Mindfulness and Impulsive Urgency are Related but Not Interacting Predictors of Disordered Gambling

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Abstract: Research suggests that emotion regulation problems are involved in disordered gambling. A cross-sectional correlational study of 296 Australian community gamblers investigated trait mindfulness as a protective factor for emotionally impulsive gamblers. Moderated regression revealed that gender, and positive and negative urgency predicted problem gambling and gambling frequency. Mindfulness did not moderate the urgency/problem gambling or urgency/gambling frequency pathways. While causal inferences cannot be inferred, we suggest that the inability to regulate extreme positive mood states is significantly involved in disordered gambling. The role of mindfulness in these processes remains unclear and requires further research using multidimensional measures of mindfulness.

Keywords: Mindfulness, Impulsivity, Negative Urgency, Positive Urgency, Disordered Gambling, Moderation.

Introduction

Problem gambling has been recognised as a significant public health concern in Australia. Over 80% of Australian adults engage in gambling, and approximately 7.2% experience significant problems with gambling (Queensland Government Statistician's Office, 2018). Problem gambling is a subclinical condition where an individual's gambling behaviours cause significant negative consequences (Gainsbury et al., 2014). It has been found that impulsivity, particularly impulsive urgency, is a strong predictor of gambling frequency and problem gambling (Blain et al., 2015; Howe et al., 2019).

Impulsivity and Impulsive Urgency

Impulsivity

Impulsivity is a multidimensional construct. Whiteside and Lynam (2001) identified a five factor model (FFM; McCrae & Costa, 1990) including; (1) Negative Urgency and (2) Positive Urgency, both defined as a disposition to act rashly or impulsively in response to either negative or positive affect; (3) [lack of] Perseverance, or difficulties seeing tasks through to completion; (4) [lack of] Premeditation, or acting before thinking, or not considering consequences of actions; and (5) Sensation Seeking, or seeking out novel, exciting, or risky experiences. Of these five facets research has identified positive and negative urgency as the strongest predictors of problem gambling (Blain et al., 2015)

Impulsive Urgency

Positive and negative urgency refer to the tendency to engage in impulsive behaviour in response to positive or negative mood states (Cyders & Smith, 2007; Cyders et al, 2008). Under heightened emotional conditions, impulsively urgent individuals are more likely to engage in problematic gambling than at other times (Blain et al., 2015). For example, Velotti and Rogier (2021) found that disordered gambling is linked to failures in regulating extreme positive emotions. The ability to regulate or minimise these emotion-based impulses may enable the individual to reduce their problem gambling behaviour. As such, we propose that mindfulness, the awareness that results from purposely paying attention in a particular way, in the present moment, and non-judgementally (Kabat-Zinn, 1994; Tomlinson et al., 2018), could be beneficial as a moderator or protective factor for this impulsively urgent gambling pathway. Supporting this are previous findings where mindfulness and impulsivity were found to have overlapping elements that might interact to influence gambling. For example, Murphy and MacKillop (2012) found that high impulsive urgency was related to lower levels of the four facets of mindfulness.

There is also considerable research demonstrating a relationship between mindfulness and gambling. For example, de Lisle, Dowling and

Allen (2012) found that mindfulness-based therapy for problem gambling may help to promote acceptance of distressing thoughts and emotions. Haw (2017) also provided support for mindfulness-based interventions in the treatment of problem gambling.

Aims and Objectives

There is a lack of research examining impulsive urgency and dispositional mindfulness in relation to problem gambling. The aim of the current study is to address this by examining the moderating impact of mindfulness as a protective factor on the impulsive urgency/problem gambling pathway.

The first hypothesis was that negative urgency, positive urgency, and mindfulness would be significant predictors of gambling problems and gambling frequency.

The second hypothesis was that mindfulness would moderate the relationship between impulsive urgency and problem gambling, and between impulsive urgency and gambling frequency, such that higher levels of mindfulness would reduce the strength of these relationships.

The third hypothesis was that the proposed moderation effects would be stronger for those aged 26 and over. Research suggests that people 25 and under have developing neural networks, and that the frontal cortical and subcortical neurodevelopment occurring during adolescence and early adulthood promotes trait-behaviour impulsivity and an increased vulnerability to addictive behaviours such as problematic and pathological gambling (Chambers & Potenza, 2003; Ripke et al., 2012; Whelan & McHugh, 2009).

Method

Participants

A total of 339 participants were recruited through convenience sampling, and all gave informed consent (Table 1). They were recruited through Prolific, a paid online survey distribution platform that uses a pre-screening process to find specific representative samples. After removing 43 cases for missing data, 296 participants who had gambled in the past 6 months were included; 156 males (52.7%) and 140 females (47.3%), aged 18 to 73 years ($M = 34.40$, $SD = 12.14$).

Table 1

Demographic Characteristics of the sample (*N* = 296)

Demographic	Male[a]		Female[b]		Total[c]	
	n	(%)	*n*	(%)	*N*	(%)
Nationality						
Australian	61	(20.6)	63	(21.3)	124	(41.9)
Non-Australian	95	(32.1)	77	(26.0)	172	(58.1)
Relationship Status						
Single	76	(25.6)	62	(21.0)	138	(46.6)
In a Relationship	4	(1.4)	6	(2.0)	10	(3.4)
De Facto	23	(7.8)	20	(6.7)	43	(14.5)
Married	48	(16.2)	43	(14.5)	91	(30.7)
Divorced/Separated	5	(1.7)	7	(2.4)	12	(4.1)
Widowed	0	(0.0)	2	(0.7)	2	(0.7)
Highest Level of Education						
Year 10 or equivalent	7	(2.4)	10	(3.3)	17	(5.7)
Year 12 or equivalent	29	(9.8)	28	(9.5)	57	(19.3)
TAFE[d], Apprenticeship, or Diploma[e]	27	(9.1)	16	(5.4)	43	(14.5)
Undergraduate Bachelor's Degree	71	(24.0)	67	(22.6)	138	(46.6)
Postgraduate Degree (Masters/PhD)	22	(7.4)	19	(6.5)	41	(13.9)
Employment Status						
Employed Full Time	105	(35.5)	68	(22.9)	173	(58.4)
Employed Part Time	18	(6.1)	37	(12.5)	55	(18.6)
Unemployed	11	(3.7)	14	(4.7)	25	(8.4)
Retired	6	(2.0)	2	(0.7)	8	(2.7)
Student	16	(5.4)	19	(6.5)	35	(11.9)

Notes. [a] *n = 156,* [b] *n = 140,* [c] *N = 296*, [d] TAFE (Technical and Further Education) is a vocational education pathway after high school, [e] Diploma (2 year degree after high school).

Materials and Measures

The Mindfulness Attention Awareness Scale (MAAS). The MAAS is a 15-item scale designed to assess dispositional trait mindfulness by measuring the frequency of mindful states in day-to-day life (Brown & Ryan, 2003). This scale showed good reliability in the current study (α = .89).

The UPPS-P Impulsive Behaviour Scale. The UPPS-P is a 59-item scale designed to asses five distinct personality pathways that lead to impulsive behaviour (Lynam et al., 2006). Cronbach's alphas in the current study ranged from .82 to .94. We analysed Negative Urgency and Positive Urgency items only, and combined them into a scale of Urgency (α = .94). There is debate in the literature as to whether urgency should be unitary or separated by valence (Blain et al., 2015).

The Gambling Frequency Scale (GFS). The GFS is a 14-item self-report scale designed to measure gambling frequency in the Australian context which has been adapted from the South Oaks Gambling Screen (Lesieur & Blume, 1987, 1993). This scale showed good reliability in the current study (α = .87).

The Problem Gambling Severity Index (PGSI). The PGSI is a 9-item self-report scale designed to screen problem gambling, based on DSM IV-TR criteria of gambling disorder retrospective over the past 12-months (Ferris & Wynne, 2001; α = .93).

Procedure and Design

Upon receiving university ethics approval, participants completed the online questionnaire through Qualtrics, and data were analysed with IBM SPSS 25 and Hayes' (2019) PROCESS macro for moderation analysis. A cross-sectional correlational design and simple moderation analysis were used (Figure 1). Two dependant variables (PGSI score and GFS score) and three independent variables (Urgency, Positive Urgency, and Negative Urgency) were used in six moderation analyses with mindfulness as a moderator variable.

Figure 1

A Simple Moderation Model as a Conceptual Diagram
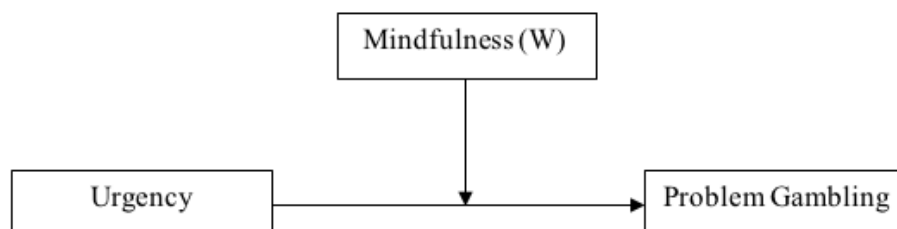
Results

Assumption Testing

Square root transformations were computed for both PGSI scores and GFS scores, and Log10 transformation was done for Positive Urgency to assist with normality (Tabachnick & Fidell, 2013). Following the transformations, histogram and Q-Q plots for Positive Urgency score appeared normal, but those for GFS scores appeared to still be moderately positively skewed, and PGSI score remained *severely* positively skewed. No outliers were recognised, and all other assumptions (independent errors, multicollinearity, residuals) were met.

Descriptive Statistics

Descriptive statistics and *t*-tests by gender are presented in Table 2.

Table 2

Gender Differences in Test Scores

Test	*Mean*	*SD*	*t*	*Sig.* (2-tailed)
MAAS			3.450	.001***
Male	59.14	12.05		
Female	54.22	12.47		
GFS			3.149	.002**
Male	26.25	9.43		
Female	23.09	7.80		
PGSI			2.476	.014*
Male	2.74	4.72		
Female	1.58	3.31		
Positive Urgency (UPPS-P)			1.003	.317
Male	25.18	8.21		
Female	24.18	8.96		
Negative Urgency (UPPS-P)			−2.512	.013*
Male	26.78	6.70		
Female	28.86	7.51		
Urgency Total (UPPS-P)			−0.631	.528
Male	51.96	13.93		
Female	53.03	15.35		

Note. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$; $df = 294$

Correlations

A series of partial correlation coefficients are presented in Table 3. Gender was the only demographic variable that was found to be related to gambling problems or gambling frequency and was controlled for in the regression analyses.

Table 3

Partial Correlations Controlling for Gender

Test	GFS	PGSI	MAAS	Negative Urgency	Positive Urgency	Urgency Total
	r	r	r	r	r	r
GFS	1	.669***	−.124*	.272***	.335***	.344***
PGSI		1	−.214***	.376***	.387***	.421***
MAAS			1	−.603***	−.566***	−.615***
Negative Urgency				1	.742***	.919***
Positive Urgency					1	.938***
Urgency Total						1

Note. *$p < .05$, **$p < .01$, ***$p < .001$; Sig. (2-tailed).*

Multiple Regression Analyses

Regression models indicated that Negative Urgency, Positive Urgency, and MAAS scores accounted for a significant 16.9% of the variability in PGSI Scores, $F(3, 292) = 19.76$, $p < .001$. Negative Urgency, Positive Urgency, and MAAS Scores also accounted for a significant 13.2% of the variability in GFS Scores, $F(3, 292) = 14.78$, $p < .001$.

Table 4

Prediction of Problem Gambling (PGSI) and Gambling Frequency (GFS) from Negative and Positive Urgency Subscores (UPPS-SF) and Mindfulness Attention Awareness Scale (MAAS) Scores (N = 296)

Model	Unstandardised regression coefficient *B* [95% CI]	Standardised regression coefficient β	Semi-partial correlations (sr^2)
PGSI Scores			
Negative Urgency	.03 [.003, .057] *	.18	.02
Positive Urgency	2.52 [1.288, 3.742] ***	.32	.05
MAAS Scores	.01 [–.003, .023]	.10	.01
GFS Scores			
Negative Urgency	.01 [–.013, .026]	.06	.00
Positive Urgency	2.18 [1.289, 3.068] ***	.39	.07
MAAS Scores	.01 [.001, .020] *	.16	.02

Notes. CI = confidence interval; *p < .05, **p < .01, ***p < .001

Moderation Analyses

Moderation analyses with gender as a covariate are presented in Table 4. There were no significant moderation effects, as zero was within the bootstrapped 95% confidence intervals of the interaction term (Field, 2013). There were no moderation effects for either the 26 and older or the 25 and younger age groups.

Table 5

Moderated Regression Results for each Model

Model	B	t	Sig.	95% CI
Negative Urgency × MAAS Score; PGSI Score				
Negative Urgency	.06	$t = 5.71$	$p < .001$***	
MAAS Score	.00	$t = .26$	$p = .792$	
Interaction	−.00	$t = -.50$	$p = .617$	[−.0017, .0010]
Gender	−.46	$t = -3.55$	$p < .001$***	
Positive Urgency × MAAS Score; PGSI Score				
Positive Urgency	3.05	$t = 5.88$	$p < .001$***	
MAAS Score	.00	$t = .04$	$p = .968$	
Interaction	−.03	$t = -.99$	$p = .322$	[−.1027, .0338]
Gender	−.27	$t = -2.06$	$p < .01$**	
Urgency Total × MAAS Score; PGSI Score				
Urgency Total	.04	$t = 6.77$	$p < .001$***	
MAAS Score	.01	$t = 1.02$	$p = .307$	
Interaction	−.00	$t = -.37$	$p = .712$	[−.0008, .0005]
Gender	−.34	$t = -2.68$	$p < .01$**	
Negative Urgency × MAAS Score; GFS Score				
Negative Urgency	.04	$t = 4.38$	$p < .001$***	
MAAS Score	.00	$t = .83$	$p = .406$	
Interaction	−.00	$t = -.61$	$p = .543$	[−.0013, .0007]
Gender	−.36	$t = -3.82$	$p < .001$***	
Positive Urgency × MAAS Score; GFS Score				
Positive Urgency	2.14	$t = 5.74$	$p < .001$***	
MAAS Score	.01	$t = 1.35$	$p = .178$	
Interaction	−.02	$t = -.922$	$p = .357$	[−.0720, .0261]
Gender	−.23	$t = -2.45$	$p < .05$*	
Urgency Total × MAAS Score; GFS Score				
Urgency Total	.02	$t = 6.04$	$p < .001$***	
MAAS Score	.01	$t = 1.93$	$p = .054$	
Interaction	−.00	$t = -.59$	$p = .557$	[−.0006, .0003]
Gender	−.29	$t = -3.10$	$p < .01$**	

Note. *$p < .05$, **$p < .01$, ***$p <.001$

Further Testing

Testing alternative causal models in moderation and mediation is essential (Fiedler et al., 2018). The mediated indirect paths from urgency to mindfulness to gambling were further tested with gender controlled. No indirect effects were found, as zero was in the 95% CI for all six models: Negative Urgency to GFS [-.0148; .0060], Positive Urgency to GFS [-.7647; .1484], Urgency Total to GFS [-.0101; .0001], Negative Urgency to PGSI [-.0155; .0128], Positive Urgency to PGSI [-.5579; .5238], Urgency Total to PGSI [-.0106; .0029].

Discussion

As expected, impulsive urgency predicted both gambling measures. Contrary to predictions, mindfulness did not reduce the strength of the relationship between urgency and problem gambling, or that between urgency and gambling frequency.

Model Testing

These findings reinforce the notion that failures in regulating positive emotions are significantly involved in disordered gambling (Cyders et al., 2014; Velotti & Rogier, 2021). Similar to previous studies, there were significant but weak correlations between mindfulness and problem gambling, and between mindfulness and gambling frequency, and mindfulness predicted gambling frequency (Bishop et al., 2004; de Lisle et al., 2012).

The interaction effects between urgency and mindfulness for all moderation models were not significant. This suggests that mindfulness and urgency may lead to problem gambling via two separate pathways which do not interact. For example, urgency is part of Blaszczynski and Nower's (2002) antisocial/impulsivist gambler pathway, while mindfulness may be part of the emotionally vulnerable pathway (Bishop et al., 2004; Williams & Grisham, 2012; Yao et al., 2017). As such, the two variables may contribute independently to problem gambling. The mediation models tested were also nonsignificant, supporting this argument.

Alternatively, and more likely, is that urgency and mindfulness partially overlap and share variance in gambling, but without interacting. This explanation is supported by the reduced effect of mindfulness observed when urgency was included in the regression analyses, and the strong relationships between mindfulness and urgency. Similarly, Murphy and MacKillop (2012) concluded that the role of mindfulness in alcohol misuse was a function of impulsivity. It is also worth noting that this study focused on dispositional trait mindfulness; that is, individual differences in receptive awareness of, and attention to, the present. It may be that other aspects of mindfulness influence impulsivity and gambling differently.

It was also hypothesized that mindfulness would successfully moderate the relationship between urgency and problem gambling for

individuals above the age of 26 due to matured neural networks, and evidence from temporal monetary discounting studies (Ripke et al., 2012; Whelan & McHugh, 2009). The fact that mindfulness did not moderate the relationship between urgency and problem gambling for either age group provides additional support to the idea that mindfulness and urgency seem to operate as two related but not interactive predictors of problem gambling. Moreover, these results suggest that the urgency displayed in problem gambling is a trait-like construct (as opposed to state-like) that is independent of age and constant across time (Lai et al., 2011). These claims require longitudinal testing to evaluate.

Limitations

As this study utilised a cross-sectional correlational design, causal inferences cannot be made. The current community sample cannot be generalised to disordered gambling. The outcome measures were also positively skewed. The current study focused on impulsive urgency rather than all impulsivity dimensions, and measured mindfulness as receptive awareness.

Implications and Recommendations

Our results suggest that the inability to regulate extreme positive mood states is significantly involved in problem gambling. This is supported by Howe et al. (2019) who argue that when treating problem gamblers, psychologists and counsellors should concentrate on reducing or better controlling impulsive urgency. Our interpretation of the models tested suggests that the role of mindfulness in gambling may be in part a function of impulsive urgency. Further investigation using multidimensional measures of mindfulness is needed.

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No conflicts to declare.

Availability of data and material
On request from corresponding author.

Author's contributions
Camilla, Peter and Keis; study design, data collection, data analysis, write up. Jessica; data analysis, write up.

Ethics and informed consent
Ethics approval granted by the Victoria University Ethics Committee. The current study only involved adult subjects (+18 years old) and informed consent was obtained in all cases.

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