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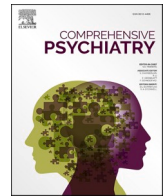
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# Gambling and gaming during COVID-19: The role of mental health and social motives in gambling and gaming problems

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## ABSTRACT

**Background:** The uncertain and stressful global situation caused by the COVID-19 pandemic has the potential to cause anxiety and impact people's mental health. Simultaneously, social distancing policies have isolated people from their normal social interactions. These societal changes have inevitably influenced gambling and gaming practices, and many people may have turned to betting or gaming as a means of social exchange. This study examined the influence of COVID-19 anxiety on increased mental health problems and their relationship to gambling and gaming problems. The mediating role of social motives for gambling and gaming was also investigated.

**Material and methods:** Finnish adults ( $N = 1530$ ;  $M_{age} = 46.67$ ; 50.33% male) were recruited from a volunteer participant panel to participate in a survey study. COVID-19 anxiety was assessed using a scale adapted from the Spielberger State-Trait Anxiety Inventory. Mental health problems were evaluated with the five-item Mental Health Inventory. Gambling problems were measured using the Problem Gambling Severity Index, and gaming problems were measured with the Internet Gaming Disorder Test. Social motives for gaming were evaluated using a single-item measure. Analyses used generalised structural equation modelling.

**Results:** COVID-19 anxiety predicted increased mental health problems, which were associated with heightened gambling and gaming problems. Social motives for gambling and gaming were a significant mediator, suggesting that gambling and gaming problems are emphasized markedly among those who are socially motivated by and involved in such games.

**Conclusions:** Mental health problems experienced during the pandemic and the social properties of games might accentuate gambling and gaming problems.

## 1. Introduction

In late 2019, cases of a new type of pneumonia began to emerge in Wuhan, China. By early 2020, the disease had been identified as an outbreak of the novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which causes the disease commonly known as COVID-19 [1,2]. The disease spread swiftly, and the World Health Organization declared a global pandemic in March 2020 [3]. In response, governments worldwide aimed to slow the spread of the disease by introducing new strategies, including limiting national and international travel and restricting social gatherings [4–6]. Consequently, people quarantined in their homes and remained isolated from their friends and family for a prolonged period [7]. Facing a worldwide crisis can be a stressful experience, and the psychological consequences of

epidemics are widespread [8,9]. Pandemics produce fear of contracting the disease, concerns about the safety of one's family and friends, and increased distress due to uncertainty about the future [10,11]. The COVID-19 pandemic, however, differs from previous outbreaks due to its large scale and ongoing nature, and its magnitude has caused anxiety for many [12–14]. Anxiety is a normal response to stressful stimuli, and it is typically accompanied by feelings of worry and fear [15]. The prolonged presence and spread of COVID-19, accompanied by rapidly changing mandates and recommendations, is expected to further impact the psychological well-being of the general population and to have unprecedented long-term public health consequences [16]. Such consequences might include increased gambling and online gaming problems [17].

Recent studies on the influence of the COVID-19 pandemic on mental

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health have revealed that anxiety, distress, and depression levels have been particularly high among people worldwide [18–20]. People cope with stressful situations in various ways. Many individuals gamble or play digital games online as a way of relieving stress or escaping reality [21,22]. During a difficult time, such as a pandemic, gambling and online gaming might seem like attractive ways to avoid unpleasant feelings. Indeed, recent research has shown that experiencing increased distress or depression during the pandemic has been associated with increased gambling and gaming [23,24]. One factor that might motivate gambling in particular is the idea of making seemingly easy money through winnings [25]. The COVID-19 pandemic has impacted the global economy and caused people major concerns about their ability to maintain steady income levels [26,27]. Financial difficulties encourage people to gamble to attempt to make money [28]. Another important motive for gambling or online gaming might be socializing and interacting with others through the game or gaming platform [29,30]. Although gambling and gaming can offer many benefits to individuals, ranging from (virtual) social contact to mental exercise, they can also develop into problematic behaviours and bring significant physical, social, and financial harm [31,32].

Studies on gambling during the COVID-19 pandemic have yielded mixed results in terms of the pandemic's impact on gambling behaviours, depending on the sample and setting [33,34]. A scoping review study examining the impact of the COVID-19 pandemic on gambling behaviour found that gambling behaviours decreased or stayed the same in most studies analysed [35]. Notably, participation in various forms of online gambling has increased during the pandemic, especially among individuals who have previous gambling experience and those who are high-risk gamblers [23,36]. These results are also supported by Brodeur et al. (2021) who indicate that gambling behaviour has increased during the pandemic among those who were already attributed as high-risk gamblers [35]. One study on adolescents examined the relationships between mental health, gambling and gaming participation, and problem gambling and video gaming [37]. Problem gambling significantly mediated the association between mental health and the frequency of participation in certain forms of gambling, such as fantasy sports, games of skill, and cards. E-sports betting, however, was related to mental health problems through problem video gaming, suggesting that gamers find e-sports betting appealing because it is related to video games [37].

Studies on pandemic-time gambling have shown that increased gambling during the pandemic is associated with anxiety, stress, and higher alcohol use [23,36,38]. Additional risk factors of increased problem gambling during the pandemic have been identified, including male gender, younger age, tobacco use, and higher income [34,35].

Online gaming and related activities such as e-sports betting have increased significantly during the COVID-19 pandemic [39]. Given the large-scale stay-at-home orders, the World Health Organization, together with various gaming companies, launched the #Play-ApartTogether initiative to promote well-being and encourage people to stay socially connected through virtual play [39,40]. Consistent with studies on gambling, increased online gaming during the pandemic has been associated with distress and anxiety [24]. However, Ellis et al. (2020) found that online games that use augmented reality features, such as Pokémon Go, promoted physical and mental health and relieved distress among individuals during social restrictions [41]. Notably, few studies to date have examined the influence of the COVID-19 pandemic on online gaming problems [42]. More research is needed on potential mental health determinants, especially anxiety caused by the pandemic, on gambling and online gaming problems. Given the evident effects of the COVID-19 pandemic on people's social lives and the social elements inherent to online games, the possibility that motivating social factors influence gambling and gaming participation in the context of the pandemic should be investigated. Importantly, more research is needed on the COVID-specific mental health and social factors, as it is still unknown what the full impact of the COVID-19 pandemic on gambling and gaming will be [43].

In this study, we aimed to address the aforementioned research gap and examine the influence of COVID-19 anxiety on mental health problems and their associations with gambling problems and online gaming problems. We also investigated the mediating role of being socially motivated to gamble or play online games in gambling and gaming problems. Anxiety and other mental health problems are typically comorbid, but because anxiety often precedes other mental health issues [44], we expected that experiencing COVID-19 related anxiety has led to increased mental health problems. Based on the literature we reviewed, we assume that COVID-19 anxiety and mental health problems are related to increased gambling and online gaming problems. In addition, we hypothesise that social motives for gambling or online gaming mediate the relationship between mental health and gambling or online gaming problems.

## 2. Methods

### 2.1. Design and participants

The study sample ( $N = 1530$ ) consisted of 18–75-year-old ( $M = 46.67$ ;  $SD = 16.42$ ; 49.41% female) Finnish individuals who participated in a survey study conducted in April 2021. The survey study focused on gambling and gaming habits and psychological well-being during the COVID-19 pandemic.

Participation in the study was voluntary. The participants were informed that by completing the survey, they gave their consent for participation. The participants were recruited from a volunteer participant panel administered by the data provider company Norstat, which provided the anonymised data to the research group. The average survey completion time was 18 min. Prior to implementation in April 2021, the Academic Ethics Committee of the Tampere region declared that the survey study did not involve any ethical issues.

### 2.2. Measures

COVID-19 anxiety was assessed using a 6-item measure adapted from the state scale of the Spielberger State-Trait Anxiety Inventory (STAI-6) [45]. The STAI-6 measures individual's transient state of arousal that occurs in response to a stressful situation. To apply the measure to the ongoing COVID-19 situation, the scale was modified to ask the respondents about their reactions to the coronavirus crisis. COVID-19 anxiety was evaluated using a timeframe of the past seven days. The response scale for each statement ranged from 1 (*does not describe my state at all*) to 7 (*describes my state completely*). The scale had good internal consistency based on McDonald's omega ( $\omega = 0.88$ ).

Mental health problems were evaluated with the five-item Mental Health Inventory (MHI-5) [46]. The MHI-5 is a short form of the original 38-item version measuring emotional health status. It is a commonly used and attractive brief screen for general mental health, wellbeing, and mood disorders [47–49]. The MHI-5 screen consists of five statements which pertain to mood as experienced in the past month and assess psychological well-being as well as absence of psychological distress [50]. The screen inquires how much of the time during the last month (30 days) the respondent has, for instance, felt downhearted or blue or felt calm and peaceful. Answers were given on a scale ranging from 1 (*none of the time*) to 6 (*all of the time*). The measure had good internal consistency ( $\omega = 0.89$ ).

We asked the participants how often they had played or engaged in different types of gambling activities such as slot machines, lotteries, and online poker in the last six months. We also inquired about the types of online games participants had played during the last six months. Game type choices ranged from action and adventure games to strategy and logic games. Answer choices were given on a scale from 0 (*less than once a month*) to 6 (*multiple times a day*) for both gambling and gaming participation. We report percentages for those who have not participated in either gambling or gaming, for those who have participated in

gambling or gaming over the last six months, and for those who have participated in both gambling and gaming during the past six months.

Gambling problems were measured using the Problem Gambling Severity Index (PGSI) [51], an ideal and widely used measure for assessing problem gambling in the general population rather than in clinical settings [52,53]. The measure includes nine items that assess problematic gambling behaviours and the adverse consequences of gambling [51,54]. For the purpose of the study, we measured gambling habits and consequences experienced in the last six months (e.g., “Thinking about the last six months, have you bet more than you could really afford to lose?”). The response choices were 0 (*never*), 1 (*sometimes*), 2 (*most of the time*), and 3 (*almost always*). The scale had excellent internal consistency ( $\omega = 0.95$ ) and was used as a continuous measure in the analyses.

Gaming problems were measured with the ten-item Internet Gaming Disorder Test (IGDT) [55], a short screen designed to effectively assess Internet gaming disorder as described in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) [56,57]. It has been used in Finland among vocational school students, where it showed good psychometric properties [58]. The measure assesses the extent to which and how often the ten gaming related statements (e.g., “How often have you felt restless, irritable, anxious and/or sad when you were unable to play or played less than usual?”) apply to the individual. Consistent with the PGSI, we measured gaming problems during the last six months. Answer choices were 0 (*never*), 1 (*sometimes*), and 2 (*often*). The scale had good internal consistency ( $\omega = 0.89$ ). We used the IGDT as a continuous measure in our analyses.

Social motives for gambling or gaming were evaluated with the question “How often during the last six months have you gambled or played digital games to socialize with others?” Responses were provided on a scale ranging from 0 (*never*) to 4 (*always*). The measure was recoded into a dummy variable to identify those gamblers and gamers who had *never* or *rarely* (0) played for social reasons and those who had played for social reasons *sometimes*, *often*, or *always* (1). Age and gender were included in the models as demographic control variables.

### 2.3. Statistical analyses

Descriptive statistics were calculated for all measures. To examine the associations between the independent variables (COVID-19 anxiety, mental health, and social motives) and the dependent variables (gambling problems and online gaming problems), zero-inflated negative binomial regression (ZINB) was applied. Although our sample size was relatively large, the distributions of the variables measuring gambling problems and gaming problems were skewed, as they contained a large number of zeros and a long right tail with small values [59]. ZINB regression models produce good estimates in these types of models containing excess zeros, which are common in addiction research [60,61]. In the models, we estimated gambling and online gaming problems using incidence rate ratios (IRRs) and excessive zeros using odds ratios (ORs).

In addition, we used generalised structural equation modelling (GSEM) to observe how COVID-19 anxiety and mental health relate to gambling and online gaming problems when social motives for playing are set as the mediating variable. The path for COVID-19 anxiety and mental health was executed using a linear regression model with Gaussian distribution. The paths for social motives were based on logistic models with Bernoulli distribution. The outcome variables of gambling problems and online gaming problems were defined as continuous with Gaussian distributions, as the covariance of the error term between the two was included in the model. All assumptions of GSEM were met, but due to heteroscedasticity of the residuals, the model was run using robust standard errors. We also conducted sensitivity analyses in which the models were further tested after removing those participants ( $n = 58$ ) who had not engaged in any gambling or gaming activities. These results, however, are not reported as they did

not differ from the results of the main analyses. All models were estimated using Stata 15.0 software.

### 3. Results

Of the total sample, 92.09% of participants reported having gambled and 66.80% reported having played digital games during the past six months. Nearly 63% had participated in both gambling and gaming. Only 3.79% ( $n = 58$ ) neither gambled nor played digital games in the last six months. The mean PGSI score was 1.31 ( $SD = 3.33$ ). Based on the final PGSI scores and recommended cutoff points [51], 14.18% of the participants were moderate-risk gamblers (3–7 points) or problem gamblers ( $>8$  points). The mean IGDT score was 1.34 ( $SD = 2.64$ ). Approximately 1% of the total sample had a gaming problem according to the DSM-5 criteria and when using the suggested threshold of five points on the IGDT (on a scale from 0 to 9 [57]). Nearly 27% indicated gambling or gaming for social reasons during the past six months. Detailed descriptive statistics of the study variables are reported in Table 1.

According to our ZINB models (Table 2), excess zeros in gambling problems (i.e., lack of gambling problems) were more common among females (OR: 0.53; 95% CI: 0.07–0.99), and excess zeros in gaming problems (i.e., lack of online gaming problems) were more common among older individuals (OR: 0.04; 95% CI: 0.03–0.06). Social motives for gambling and online gaming negatively explained excess zeroes in the lack of gambling problems (OR: -1.34; 95% CI: -2.15–0.54) and gaming problems (OR: -1.70; 95% CI: -2.22–1.10). Accordingly, for every increase in social motives to play, the likelihood of having no problems related to gambling or gaming decreases.

Regarding the presence of gambling problems and online gaming problems in the model, COVID-19 anxiety was related to both gambling problems (IRR: 1.05; 95% CI: 1.01–1.09) and online gaming problems (IRR: 1.03; 95% CI: 1.01–1.05). Higher incidence of mental health issues was only associated with gaming problems (IRR: 1.10; 95% CI: 1.04–1.11), whereas social motives for gambling or online gaming predicted both gambling problems (IRR: 1.70; 95% CI: 1.21–2.30) and online gaming problems (IRR: 2.04; 95% CI: 1.64–2.54).

In terms of the GSEM path analyses (Table 3 and Fig. 1), when exploring the influence of COVID-19 anxiety and mental health on gambling and online gaming problems via social motives, we found that COVID-19 anxiety was directly related to increased mental health problems ( $p < 0.001$ ) and online gaming problems ( $p = 0.03$ ), but not with gambling problems ( $p = 0.22$ ). In addition, COVID-19 anxiety did not directly predict social motives for gaming ( $p = 0.10$ ), but mental health problems had a significant association with motives to play for social reasons ( $p = 0.01$ ). Mental health problems were also a significant predictor of both gambling problems ( $p < 0.001$ ) and online gaming problems ( $p < 0.001$ ). Social motives for gaming were a significant mediator in the model, facilitating higher incidence of gambling problems ( $p < 0.001$ ) and gaming problems ( $p < 0.001$ ).

**Table 1**  
Descriptive statistics for the sample characteristics and the study variables.

Cont. variables	<i>M</i>	<i>SD</i>	Range
COVID-19 anxiety	20.62	5.05	7–36
MHI-5	14.45	2.15	5–30
Gambling problems	1.31	3.33	0–27
Gaming problems	1.34	2.64	0–20
Age	46.67	16.42	18–75
Cat. variables	<i>Coding</i>	<i>n</i>	%
Gender	Male	770	50.33
	Female	756	49.41
	Other	4	0.26
Social motives for playing	No	1124	73.46
	Yes	406	26.54

**Table 2**

Zero-inflated negative binomial regression results explaining gambling problems and gaming problems, and excess zeroes (inflation).

	Gambling problems			Gaming problems		
	IRR	Robust SE	95% CI	IRR	Robust SE	95% CI
COVID-19 anxiety	1.05*	0.02	1.01–1.09	1.03**	0.012	1.01–1.05
Mental health (MHI-5)	1.04	0.30	0.98–1.10	1.10***	0.020	1.04–1.11
Social motive	1.70**	0.27	1.21–2.30	2.04***	0.230	1.64–2.54
Age	0.99	0.01	0.99–1.01	0.99	0.004	0.99–1.00
Female gender	0.83	0.13	0.61–1.14	0.84	0.096	0.67–1.05
	OR	Robust SE	95% CI	OR	Robust SE	95% CI
<i>Inflation</i>						
COVID-19 anxiety	−0.04	0.030	−0.10–0.02	−0.03	0.02	−0.07–0.01
Mental health (MHI-5)	−0.09	0.051	−0.19–0.01	−0.10	0.04	−0.18–0.01
Social motive	−1.34**	0.411	−2.15–0.54	−1.70***	0.30	−2.22–1.10
Age	0.01	0.010	−0.01–0.04	0.04***	0.01	0.03–0.06
Female gender	0.53*	0.234	0.07–0.99	0.26	0.22	−0.17–0.68
(/ln)alpha	0.90***			−0.41*		
Wald $\chi^2$ : (5)	53.64			109.45		
Max. likelihood R <sup>2</sup>	0.11			0.12		
Cragg & Uhler's R <sup>2</sup>	0.11			0.28		
McFadden's Adj. R <sup>2</sup>	0.04			0.11		

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ **Table 3**

Generalised structural equation path models reporting regression coefficients (B), robust standard errors, statistical significances (p), and 95% confidence intervals.

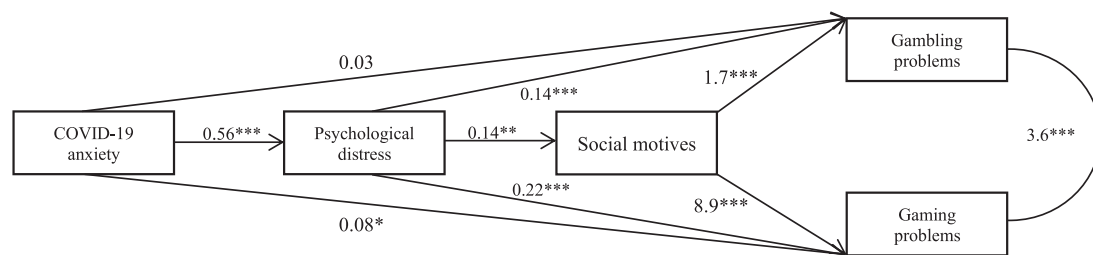
	B	Robust SE	p	95% CI
<i>Mental health</i>				
COVID-19 anxiety	0.56	0.02	<0.001	0.514–0.596
<i>Gambling problems</i>				
Mental health	0.14	0.03	<0.001	0.085–0.191
COVID-19 anxiety	0.03	0.02	0.222	−0.015–0.067
Social motive	1.70	0.45	<0.001	0.806–2.564
<i>Gaming problems</i>				
Mental health	0.22	0.04	<0.001	0.139–0.301
COVID-19 anxiety	0.08	0.04	0.033	0.006–0.158
Social motive	8.90	0.71	<0.001	7.481–10.26
<i>Social motive</i>				
Mental health	0.14	0.05	0.006	0.039–0.240
COVID-19 anxiety	0.03	0.02	0.102	−0.005–0.066
Covariance pgsl*igdt	3.58	0.69	<0.001	2.227–4.923

Note. Pgsl = Problem gambling severity index. Igdt = Internet gaming disorder test.

#### 4. Discussion

This was the first study to investigate the roles of COVID-19 anxiety and mental health in gambling and online gaming problems in a general adult population. In our first model, COVID-19 anxiety was directly associated with increased gambling problems and online gaming problems. Mental health was only a significant predictor of online gaming problems. According to our path model, COVID-19 anxiety was directly associated with online gaming problems but not gambling problems. This result could indicate that online gamers, who also tend to be younger, experience higher levels of anxiety due to the pandemic. Many younger and working-age individuals' daily lives might have been disrupted more obviously by the COVID-19 outbreak than those of older individuals [62], thus leading younger people to exhibit increased gaming problems.

The COVID-19 pandemic is a major source of anxiety for individuals, and in our path model, it was significantly related to increased mental health problems. Mental health problems, in turn, were associated with significantly higher gambling problems and online gaming problems. These results support previous research by demonstrating that increases in mental health problems experienced during the pandemic are related to increases in gambling problems and online gaming problems [23,24,36–38]. However, prior studies did not account for the fact that COVID-19 anxiety in particular might be an underlying reason many individuals have suffered mental health consequences during the

**Fig. 1.** The path diagram for gaming problems and gambling problems.

The effects of COVID-19 anxiety and mental health on gambling and gaming problems with social motives as a mediating variable. Values are expressed as regression coefficients.

Note. Psychological distress = The Five-item Mental Health Inventory (MHI-5). Social motives = Social motives for gaming and gambling. Gambling problems measured with the PGSI as a continuous outcome variable. Gaming problems measured with the IGDT as a continuous outcome variable.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

pandemic, as well as why these might manifest in increased gambling and online gaming problems.

This study showed that social motives for gambling and gaming were a significant mediator in the relationship between mental health issues and gambling and online gaming problems. This finding indicates that gambling problems and online gaming problems are more common among individuals who are socially motivated by and involved in these games. While previous research has shown that gambling behaviours have decreased or remained the same during the pandemic among many people [35], some may have turned to or increased their gambling and online gaming in order to distract themselves from the current coronavirus situation. Less frequent gambling due to the pandemic is inherently a good thing, as it is associated with lower gambling-related financial losses and higher self-awareness regarding the possibility that one is spending too much time in the games [33,43]. On the other hand, the social features of games might have provided an alternative way of communicating and building social connections with others while staying socially isolated at home. The built-in social features of online games and some gambling sites and the social motivation to play can function as protective factors against gambling and gaming harms [39,40]. However, being socially motivated to gamble or play online games might lead to spending excessive time in the game, often at the expense of sleep and physical activity, and potentially increasing expenditure in the games. Together, these factors might eventually lead to gambling and gaming related problems and long-term harms.

Based on the results of this study, those gamblers and gamers in particular, who are experiencing mental health problems during uncertain times such as the current COVID-19 pandemic, are more likely to experience gambling and gaming problems if they are socially motivated to play. Even though social exchange in virtual environments may have benefits for well-being, particularly during unusual periods of social isolation, the social properties of games might accentuate gambling and gaming problems [63]. Mental wellbeing and social motivations for gaming and gambling should be given increased attention in post-pandemic prevention and intervention work as they may have become more pronounced during the COVID-19 crisis.

The current study has some limitations. First, our data are cross-sectional, so we cannot draw sequential or causal inferences regarding the relationships between the variables. Second, the measures are based on participants' self-reports which are sensitive to bias. In addition, we used a single-item measure for the construct of social motives for gambling and gaming which may be sensitive to measurement errors. Future research should investigate social motives for gambling and gaming by utilizing a more dimensional and comprehensive measure. Our study was conducted in the context of Finland, which has high institutional trust [4] and where the COVID-19 pandemic has been largely under control. Thus, caution should be taken when interpreting and generalising the results of this study. Future cross-national and longitudinal studies should evaluate the relationships between COVID-19 anxiety, mental health, social motives for playing, and gambling and gaming problems.

## Declaration of Competing Interest

None.

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