An Exploratory Study of the Relationship Between Financial Well-Being and Changes in Reported Gambling Behaviour During the COVID-19 Shutdown in Australia

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Abstract

A change in someone's financial situation, such as a windfall gain or increased financial stress, can affect the way that they gamble. The aim of this paper was to explore the relationship between financial well-being and changes in gambling behaviour during the coronavirus 2019 (COVID-19) shutdown. Australian past-year gamblers ($N = 764$; 85% male) completed an online cross-sectional survey in May 2020. Participants retrospectively reported monthly gambling participation before and after the COVID-19 shutdown, as well as their financial well-being, experience of COVID-related financial hardship, problem gambling severity, and psychological distress. Financial well-being showed strong negative associations with problem gambling and psychological distress. Neither financial well-being nor the interaction between financial well-being and problem gambling severity showed consistent evidence for predicting changes in gambling participation during the shutdown in this sample. This study provides preliminary evidence that self-reported financial well-being has a strong negative association with gambling problems but is not related to gambling participation. Future studies should link objective measures of financial well-being from bank transaction data with survey measures of problem gambling severity and experience of gambling-related harm.

Keywords: gambling, problem gambling, financial well-being, financial hardship, stress, COVID-19, coronavirus, Australia

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Introduction

The coronavirus 2019 (COVID-19) pandemic caused major social and economic disruption in Australia and internationally. Changes in income and employment

situations were two of the main uncertainties facing individuals and households in the early stages of the pandemic (Biddle et al., 2020; Tsiaplias, 2020). Impacts were felt differently across the population: Some people reported increased financial stress and job loss, whereas others experienced windfall gains from government economic stimulus programs, reduced expenses, or increased demand for their business (Biddle et al., 2020). Both financial stress and windfall gains can influence gambling behaviour (Buchanan et al., 2020; Lye & Hirschberg, 2014). In this study, we aimed to explore the relationship between financial well-being and changes in gambling behaviour among a sample of Australian gamblers during the initial COVID-19 shutdown.

In Australia, the first major restrictions and economic stimulus packages in response to COVID-19 were announced in March 2020 (Australian Bureau of Statistics, 2020c). These measures affected people's ability to work and their financial situation, and they restricted travel to essential activities only. A survey conducted by the Australian Bureau of Statistics (2020a) in the month following this announcement found that 31% of Australians reported their financial situation to have worsened due to COVID-19. Involuntary job loss, difficulties finding work, and/or problems paying rent or making mortgage repayments were reported to affect one in five Australian households (Australian Bureau of Statistics, 2020b). Other Australians, especially those among lower income deciles, experienced improvements in their financial situation due to receipt of economic stimulus payments (Biddle et al., 2020). Land-based gambling venues, including pubs, clubs, and casinos, were among the many places of social gathering restricted from opening. Most major domestic and international sporting events were cancelled, resulting in fewer opportunities for sports betting. This action constituted a historic change in the availability of gambling in Australia, given that the majority of gambling expenditure typically occurs in land-based venues (Queensland Government Statistician's Office, 2019). Online wagering, in comparison, still occurs at a relatively low base rate, despite its rapid growth in the past decade (Browne et al., 2020; Jenkinson et al., 2019). Overall, the reduced availability of gambling seemed likely to lead to a decrease in gambling participation in the initial stages of the pandemic; however, it was also possible that disruptions to people's normal financial situation might motivate more intense gambling.

Understanding the links between changes in financial resources and consumer behaviour is a topic of fundamental interest in the broader economics literature. In their review of this literature, Jappelli and Pistaferri (2010) highlight that how consumers respond to a change in income can depend on several factors, such as whether the change represents an increase or decrease, is small or large, is permanent or transitory, and is expected or unexpected. Studies in the field of behavioural economics show that even small changes to an individual's financial resources can influence their marginal propensity to consume. For example, Milkman and Beshears (2009) found that customers who received a small unexpected windfall in the form of a $10-off discount coupon spent significantly more at an online grocer than did customers who did not use a coupon. Moreover, customers who used the

coupon spent significantly more on items that they did not usually purchase. Such findings suggest that people spend their money differently depending on the source of the funds, in support of mental accounting explanations of financial decision making (Thaler, 1999).

In the context of gambling, evidence suggests that changes in a person's financial situation can influence their gambling behaviour. Reduced disposable income might lead some individuals to moderate their expenditure on recreational activities, such as gambling (Heiskanen, 2017; Warren et al., 2020). Financial stress can motivate increased gambling, as the possibility of a "big win" can be perceived as a way out of financial problems (Buchanan et al., 2020; Swanton & Gainsbury, 2020b). Persistent gambling to chase financial losses is a common feature of problem gambling (Blaszczynski & Nower, 2002). Financial issues often precipitate a relapse in gambling, which means that the gambling behaviour of individuals with a history of gambling problems is likely to be disproportionately affected by increased financial stress (Hodgins & el-Guebaly, 2004). Worry about ability to repay debts owed is strongly associated with problem gambling behaviour (Swanton & Gainsbury, 2020a). Sudden increases in income may also affect the way people gamble. People are more willing to spend windfall gains, such as money received through government stimulus programs (Arkes et al., 1994; Epley et al., 2006; Thaler & Johnson, 1990). Stimulus payments made in response to the 2008 global financial crisis were found to result in significant increases in gambling expenditure in Australia (Buddelmeyer & Peyton, 2014; Lye & Hirschberg, 2014).

Income is frequently used in research as a proxy measure of someone's financial situation, yet it is only one of a complex array of factors influencing their financial well-being (Muir et al., 2017). Financial well-being is a broad construct that encompasses the extent to which people perceive and have the ability to meet their financial obligations (e.g., food, housing, electricity), financial freedom to enjoy life, control over their finances, and financial security to handle unexpected expenses (Comerton-Forde et al., 2018). Adopting a holistic approach to measuring someone's financial situation is necessary given the high degree of uncertainty brought about by COVID-19, its complex impacts on their finances, and the ways they might manage their money differently in response. Moreover, it is important to investigate how financial well-being may interact with pre-existing gambling problems to cause differential effects on gambling behaviour. For example, it is plausible that those with pre-existing gambling problems and lower financial well-being may be more likely to increase their gambling as a coping response to the increased stress brought about by the pandemic (Blaszczynski & Nower, 2002; Buchanan et al., 2020).

In the present study, we assessed the impacts of COVID-19 on the gambling behaviour of Australian past-year gamblers. The aim was to explore changes in gambling behaviour in relation to reported financial well-being during the initial stages of the COVID-19 shutdown, taking into account relevant demographic variables, problem gambling, and psychological distress. The protocol was preregistered on Open

Science Framework (https://osf.io/tskdq). No hypotheses were formulated in relation to the current study due to its exploratory nature. Findings about the relationships between pre-existing gambling problems, psychological distress, and changes in gambling behaviour during the initial shutdown are reported in a separate paper (Gainsbury et al., 2020). Overall, we found that most participants in our sample reduced their gambling, but those at moderate risk of gambling problems were more likely to report increased gambling during the shutdown.

Method

Participants

Eligibility criteria required participants to be at least 18 years of age, live in Australia, and have spent money on gambling in the past 12 months. Of 1,183 responses received, 769 were retained for analysis: 414 were screened out due to the respondents not having gambled in the past 12 months ($n = 14$) or returning incomplete responses ($n = 400$).

Participants were between 18 and 82 years old ($M = 43.8$, $SD = 14.8$) and mostly male (85.2%). Three participants reported their gender as other. The majority (63.0%) were in a married or de facto relationship, and most participants (62.7%) lived in a household with their partner (with or without children). Most participants spoke English at home (97.1%). Two in five participants (42.4%) had completed tertiary-level education. Two-thirds of participants (65.8%) were employed either part- or full-time, and 10.3% reported that their job had been suspended due to COVID-19 but expected it to resume in the future. Fourteen percent of participants reported having full-time responsibility for childcare or homeschooling as a result of COVID-19. The modal gross personal income category reported was AUD $104,000–$155,999 and the median category reported was AUD $65,000–$77,999 for both the 2019 (estimated) and the 2020 (projected) calendar years. For comparison, the Australian Bureau of Statistics (2019) reports that the median gross personal income in Australia was AUD $48,360 in 2015–2016.

Most participants in our sample were already gambling regularly online prior to the venue shutdown. During a typical month in the 12 months prior to the shutdown, most participants (78.1%) reported gambling at least weekly on at least one online form of gambling, and about half (48.3%) reported gambling at least weekly on at least one land-based form. Only 14.8% of our sample reported a land-based gambling activity to be their predominant form of gambling in the period prior to the shutdown.

Procedure

A convenience sample was recruited for an online survey through recruitment notices posted on websites and social media, as well as in email communications (including a mailing list of consenting individuals from previous studies conducted by the researchers). Twenty-six organizations, including gambling operators and support

services, disseminated recruitment notices to reach individuals who participate in gambling. The recruitment notice directed individuals to the study homepage. The homepage provided information about the study for participants to read prior to providing consent by clicking "Continue" to start the survey. Supplementary materials, including the complete survey instrument, are available on Open Science Framework (https://osf.io/vk8wh/). The median response duration was 12.4 min. Recruitment occurred between May 1 and 22, 2020. As reimbursement for their time, participants who submitted a complete response were eligible for entry into a prize draw for one of five AUD $50 shopping gift vouchers. The study received ethical approval from the University of Sydney Human Research Ethics Committee (protocol number 2019/213).

Measures

Gambling Participation

The frequency of participation in 17 categories of land-based and online gambling was retrospectively reported for two time frames: (1) during a typical month in the 12 months prior to the shutdown on March 26, 2020 (T1/baseline), and (2) in the past 30 days (T2). Participants responded on 5-point rating scales (*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 participation score (possible values ranging from 0 to 510 interactions per month). This measure represents both the breadth and the frequency of gambling activity.

Financial Well-Being

The Commonwealth Bank of Australia – Melbourne Institute Reported Financial Wellbeing Scale consists of 10 items designed to measure perceived financial well-being among Australians (Comerton-Forde et al., 2018, 2020). To examine participants' financial situation since the shutdown, we modified the time frame of the original scale from the past 12 months to the past 30 days. Participants responded on 5-point rating scales (e.g., *very difficult* = 0; *very easy* = 4). Items 5 and 7 were reverse coded. Internal consistency was excellent (Cronbach's α = .93). Item scores were summed and multiplied by 2.5 to yield a total score ranging from 0 to 100 by which participants were classified: having trouble = 0–22.5; just coping = 25–47.5; getting by = 50–75; doing great = 77.5–100 (Haisken-DeNew et al., 2018).

COVID-Related Financial Hardship

One question assessed the extent to which COVID-19 had affected the person's ability to make ends meet financially (i.e., have enough money to cover their expenses). Participants responded on a 5-point rating scale (*made much easier* = 0; *made much more difficult* = 4).

Gambling Problems

The Problem Gambling Severity Index (PGSI) is a nine-item measure of indicators of problem gambling experienced in the past 12 months (Ferris & Wynne, 2001).

Participants respond on a 4-point rating scale (*never* = 0; *almost always* = 3). Item scores were summed to yield a total score by which participants were classified: non-problem gambling = 0; low-risk gambling = 1–2; moderate-risk gambling = 3–7; problem gambling = 8–27. Internal consistency was excellent (Cronbach's α = .94).

Psychological Distress

The Kessler Psychological Distress Scale (K6) is a widely used six-item measure of symptoms of psychological distress experienced during the past 30 days (Kessler et al., 2002). Participants responded on 5-point rating scales (*none of the time* = 0; *all of the time* = 4). Item scores were summed to yield a total score ranging from 0 to 24. Higher scores relate to higher psychological distress. Internal consistency was excellent (Cronbach's α = .91).

Demographics

Questions included gender, age, relationship status, household type, primary language spoken at home, prior education, employment status, and gross personal annual income.

Statistical Analysis

Data processing and analysis was conducted in RStudio by using tidyverse R packages (R Core Team, 2020; Rstudio Team, 2019; Wickham et al., 2019). Following preliminary examination of the data, we removed five outliers because of implausible response patterns: Four respondents reported a monthly gambling expenditure of AUD $1,000,000 + and one reported the maximum possible gambling participation score at baseline and the minimum possible score during shutdown. This resulted in a final sample of 764 responses.

Response distributions on both gambling participation variables were positively skewed. We transformed the gambling participation variables by using the log1p(x) function to reduce the influence of outliers and the skewness and kurtosis of the distribution. This function, which computes $\log(1 + x)$, was used because some participants reported zero gambling participation at T2. Changes in gambling participation were calculated as the difference score between the two time frames. Positive difference scores relate to increases in gambling participation. Converting values for log-transformed change in gambling participation back to natural values reflects $\frac{t_2 + 1}{t_1 + 1}$.

Following our preregistered protocol, we took a random subset of 200 responses to build a model (Model 1, exploratory analysis), which we then tested on a larger subset of the remaining 564 responses (Model 2, confirmatory analysis). This approach was adopted to mitigate against the identification of spurious relationships. We performed a multiple linear regression on each subset to examine the relationship between the financial well-being score (continuous predictor) and log-transformed change in overall gambling participation (dependent variable). The following variables were entered into the model as covariates: PGSI (continuous), the

interaction between PGSI and financial well-being score (continuous), K6 (continuous), gender (dichotomous), age (continuous), and prior education (dichotomous). Continuous predictors were mean centred to aid interpretation. To summarize, the following model was specified:

participation_overall_log_change = α + β_1(fw_overall_mean_centred) + β_2(pgsi_mean_centred) + β_3(k6_mean_centred) + β_4(gender$_{female}$) + β_5(age_mean_centred) + β_6(tertiary_educated$_{TRUE}$) + β_7(fw_overall_mean_centred $\times$ pgsi_mean_centred) + ϵ

We did not include COVID-related financial hardship in the model because this variable was measured by using only one item, and we expected it to have a moderate-to-strong association with reported financial well-being. Critical alpha for two-tailed significance tests was set at α = .05.

Results

Descriptive Statistics

Figure 1 shows the distribution of financial well-being scores based on the extent to which COVID-19 had affected the person's ability to make ends meet financially. More than half of the participants (51.6%) reported that COVID-19 had not changed their financial situation, whereas about one in four reported that their financial situation had been made easier (23.8%) or harder (24.6%). Visual inspection indicated a modest negative relationship between reported financial well-being and experience of COVID-related financial hardship. Reporting of COVID-related financial hardship was more common among those who were "having trouble" (64.7%, n = 34) or "just coping" (43.9%, n = 139) than it was among those who were "getting by" (23.6%, n = 360) or "doing great" (8.7%, n = 231). Similar proportions of participants across financial well-being categories, ranging between 20.6% to 26.4%, reported that COVID-19 had made their financial situation easier.

Table 1 contains descriptive statistics for key measures among both exploratory and confirmatory subsets. The results of Mann-Whitney U tests of continuous variables and chi-square tests of categorical variables indicated that there were no significant differences between the subsets (all ps > .05).

Exploratory Analysis

Figure 2 contains a correlation matrix that summarizes the bivariate relationships observed among the exploratory subset. Financial well-being was not significantly associated with gambling participation prior to (p = .772) or during the shutdown (p = .068). Financial well-being showed a significant positive association with log change in gambling participation (r_s = .23, p < .01), suggesting that increases in gambling participation from baseline to shutdown were related to higher financial well-being. Problem gambling severity and psychological distress had significant

Figure 1

Financial Well-Being Scores in Relation to the Experience of COVID-Related Financial Hardship (N = 764)
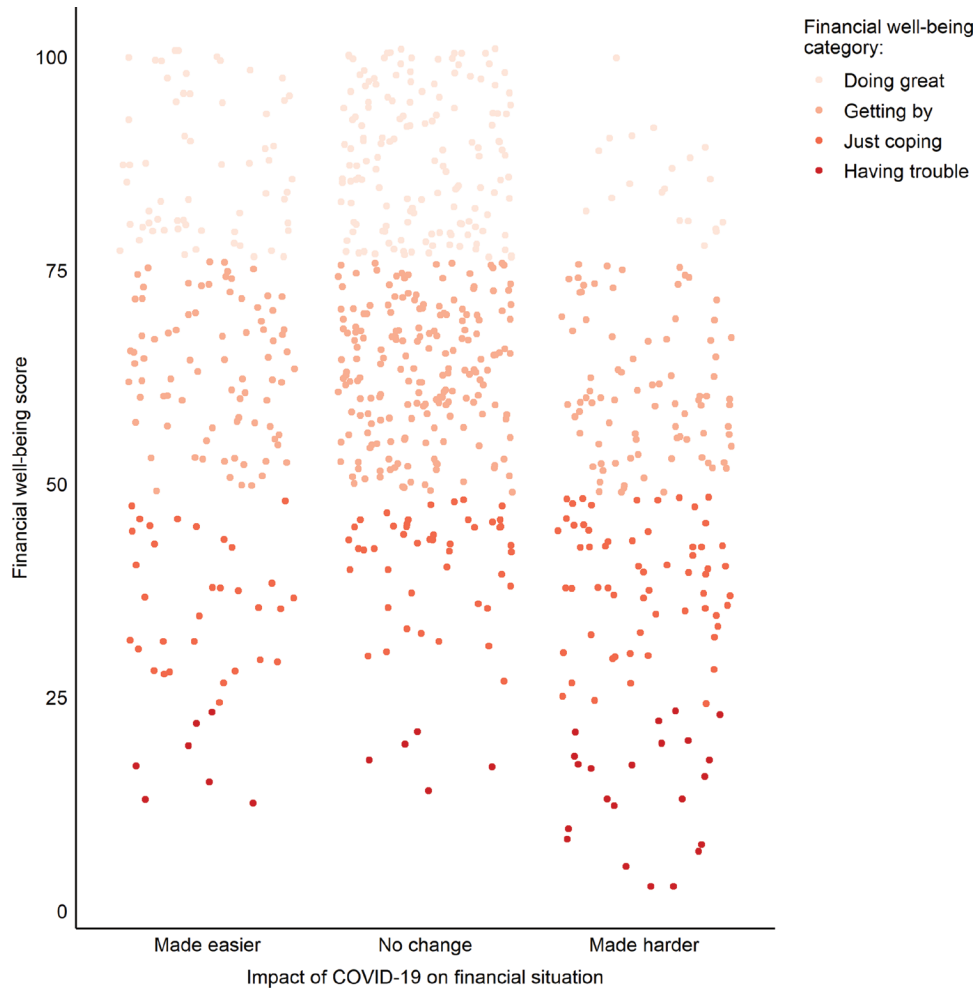
negative associations with financial well-being (r_s = -.40 and r_s = -.45, respectively, ps < .001).

Table 2 contains regression coefficients and standard errors for Model 1, which significantly predicted log change in gambling participation, $F(7, 192)$ = 4.55, p < .001. The contribution of financial well-being to the model was not statistically significant (p = .209). Three variables did significantly predict changes in gambling participation: PGSI, age, and the interaction between PGSI and financial well-being (albeit with a coefficient close to zero). On average, participants reduced their gambling participation by 54% from baseline to shutdown. For individuals reporting relatively low financial well-being (mean-centred score = -14.7 at 25th percentile) and relatively high problem gambling severity (mean-centred PGSI = 2.3 at 75th percentile), the model predicted a reduction in gambling participation by 60%, all other variables being held constant. Conversely, for individuals reporting relatively high financial well-being (mean-centred score = 15.9 at 75th percentile) and relatively

Table 1

Descriptive Statistics

Variable	Exploratory subset (N = 200)		Confirmatory subset (N = 564)		Test statistic	p
	M	SD	M	SD		
Log gambling participation at baseline	3.30	0.87	3.16	0.89	52,107	.109
Log gambling participation during shutdown	2.58	1.22	2.48	1.21	53,399	.262
Log change in gambling participation	-0.71	0.94	-0.68	0.97	56,418	.995
Financial well-being	62.98	20.44	64.20	21.32	58,871	.357
COVID-related financial hardship	1.92	0.87	2.00	0.91	58,561	.382
Problem gambling severity	5.01	5.75	4.63	5.69	52,537	.146
Psychological distress	3.98	4.17	4.70	4.87	59,289	.278
Age	44.51	14.86	43.55	14.80	54,044	.380
Gender					1.534	.465
Female	13.00%		14.89%			
Male	87.00%		84.57%			
Other	0.00%		0.53%			
Tertiary educated	42.00%		42.55%		.003	.958

Note. Differences between means of continuous variables were tested by using the Mann-Whitney U test. Categorical variables were tested by using the chi-square test for equality of proportions.

low problem gambling severity (mean-centred PGSI = -3.7 at 25th percentile), the model predicted a reduction in gambling participation by 34%, all other variables being held constant. Therefore, Model 1 predicted that individuals with lower financial well-being and at higher risk of gambling problems would reduce their gambling more than the average participant would, whereas individuals with higher financial well-being and at lower risk of gambling problems would reduce their gambling less than the average participant would.

Confirmatory Analysis

Figure 3 contains a correlation matrix that summarizes the bivariate relationships observed among the confirmatory subset. Consistent with the exploratory subset, financial well-being showed significant negative associations of similar magnitude with problem gambling severity and psychological distress (r_s = -.40 and r_s = -.43, respectively, ps < .001). Financial well-being was not significantly associated with typical gambling participation prior to the shutdown (p = .211), or with gambling participation during the shutdown (p = .053). The sign of the correlation coefficient for financial well-being and gambling participation during the shutdown was not consistent between exploratory (r_s = .13) and confirmatory subsets (r_s = -.08). A change in sign was also observed in the relationship between financial well-being and log change in gambling participation, which was nonsignificant in the confirmatory subset (p = .644).

Figure 2

Spearman's Correlations for Continuous Variables in the Exploratory Subset (N = 200)
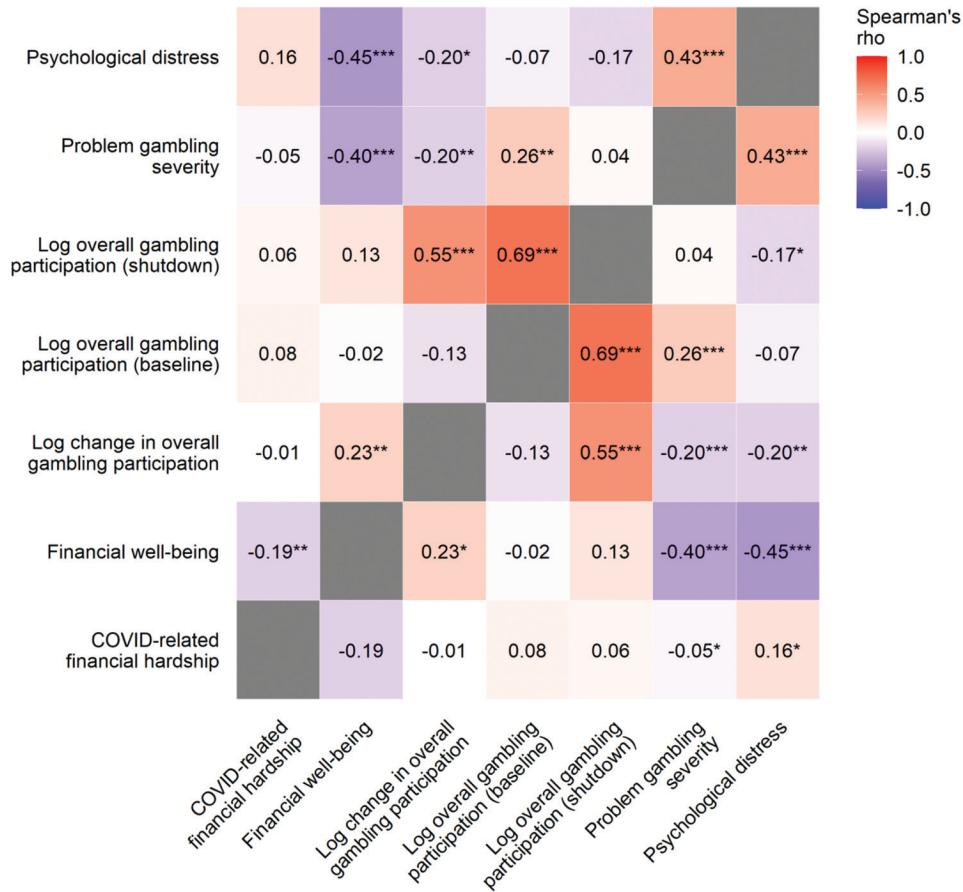
*Note. *p<.05. **p<.01. ***p<.001.*

Table 3 contains regression coefficients and standard errors for Model 2, which significantly predicted log change in gambling participation, $F(8, 555) = 7.38$, $p < .001$. The contribution of financial well-being to the model was statistically significant ($p = .005$), as were PGSI ($p = .001$) and both gender predictors (both ps $< .05$). On average, participants reduced their gambling participation by 48% from baseline to shutdown. For individuals reporting relatively low financial well-being (mean-centred score = -14.1 at 25th percentile) and relatively high problem gambling severity (mean-centred PGSI = 1.3 at 75th percentile), the model predicted a reduction in gambling participation by 47%, all other variables being held constant. Conversely, for individuals reporting relatively high financial well-being (mean-centred score = 15.9 at 75th percentile) and relatively low problem gambling severity (mean-centred PGSI = -4.7 at 25th percentile), the model predicted a reduction in gambling participation by 40%, all other variables being held constant. Therefore, Model 2 predicted that individuals with lower financial well-being and at higher risk of gambling problems would reduce their gambling to a similar extent as

Table 2

Multiple Regression Results for Log Change in Gambling Participation in Exploratory Subset (N = 200)

Log change in gambling participation	B	95% CI for B		SE B	p	R^2	ΔR^2
		LL	UL				
Model 1						.142	.111
Constant	-.77	-.96	-.57	.10			
Financial well-being	.01	.00	.01	.00	.209		
PGSI	-.05	-.08	-.02	.02	.001		
K6	-.01	-.05	.03	.02	.564		
Gender (female)[a]	-.03	-.41	.35	.19	.866		
Age	.01	.00	.02	.00	.021		
Tertiary educated[b]	-.01	-.29	.27	.14	.937		
PGSI × financial well-being	.00	.00	.00	.00	.018		

Note. Negative coefficients relate to decreases in gambling participation. Continuous predictors are mean centred. Model = simultaneous method; *B* = unstandardized coefficient; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; *SE B* = standard error of the coefficient; R^2 = coefficient of determination; ΔR^2 = adjusted R^2; PGSI = Problem Gambling Severity Index; K6 = Kessler Psychological Distress Scale.
[a]Reference group is male. No cases of other gender occurred in the exploratory subset.
[b]Reference group is non-tertiary educated individuals.

the average participant, whereas individuals with higher financial well-being and at lower risk of gambling problems would reduce their gambling less than the average participant would.

Visual inspection of Q-Q plots indicated that residuals were approximately normally distributed in both models. The independence of residuals was shown by Durbin-Watson statistics of 1.85 in Model 1 (*p* = .318) and 1.86 in Model 2 (*p* = .086). Scatterplots of residuals against fitted values did not display evidence for non-linearity or heteroscedasticity. All variance inflation factor values were below 2, indicating that multicollinearity was not problematic.

Supplementary Post Hoc Analyses

The coefficient for the gender (other) predictor in Model 2 is likely to be unreliable, as only three respondents indicated their gender as other. We ran a sensitivity analysis to examine the effect of including these three cases in the model by running the model again without them (*N* = 561). No changes in the signs of coefficients or in the significance of predictors were observed (see Supplemental Table 1).

As the sign of the coefficient and the statistical significance of the financial well-being predictor changed from Model 1 (*B* = .01, *p* = .209) to Model 2 (*B* = -.01, *p* = .005), we used resampling to estimate the average magnitude of the coefficient and to test how frequently it significantly predicted change in gambling participation. Among 1,000 redrawn confirmatory subsets, financial well-being was a significant predictor of change in gambling participation in 23% of replications (*p* < .05), with a mean

Figure 3

Spearman's Correlations for Continuous Variables in the Confirmatory Subset (N = 564)
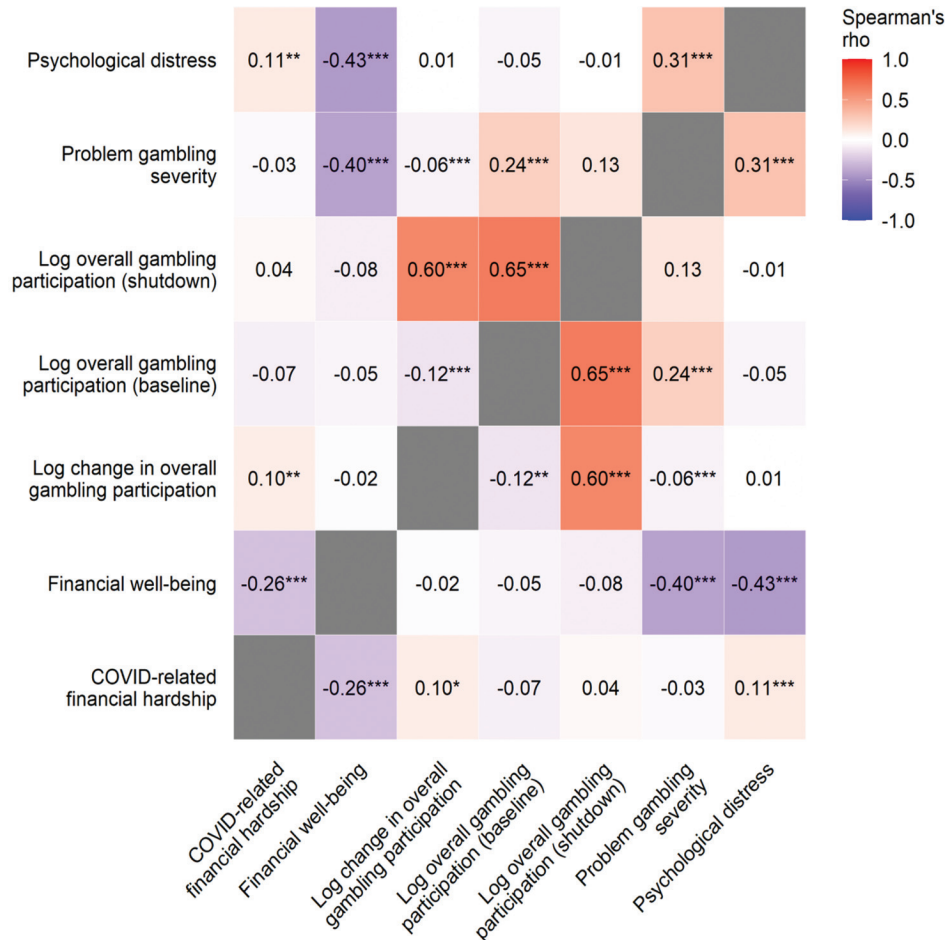
*Note. *p<.05. **p<.01. ***p<.001.*

coefficient of -.004 (*SD* = .001). In sum, this result indicated that there was no consistent evidence for financial well-being as a significant predictor of changes in gambling participation in our sample.

Finally, we examined whether the relationship between PGSI and financial well-being differed depending on whether participants predominantly engaged in land-based activities that were forced to close as a result of the shutdown (i.e., electronic gaming machines, casino table games, keno, poker, race betting, and sports betting in land-based gambling venues). Visual inspection of a scatterplot indicated a similar pattern of scores for those who predominantly participated in land-based activities affected by the shutdown and those who predominantly participated in activities that were not forced to close (e.g., online race betting). Scores were present in both groups across all ranges of PGSI and financial well-being.

Table 3

Multiple Regression Results for Log Change in Gambling Participation in Confirmatory Subset (N = 564)

| Log change in gambling participation | *B* | 95% CI for *B* | | *SE B* | *p* | R^2 | ΔR^2 |
		LL	*UL*				
Model 2						.096	.083
Constant	-.66	-.77	-.55	.06			
Financial well-being	-.01	-.01	.00	.00	.005		
PGSI	-.05	-.07	-.03	.01	<.001		
K6	.02	.00	.04	.01	.059		
Gender (female)a	-.41	-.63	-.19	.11	<.001		
Gender (other)a	1.39	.33	2.44	.54	.010		
Age	.00	-.01	.01	.00	.865		
Tertiary educated	.05	-.11	.21	.08	.548		
PGSI × financial well-being	.00	.00	.00	.00	.725		

Note. Negative coefficients relate to decreases in gambling participation. Continuous predictors are mean centred. Model = simultaneous method; *B* = unstandardized coefficient; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; *SE B* = standard error of the coefficient; R^2 = coefficient of determination; ΔR^2 = adjusted R^2; PGSI = Problem Gambling Severity Index; K6 = Kessler Psychological Distress Scale.
[a]Reference group is male.
[b]Reference group is non-tertiary educated individuals.

We conducted a supplementary exploratory test to check whether financial well-being, PGSI, or their interaction term were predictive of predominantly participating in land-based activities affected by the shutdown. Full results of the logistic regression are reported in Supplemental Table 2. A positive relationship (*B* = .09, *p* < .001) was observed between the PGSI score and the probability of predominantly participating in land-based activities affected by the shutdown. This finding suggests that participants with higher PGSI scores were more likely to participate in activities that were forced to close due to the shutdown. No relationship was found between predominantly participating in land-based activities affected by the shutdown and financial well-being (*p* = .490), or in the interaction between PGSI and financial well-being (*p* = .382). This finding indicated that within this sample, it is not the case that individuals with low financial well-being and high PGSI scores were predominantly participating in land-based activities that were forced to close as a result of the shutdown.

Discussion

In this study, we aimed to explore the relationship between financial well-being and changes in gambling behaviour during the COVID-19 shutdown. Data collected from a cross-sectional survey of 764 Australian gamblers demonstrated that on average, individuals moderated their gambling during the shutdown in comparison with their typical pre-shutdown gambling patterns. This study represents one of the first investigations of financial well-being among gambling populations and provides

empirical evidence that self-reported financial well-being has a significant negative association with problem gambling severity. However, neither financial well-being nor the interaction between financial well-being and problem gambling severity showed consistent evidence for predicting changes in gambling participation within this sample.

Although it is somewhat surprising that financial well-being was not associated with changes in gambling participation during the shutdown, this finding is broadly consistent with research conducted in 2017 with customers of one of Australia's largest financial institutions (Comerton-Forde et al., 2020; Haisken-DeNew et al., 2018). In a survey paired with financial records of 5,682 bank customers, Comerton-Forde and colleagues (2020) found that observed financial well-being (a measure calculated on the basis of indicators from customers' past-year financial records) was negatively associated with the presence of gambling transactions in the customers' account history. Self-reported financial well-being, however, was not significantly associated with the presence of gambling transactions. Neither objective nor reported financial well-being varied in relation to the number of gambling transactions or the amount of gambling expenditure (Haisken-DeNew et al., 2018); however, it is possible that the categorical thresholds adopted (between 1 and 19 vs. 20 or more gambling trans-actions; AUD \$1 to \$499 vs. \$500 or more on gambling spending) were too low to function as proxy measures for problem gambling. Our study suggests that problem gambling is strongly associated with lower financial well-being. This result is consistent with financial harms being a fundamental consequence of problem gambling (Angus et al., 2020; Langham et al., 2016; Paterson et al., 2020).

It is important to keep in mind that the results of this cross-sectional study represent a snapshot of a group of Australian gamblers during an unusual period in modern history. Consumers did not choose to cease gambling in venues; rather, they were forced to reduce their engagement in many gambling activities because of government restrictions. The reduction in gambling observed within this sample occurred during a period early in the pandemic when access to gambling was largely limited to online forms. The financial impacts of COVID-19 were not uniform across our sample: For some participants, their financial situation was made easier (potentially due to government stimulus payments), whereas others experienced increased difficulty in having enough money to cover their expenses. The experience of COVID-related financial hardship was not strongly associated with financial well-being (see Figure 1); the relationship between these factors was found to be significant and negative, but only small to moderate in magnitude. Although sudden disruptions in someone's financial situation could theoretically be expected to motivate increased gambling as a coping response, most participants in this survey reported that they curtailed their gambling in response to these stressors.

Interpretation of the results must be tempered by several limitations of the study. Participants were recruited by convenience sampling, meaning the sample is affected by self-selection bias and is not representative of the population of Australian gamblers. Regular online gamblers were strongly over-represented, and median gross

personal income and levels of financial well-being reported were substantially higher than those of the broader population (Australian Bureau of Statistics, 2019; Comerton-Forde et al., 2018). The online survey methodology used may have resulted in under-representation of individuals who typically gamble in land-based venues only. This segment of the population was difficult to recruit given the venue shutdown. The study was cross-sectional, involving pseudo-longitudinal comparisons of retrospective recall measures of typical pre-shutdown gambling and past-month gambling during the shutdown. The measure of gambling participation used did not capture activity occurring at least once per year, but less than once per month. Reported financial well-being was measured for only one time period (past 30 days during the shutdown), meaning we could not examine changes in financial well-being pre- and post-shutdown. The survey was conducted in May 2020, commencing slightly over a month after the closure of Australian gambling venues (apart from retail lottery outlets). The findings reflect changes in gambling behaviour at one point in time relatively early in the pandemic. It is possible that COVID-related financial hardship may have been felt more severely at later stages of the pandemic. The potential impacts of stressors and restrictions on gambling patterns over time require longitudinal investigation.

In conclusion, changes in gambling reported by this sample of Australian gamblers were not predicted by their financial well-being during the COVID-19 shutdown. Whether someone had lower financial well-being and higher problem gambling severity or higher financial well-being and lower problem gambling severity did not significantly predict any change in how frequently they gambled. More broadly, this study provides preliminary evidence that self-reported financial well-being has a strong negative association with problem gambling, but is not related to participation in gambling (measured based on breadth and frequency of gambling activity in this study). Further studies pairing financial transaction data with self-reported measures of financial well-being, problem gambling, and experience of gambling-related harms would be beneficial for identifying ways for financial institutions to maximize the financial well-being of customers experiencing gambling problems (Swanton et al., 2019).

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Supplemental Table 1

*Multiple Regression Results for Log Change in Gambling Participation in Confirmatory Subset Excluding Three Responses in Which Gender Was Indicated as "Other" (*N = 561*)*

Log change in gambling participation	*B*	95% CI for *B*		*SE B*	*p*	*R²*	*ΔR²*
		LL	*UL*				
Sensitivity analysis of Model 2						.082	.070
Constant	-.67	-.78	-.56	.06			
Financial well-being	-.01	-.01	.00	.00	.003		
PGSI	-.05	-.07	-.03	.01	< .001		
K6	.01	.00	.03	.01	.123		
Gender (female)a	-.40	-.62	-.19	.11	< .001		
Age	.00	.00	.01	.00	.697		
Tertiary educated	.07	-.09	.23	.08	.389		
PGSI × financial well-being	.00	.00	.00	.00	.728		

Note. Negative coefficients relate to decreases in gambling participation. Continuous predictors are mean centred. Model = simultaneous method; *B* = unstandardized coefficient; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; *SE B* = standard error of the coefficient; *R²* = coefficient of determination; *ΔR²* = adjusted *R²*; PGSI = Problem Gambling Severity Index; K6 = Kessler Psychological Distress Scale.
[a]Reference group is male.
[b]Reference group is non-tertiary educated individuals.

Supplemental Table 2

Logistic Regression Predicting Predominant Participation at Baseline in Gambling Activities That Were Subsequently Forced to Close Due to Venue Shutdown (N = 764)

	B	*SE*	Wald	*df*	*p*	OR	95% CI for OR *LL*	*UL*
Constant	-1.80	.11						
Financial well-being	.00	.01	.48	1	.490	1.00	.99	1.02
PGSI	.09	.02	21.70	1	<.001	1.10	1.06	1.14
PGSI × financial well-being	.00	.00	.76	1	.382	1.00	1.00	1.00

Note. Gambling activities that were forced to close due to the venue shutdown included electronic gaming machines, casino table games, keno, poker, race betting, and sports betting in land-based gambling venues. Continuous predictors are mean centred. *B* = unstandardized coefficient; *SE* = standard error; *df* = degrees of freedom; CI = confidence interval; OR = odds ratio; *LL* = lower limit; *UL* = upper limit; PGSI = Problem Gambling Severity Index.