions in the incidence of gambling problems.

Specifically, the study addressed the following research questions in relation to the sample:

1. How did gambling participation and gambling problems change during and after the national COVID-19 lockdown, inclusive of changes from T1 (before lockdown) to T2 (during lockdown), T3 (one year after lockdown), and T4 (two years after lockdown)?
2. What demographic characteristics, psychosocial stressors and gambling behaviours were associated with transitions in gambling risk status from T1 (before lockdown) to T2 (during lockdown)?
3. What demographic characteristics, psychosocial stressors and gambling behaviours were associated with transitions in gambling risk status from T2 (during lockdown) to T3 (one year after lockdown)?
4. What demographic characteristics, psychosocial stressors and gambling behaviours were associated with transitions in gambling risk status from T3 (one year after lockdown) to T4 (two years after lockdown)?

METHODS

The research design comprised a prospective longitudinal cohort study using repeated measures to collect data from the same people across three survey waves that covered four time periods.

Survey waves

The online surveys were launched in the last week of May in 2020, 2021 and 2022. The Wave 1 survey asked about two time periods: the 12-month period prior to lockdown commencement (T1; 23rd March 2019 to 23rd March 2020), and the two-month lockdown period (T2; 23rd March 2020 to 23rd May 2020). For consistency with T2, the subsequent surveys each asked about the prior two-month period approximately starting one and two years after lockdown (T3 launched on 28 May 2021; T4 launched on 26 May 2022).

Sampling and recruitment

Eligibility criteria for Wave 1 included being aged 18 years or over, living in Australia, and having gambled at least once in the past 12 months. Participants were recruited from two sources. The first source was an institutional research panel maintained by the lead author's research group, comprising respondents to their previous Australian surveys who consented to be invited into future studies. At Wave 1, these respondents could enter a random draw to win one of 10 × $100 shopping vouchers. To boost the study's relevance to the funding agency, an additional sample of Victorian residents who met the inclusion criteria was recruited through the panel aggregator Qualtrics, and compensated based on their panel's points-based rewards system. Preliminary analyses compared results from the two sources and found no significant differences. Both sources are therefore analysed together.

Sample sizes

Wave 1 obtained 2,125 eligible responses: 610 responses from the research group's panel and 1,515 from the Qualtrics panels. Of the Wave 1 respondents, 1,418 provided email addresses for follow-up in Wave 2, which gained 649 eligible responses (30.5% of the initial sample and 45.8% of those who provided email addresses). These 649 respondents were subsequently emailed an invitation to complete Wave 3, which gained 458 eligible responses (21.6% of the Wave 1 sample and 70.6% of the Wave 2 sample). Respondents to Waves 2 and 3 could enter a random draw to win one of 10 × $100 shopping vouchers offered in each wave. Table S1 in the supplementary materials shows recruitment numbers, screening and eligibility exclusions, completion and response rates for each wave.

Participants

At Wave 1, respondents were most likely to be married (48.8%), living in a metropolitan area (68.6%), living in Victoria (78.9%), possessing a trade or university education (70.2%), employed full-time (35.5%), born in Australia (78.6%), and mainly speaking English at home (94.8%). The mean age of 50.4 years was higher than the population mean, and was even higher for continuing respondents at Waves 2 and 3. The proportion of male (50.9%) and female (48.9%) respondents was relatively balanced at Wave 1, but was skewed towards males at Waves 2 (61.0%) and 3 (65.6%). Respondents in Waves 2 and 3 were also more likely to be older, retired and not live in Victoria. Those scoring in the problem gambling category (PGSI 8+) at Times 1 and 2 were less likely to complete the subsequent surveys (22.2% completed Wave 2 and 19.0% completed Wave 3, compared to 31.7% and 29.2% respectively for those with PGSI scores <8), as found in other longitudinal studies (Wohl & Sztainert, 2011). Table S2 in the supplementary materials details the socio-demographic characteristics of respondents (Table 1).

Measures

Table 1 describes the measures used for the current analyses.

Analysis

A unique, anonymous identifier linked each person's responses across assessment periods (T1→T2, T2→T3, T3→T4). Respondents were classified as reporting no (PGSI = 0) or any (PGSI = 1+) problem gambling symptoms at each time point, i.e., "non-problem gambling" or "at-risk gambling", respectively.

The independent variables captured demographics, psychosocial stressors and gambling behaviour. For associations with changes in gambling risk status, the analysis used the measure of the independent variable at the second time point in the comparison. The same predictors were used across all analyses, and the lowest tolerance was 0.38, indicating no issues with multicollinearity. Bivariate analyses allowed for all possible comparisons between transitions (e.g., PGSI 1+ at T1 to PGSI = 0 at T2, compared to those who were PGSI 1+ at both time points). Multinomial logistic regressions, with PGSI = 0 at both times as the reference group, were also conducted for transitions, to help control for possible overlap between variables and type I errors. However, these are restricted to three of the possible six comparisons due to three degrees of freedom being available. We therefore report both bivariate and multivariate analyses.

The findings from the multivariate analyses are generally consistent with the bivariate results. One important difference is for binary predictors (e.g., gender). The bivariate analyses allow comparisons of differences between transitions in gambling risk status separately for each gender, while the multivariate analyses determine an interaction, i.e., whether differences between transitions in gambling risk status for men is different from the differences between these transitions for women. That is, while the bivariate and multivariate results may at first appear to be different, it is instead because the analyses are not directly comparable. In addition, tests of multicollinearity were performed for the multivariate analyses. Correlations for T1 to T2 transition predictors are reported in Table 2, and the lowest tolerance was ~0.46 for psychological distress, indicating no concerns about multicollinearity. We focus our interpretations on the bivariate results as they provide a more comprehensive coverage of comparisons between groups.

Changes in gambling frequency on each form were determined by comparing reported frequency for each form. For example, if a participant indicated less frequent EGM gambling at T2 compared to T1, they were classified as "decreased". These changes for each form were cross-tabulated with changes in gambling risk status (i.e., 0 to 1+, 0 at both times, 1 at both times, 1+ to 0) for each transition (e.g., T1 to T2, T2 to T3). This approach meant some sparseness, violating assumptions of inferential statistics. Typically, sparseness might be addressed by combining categories, however sparseness differed for the transitions. For example, for T1 to T2, few participants increased their frequency of engagement with certain gambling forms due to restrictions, and few people changed from PGSI = 0 to PGSI = 1+. For T2 to T3, few people decreased their frequency of engagement with certain gambling forms, and few people transitioned from PGSI = 1+ to PGSI = 0. Each gambling form had different ns, making multivariate approaches difficult. Therefore, we have opted not to report inferential statistics for these analyses and instead report descriptive information only. An alpha of 0.05 was used throughout. There were no missing data apart from attrition at T3 and T4.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of Central Queensland University approved the study (#22418 and #23008). All subjects were informed about the study and all provided informed consent.

Table 1. Variables measured in each survey wave

Category	Variable(s)	T1 Wave 1 – Before lockdown	T2 Wave 1 – During lockdown	T3 Wave 2 – 12 months after lockdown	T4 Wave 3 – 2 years after lockdown
Demographics	Socio-demographics and employment (see Table S2 for the response options).	–	✓	✓	✓
Gambling behaviour	Participation and frequency on 14 forms: instant scratch tickets, lottery, lotto or pools tickets, EGMs, race betting, sports betting, novelty event betting, esports betting, fantasy sports betting, skin gambling, bingo, keno, poker, other casino games. Purchasing loot boxes was also included, since it has the core characteristics of gambling, but it is not regulated as gambling in Australia.	✓	✓	✓	✓
Problem gambling severity (PGSI)	Problem gambling status was assessed using the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The index contains 9 items (e.g., 'did you feel that you might have a problem with gambling') measured on a 4-point scale from 0 (never) to 3 (almost always). Scores are summed with a total score of 0 = non-problem gambling, 1 to 2 = low-risk gambling, 3 to 7 = moderate risk gambling, and 8 to 27 = problem gambling. At Times 2, 3 and 4, the PGSI was administered only in relation to the previous 2 months. Cronbach's alpha was 0.95 (T1), 0.96 (T2), 0.93 (T3) and 0.94 (T4).	✓	✓	✓	✓
Stress (PSS)	Four items adapted from the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) measured symptoms of stress over the past 30 days (e.g., 'how often did you feel that you were unable to control the important things in your life'). Items were measured on a 5-point scale from 'none of the time' to 'all of the time'. Two items were positively worded and reverse scored. All items were summed and higher scores indicate higher levels of stress.	–	✓	✓	✓
Psychological distress (K6)	The Kessler Psychological Distress Scale 6 (K6; Kessler et al., 2002) measured 6 symptoms of psychological distress over the past 30 days (e.g., 'how often did you feel so depressed that nothing could cheer you up'). Each item was measured on a 5-point scale from 'none of the time' to 'all of the time'. Scores were summed and higher scores indicate higher levels of psychological distress.	–	✓	✓	✓
Loneliness	The 8-item UCLA Loneliness Scale (UCLA-L; Hays & DiMatteo, 1987) measured subjective feelings of loneliness and social isolation (e.g., 'I feel isolation from others'). Four response options from 'never' to 'often' were summed and higher scores indicate higher levels of loneliness.	–	✓	✓	✓
Health anxiety about COVID-19 (SHAI)	The Short Health Anxiety Inventory (SHAI; Salkovskis, Rimes, Warwick, & Clark, 2002) was adapted to measure health anxiety specific to COVID-19 using 4 items. Each item had 4 response options and scores were summed, with higher scores reflecting higher levels of health anxiety. This measure was selected before a range of COVID-anxiety measures became available.	–	✓	✓	✓

(continued)

Table 1. Continued

Category	Variable(s)	T1 Wave 1 – Before lockdown	T2 Wave 1 – During lockdown	T3 Wave 2 – 12 months after lockdown	T4 Wave 3 – 2 years after lockdown
Financial hardship	Financial hardship was assessed using 6 indicators (e.g., 'a utility service was disconnected') (Gjertson, 2016), measured as a yes/no response. All items were summed, and higher scores indicate higher levels of financial hardship.	–	✓	✓	✓
Stressful life events due to COVID-19	Stressful life events due to COVID-19 were measured using 14 items adapted from the Social Readjustment Scale (Holmes & Rahe, 1967). Each event (e.g., 'lost a job') was answered in a yes/no format, with all scores being summed and higher scores reflecting higher experiences of stressful events due to COVID-19.	–	✓	✓	✓

Note: Unless otherwise stated, measures at T1 were administered in relation to the past 12 months. Unless otherwise indicated, measures at T2, T3 and T4 were administered in relation to the past 2 months, to align with the length of the lockdown period.

RESULTS

RQ1: How did gambling participation and gambling problems change during and after the national COVID-19 lockdown, inclusive of changes from T1 (before lockdown) to T2 (during lockdown), T3 (one year after lockdown), and T4 (two years after lockdown)?

To provide context for the subsequent analyses, the results first present gambling participation and gambling problems at each time point, but they should not be interpreted as prevalence figures. Data for T3 and T4, but not at T1 and T2, are affected by sample attrition.

Figures 1 and 2 show a) the proportion of respondents at each time point who reported participating in any gambling and, separately, participation in each gambling form, and b) those who reported any symptoms of problem gambling and scored in each PGSI category, respectively. These figures show a decline in participation in any gambling and in each gambling form during lockdown, as well as a decrease in those reporting any problem gambling symptoms from T1 (pre-lockdown) to T2 (during lockdown). Post-lockdown, participation and having any problem gambling symptoms both increased at T3 (one year after lockdown), with these levels generally sustained at T4 (two years after lockdown). The incidence of problem gambling symptoms tracked closely to overall gambling participation over time. A slightly different pattern was observed for PGSI categories. Low risk (PGSI 1–2), moderate risk (PGSI 3–7) and problem (PGSI 8+) gambling decreased with the lockdown decline in gambling participation at T2. Low risk and moderate risk gambling increased at T3, but problem gambling still showed a decline. This result reflects greater attrition in the problem gambling group after T2 that may introduce survivor bias. Participation in online gambling showed a steady increase: 49.9% at T1, 53.3% at T2, 57.0% at T3 and 59.2% at T4.

RQ2: What demographic characteristics, psychosocial stressors and gambling behaviours were associated with transitions in gambling risk status from T1 (before lockdown) to T2 (during lockdown)?

Few respondents who reported 0 on the PGSI before lockdown (T1) developed symptoms of problem gambling (PGSI 1+) during lockdown at T2 (n = 25; 1.2%). These respondents were significantly more likely to be younger, employed, and higher in perceived stress, psychological distress, and stressful life events, although these findings are based on small numbers. In contrast, 40.8% of those who reported one or more symptoms at T1 no longer reported any symptoms at T2. These respondents were significantly more likely to be older, female, not employed, and lower in perceived stress, psychological distress, loneliness, financial hardship, and stressful life events (Table 3).

In relation to gambling behaviour, participants who were most likely to show no symptoms, or to transition from at-risk (PGSI 1+) to non-problem gambling, decreased their

Table 2. Correlations between demographic and psychological predictors

Variable	1	2	3	4	5	6	7	8	9	10	11
Gender (1)											
Residence (2)	*0.03*										
Marital status (3)	*−0.16****	*−0.02*									
Employment status (4)	*0.03*	*0.23****	*−0.12****								
Age (5)	−0.15***	0.15***	0.08***	0.44***							
Education (6)	−0.02	−0.15***	0.04	−0.25***	−0.23***						
Perceived stress (7)	0.08***	−0.06*	−0.09***	−0.09***	−0.34***	0.03					
Psychological distress (8)	0.10***	−0.09***	−0.09***	−0.07***	−0.37***	0.04	0.69***				
Loneliness (9)	0.11***	−0.03	−0.17***	−0.00	−0.12***	0.01	0.42***	0.43***			
Health anxiety from COVID (10)	0.05*	0.04	−0.04	0.07**	0.00	−0.06**	0.25***	0.27***	0.20***		
Financial hardship (11)	0.01	−0.01	−0.06*	−0.10***	−0.25***	−0.02	0.32***	0.33***	0.22***	0.17***	
Stressful life events (12)	0.05*	−0.06*	0.00	−0.25***	−0.38***	0.09***	0.43***	0.42***	0.35***	0.19***	0.56***

Note: Correlations in italics are polychoric correlations, all others are Pearson correlations. $^{*}p < 0.05$, $^{**}p < -0.1$, $^{***}p < 0.001$.

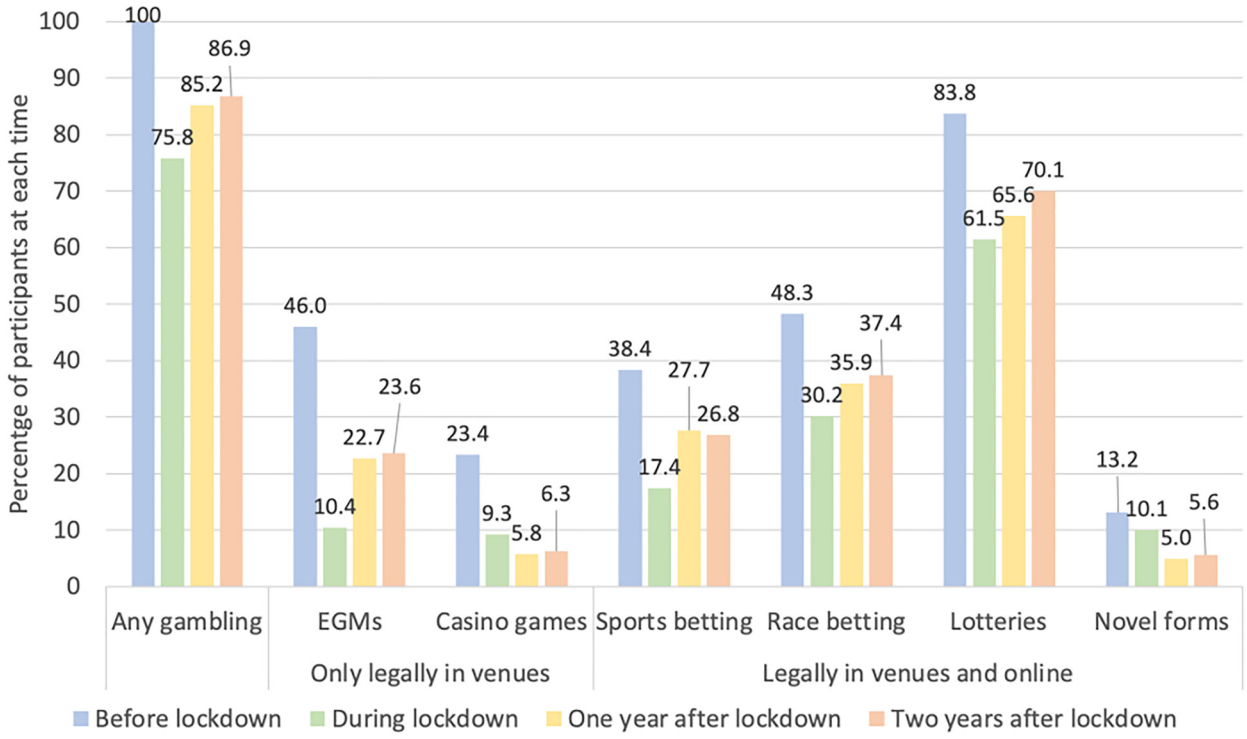

Fig. 1. Proportion of respondents who reported participating in any gambling, and in each gambling form, at each time point
Note: N = 2,125 (T1), N = 2,125 (T2), N = 649 (T3), N = 458 (T4). Novel forms comprised esports betting, fantasy sports betting, skin gambling and purchasing loot boxes.

gambling on all forms (compared to those who remained at-risk), with the exception of online gambling and novel forms, where there was little difference between transitioning from at-risk to non-problem compared to those who remained at risk. Table 4 shows these results.

RQ3: What demographic characteristics, psychosocial stressors and gambling behaviours were associated with transitions in gambling risk status from T2 (during lockdown) to T3 (one year after lockdown)?

At T3, around half of those who reported any PGSI symptoms had not reported symptoms at T2. Respondents who reported symptoms at T3, but not at T2, were significantly more likely to report higher perceived stress, psychological distress and loneliness. Those who reported symptoms at T2, but not at T3, were significantly more likely to be female, compared to those who reported symptoms at both time periods (Table 5).

Transitions to at-risk gambling at T3 amongst those with no reported symptoms at T2 were found for respondents

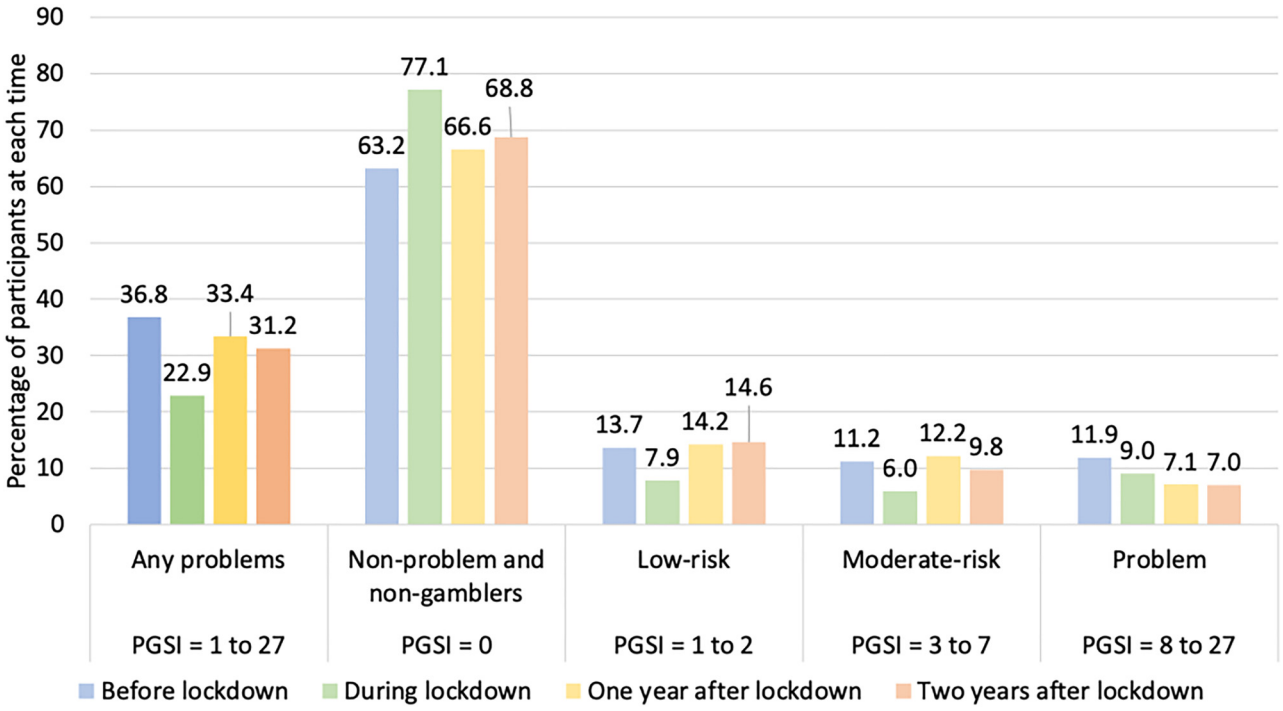

Fig. 2. Proportion of respondents with any PGSI symptoms and in each PGSI category at each time point
Note: $N = 2{,}125$ (T1), $N = 2{,}125$ (T2), $N = 649$ (T3), $N = 458$ (T4).

who bet more frequently on EGMs, and respondents who decreased their frequency of online gambling (rather than staying the same) (Table 6). Results are not reported for novel forms due to low numbers.

RQ4: What demographic characteristics, psychosocial stressors and gambling behaviours were associated with transitions in gambling risk status from T3 (one year after lockdown) to T4 (two years after lockdown)?

Gambling availability changed little between T3 and T4, and was accompanied by little change in gambling participation and gambling risk status between these time periods. Similar numbers of respondents started and stopped experiencing any symptoms of problem gambling between T3 and T4. Commencement of symptoms at T4 amongst those without symptoms at T3 was significantly associated with higher loneliness. No changes in reporting problem gambling symptoms were associated with respondents who increased, decreased or stayed the same in their frequency of gambling on any forms. These results are presented in Tables S3 and S4 in the supplementary materials.

DISCUSSION

This study examined demographic, psychosocial and behavioural characteristics associated with transitions in gambling risk status during and after the national COVID-19 lockdown in Australia. Reports of any problem gambling symptoms (PGSI 1+) showed an overall decrease from T1 (pre-lockdown) to T2 (during lockdown), and then an overall increase by one year after lockdown (T3) and little further change two years after lockdown (T4).

Characteristics associated with different transitions in gambling risk status

Few demographic variables were associated with transitions in gambling risk status. Being older, female and not employed were significantly associated with cessation of problem gambling symptoms between T1 and T2, and female gender between T2 and T3.

Several psychosocial factors were linked to different transitions in gambling risk status. Respondents whose prior symptoms of problem gambling (PGSI 1+) ceased between T1 and T2 tended to report less psychosocial stress (less perceived stress, psychological distress, loneliness, financial hardship, and stressful life events).

Conversely, several psychosocial risk factors were associated with increases in at-risk gambling after lockdown ended. Those who reported problem gambling symptoms at T3, but not at T2, were more likely to report higher levels of perceived stress, psychological distress and loneliness. Prospective studies of gambling during the first year of the pandemic found psychosocial predictors of higher problem gambling severity that are largely consistent with these results. These included higher depression and anxiety (RCG, 2022), stress (Shaw et al., 2021), social isolation and worries about mental health (Månsson et al., 2021).

In the current study, transitions in gambling risk status were also related to certain gambling behaviours. When gambling availability was curtailed during lockdown,

Table 3. Factors associated with changes in gambling risk status, T1-T2 (N = 2,125)

	0 at both times n = 1,319 (62.1%)	1+ to 0 n = 318 (15.0%)	1+ at both times n = 463 (21.8%)	0 to 1 + n = 25 (1.2%)	Inferential statistics			
						Multivariate (Unstandardised coefficients and standard errors)		
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Bivariate	0 at both times vs 1+ to 0	0 at both times vs 1+ at both times	0 at both times vs 0 to 1+
Age (years)	53.83_a (15.74)	46.87_b (16.68)	43.40_c (16.15)	$43.24_{b,c}$ (13.48)	F (32,121) = 57.01, p < 0.001, η^2 = 0.08	−0.03 (0.01), p < 0.001	−0.03 (0.01), p < 0.001	−0.02 (0.02), p = 0.164
Education	6.11 (1.27)	6.17 (1.25)	6.16 (1.32)	6.68 (1.11)	F (32,121) = 1.79, p = 0.148, η^2 = 0.003	−0.07 (0.06), p = 0.227	−0.09 (0.05), p = 0.078	0.29 (0.19), p = 0.132
Perceived stress	8.87_a (3.24)	9.95_b (3.04)	10.85_c (2.81)	$11.36_{b,c}$ (3.81)	F (32,121) = 51.50, p < 0.001, η^2 = 0.068	−0.01 (0.03), p = 0.810	0.03 (0.03), p = 0.232	0.20 (0.09), p = 0.026
Psychological distress	10.53_a (5.49)	12.89_b (5.49)	14.15_c (5.74)	$13.80_{b,c}$ (7.06)	F (32,121) = 55.38, p < 0.001, η^2 = 0.073	0.03 (0.02), p = 0.044	0.02 (0.02), p = 0.285	−0.01 (0.05), p = 0.868
Loneliness	17.07_a (4.58)	18.47_b (4.55)	19.81_c (4.84)	$17.64_{a,b,c}$ (5.27)	F (32,121) = 41.98, p < 0.001, η^2 = 0.056	0.04 (0.02), p = 0.005	0.09 (0.02), p < 0.001	−0.04 (0.05), p = 0.372
Health anxiety from COVID	7.34_a (2.67)	7.90_b (2.80)	8.11_b (2.79)	$8.36_{a,b}$ (2.77)	F (32,121) = 11.42, p < 0.001, η^2 = 0.016	0.06 (0.03), p = 0.024	0.04 (0.02), p = 0.103	0.11 (0.07), p = 0.141
Financial hardship	6.21_a (0.81)	6.36_a (1.03)	7.13_b (1.61)	6.48_a (1.00)	F (32,121) = 85.45, p < 0.001, η^2 = 0.108	0.01 (0.08), p = 0.944	0.36 (0.06), p < 0.001	−0.09 (0.24), p = 0.718
Stressful life events	15.51_a (2.10)	16.28_b (2.45)	17.52_c (3.35)	$17.24_{b,c}$ (3.29)	F (32,121) = 77.09, p < 0.001, η^2 = 0.098	0.04 (0.03), p = 0.241	0.06 (0.03), p = 0.033	0.15 (0.10), p = 0.120
	n (%)	n (%)	n (%)	n (%)				
Gender*								
Male	615_a (46.7)	163_a (51.4)	292_b (63.1)	$11_{a,b}$ (44.0)	χ^2 = 37.08, p < 0.001, ϕ = 0.132	0.48 (0.13), p < 0.001	1.13 (0.13), p < 0.001	0.17 (0.43), p = 0.694
Female	701_a (53.3)	154_a (48.6)	171_b (36.9)	$14_{a,b}$ (56.0)				
Residence								
Metropolitan	865_a (65.6)	241_b (75.8)	334_b (72.1)	$18_{a,b}$ (72.0)	χ^2 = 16.04, p = 0.001, ϕ = 0.087	0.39 (0.15), p = 0.009	0.12 (0.14), p = 0.391	−0.00 (0.47), p = 0.996
Regional/rural	454_a (34.4)	77_b (24.2)	129_b (27.9)	$7_{a,b}$ (28.0)				
Marital status								
No partner	461 (35.0)	110 (34.6)	166 (35.9)	6 (24.0)	χ^2 = 1.50, p = 0.682, ϕ = 0.027	−0.17 (0.14), p = 0.216	−0.21 (0.13), p = 0.122	−0.61 (0.49), p = 0.211
Partner	858 (65.0)	208 (65.4)	297 (64.1)	19 (76.0)				
Employment								
Employed	716_a (54.3)	197_b (61.9)	322_c (69.5)	$19_{b,c}$ (76.0)	χ^2 = 37.55, p < 0.001, ϕ = 0.133	−0.06 (0.15), p = 0.700	0.09 (0.14), p = 0.523	0.36 (0.51), p = 0.490
Not employed	603_a (45.7)	121_b (38.1)	141_c (30.5)	$6_{b,c}$ (24.0)				

Note: * 4 participants who reported 'other' were excluded from this analysis due to small cell count. Subscripts indicate significant differences across rows. Groups with different subscripts (e.g., a vs b) differ significantly.

Table 4. Changes in gambling frequency associated with changes in gambling risk status, T1-T2

Variable	0 at both times n (%)	1+ to 0 n (%)	1+ at both times n (%)	0 to 1+ n (%)
EGMs (n = 994)				
Decreased (n = 818)	407 (90.2%)	195 (95.1%)	206 (63.4%)	10 (76.9%)
Same (n = 93)	33 (7.3%)	6 (2.9%)	51 (15.7%)	3 (23.1%)
Increased (n = 83)	11 (2.4%)	4 (2.0%)	68 (20.9%)	0 (0.0%)
Sports betting (n = 836)				
Decreased (n = 604)	269 (82.0%)	138 (85.2%)	188 (56.3%)	9 (75.0%)
Same (n = 145)	44 (13.4%)	16 (9.9%)	85 (25.4%)	0 (0.0%)
Increased (n = 87)	15 (4.6%)	8 (4.9%)	61 (18.3%)	3 (25.0%)
Race betting (n = 1,058)				
Decreased (n = 519)	279 (56.4%)	124 (68.5%)	110 (30.0%)	6 (40.0%)
Same (n = 360)	174 (35.2%)	35 (19.3%)	147 (40.1%)	4 (26.7%)
Increased (n = 179)	42 (8.5%)	22 (12.2%)	110 (30.0%)	5 (33.3%)
Casino games (n = 524)				
Decreased (n = 369)	144 (85.7%)	88 (87.1%)	133 (53.4%)	4 (66.7%)
Same (n = 67)	14 (8.3%)	8 (7.9%)	43 (17.3%)	2 (33.3%)
Increased (n = 88)	10 (6.0%)	5 (5.0%)	73 (29.3%)	0 (0.0%)
Online gambling (n = 1,163)				
Decreased (n = 66)	21 (3.8%)	15 (9.8%)	29 (6.7%)	1 (5.0%)
Same (n = 556)	314 (56.3%)	45 (29.4%)	190 (44.0%)	7 (35.0%)
Increased (n =541)	223 (40.0%)	93 (60.8%)	213 (49.3%)	12 (60.0%)
Lotteries (n = 1808)				
Decreased (n = 717)	471 (41.6%)	110 (45.8%)	133 (32.0%)	3 (14.3%)
Same (n = 865)	590 (52.1%)	94 (39.2%)	175 (42.2%)	6 (28.6%)
Increased (n = 226)	71 (6.3%)	36 (15.0%)	107 (25.8%)	12 (57.1%)
Novel forms (n = 302)				
Decreased (n = 152)	34 (64.2%)	23 (60.5%)	93 (44.9%)	2 (50.0%)
Same (n = 44)	8 (15.1%)	5 (13.2%)	31 (15.0%)	0 (0.0%)
Increased (n = 106)	11 (20.8%)	10 (26.3%)	83 (40.1%)	2 (50.0%)

Note: EGMs = electronic gaming machines. "Decreased", "same" and "increased" refer to reported frequency of engaging in each form from time 1 to 2.

decreased frequency of gambling on EGMs, casino games, sports betting, race betting, and lottery purchasing was associated with transitions from at-risk to non-problem gambling. Conversely, one year after lockdown when gambling availability had largely returned to pre-pandemic conditions, increased frequency of gambling on EGMs and decreased frequency of online gambling was associated with increased PGSI scores. EGMs are known to present the highest risk of problem gambling (Browne et al., 2023; Delfabbro, King, Browne, & Dowling, 2020; Hing, Russell, et al., 2022; Mazar, Zorn, Becker, & Volberg, 2020).

Prospective studies have also implicated certain gambling behaviours in the first year of the pandemic as leading to increased gambling problems. These include increases in online gambling, gambling losses, time spent gambling, gambling frequency, number of types of gambling, and gambling on high-risk activities (Bellringer & Garrett, 2021; Månsson et al., 2021; RCG, 2022; Shaw et al., 2021). The current findings mainly align with these results, wherein increased gambling on EGMs was, unsurprisingly, related to increased problem gambling severity. However, the study found no consistent link between engagement in online gambling and gambling problems. The different online gambling products that are legally available in other jurisdictions, including online EGMs and casino games which are outlawed for provision in Australia, may explain these results. Fewer than 1% of Australian adults illegally gambled online on EGMs and casino games in 2019 (Hing, Russell, Browne, et al., 2021), and few respondents in the current study took up these options during lockdown.

The bigger picture

The most significant curtailment of gambling availability Australia-wide occurred during the national lockdown, when psychosocial stressors and financial hardship were also heightened. It has long been recognised that these stressors increase the likelihood of gambling and gambling disorder (Allami et al., 2021; Browne et al., 2019; Dowling et al., 2015, 2017; Sharman, Butler, & Roberts, 2019). Yet despite these heightened risk factors, reduced accessibility due to the lockdown led to significant declines in gambling participation and symptoms of problem gambling for most respondents. This pattern has been found in all Australian and international studies of gambling and gambling disorder during COVID-19 lockdowns (Barbato et al., 2021; Brodeur et al., 2021; Hodgins & Stevens, 2021). Gambling participation and gambling problems, therefore, cannot be

Table 5. Factors associated with changes in gambling risk status, T2-T3 (N = 649)

	0 at both times n = 407 (62.7%)	1+ to 0 n = 25 (3.9%)	1+ at both times n = 110 (16.9%)	0 to 1 + n = 25 (16.5%)	Inferential statistics			
						Multivariate (Unstandardised coefficients and standard errors)		
Variable	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Bivariate	0 at both times vs 1+ to 0	0 at both times vs 1+ at both times	0 at both times vs 0 to 1+
Age (years)	60.40_{a} (13.14)	$53.36_{a,b}$ (13.05)	54.25_{b} (14.29)	$57.39_{a,b}$ (14.24)	F (3,645) = 7.71, p < 0.001, η^2 = 0.035	−0.04 (0.02), p = 0.052	−0.02 (0.01), p = 0.025	−0.01 (0.01), p = 0.149
Education	6.15 (1.35)	6.08 (1.26)	6.00 (1.30)	6.04 (1.25)	F (3,645) = 0.52, p = 0.668, η^2 = 0.002	−0.13 (0.17), p = 0.437	−0.2 (0.09), p = 0.032	−0.11 (0.09), p = 0.214
Perceived stress	8.39_{a} (3.14)	$8.72_{a,b}$ (4.14)	10.35_{b} (2.94)	$9.38_{b,c}$ (3.16)	F (3,645) = 12.28, p < 0.001, η^2 = 0.054	−0.09 (0.1), p = 0.343	0.09 (0.05), p = 0.066	0.04 (0.05), p = 0.417
Psychological distress	9.51_{a} (4.80)	$11.08_{a,b}$ (5.99)	12.66_{b} (5.78)	$11.20_{b,c}$ (5.39)	F (3,645) = 12.21, p < 0.001, η^2 = 0.054	0.03 (0.06), p = 0.688	0.01 (0.03), p = 0.853	0.01 (0.03), p = 0.806
Loneliness	16.73_{a} (4.21)	$18.00_{a,b}$ (4.97)	19.60_{b} (4.52)	$18.03_{b,c}$ (4.96)	F (3,645) = 13.02, p < 0.001, η^2 = 0.057	0.02 (0.06), p = 0.708	0.12 (0.03), p < 0.001	0.04 (0.03), p = 0.234
Health anxiety from COVID	6.69 (2.50)	7.40 (2.96)	6.85 (2.57)	7.20 (2.66)	F (3,645) = 1.54, p = 0.203, η^2 = 0.007	0.09 (0.09), p = 0.286	−0.05 (0.05), p = 0.37	0.04 (0.05), p = 0.343
Financial hardship	6.16_{a} (0.65)	$6.24_{a,b}$ (0.88)	6.56_{b} (1.17)	$6.28_{a,b}$ (0.93)	F (3,645) = 6.92, p < 0.001, η^2 = 0.031	−0.18 (0.31), p = 0.564	0.26 (0.14), p = 0.056	−0.01 (0.17), p = 0.941
Stressful life events	15.14_{a} (1.88)	$16.16_{a,b}$ (2.94)	16.07_{b} (2.93)	$15.75_{a,b}$ (2.59)	F (3,645) = 6.83, p < 0.001, η^2 = 0.031	0.14 (0.1), p = 0.169	0 (0.06), p = 0.941	0.06 (0.06), p = 0.329
	n (%)	n (%)	n (%)	n (%)				
Gender*								
Male	232_{a} (57.1)	13_{a} (52.0)	85_{b} (77.3)	66_{a} (62.3)	χ^2 = 15.64, p = 0.001, ϕ = 0.155	0.09 (0.44), p = 0.833	1.36 (0.28), p < 0.001	0.46 (0.24), p = 0.053
Female	174_{a} (42.9)	12_{a} (48.0)	25_{b} (22.7)	40_{a} (37.7)				
Residence								
Metropolitan	260 (63.9)	18 (72.0)	75 (68.2)	72 (67.3)	χ^2 = 1.44, p = 0.696, ϕ = 0.047	0.34 (0.47), p = 0.473	0.13 (0.25), p = 0.595	0.12 (0.24), p = 0.609
Regional/rural	147 (36.1)	7 (28.0)	35 (31.8)	35 (32.7)				
Marital status								
No partner	121 (29.7)	9 (36.0)	36 (32.7)	30 (28.0)	χ^2 = 1.01, p = 0.80, ϕ = 0.039	0.18 (0.45), p = 0.689	−0.12 (0.26), p = 0.653	−0.19 (0.25), p = 0.452
Partner	286 (70.3)	16 (64.0)	74 (67.3)	77 (72.0)				
Employment								
Employed	199_{a} (48.9)	$15_{a,b}$ (60.0)	67_{b} (60.9)	$56_{a,b}$ (52.3)	χ^2 = 5.71, p = 0.126, ϕ = 0.094	−0.09 (0.52), p = 0.866	0.01 (0.29), p = 0.969	−0.13 (0.28), p = 0.636
Not employed	208_{a} (51.1)	$10_{a,b}$ (40.0)	43_{b} (39.1)	$51_{a,b}$ (47.7)				

Note: * 2 participants who reported 'other' were excluded from this analysis due to small cell count. Subscripts indicate significant differences across rows. Groups with different subscripts (e.g., a vs b) differ significantly.

Table 6. Changes in gambling frequency associated with changes in gambling risk status, T2-T3

Variable	0 at both times n (%)	1+ to 0 n (%)	1+ at both times n (%)	0 to 1+ n (%)
EGMs (n = 164)				
Decreased (n = 25)	8 (12.9%)	3 (75.0%)	12 (25.5%)	2 (3.9%)
Same (n =8)	2 (3.2%)	0 (0.0%)	5 (10.6%)	1 (2.0%)
Increased (n = 131)	52 (83.9%)	1 (25.0%)	30 (63.8%)	48 (94.1%)
Sports betting (n = 194)				
Decreased (n = 20)	8 (11.4%)	4 (40.0%)	4 (5.5%)	4 (9.8%)
Same (n = 20)	5 (7.1%)	1 (10.0%)	10 (13.7%)	4 (9.8%)
Increased (n =154)	57 (81.4%)	5 (50.0%)	59 (80.8%)	33 (80.5%)
Race betting (n = 260)				
Decreased (n =71)	29 (27.6%)	6 (42.9%)	22 (24.4%)	14 (27.5%)
Same (n =100)	42 (40.0%)	4 (28.6%)	40 (44.4%)	14 (27.5%)
Increased (n = 89)	34 (32.4%)	4 (28.6%)	28 (31.1%)	23 (45.1%)
Casino games (n = 54)				
Decreased (n = 22)	7 (46.7%)	2 (100.0%)	11 (42.3%)	2 (18.2%)
Same (n =4)	1 (6.7%)	0 (0.0%)	2 (7.7%)	1 (9.1%)
Increased (n =28)	7 (46.7%)	0 (0.0%)	13 (50.0%)	8 (72.7%)
Online gambling (n = 410)				
Decreased (n = 156)	65 (31.6%)	10 (45.5%)	47 (44.8%)	34 (44.2%)
Same (n =175)	98 (47.6%)	9 (40.9%)	48 (45.7%)	20 (26.0%)
Increased (n =79)	43 (20.9%)	3 (13.6%)	10 (9.5%)	23 (29.9%)
Lotteries (n = 471)				
Decreased (n = 116)	59 (21.1%)	11 (57.9%)	25 (28.1%)	21 (25.3%)
Same (n =207)	141 (50.4%)	4 (21.1%)	32 (36.0%)	30 (36.1%)
Increased (n =148)	80 (28.6%)	4 (21.1%)	32 (36.0%)	32 (38.6%)

Note: EGMs = electronic gaming machines. "Decreased", "same" and "increased" refer to reported frequency of engaging in each form from time 2 to 3. Novel forms not reported due to low numbers of participants.

explained by the mere presence or elevation of psychosocial risk factors in the population.

Instead, what changed during lockdown was a reduction in the availability of high-risk gambling products. This was immediately accompanied by a marked decline in low risk, moderate risk and problem gambling, as found in other COVID-gambling studies (e.g., Biddle et al., 2020; Gunstone et al., 2020; Shaw et al., 2021). While respondents who reported more psychosocial and financial stress were more likely to report increases in at-risk gambling, and these stressors also increased overall, there was nevertheless a net drop in the sample's gambling problems during lockdown. These results indicate that gambling problems declined in tandem with the curtailed availability of gambling, and implicate gambling availability as a stronger influence on gambling problems, at the population level, than psychosocial risk factors. This is consistent with Allami et al.'s meta-analytic findings (2021). Some gambling was still available during lockdown, but vulnerable people largely did not switch to these surviving products. This finding is further strengthened by evidence that once gambling availability returned to (near) pre-pandemic levels, gambling problems also returned to (near) former levels. This occurred despite an easing of COVID-19 restrictions, which lessened the psychosocial risk factors for gambling problems after lockdown as stay-at-home restrictions were relaxed, vaccines became available, and schools and businesses reopened. Nonetheless, there may be other unmeasured variables, part from gambling availability and psychosocial stressors, that contributed to changes in gambling problems during this period.

The dominant narrative has long been that a small group of people ("problem gamblers") develop gambling problems as a consequence of pre-existing psychosocial problems, rather than consumption of a harmful gambling product leading to negative consequences. This pathologising of problem gambling has assigned blame to individual vulnerabilities and called for consumers to "gamble responsibly". But if gambling problems are mainly a product of psychosocial vulnerabilities, they should have increased during lockdown when these stressors were heightened and some outlets for gambling activity remained. However, findings from this and other COVID-gambling studies (e.g., Biddle et al., 2020; Gunstone et al., 2020; Shaw et al., 2021) indicate, instead, that gambling problems decreased when gambling supply was curtailed. This body of research indicates that gambling supply matters because it is a direct driver of gambling problems. While individual and psychosocial factors increase the propensity of some people to be more vulnerable to gambling problems, this is exceeded by the effect of overall access to and availability of legalised gambling activities. This study also found that gamblers, even those experiencing some degree of gambling problems, show a marked reluctance to switch mode or form of gambling when their preferred form becomes unavailable. Online EGMs and casino games cannot be legally provided

to Australian residents, which may have deterred a switch of mode for these forms when their land-based availability was restricted. Nonetheless, overseas studies have also found little substitution when certain forms and modes of gambling have been restricted (Auer, Malischnig, & Griffiths, 2023; Capitanucci, Avanzi, & Avanzi, 2023; Lund, 2009). This suggests that we should expect to see relatively little switching of demand if the availability of high-risk gambling forms such as EGMs were restricted. Changes in gambling behaviour observed in this and other COVID-gambling studies indicate that people reduce their gambling when supply is reduced, and that this directly reduces gambling problems.

Limitations and strengths

The sample was self-selecting, may not have been representative of gamblers in Australia, and was subject to substantial attrition at T3 and T4 (but not at T1 and T2). The results should not be interpreted as prevalence figures. Instead, purposive sampling aimed for sufficient respondents in subgroups of interest to analyse characteristics associated with transitions in at-risk gambling. Representative sampling was not necessary to reliably examine these relationships within cohorts. Similarly, the analyses did not require all respondents to have completed all survey waves; however, the limited sample sizes at T3 and T4 constrained some analyses. The surveys elicited self-report data which may be subject to social desirability and recall biases. Recall bias might particularly apply to the T1 data on the previous 12 months. The surveys could not include all potential risk factors, but focused on those elevated by the pandemic. Some Australian states had subsequent COVID-19 lockdowns after the national lockdown, but these did not occur during the T3 and T4 assessment periods. Nonetheless, they may have impacted relatively more on the psychosocial wellbeing of respondents from these jurisdictions. Despite these limitations, the study provides the most detailed assessment to date of how changes in gambling availability interacted with the heightened psychosocial stressors during the COVID-19 pandemic to impact on at-risk gambling in Australia.

CONCLUSIONS

From a public health perspective, the findings from this and other COVID-gambling studies suggest that the most impactful way to reduce gambling harm is to reduce the supply of legalised gambling products. An argument often used against curtailing legal supply is that most people will instead switch to using illegal gambling products and modes. This study shows that this argument is contradicted by the evidence, with most respondents stopping gambling on unavailable forms and modes rather than turning to black market alternatives. The findings therefore indicate that regulatory and other efforts to protect public health would best be directed at reducing gambling supply rather than curtailing demand. However, research is needed into intentions and behaviours relating to the use of illegal gambling when supply is curtailed over the longer-term so that inferences can be made about the potential impacts of curtailing legalised high-risk gambling products. Currently, harm minimisation efforts aim to reduce demand rather than supply, such as through restrictions on advertising or messaging on temperance. Much more is likely be gained from reducing gambling availability than from urging people to "gamble responsibly" or to use consumer protection tools to self-regulate their gambling. Tools such as limit-setting, self-exclusion and player activity statements should be in place as minimum consumer protection tools, as they help some individuals experiencing gambling harm to reflect on their gambling (Hing et al., 2015; 2022b). However, a population-level reduction in gambling harm requires a population-level initiative. The most meaningful initiative is likely to be a substantial reduction in the supply of high-risk gambling products, especially EGMs, which this and previous COVID-gambling studies indicate would be the most impactful change likely to reduce gambling problems in the community.

Funding sources: Financial support for this study was received by the Victorian Responsible Gambling Foundation through its Grants for Gambling Research program. Project number: GR11/20/01.

Authors' contribution: NH conceptualised the paper. AR, VR and MB conducted all analyses and verified the underlying data. NH led the overall project from which these data were drawn. NH, AR, MB, MR, NG, HT, PN, MS, ND, and SM secured funding for the corresponding project, and were involved in the design of the overall project and survey instrument. NH wrote the first draft of the paper. All authors critically edited the manuscript and approved it for submission.

Conflict of interest: Nerilee Hing in the last 5 years has received funding from numerous government sources, including: Gambling Research Australia, the Victorian Responsible Gambling Foundation, the NSW Responsible Gambling Fund and NSW Office of Responsible Gambling, the New Zealand Ministry of Health, the South Australian Office for Problem Gambling, Australia's National Research Organisation for Women's Safety, the Australian Media and Communications Authority, and the Alberta Gambling Research Institute. She has also been subcontracted to assist with research projects conducted by First Person Consulting, and the First Nations Foundation. She declares no conflicts of interest in relation to this manuscript.

Alex Russell has received funding from Victorian Responsible Gambling Foundation; New South Wales Office of Responsible Gambling; South Australian Government; Gambling Research Australia; New Zealand Ministry of Health; Australian Communications and Media Authority and the Alberta Gambling Research Institute. He has had travel expenses paid to present research by the Victorian

Responsible Gambling Foundation, PsychMed and the Hawthorn Hawks Football Club Players Association. He has received an honorarium from Movember for assessing applications for funding. He is also affiliated with the University of Sydney and Deakin University. He declares no conflicts of interest in relation to this manuscript.

Vijay Rawat has received research funding from Central Queensland University, Gambling Research Australia, the New South Wales Responsible Gambling Fund, and the Victorian Responsible Gambling Foundation. He declares no conflicts of interest in relation to this manuscript.

Gabrielle Bryden has received research funds from the Australian Government, Department of Education and Training. She declares no conflict of interest in relation to this manuscript.

Matthew Browne has received research funds from the Australian Government, Gambling Research Australia, the Victorian Responsible Gambling Foundation, Queensland Government Department of Health, NSW Responsible Gambling Fund, Australian Department of Social Services, South Australian Government, New Zealand Ministry of Health, Department of Families, Housing, Community Services and Indigenous Affairs, Department of Innovation, Industry, Science and Research, Australian Department of Foreign Affairs and Trade, Japanese Ministry of Economy, Trade and Industry. He declares no conflicts of interest in relation to this manuscript.

Matthew Rockloff has received research funds from Gambling Research Australia, Victorian Responsible Gambling Foundation, Queensland Treasury, Victorian Treasury, NSW Responsible Gambling Fund, NSW Office of Liquor & Gaming, Tasmanian Department of Treasury and Finance, New Zealand Ministry of Health, Department of Families, Housing, Community Services and Indigenous Affairs, Alberta Gambling Research Institute and the First Nations Foundation. He declares no conflicts of interest in relation to this manuscript.

Hannah B Thorne has received research funds from Gambling Research Australia, the Victorian Responsible Gambling Foundation, the Auckland City Council, and the National Association of Gambling Studies for conference attendance. She declares no conflicts of interest in relation to this manuscript.

Philip Newall is a member of the Advisory Board for Safer Gambling – an advisory group of the Gambling Commission in Great Britain, and in 2020 was a special advisor to the House of Lords Select Committee Enquiry on the Social and Economic Impact of the Gambling Industry. In the last three years Philip Newall has contributed to research projects funded by the Academic Forum for the Study of Gambling, Clean Up Gambling, Gambling Research Australia, NSW Responsible Gambling Fund, and the Victorian Responsible Gambling Foundation, received travel and accommodation funding from Alberta Gambling Research Institute, and received open access fee funding from Gambling Research Exchange Ontario. Philip declares no conflicts of interest in relation to this manuscript.

Nicki A Dowling in the last 3 years has received research funds from the Swedish Gambling Research Council, the Health Research Council of New Zealand, the Victorian Responsible Gambling Foundation, the New South Wales Office of Responsible Gambling, Gambling Research Australia, the New Zealand Ministry of Health and the International Center for Responsible Gaming (with funding decisions the responsibility of a scientific advisory board). She has not knowingly received research funding from the gambling, tobacco, or alcohol industries or any industry-sponsored organisation. She declares no conflicts of interest in relation to this manuscript.

Stephanie S Merkouris has received research funds from multiple sources, including the Victorian Responsible Gambling Foundation, New South Wales Office of Responsible Gambling, Health Research Council of New Zealand, International Center for Responsible Gaming, New Zealand Ministry of Health and Gambling Research Australia. She is currently the recipient of a New South Wales Office of Responsible Gambling Postdoctoral Fellowship. She declares no conflicts of interest in relation to this manuscript.

Matthew Stevens has received research funds from the Northern Territory Government Community Benefit Fund (the Community Benefit Fund receives money through a 10% hypothecated tax on electronic gambling machines (EGMs) located in the two casinos and in hotels in the Northern Territory, Australia). Matt has received funding from National Health and Medical Research Council Early Career Fellowship (2013–2017), the NT Government Department of Business, Gambling Research Australia, the Victorian Foundation for Responsible Gambling, and the New South Wales Office of Liquor and Gaming (with this funding coming from hypothecated gambling taxes on EGMs). He declares no conflicts of interest in relation to this manuscript.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1556/2006.2023.00085.

REFERENCES

Allami, Y., Hodgins, D. C., Young, M., Brunelle, N., Currie, S., Dufour, M., … Nadeau, L. (2021). A meta-analysis of problem gambling risk factors in the general adult population. *Addiction*, *116*(11), 2968–2977. https://doi.org/10.1111/add.15449.

Auer, M., Malischnig, D., & Griffiths, M. D. (2023). Gambling before and during the COVID-19 pandemic among European regular sports bettors: An empirical study using behavioral tracking data. *International Journal of Mental Health and Addiction*, *21*(1), 20–27. https://doi.org/10.1007/s11469-020-00327-8.

Barbato, L., Bruch, A. S., Giglio, L., & Tohoff, L. (2021). *Covid-19 and gambling behaviour in industrialized countries: A*

systematic review. Bocconi University. https://dondena.unibocconi.eu/sites/default/files/media/attach/Barbato-et-al-2021—Covid19-and-Gambling-Behaviour.pdf.

Bellringer, M. E., & Garrett, N. (2021). Risk factors for increased online gambling during covid-19 lockdowns in New Zealand: A longitudinal study. *International Journal of Environmental Research and Public Health*, *18*(24), 12946. https://doi.org/10.3390/ijerph182412946.

Biddle, N. B. (2020). *Gambling during the COVID-19 pandemic*. Canberra: ANU Centre for Social Research and Methods, Australian National University. https://csrm.cass.anu.edu.au/sites/default/files/docs/2020/12/Gambling_during_the_COVID-19_pandemic.pdf.

Black, N., Swanton, T. B., Burgess, M. T., & Gainsbury, S. M. (2021). Impact of gambling supply reduction during COVID-19 shutdowns on gambling problems and gambling behaviour in Australia: A national longitudinal study. *Journal of Gambling Studies*, *38*(2), 353–365. https://doi.org/10.1007/s10899-021-10067-6.

Brodeur, M., Audette-Chapdelaine, S., Savard, A.-C., & Kairouz, S. (2021). Gambling and the COVID-19 pandemic: A scoping review. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *111*, 110389. https://doi.org/10.1016/j.pnpbp.2021.110389.

Brown, R., & Hickman, A. (2020). *Changes in online gambling during the COVID-19 pandemic: Statistical Bulletin 25*. Canberra: Australian Government, Australian Institute of Criminology. https://www.aic.gov.au/publications/sb/sb25#:~:text=The%20results%20showed%20that%20almost,percent%20had%20decreased%20their%20involvement.

Browne, M., Delfabbro, P., Thorne, H., Tulloch, C., Rockloff, M., Hing, N., … Stevens, M. (2023). Unambiguous evidence that over half of gambling problems in Australia are caused by electronic gambling machines: Results from a large-scale composite population study. *Journal of Behavioral Addictions*, *12*(1), 182–193. https://doi.org/10.1556/2006.2022.00083.

Browne, M., Hing, N., Rockloff, M., Russell, A. M. T., Greer, N., Nicoll, F., & Smith, G. (2019). A multivariate evaluation of 25 proximal and distal risk-factors for gambling- related harm. *Journal of Clinical Medicine Research*, *8*(4), 509. https://doi.org/10.3390/jcm8040509.

Canli, D., & Karaşar, B. (2020). Health anxiety and emotion regulation during the period of covid-19 outbreak in Turkey. *Psychiatria Danubina*, *32*(3–4), 513–520. https://doi.org/10.24869/psyd.2020.513.

Capitanucci, D., Avanzi, D., & Avanzi, M. (2023). The impact of the COVID-19 pandemic on gamblers and their families in Italy: A systematic review. *Journal of Gambling Issues*. https://doi.org/10.4309/OLTI3151.

Cénat, J. M., Blais-Rochette, C., Kokou-Kpolou, C. K., Noorishad, P., Mukunzi, J., McIntee, S., … Labelle, P. (2021). Prevalence of symptoms of depression, anxiety, insomnia, posttraumatic stress disorder, and psychological distress among populations affected by the COVID-19 pandemic: A systematic review and meta- analysis. *Psychiatry Research*, *295*, e113599. https://doi.org/10.1016/j.psychres.2020.113599.

Close, J., Spicer, S. G., Nicklin, L. L., Lloyd, J., Whalley, B., & Lloyd, H. (2022). Gambling and gaming in the United Kingdom during the COVID-19 lockdown. *COVID*, *2*(2), 87–101. https://doi.org/10.3390/covid2020007.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385–396. https://doi.org/10.2307/2136404.

Delfabbro, P., King, D. L., Browne, M., & Dowling, N. A. (2020). Do EGMs have a stronger association with problem gambling than racing and casino table games? Evidence from a decade of Australian prevalence studies. *Journal of Gambling Studies*, *36*(2), 499–511. https://doi.org/10.1007/s10899-020-09950-5.

Dettmann, L. M., Adams, S., & Taylor, G. (2022). Investigating the prevalence of anxiety and depression during the first COVID-19 lockdown in the United Kingdom: Systematic review and meta-analyses. *British Journal of Clinical Psychology*, *61*(3), 757–780. https://doi.org/10.1111/bjc.12360.

Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2015). Prevalence of psychiatric co-morbidity in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry*, *49*(6), 519–539. https://doi.org/10.1177/0004867415575774.

Dowling, N. A., Merkouris, S. S., Greenwood, C. J., Oldenhof, E., Toumbourou, J. W., & Youssef, G. J. (2017). Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review*, *51*, 109–124. https://doi.org/10.1016/j.cpr.2016.10.008.

Ernst, M., Niederer, D., Werner, A. M., Czaja, S. J., Mikton, C., Ong, A. D., … Beutel, M. E. (2022). Loneliness before and during the COVID-19 pandemic: A systematic review with meta-analysis. *American Psychologist*, *77*(5), 660. https://doi.org/10.1037/amp0001005.

Ferris, J., & Wynne, H. (2001). The Canadian problem gambling Index: Final report. *Canadian Consortium for Gambling Research*. http://www.ccgr.ca/en/projects/resources/CPGI-Final-Report-English.pdf.

Gainsbury, S. M., Swanton, T. B., Burgess, M. T., & Blaszczynski, A. (2021). Impacts of the COVID-19 shutdown on gambling patterns in Australia: Consideration of problem gambling and psychological distress. *Journal of Addiction Medicine*, *15*(6), 468. https://doi.org/10.1097/ADM.0000000000000793.

Gamonal-Limcaoco, S., Montero-Mateos, E., Lozano-López, M. T., Maciá-Casas, A., Matías-Fernández, J., & Roncero, C. (2022). Perceived stress in different countries at the beginning of the coronavirus pandemic. *The International Journal of Psychiatry in Medicine*, *57*(4), 309–322. https://doi.org/10.1177/00912174211033710.

Gjertson, L. (2016). Emergency saving and household hardship. *Journal of Family and Economic Issues*, *37*(1), 1–17. https://doi.org/10.1007/s10834-014-9434-z.

Gunstone, M., Gosschalk, K., Joyner, O., Diaconu, A., & Sheikh, M. (2020). *The impact of the COVID-19 lockdown on gambling behaviour, harms and demand for treatment and support: On behalf of GambleAware*. YouGov. October 2020 https://www.begambleaware.org/sites/default/files/2020-12/yougov-covid-19-report.pdf.

Hays, R. D., & DiMatteo, M. R. (1987). A short-form measure of loneliness. *Journal of Personality Assessment*, *51*(1), 69–81. https://doi.org/10.1207/s15327752jpa5101_6.

Hing, N., Rockloff, M., Russell, A. M. T., Browne, M., Newall, P., Greer, N., … Thorne, H. (2022). Loot box purchasing is linked to problem gambling in adolescents when controlling for monetary gambling participation. *Journal of Behavioral Addictions*, *11*(2), 396–405. https://doi.org/10.1556/2006.2022.00015.

Hing, N., Russell, A. M. T., Black, A., Rockloff, M., Browne, M., Rawat, V., … Woo, L. (2022). Gambling prevalence and gambling problems amongst land-based-only, online-only and mixed-mode gamblers in Australia: A national study. *Computers in Human Behavior*, *132*, 107269. https://doi.org/10.1016/j.chb.2022.107269.

Hing, N., Russell, A. M. T., Browne, M., Rockloff, M., Greer, N., Rawat, V., … Woo, L. (2021). *The second national study of interactive gambling in Australia (2019-20)*. Sydney: Gambling Research Australia. https://www.gamblingresearch.org.au/sites/default/files/2021-10/Final%20IGS%20report%202021.pdf.

Hing, N., Russell, A. M. T., Bryden, G., Newall, P., King, D., Rockloff, M., … Greer, N. (2021). Skin gambling predicts problematic gambling amongst adolescents, when controlling for monetary gambling. *Journal of Behavioral Addictions*, *10*(4), 920–931. https://doi.org/10.1556/2006.2021.00078.

Hing, N., Russell, A. M. T., Tolchard, B., & Nuske, E. (2015). Are there distinctive outcomes from self-exclusion? An exploratory study comparing gamblers who have self-excluded, received counselling, or both. *International Journal of Mental Health and Addiction*, *13*(4), 481–496. https://doi.org/10.1007/s11469-015-9554-1.

Hing, N., Smith, M., Rockloff, M., Thorne, H., Russell, A. M. T., Dowling, N., & Breen, H. (2022). How structural changes in online gambling are shaping the contemporary experiences and behaviours of online gamblers: An interview study. *BMC Public Health*, *22*, 1620. https://doi.org/10.1186/s12889-022-14019-6.

Hodgins, D. C., & Stevens, R. M. G. (2021). The impact of COVID-19 on gambling and gambling disorder: Emerging data. *Current Opinion in Psychiatry*, *34*(4), 332–334. https://doi.org/10.1097/YCO.0000000000000709.

Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research*, *11*(2), 213–218. https://doi.org/10.1016/0022-3999(67)90010-4.

Jean-Baptiste, C. O., Herring, R. P., Beeson, W. L., Dos Santos, H., & Banta, J. E. (2020). Stressful life events and social capital during the early phase of COVID-19 in the US. *Social Sciences & Humanities Open*, *2*(1), 100057. https://doi.org/10.1016/j.ssaho.2020.100057.

Jenkinson, R., Sakata, K., Khokhar, T., Tajin, R., & Jatkar, U. (2020). *Gambling in Australia during COVID-19*. Melbourne: Australian Gambling Research Centre. https://aifs.gov.au/agrc/sites/default/files/publication- documents/2009_gambling_in_australia_during_covid-19.pdf.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L., … Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*(6), 959–976. https://doi.org/10.1017/s0033291702006074.

Letts, S. (2018). *Chart of the day: Are Australians the world's biggest gambling losers? You can bet on it*. ABC News. 20 November https://www.abc.net.au/news/2018-11-20/australians-worlds-biggest-gambling-losers/10495566.

Lund, I. (2009). Gambling behaviour and the prevalence of gambling problems in adult EGM gamblers when EGMs are banned. A natural experiment. *Journal of Gambling Studies*, *25*(2), 215–225. https://doi.org/10.1007/s10899-009-9127-y.

Månsson, V., Wall, H., Berman, A. H., Jayaram-Lindström, N., & Rosendahl, I. (2021). A longitudinal study of gambling behaviors during the COVID-19 pandemic in Sweden. *Frontiers in Psychology*, *12*, 708037. https://doi.org/10.3389/fpsyg.2021.708037.

Mazar, A., Zorn, M., Becker, N., & Volberg, R. A. (2020). Gambling formats, involvement, and problem gambling: Which types of gambling are more risky? *BMC Public Health*, *20*(1), 1–10. https://doi.org/10.1186/s12889-020-08822-2.

Mousavi, S. A. M., Hooshyari, Z., & Ahmadi, A. (2020). The most stressful events during the COVID-19 epidemic. *Iranian Journal of Psychiatry*, *15*(3), 220. https://doi.org/10.18502/ijps.v15i3.3814.

Nochaiwong, S., Ruengorn, C., Thavorn, K., Hutton, B., Awiphan, R., Phosuya, C., … Wongpakaran, T. (2021). Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: A systematic review and meta-analysis. *Scientific Reports*, *11*(1), 10173. https://doi.org/10.1038/s41598-021-89700-8.

Özdin, S., & Bayrak Özdin, Ş. (2020). Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. *International Journal of Social Psychiatry*, *66*(5), 504–511. https://doi.org/10.1177/0020764020927051.

Responsible Gambling Council (RCG) (2022). *Gambling during COVID-19 in Ontario*. Guelph: Centre for the Advancement of Best Practices. https://www.responsiblegambling.org/wp-content/uploads/RGC-Gambling-During-COVID-19-in-Ontario-March-2022-compressed-1-compressed.pdf.

Salerno, L., & Pallanti, S. (2021). COVID-19 related distress in gambling disorder. *Frontiers in Psychiatry*, *12*, 620661. https://doi.org/10.3389/fpsyt.2021.620661.

Salkovskis, P. M., Rimes, K. A., Warwick, H. M. C., & Clark, D. M. (2002). The Health Anxiety Inventory: Development and validation of scales for the measurement of health anxiety and hypochondriasis. *Psychological Medicine*, *32*(5), 843–853. https://doi.org/10.1017/s0033291702005822.

Savolainen, I., Vuorinen, I., Sirola, A., & Oksanen, A. (2022). Gambling and gaming during COVID-19: The role of mental health and social motives in gambling and gaming problems. *Comprehensive Psychiatry*, *117*, 152331. https://doi.org/10.1016/j.comppsych.2022.152331.

Sharman, S., Butler, K., & Roberts, A. (2019). Psychosocial risk factors in disordered gambling: A descriptive systematic overview of vulnerable populations. *Addictive Behaviors*, *99*, 106071. https://doi.org/10.1016/j.addbeh.2019.106071.

Shaw, C. A., Hodgins, D. C., Williams, R. J., Belanger, Y. D., Christensen, D. R., El- Guebaly, N., … Stevens, R. M. G. (2021). Gambling in Canada during the COVID lockdown: Prospective national survey. *Journal of Gambling Studies*, *66*(5), 485–494. https://doi.org/10.1007/s10899-021-10073-8.

Shaw, C. A., Hodgins, D. C., Williams, R. J., Belanger, Y. D., Christensen, D. R., el-Guebaly, N., … Stevens, R. M. (2022). Gambling in Canada during the pandemic: 6 Months after the national COVID lockdown. *Canadian Journal of Addiction*, *13*(3), 36–45. https://doi.org/10.1097/CXA.0000000000000157.

Sirola, A., Nyrhinen, J., & Wilska, T. A. (2023). Psychosocial perspective on problem gambling: The role of social relationships, resilience, and COVID-19 worry. *Journal of Gambling Studies*, 1–19. https://doi.org/10.1007/s10899-022-10185-9.

Swanton, T. B., Burgess, M. T., & Blaszczynski, A. (2021). An exploratory study of the relationship between financial well-being and changes in reported gambling behaviour during the COVID-19 shutdown in Australia. *Journal of Gambling Issues*, *48*, 136–157. https://doi.org/10.4309/jgi.2021.48.7.

Thomas, A. S., Osbourne, M., Appelhans, B. M., Roisman, G. I., Booth-LaForce, C., & Bleil, M. E. (2022). Disparities in covid-19–related stressful life events in the United States: Understanding who is most impacted. *Health & Social Care in the Community*, *30*(3), 1199–1211. https://doi.org/10.1111/hsc.13671.

Wardle, H., Donnachie, C., Critchlow, N., Brown, A., Bunn, C., Dobbie, F., … Hunt, K. (2021). The impact of the initial COVID-19 lockdown upon regular sports bettors in Britain: Findings from a cross- sectional online study. *Addictive Behaviors*, *118*, 106876. https://doi.org/10.1016/j.addbeh.2021.106876.

Williams, R. J., Shaw, C. A., Belanger, Y. D., Christensen, D. R., el-Guebaly, N., Hodgins, D. C., … Stevens, R. M. G. (2022). Etiology of problem gambling in Canada. *Psychology of Addictive Behaviors*. https://doi.org/10.1037/adb0000843.

Wohl, M. J., & Sztainert, T. (2011). Where did all the pathological gamblers go? Gambling symptomatology and stage of change predict attrition in longitudinal research. *Journal of Gambling Studies*, *27*, 155–169. https://doi.org/10.1007/s10899-010-9186-0.