



A longitudinal study of gambling motives, problem gambling and need frustration

Heli Hagfors^{*}, Ilkka Vuorinen, Iina Savolainen, Atte Oksanen

Faculty of Social Sciences, Tampere University, Tampere 33014, Finland

ARTICLE INFO

Keywords:

Gambling motives
Basic psychological needs
Need frustration
Problem gambling
Longitudinal design

ABSTRACT

Gambling motives are an important element in understanding the development of problem gambling, yet most of the recent studies investigating their role in problem gambling have been cross-sectional. This study analyzed the links between gambling motives and problem gambling using a longitudinal study design. The moderating effect of the frustration of basic psychological needs was also assessed. The study sample with 1,022 participants (48.43% female, $M_{age} = 49.50$ years) was surveyed at three timepoints (T1–T3) in 6-month intervals. The Problem Gambling Severity Index (PGSI) was used to measure problem gambling and need frustration was assessed with The Basic Psychological Need Satisfaction and Frustration Scale (BPNFSF). The data were analyzed using a multilevel mixed-effects regression model where PGSI was the outcome variable. Gambling motives and need frustration were the predictors while psychological distress (measured with the 5-Item Mental Health Inventory, MHI-5), offshore/onshore online gambling, and socio-demographic factors were used as control variables. All the motives predicted problem gambling individually over time. In contrast, motives to escape, to win money, and to compete along with need frustration predicted problem gambling over time in the full model. In addition, money motive and need frustration had an interaction effect so that higher need frustration combined with money motive predicted more severe gambling problems. The results of this study provide a valuable longitudinal perspective on gambling motives, frustration of basic psychological needs, and gambling problems which can be used to develop and improve treatment efforts and programs of problem gambling.

1. Introduction

What motivates behavior is one of the most frequently asked questions among people, especially when it comes to potentially harmful behaviors like gambling. In recent years, gambling motives have started to gain more research interest as their role in gambling behavior and problem gambling have been recognized (Francis et al., 2015; Stewart & Zack, 2008; Sundqvist et al., 2016; Tabri, Xuereb, et al., 2022). Although several studies have analyzed the links between gambling motives and problem gambling, a majority of the studies have been cross-sectional (i. e., Francis et al., 2015; Hagfors et al., 2022; Mulkeen et al., 2017; Sundqvist et al., 2016; Tabri, Xuereb, et al., 2022). This kind of research can be used to identify potential correlates of problem gambling, but it cannot be used to deduce the temporal sequence of the variables (Busk, 2005; Landreat et al., 2020). Moreover, gambling motives may change during the progress of gambling problem severity: the initial reasons to gamble are likely to be different than the reasons that maintain the habit

(Blaszczynski et al., 2008; Grubbs & Rosansky, 2020). Therefore, it is important to investigate the longitudinal patterns of gambling motives and their role in gambling problems over time. This study aims to fill this gap by analyzing the associations of gambling motives and problem gambling using a longitudinal study design.

Previous research has identified various motives for why people gamble. Winning money is the most fundamental motive for gambling as it is in the core of the activity (Binde, 2013). The temptation to gamble may also be fueled with other well-known motives such as enhancement, socializing, and escaping or distracting oneself from negative thoughts and emotions (Barrada et al., 2019; Francis et al., 2015; Stewart & Zack, 2008; Volberg et al., 2017; Wardle et al., 2011). Competition and developing skills have also been recognized as motives for gambling (e. g. Binde, 2013). However, only a few studies have used longitudinal designs to analyze the links between gambling motives and problem gambling. Two Canadian 5-year longitudinal studies found that gambling to escape and to win money predicted not only current

^{*} Corresponding author.

E-mail addresses: heli.hagfors@tuni.fi (H. Hagfors), ilkka.vuorinen@tuni.fi (I. Vuorinen), iina.savolainen@tuni.fi (I. Savolainen), atte.oksanen@tuni.fi (A. Oksanen).

<https://doi.org/10.1016/j.addbeh.2023.107733>

Received 19 December 2022; Received in revised form 9 March 2023; Accepted 16 April 2023

Available online 23 April 2023

0306-4603/© 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

problem gambling but also future problem gambling onset (el-Guebaly et al., 2015; Williams et al., 2015). Additionally, a recent study found that gambling to escape and positive gambling expectations predicted problem gambling six months after the initial assessment (Grubbs & Rosansky, 2020). A study by McGrath and Konkoly Thege (2018) investigated the stability versus change of gambling motives over five years. They concluded that notable changes were found in each motive category, although problem gambling was not a significant predictor for stability or change.

The pathways model of problem and pathological gambling (Blaszczynski & Nower, 2002; Nower et al., 2022) proposes that there are different pathways to problem gambling where individual's biopsychological disposition, past experiences, ecological factors, and current behavior – including gambling motives – all contribute to the development of problem gambling. According to the model, these factors make individuals vulnerable to problem gambling. For instance, cognitive processes taking place while gambling, previous mental health problems, poor coping skills, and having a troubled family history correlate with gambling problems (Blaszczynski & Nower, 2002). Moreover, certain characteristics of the environment, such as easy availability and accessibility of gambling activities, can promote heavy gambling involvement (Abbott et al., 2018; Blaszczynski & Nower, 2002; el-Guebaly et al., 2015).

The rapid rise of online gambling with easy access any time of the day poses a new kind of risk for developing gambling problems (Hing et al., 2017). Especially offshore websites form a worrisome new mode of online gambling (Gainsbury et al., 2018, 2019). Offshore gambling refers to gambling on websites that provide gambling services in a certain jurisdictional area without a valid license and against local restrictions. These websites are often heavily marketed with high payout rates, benefits and bonuses, and the ability to use local currency, but at the same time they ignore local safety standards. In previous studies, offshore gambling has been associated with more severe gambling problems than gambling on licensed onshore sites (Gainsbury et al., 2018, 2019; Hing et al., 2021; Oksanen, Hagfors et al., 2022), making it a form of activity that requires special attention.

An additional factor making individuals vulnerable to gambling problems could be the frustration of psychological needs. Basic psychological needs theory (BPNT) is a mini theory that was developed within the self-determination theory (SDT; Ryan & Deci, 2000; 2017). According to the BPNT, satisfaction of basic psychological needs for autonomy (feeling of choice and volition), competence (being confident about one's own abilities), and relatedness (being meaningfully connected to others) promotes well-being, flourishing, and personal growth (Church et al., 2013). In contrast, frustration of these needs has been associated with increased psychological distress and ill-being (Bartholomew et al., 2011; Chen et al., 2015; Vasteenkiste & Ryan, 2013). Need frustration includes experiences of rejection and loneliness (relatedness frustration), feelings of failure and doubts about one's abilities (competence frustration), and feelings of being controlled and pressured (autonomy frustration) (Chen et al., 2015). Conceptually, need frustration has been suggested to be distinguished from low levels of need satisfaction, as it is, for example, different to feel low relatedness to colleagues than to be actively rejected by them (Bartholomew et al., 2011; Vasteenkiste & Ryan, 2013).

According to the BPNT, when the psychological needs are chronically thwarted, people are likely to develop various coping strategies, including need substitutes and maladaptive compensatory behaviors (Vasteenkiste & Ryan, 2013). Previous literature has associated need frustration with problematic gambling (Mills et al., 2021; Vuorinen et al., 2022), but it is still unclear how need frustration affects gambling behavior. It is feasible that need frustration works in conjunction with certain gambling motives and accelerates the development of problem gambling. Thus, thwarted intrinsic needs may drive toward more extrinsic rewards and motivate gambling behavior as a means of compensation.

Building on previous findings on gambling motives, basic psychological needs, and problem gambling, this study aims to investigate whether gambling motives predict gambling problems over time and to further explore if need frustration moderates this association. Referring to the previous longitudinal studies, we hypothesize that gambling to escape or to win money predict gambling problems over time. Moreover, we hypothesize that need frustration moderates these associations so that the associations would be stronger when need frustration is present.

2. Materials and methods

2.1. Participants and procedure

A nation-wide sample included Finnish participants from mainland Finland, aged 18–75 years ($N = 1,022$; 51.27 % male, 48.43 % female, and 0.03 % other gender). The data were collected from a panel administered by a European data collection company Norstat. Response rate in the first time point of the study (T1) was 34.60 and the sample matches the Finnish population aged 18–75 (Oksanen, Mantere, et al., 2022). Data collection was conducted in three timepoints every 6-months, starting in April 2021 (T1). The first follow-up survey was conducted in October–November 2021 (T2) and the second follow-up in April–May 2022 (T3). Of the initial T1 participants, 66.80 % participated also in T2 and T3.

Nonresponse analysis showed that those who participated in all three timepoints ($N = 1,022$) were somewhat older (49.59 years vs. 46.67 years) than those in the original T1 ($N = 1,530$). There was no other major dropout based on gender, income, education, geographical area, or occupational or marital status. However, the mean rate of gambling problems measured with the Problem Gambling Severity Index (PGSI) was lower in the final sample compared to T1 (1.11 vs. 1.15) which indicates that the final sample is closer to the general population estimates (e.g., Salonen et al., 2020). Overall, the final sample corresponds with the general population parameters relatively well based on the demographic data by Statistics Finland (Official Statistics of Finland, 2022).

The participants were informed about the purpose and use of the survey, and they gave their consent for participation by completing the full survey. Individual participants could not be identified from the data, as Norstat provided only anonymized data to the researchers. The study was reviewed and approved by The Academic Ethics Committee of the Tampere region before the first data collection. In each timepoint, the researchers conducted data quality checks to remove obviously biased response patterns from the final data.

2.1.1. Measures

The Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001; Currie, Casey, & Hodgins, 2010) was used to assess the severity of gambling problems in the sample. The scale is widely used in assessing problem gambling in general populations, including national studies in Finland (e.g., Salonen et al., 2020; Volberg et al., 2017; Wardle et al., 2011). The scale consists of nine items, each assessing different negative consequences of gambling, such as a range of problems and harms. The original PGSI (Ferris & Wynne, 2001) evaluates gambling behaviors and harms experienced in the last 12 months, but due to the longitudinal approach of our study, we assessed gambling problems as 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?”). Each item of the scale is assessed on a four-point scale (0 = *never*, 1 = *sometimes*, 2 = *most of the time*, and 3 = *almost always*), higher points indicating a higher likelihood of gambling problems. The internal consistency of the scale measured with McDonald's omega was excellent in all three timepoints (T1: $\omega = 0.94$, T2: $\omega = 0.93$, T3: $\omega = 0.94$).

Gambling motives were assessed with eight individual questions, each addressing a different gambling motive. The items asked about frequency with the anchor: “How often during the last six months...”.

The escape motive was measured with the three escapism items from the Motivations to Play Inventory (Hagström & Kaldö, 2014), for example "...have you gambled in order to avoid real-life social encounters or situations?". Other gambling motives were chosen based on previous literature on gambling motives (Williams et al., 2017; Volberg et al., 2015). The chosen items have been widely used in Finland as well (e.g., Salonen et al., 2020; Hagfors et al., 2022). These involved motives for money ("...have you gambled to win money?"), competition ("...have you gambled to compete with others?"), excitement ("...have you gambled for excitement?"), social interaction ("...have you gambled to socialize with others?"), and competence ("...have you gambled because it makes you feel skilled?"). All motives were assessed on a five-point scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*, and 4 = *always*) where higher points indicated higher endorsement of the motive. Escape motive scale had a good internal consistency in all three timepoints (T1: $\omega = 0.84$, T2: $\omega = 0.87$, T3: $\omega = 0.88$).

To measure the frustration of basic psychological needs we combined the frustration subscales of The Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015). The scale included half of the 24 items of the full scale, with 4 items measuring autonomy frustration (e.g., "I feel forced to do many things I wouldn't choose to do"), 4 items measuring relatedness frustration (e.g., "I feel excluded from the group I want to belong to") and 4 items measuring competence frustration (e.g., "I feel disappointment with my performances") on a 7-point Likert scale (1 = *not at all true* ... 7 = *totally true*). The scale was included only at T1, but it had excellent internal consistency ($\omega = 0.92$). The satisfaction subscales were left out in order to focus exclusively on need frustration.

Psychological distress was measured using the 5-Item Mental Health Inventory (MHI-5; Berwick et al., 1991). The measure includes five items that assess emotional health status. It is a short version of the original 38-item version and commonly used in surveys to efficiently screen for general mental health and wellbeing (e.g., Elovainio et al., 2020). Items of the MHI-5 inquire, for example, how much of the time during the last 30 days the individual has felt downhearted or blue, or felt calm and peaceful. Answer options range on a scale from 1 (*none of the time*) to 6 (*all of the time*). Internal consistency of the inventory was high in all measurement points (T1: $\omega = 0.89$, T2: $\omega = 0.88$, T3: $\omega = 0.87$).

In Finland, gambling is provided by a state-owned monopoly supplier, Veikkaus Oy. Offshore and onshore gambling were inquired with two different questions: "Have you gambled on any offshore gambling websites (other than websites provided by Veikkaus or Paf)?" and "Have you gambled on gambling websites provided by Paf?". Paf (Ålands Penningautomatförening) is the Åland Islands' own monopoly operator that provides online games and gambling opportunities on ships sailing between Finland and Sweden or Estonia. Despite the state-owned monopoly in Finland, participating in offshore gambling, that is, foreign gambling operators or games offered by Paf, is not prohibited under Finnish legislation. Answering 'yes' to either or both questions was categorized as offshore gambling, whereas answering 'no' to both questions was categorized as onshore gambling. Finally, several socio-demographics such as age, gender, income, education, and occupational status were inquired from the participants.

2.2. Statistical techniques

We conducted the analyses using Stata 17 software. Main analyses were conducted using multilevel linear mixed-effects regression. These models analyze the within-person changes and between-person differences in gambling problems over time. Within-person predictors are time-varying and include gambling motives, need frustration, onshore/offshore gambling, psychological distress, occupational status, and income. Age, gender, and education are added as between-person predictors measured at T1.

Models 0 include only gambling motives added separately without any other variables. Model 1 includes all gambling motives and other

variables in the same model. Model 2 adds to Model 1 by including interactions between different gambling motives and need frustration.

For the fixed parts of our models, we report unstandardized regression coefficients (B) and their standard errors (SE B) and the statistical significance of the estimates (p). Our models included random intercepts and random slopes for time with an unstructured covariance structure. For the random parts of our models, we report regression coefficients (B) and their standard errors (SE B), and 95 % confidence intervals. Statistically significant interactions are plotted in the figure.

Additional robustness checks of the analyses were conducted using multilevel fixed effects regression. Fixed effects regression is especially powerful when focusing only on individual variation over time as they exclude between-person variation. Hence, they give also better ground for causal inference as they are more efficient in controlling unobserved confounders (Brüderl & Ludwig, 2015). These analyses focused only on gambling motives, and they are comparable to models 0. Predictors were standardized. These analyses are only reported in the text.

3. Results

Descriptive statistics of the study sample are presented in Table 1. At T1, around 40 % of the participants had a bachelor's degree or higher and more than half were employed. The mean score for gambling problems measured with the PGSI was a bit higher at T2 (2.98) than in the original sample at T1 (1.15) or at T3 (1.11). Gambling for money, to escape, and for excitement had the highest mean scores of the motives, respectively. The majority of the participants had gambled on onshore websites, while a fifth had also gambled on offshore gambling sites.

Table 2 presents the results from the multilevel mixed-effects regression analysis predicting gambling problems. In Model 0, within-person changes in each gambling motive predicted gambling problems over time. Escape motive had the strongest within-person effect on gambling problems ($B = 0.85$, $p < .001$) when compared to the other motives. Model 1 included all the gambling motives as independent variables. Need frustration, onshore/offshore gambling, psychological distress, age, gender, income, education, and occupational status were treated as control variables. The results show that escape, money, and competition motives had statistically significant within-person effects on gambling problems. Need frustration and offshore gambling also had significant within-person effects on gambling problems. Higher education, in turn, had a statistically significant between-person effect predicting fewer gambling problems over time.

The full model (Model 2) includes all independent variables, control variables, and the interaction terms with motives and need frustration. All the significant predictors from Model 1 remained statistically significant also in Model 2. Moreover, the results show that need frustration moderated the association between money motive and gambling problems ($B = 0.29$, $p < .001$) so that gambling for money combined with higher need frustration predicted more severe gambling problems (Fig. 1). None of the other interaction terms were statistically significant.

Additional robustness checks confirmed the role of gambling motives in gambling problems. Within person effects based on fixed effects regression models were all statistically significant. Escapism had the strongest effect ($B = 0.66$, $p < .001$), followed by money motive ($B = 0.30$, $p < .001$), competition motive ($B = 0.30$, $p < .001$), excitement motive ($B = 0.21$, $p < .001$), social motive ($B = 0.21$, $p < .001$), and competence motive ($B = 0.14$, $p = .002$).

4. Discussion

This longitudinal study investigated gambling motives and their association with gambling problems among Finnish adults. The moderating role of basic psychological need frustration was also examined. We expected that gambling to escape and to win money would predict gambling over time, and that need frustration would moderate the

Table 1
Descriptive statistics of the main study variables (n = 1,022).

Continuous variables	Range	T1		T2		T3	
		M	SD	M	SD	M	SD
Gambling problems ^a	0–27	1.15	3.02	1.12	2.98	1.11	3.04
Motive: Escape	0–10	0.83	1.72	0.82	1.74	0.80	1.75
Motive: Money	0–4	0.99	1.37	1.05	1.36	0.99	1.36
Motive: Competition	0–4	0.48	0.89	0.51	0.94	0.49	0.90
Motive: Excitement	0–4	0.86	1.15	0.86	1.14	0.82	1.07
Motive: Socializing	0–4	0.43	0.89	0.42	0.86	0.42	0.85
Motive: Competence	0–4	0.49	0.89	0.50	0.89	0.49	0.88
Need frustration ^b	12–74	32.46	13.40	32.46	13.40	32.46	13.40
Psychological distress ^c	5–30	12.24	4.67	12.20	4.58	12.28	4.43
Income	1–8	3.16	1.59	3.18	1.60	3.25	1.60
Age	18–75	49.50	15.86	–	–	–	–
<i>Categorical variables</i>		<i>n</i>	% yes (=1)	<i>n</i>	% yes (=1)	<i>n</i>	% yes (=1)
Onshore online gambling	0/1	649	63.50	634	62.04	633	61.94
Offshore online gambling	0/1	199	19.47	207	20.25	192	18.79
Working	0/1	527	51.57	562	54.99	580	56.75
Male	0/1	524	51.27	–	–	–	–
BA degree or higher	0/1	404	39.53	–	–	–	–

Note.

^a Problem Gambling Severity Index (PGSI).

^b Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS).

^c 5-Item Mental Health Inventory (MHI-5).

Table 2
Multilevel mixed-effects regression models predicting gambling problems^a (n = 1,022).

Fixed part	Models 0			Model 1			Model 2		
	B	SE (B)	p	B	SE (B)	p	B	SE (B)	p
Constant				1.26	0.29	<0.001	1.26	0.29	<0.001
<i>Within-person variables</i>									
Motive: escape	0.85	0.11	<0.001	0.71	0.11	<0.001	0.73	0.11	<0.001
Motive: money	0.44	0.06	<0.001	0.32	0.05	<0.001	0.35	0.05	<0.001
Motive: competition	0.44	0.06	<0.001	0.17	0.05	0.002	0.15	0.05	0.004
Motive: excitement	0.41	0.06	<0.001	0.01	0.06	0.820	0.01	0.06	0.855
Motive: social	0.29	0.06	<0.001	0.02	0.05	0.702	0.02	0.04	0.708
Motive: competence	0.29	0.05	<0.001	−0.05	0.06	0.405	−0.05	0.05	0.335
Need frustration ^b	–	–	–	0.23	0.08	0.004	0.24	0.08	0.003
Onshore online gambling	–	–	–	0.07	0.04	0.057	0.07	0.04	0.052
Offshore online gambling	–	–	–	0.55	0.07	<0.001	0.55	0.07	<0.001
Psychological distress ^c	–	–	–	0.06	0.05	0.235	0.07	0.05	0.150
Working	–	–	–	0.02	0.07	0.806	0.02	0.07	0.728
Income	–	–	–	0.04	0.05	0.449	0.03	0.05	0.492
<i>Between-person variables</i>									
Age	–	–	–	0.00	0.01	0.958	0.00	0.00	0.871
Male	–	–	–	0.04	0.14	0.772	0.07	0.14	0.636
BA degree or higher	–	–	–	−0.35	0.14	0.011	−0.33	0.13	0.014
Motive: escape × frustration	–	–	–	–	–	–	−0.05	0.09	0.607
Motive: money × frustration	–	–	–	–	–	–	0.29	0.06	<0.001
Motive: competition × frustration	–	–	–	–	–	–	0.08	0.06	0.167
Motive: excitement × frustration	–	–	–	–	–	–	−0.03	0.05	0.586
Motive: social × frustration	–	–	–	–	–	–	0.01	0.05	0.815
Motive: competence × frustration	–	–	–	–	–	–	0.01	0.06	0.908
Random part				<i>B</i>	<i>SE (B)</i>	<i>95% CI</i>	<i>B</i>	<i>SE (B)</i>	<i>95% CI</i>
Variance (time)	–	–	–	0.17	0.09	0.06–0.49	0.15	0.09	0.05–0.47
Variance (constant)	–	–	–	5.51	1.06	3.79–8.03	4.97	1.00	3.36–7.37

Note.

^a Problem Gambling Severity Index (PGSI).

^b Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS).

^c 5-Item Mental Health Inventory (MHI-5).

association between gambling motives and gambling problems. The results largely supported our hypotheses. According to our results, all the measured motives predicted gambling problems individually over time. In the full model, however, only escape, money, and competition motives predicted gambling problems over time. Need frustration, offshore gambling, and having a lower education (less than a bachelor's degree) also predicted gambling problems. In terms of the interaction analysis, we found that need frustration moderated the association

between money motive and gambling problems so that gambling for money predicted more severe gambling problems especially when need frustration was present.

The results of this study support the previous research which has shown that varying motives for gambling, such as winning money, excitement, socializing, and escaping negative emotions are critical factors in gambling engagement (Barrada et al., 2019; Binde, 2013; Francis et al., 2015; Stewart & Zack, 2008; Volberg et al., 2017; Wardle

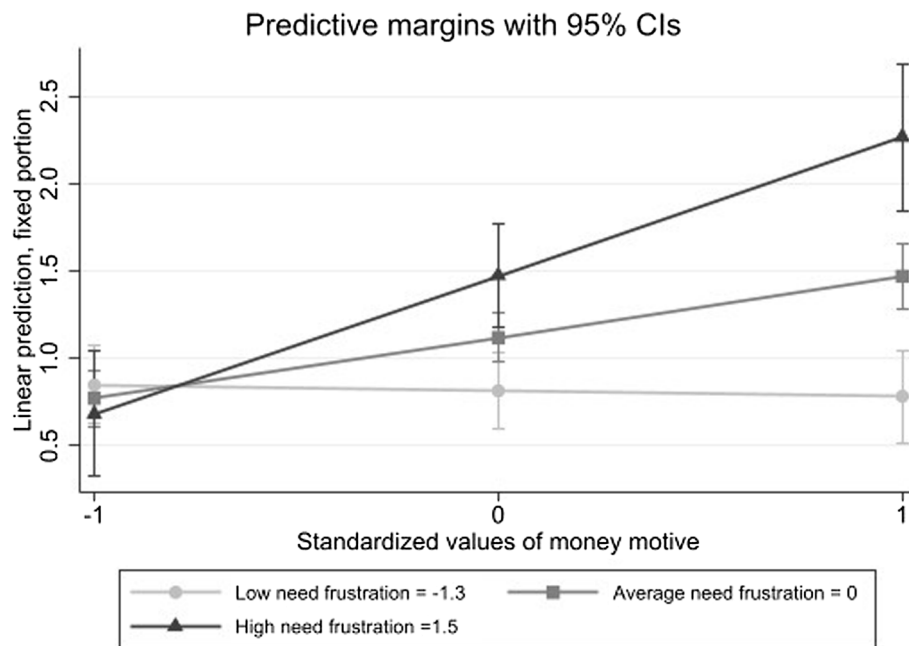


Fig. 1. Higher need frustration combined with money motive predicts more severe gambling problems.

et al., 2011). Our results suggest that especially the motives to escape, to win money, or to compete predict gambling problems over time. This is in line with the Pathways model, which suggests that those with mood disorders and other emotional vulnerabilities may use gambling to narrow their focus of attention to alleviate the symptoms of anxiety and depression (Baudinet & Blaszczynski, 2013; Blaszczynski & Nower, 2002; Wood & Griffiths, 2007). The money motive is also plausible, especially if the individual views money as a measure of success and extension of self-worth (Tabri, Xuereb, et al., 2022). In addition, gambling venues and sites offer competitive environments, which may appeal to some gamblers' need to assert oneself and thus contribute to continuation of gambling and gambling problems (Harris et al., 2015; Weiss & Schiele, 2013; Young & Stevens, 2009). Understanding the impact of these motives is crucial in understanding how some gamblers develop problems and which kinds of rewarding mechanisms lure individuals to gamble.

Our findings regarding the interaction between need frustration and money motive is also largely consistent with the BPNT. When people chronically feel that their needs are not being met, they develop strategies to cope with this situation, such as compensatory behavior and need substitutes (Vasteenkiste & Ryan, 2013; Verstuyf et al., 2012). People may use gambling to cope with the negative emotions produced by need thwarting, and this may be especially true if the individual is motivated to gamble for money. According to the BPNT, need substitutes are divided into extrinsic goals, such as popularity, physical attractiveness or financial success, and intrinsic goals, such as personal growth or contributing to the community (Vasteenkiste & Ryan, 2013). Money can be an appealing goal for those experiencing deficits in their self-worth and yearning social approval, as it represents power, prestige, and status (Blaszczynski & Nower, 2010), and for many, gambling may seem like an easy way to make money (Binde, 2013; Tabri et al., 2022). Previous research has indeed found that those with problem gambling often have a financially focused self-concept and it may be a factor that maintains problematic gambling (Blaszczynski & Nower, 2010; Tabri, Salmon, et al., 2022; Tabri & Wohl, 2021). This is very much in line with the BPNT and implies that we must not only focus on the individual-level of gambling problems, but also strive to study and change the need thwarting environments that people might be exposed to.

Finally, our results join a small but growing body of evidence which links offshore gambling to gambling problems (Gainsbury et al., 2018,

2019; Hing et al., 2021; Oksanen, Hagfors et al., 2022). This may be due to both individual and website-related characteristics. Offshore gambling sites try to appeal to customers by offering them more diverse choices, products, and experiences than many onshore alternatives. They also include attractive payouts that often come with higher risks (Gainsbury et al., 2018). As gambling problems are characterized by high gambling involvement in general, those with gambling problems may be motivated to gamble on offshore websites as well (Binde et al., 2017).

The results of this study can be used to develop and advance the treatment of problem gambling. It would be beneficial to encourage those with gambling problems to reflect on their motives to gamble and how these motives may maintain the problem. Moreover, our findings highlight the requirement to address individual's psychological needs as a part of wholesome problem gambling intervention. It would be important to recognize and discuss unmet basic psychological needs and how their satisfaction or frustration may impact behavior. Teaching alternative and more adaptive coping behaviors as well as helping individuals find ways to satisfy these needs in a healthy way might be fruitful in efforts to change the thoughts and behaviors of those experiencing gambling problems.

The current study has some limitations. First, our study is limited to Finland. Future cross-national studies should investigate these associations in different cultural settings and gambling jurisdictions. Second, although our gambling motive items were based on validated scales, there are other gambling motive scales that we could have utilized, such as the 16-item Gambling Motives Questionnaire-Financial (GMQ-F) that includes financial, coping, enhancement and social motives (Schellenberg et al., 2016). Notably, our study found that escapism and competition motives are important in gambling behavior. Hence future studies could also investigate the possibility of combining sub-scales from different scales to screen for gambling motives more broadly. Third, the measures are based on self-reports which can be sensitive to bias, especially when concerning potentially undesirable behaviors, such as problematic gambling. Finally, we measured basic psychological need satisfaction and frustration only in T1, assuming there would not be much fluctuation during the next year. One must be cautious with making statements about whether this is the case. Future studies should continue investigations of gambling motives with both longitudinal and experimental designs. We also recommend future studies to continue

investigating the role of basic psychological needs in gambling problems, as the environment may increasingly threaten the satisfaction of these basic needs, for example, due to increased demands in different areas of life, including learning, working life, and the digitalization of social connectedness which may ultimately interact with gambling motives.

5. Conclusions

This study investigated the association between gambling motives and gambling using a three-wave longitudinal study-design. The results showed that gambling for money, to escape, and for competition predicted gambling problems over time. It was also found that the frustration of basic psychological needs moderated the association between money motive and gambling problems. The results highlight that gamblers' psychological needs should be better acknowledged and addressed in prevention and intervention work, as they are likely attempted to be satisfied by gambling, especially if motivated by money.

Author agreement statement

We the undersigned declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We understand that the Corresponding Author is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

Role of funding sources

The study was funded by the Finnish Foundation for Alcohol Studies (*Gambling in the Digital Age* Project, 2021–2023, PI: A. Oksanen). Heli Hagfors worked with a personal grant from the Finnish Foundation for Alcohol Studies. Ilkka Vuorinen worked with a personal grant from the Jenny and Antti Wihuri Foundation, Finland (2021–2022).

CRedit authorship contribution statement

Heli Hagfors: Conceptualization, Formal analysis, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Ilkka Vuorinen:** Data curation, Funding acquisition, Writing – original draft, Writing – review & editing. **Iina Savolainen:** Data curation, Funding acquisition, Writing – original draft, Writing – review & editing. **Atte Oksanen:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Supervision, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data is available from the authors with a reasonable request.

References

Abbott, M., Binde, P., Clark, L., Hodgins, D., Johnson, M., Maniowabi, D., ... Williams, R. (2018). *Conceptual framework of harmful gambling, third edition*. Gambling Research Exchange Ontario. doi: 10.33684/CFHG3.en.

- Barrada, J. R., Navas, J. F., Ruiz de Lara, C., Billieux, J., Devos, G., & Perales, J. C. (2019). Reconsidering the roots, structure, and implications of gambling motives: An integrative approach. *PLoS One*, 14(2), e0212695.
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin*, 37(11), 1459–1473. <https://doi.org/10.1177/0146167211413125>
- Baudinet, J., & Blaszczynski, A. (2013). Arousal and gambling mode preference: A review of the literature. *Journal of Gambling Studies*, 29(2), 343–358. <https://doi.org/10.1007/s10899-012-9304-2>
- Berwick, D. M., Murphy, J. M., Goldman, P. A., Ware, J. E., Barsky, A. J., & Weinstein, M. C. (1991). Performance of a Five-Item Mental Health Screening Test. *Medical Care*, 29(2), 169–176. <https://doi.org/10.1097/00005650-199102000-00008>
- Binde, P. (2013). Why people gamble: A model with five motivational dimensions. *International Gambling Studies*, 13(1), 81–97. <https://doi.org/10.1080/14459795.2012.712150>
- Binde, P., Romild, U., & Volberg, R. A. (2017). Forms of gambling, gambling involvement and problem gambling: Evidence from a Swedish population survey. *International Gambling Studies*, 17(3), 490–507. <https://doi.org/10.1080/14459795.2017.1360928>
- Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, 97(5), 487–499. <https://doi.org/10.1046/j.1360-0443.2002.00015.x>
- Blaszczynski, A., & Nower, L. (2010). Instrumental tool or drug: Relationship between attitudes to money and problem gambling. *Addiction Research & Theory*, 18(6), 681–691. <https://doi.org/10.3109/16066351003786752>
- Blaszczynski, A., Walker, M., Sharpe, L., & Nower, L. (2008). Withdrawal and tolerance phenomenon in problem gambling. *International Gambling Studies*, 8(2), 179–192. <https://doi.org/10.1080/14459790802140007>
- Brüderl, J., & Ludwig, V. (2015). Fixed-effects panel regression. In *The Sage handbook of regression analysis and causal inference*, 2015 (pp. 327–357). doi: 10.4135/9781446288146.
- Busk, P. (2005). Correlation Studies. *Encyclopedia of Statistics in Behavioral Science*, (Vol. 1), 403–404. <https://doi.org/10.1002/0470013192.bsa721>
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., ... Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39(2), 216–236. <https://doi.org/10.1007/s11031-014-9450-1>
- Church, A. T., Katigbak, M. S., Locke, K. D., Zhang, H., Shen, J., de Jesús Vargas-Flores, J., ... Ching, C. M. (2013). Need satisfaction and well-being: Testing self-determination theory in eight cultures. *Journal of Cross-Cultural Psychology*, 44(4), 507–534. <https://doi.org/10.1177/0022022112466590>
- Currie, S. R., Casey, D. M., & Hodgins, D. C. (2010). *Improving the Psychometric Properties of the Problem Gambling Severity Index*. Canadian Consortium for Gambling Research.
- el-Guebaly, N., Casey, D. M., Currie, S. R., Hodgins, D. C., Schopflocher, D. P., Smith, G. J., & Williams, R. J. (2015). *The leisure, lifestyle, & lifecycle project (LLL): A longitudinal study of gambling in Alberta*. Final Report for the Alberta Gambling Research Institute. <http://hdl.handle.net/1880/50377>
- Elovainio, M., Hakulinen, C., Pulkki-Råback, L., Aalto, A.-M., Virtanen, M., Partonen, T., & Suvisaari, J. (2020). General Health Questionnaire (GHQ-12), Beck Depression Inventory (BDI-6), and Mental Health Index (MHI-5): Psychometric and predictive properties in a Finnish population-based sample. *Psychiatry Research*, 289, Article 112973. <https://doi.org/10.1016/j.psychres.2020.112973>
- Ferris, J., & Wynne, H. (2001). *The Canadian problem gambling index: Final report*. Ottawa: Canadian Centre on Substance Abuse.
- Francis, K., Dowling, N., Jackson, A., Christensen, D., & Wardle, H. (2015). Gambling motives: Application of the reasons for gambling questionnaire in an Australian population survey. *Journal of Gambling Studies*, 31(3), 807–823. <https://doi.org/10.1007/s10899-014-9458-1>
- Gainsbury, S., Abarbanel, B., & Blaszczynski, A. (2019). Factors influencing Internet Gamblers' use of offshore online gambling sites: Policy implications. *Policy & Internet*, 11(2), 235–253. <https://doi.org/10.1002/poi3.182>
- Gainsbury, S., Russell, A., Hing, N., & Blaszczynski, A. (2018). Consumer engagement with and perceptions of offshore online gambling sites. *New Media & Society*, 20(8), 2990–3010. <https://doi.org/10.1177/1461444817738783>
- Grubbs, J. B., & Rosansky, J. A. (2020). Problem gambling, coping motivations, and positive expectancies: A longitudinal survey study. *Psychology of Addictive Behaviors*, 34(2), 414–419. <https://doi.org/10.1037/adb0000529>
- Hagfors, H., Castrén, S., & Salonen, A. H. (2022). How gambling motives are associated with socio-demographics and gambling behavior—A Finnish population study. *Journal of Behavioral Addictions*, 11(1), 63–74. <https://doi.org/10.1556/2006.2022.00003>
- Hagström, D., & Kaldö, V. (2014). Escapism among players of MMORPGs - Conceptual clarification, its relation to mental health factors, and development of a new measure. *Cyberpsychology, Behavior and Social Networking*, 17(1), 19–25. <https://doi.org/10.1089/cyber.2012.0222>
- Harris, N., Newby, J., & Klein, R. (2015). Competitiveness facets and sensation seeking as predictors of problem gambling among a sample of University student gamblers. *Journal of Gambling Studies*, 31(2), 385–396. <https://doi.org/10.1007/s10899-013-9431-4>
- Hing, N., Russell, A., Browne, M., Rockloff, M., Greer, N., Rawat, V., ... Woo, L. (2021). *The second national study of interactive gambling in Australia (2019–20)*. NSW: Gambling Research Australia. <https://www.gamblingresearch.org.au/publications/second-national-study-interactive-gambling-australia-2019-20>

- Hing, N., Russell, A., Lamont, M., Vitartas, P., & Russell, A. M. T. (2017). Bet anywhere, anytime: An analysis of internet sports bettors' responses to gambling promotions during sports broadcasts by problem gambling severity. *Journal of Gambling Studies*, 33(4), 1051–1065. <https://doi.org/10.1007/s10899-017-9671-9>
- Landreat, M. G., Boudet, I. C., Perrot, B., Romo, L., Codina, I., , ... Magalon, D., & JEU Group. (2020). Problem and non-problem gamblers: A cross-sectional clustering study by gambling characteristics. *BMJ Open*, 10(2), e030424.
- McGrath, D. S., & Konkoly Thege, B. (2018). The categorical stability of gambling motives among community-recruited gamblers: A longitudinal assessment. *Journal of Gambling Studies*, 34(1), 21–38. <https://doi.org/10.1007/s10899-017-9687-1>
- Mills, D. J., Li Anthony, W., & Nower, L. (2021). General motivations, basic psychological needs, and problem gambling: Applying the framework of Self-Determination Theory. *Addiction Research & Theory*, 29(2), 175–182. <https://doi.org/10.1080/16066359.2020.1787389>
- Mulkeen, J., Abdou, H. A., & Parke, J. (2017). A three stage analysis of motivational and behavioural factors in UK internet gambling. *Personality and Individual Differences*, 107, 114–125. <https://doi.org/10.1016/j.paid.2016.11.007>
- Nower, L., Blaszczyński, A., & Anthony, W. L. (2022). Clarifying gambling subtypes: The revised pathways model of problem gambling. *Addiction*, 117(7), 2000–2008. <https://doi.org/10.1111/add.15745>
- Official Statistics of Finland. (2022). In *Population structure [online publication]*. Helsinki: Statistics Finland. <https://stat.fi/en/statistics/vaerak>
- Oksanen, A., Hagfors, H., Vuorinen, I., & Savolainen, I. (2022). Longitudinal perspective on cryptocurrency trading and increased gambling problems: A 3 wave national survey study. *Public Health*, 213, 85–90. <https://doi.org/10.1016/j.puhe.2022.10.002>
- Oksanen, A., Mantere, E., Vuorinen, I., & Savolainen, I. (2022). Gambling and online trading: Emerging risks of real-time stock and cryptocurrency trading platforms. *Public Health*, 205, 72–78. <https://doi.org/10.1016/j.puhe.2022.01.027>
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications. <http://ebookcentral.proquest.com/lib/tampere/detail.action?docID=4773318>.
- Ryan, R. M., & Deci, E. L. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *The American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Salonen, A., Lind, K., Hagfors, H., Castrén, S., & Kontto, J. (2020). *Rahapelaaminen, peliongelmat ja rahapelaamiseen liittyvät asenteet ja mielipiteet vuosina 2007–2019: Suomalaisten rahapelaaminen 2019* (Report No. 18/2020). THL. <http://urn.fi/URN:ISBN:978-952-343-594-0>.
- Schellenberg, B. J. I., McGrath, D. S., & Dechant, K. (2016). The Gambling Motives Questionnaire financial: Factor structure, measurement invariance, and relationships with gambling behaviour. *International Gambling Studies*, 16(1), 1–16. <https://doi.org/10.1080/14459795.2015.1088559>
- Stewart, S. H., & Zack, M. (2008). Development and psychometric evaluation of a three-dimensional Gambling Motives Questionnaire. *Addiction*, 103(7), 1110–1117. <https://doi.org/10.1111/j.1360-0443.2008.02235.x>
- Sundqvist, K., Jonsson, J., & Wennberg, P. (2016). Gambling motives in a representative Swedish Sample of Risk Gamblers. *Journal of Gambling Studies*, 32(4), 1231–1241. <https://doi.org/10.1007/s10899-016-9607-9>
- Tabri, N., Salmon, M. M., & Wohl, M. J. A. (2022). Advancing the pathways model: Financially focused self-concept and erroneous beliefs as core psychopathologies in disordered gambling. *Journal of Gambling Studies*. <https://doi.org/10.1007/s10899-022-10105-x>
- Tabri, N., & Wohl, M. J. A. (2021). Financially focused self-concept in disordered gambling. *Current Addiction Reports*, 8(1), 57–63. <https://doi.org/10.1007/s40429-021-00360-0>
- Tabri, N., Xuereb, S., Cringle, N., & Clark, L. (2022). Associations between financial gambling motives, gambling frequency and level of problem gambling: A meta-analytic review. *Addiction*, 117(3), 559–569. <https://doi.org/10.1111/add.15642>
- Vasteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263–280. <https://doi.org/10.1037/A0032359>
- Verstuyf, J., Patrick, H., Vansteenkiste, M., & Teixeira, P. J. (2012). Motivational dynamics of eating regulation: A self-determination theory perspective. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 21. <https://doi.org/10.1186/1479-5868-9-21>
- Volberg, R. A., Williams, R. J., Stanek, E. J., Houpt, A., Zorn, M., & Rodriguez-Monguió, R. (2017). *Gambling and problem gambling in Massachusetts: Results of a baseline population survey*. Amherst, MA: School of Public Health and Health Sciences, University of Massachusetts Amherst. www.umass.edu/seigma.
- Volberg, R. A., Williams, R. J., Stanek, E. J., Houpt, A., Zorn, M., & Rodriguez-Monguió, R. (2015). *Gambling and problem gambling in Massachusetts: Results of a baseline population survey*. Amherst, MA: School of Public Health and Health Sciences, University of Massachusetts, Amherst.
- Vuorinen, I., Savolainen, I., Hagfors, H., & Oksanen, A. (2022). Basic psychological needs in gambling and gaming problems. *Addictive Behaviors Reports*, 16, Article 100445. <https://doi.org/10.1016/j.abrep.2022.100445>
- Wardle, H., Moody, A., Spence, S., Orford, J., Volberg, R., Jotangia, D., ... Dobbie, F. (2011). *British gambling prevalence survey 2010*. Prepared for: The Gambling Commission. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/243515/9780108509636.pdf.
- Weiss, T., & Schiele, S. (2013). Virtual worlds in competitive contexts: Analyzing eSports consumer needs. *Electronic Markets*, 23(4), 307–316. <https://doi.org/10.1007/s12525-013-0127-5>
- Williams, R. J., Hann, R., Schopflocher, D., West, B., McLaughlin, P., ... Flexhaug, T. (2015). *Quinte longitudinal study of gambling and problem gambling*. Report prepared for the Ontario Problem Gambling Research Centre. <http://hdl.handle.net/10133/3641>.
- Williams, R. J., Pekow, P., Volberg, R. A., Stanek, E. J., Zorn, M., & Houpt, A. (2017). *Impacts of gambling in Massachusetts: Results of a baseline online panel survey (BOPS)*. University of Massachusetts Amherst, School of Public Health and Health Sciences. https://massgaming.com/wp-content/uploads/Impacts-of-Gambling-in-Massachusetts-Results-of-a-Baseline-Online-Panel-Survey-BOPS_1.10.2017_Report.pdf.
- Wood, R. T. A., & Griffiths, M. D. (2007). A qualitative investigation of problem gambling as an escape-based coping strategy. *Psychology & Psychotherapy: Theory, Research & Practice*, 80(1), 107–125. <https://doi.org/10.1348/147608306X107881>
- Young, M., & Stevens, M. (2009). Player preferences and social harm: An analysis of the relationships between player characteristics, gambling modes, and problem gambling. *International Journal of Mental Health & Addiction*, 7(1), 262–279. <https://doi.org/10.1007/s11469-008-9185-x>