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The relative contribution of metacognitions and attentional control to the severity of gambling in problem gamblers

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ABSTRACT

The present study explored the relationship between metacognitions, attentional control, and the severity of gambling in problem gamblers. One hundred and twenty six problem gamblers completed the Depression Anxiety Stress Scales 21, the Meta-Cognitions Questionnaire 30, the Attentional Control Scale, and the Problem Gambling Severity Index. Results revealed that negative affect, four out of five metacognitions factors (positive beliefs about worry, negative beliefs about thoughts concerning danger and uncontrollability, cognitive confidence and beliefs about the need to control thoughts), and all attentional control factors (focusing, shifting and flexible control of thought) were correlated, in the predicted directions, with the severity of gambling. The same metacognitions were also found to be correlated, in the predicted directions, with attention focusing, however only negative beliefs about thoughts concerning danger and uncontrollability and cognitive confidence were found to be correlated with attention shifting and flexible control of thought. A hierarchical regression analysis showed that beliefs about the need to control thoughts were the only predictor of the severity of gambling controlling for negative affect. Overall these findings support the hypotheses and are consistent with the metacognitive model of psychological dysfunction. The implications of these findings are discussed.

1. Introduction

Problem gambling has far reaching effects on numerous areas of an individual's life, including health, relationships with family and friends, and financial stability. Problem gambling has also been associated with alcoholism and drug use, depression and suicidal tendencies, and criminal behaviour (Morasco et al., 2006; Petry, Stinson, & Grant, 2005).

Cognitive behavioural therapy (CBT) has been used as the first line of treatment for problem gambling with a primary focus upon the restructuring of the content of thinking, such as tackling irrational beliefs and attitudes relating to gambling, which have been shown to be central in the development and maintenance of gambling problems (Gaboury & Ladouceur, 1989; Sharpe, 2002; Toneatto, 1999). There is evidence supporting CBT for problem gambling (Toneatto, 2005; Toneatto & Millar, 2004), however improvements appear to only occur in the short-term with relapse rates remaining high (Cowlishaw et al., 2012; Toneatto, Vettese, & Nguyen, 2007).

A fundamental limitation of CBT is its almost exclusive focus on targeting the content of thoughts at the detriment of not fully addressing other crucial components of cognition involved in the maintenance of psychological dysfunction. As Wells and Matthews (1996) state "cognitive theories of emotional disorder tend to consider only limited elements of cognition, and they often neglect broader aspects such as attention, regulation of cognition, levels of control of processing, and interactions between varieties of processing" (p.881).

Twenty years ago Wells and Matthews (1994) put forward the Self--Regulatory Executive Function (S-REF) model with the specific aim of addressing how multiple levels of cognition (i.e. metacognition) are involved in the development and maintenance of psychological dysfunction. Over the last two decades the S-REF model has led to the development of disorder-specific formulations and treatments for a wide array of psychological disorders and a psychological treatment, metacognitive therapy (MCT), which has been evaluated across a series of studies with preliminary results indicating superior outcomes to CBT (Normann, van Emmerik, & Nexhmedin, 2014; Wells, 2009, 2013).

In the S-REF model, Wells and Matthews (1994, 1996) argue that psychological dysfunction is associated with a style of thinking termed the Cognitive Attentional Syndrome (CAS) which consists of heightened self-focused attention, recyclical thinking patterns (rumination and worry), avoidance and thought suppression, and threat monitoring. The activation and persistence of the CAS in response to stress are dependent on maladaptive metacognitions. Metacognitions refer to the information individuals hold about their own cognition and internal states, and about coping strategies that impact on both (Wells, 2000; Wells & Matthews, 1994, 1996). Examples of information individuals hold about their own cognition may include beliefs concerning the significance of particular types of thoughts, e.g. "It is bad to think X" or "I

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need to control thought X". Examples of information individuals hold about coping strategies that impact on cognition may include beliefs such as "Worrying will help me get things sorted out in my mind" or "Ruminating will help me solve the problem".

2. Metacognitions in gambling

Metacognitions have been found to predict psychopathology generally (for a review see Wells, 2009, 2013) and also play a role in the severity of clinical presentations across addictive behaviours, including alcohol (Hoyer, Hacker, & Lindenmeyer, 2007; Spada & Wells, 2005, 2006, 2008, 2009, 2010; Spada, Caselli, & Wells, 2013; Spada, Moneta, & Wells, 2007; Spada, Zandvoort, & Wells, 2007), Internet (Spada, Langston, Nikčević, & Moneta, 2008; Spada, Mohiyeddini, & Wells, 2008) and nicotine (Nikčević & Spada, 2008, 2010; Spada et al., 2007; Spada, Nikčević, Moneta, & Wells, 2007) use.

More recently, a preliminary study undertaken by Lindberg and colleagues (Lindberg, Fernie, & Spada, 2011) in a community sample found that metacognitions (negative beliefs about thoughts concerning uncontrollability and danger, and beliefs about the need to control thoughts) predicted gambling controlling for negative affect. These metacognitions refer to beliefs that certain thoughts should not be experienced, because of their negative content, and will lead to negative consequences if they are not controlled. The authors argued that the presence of such beliefs may increase the likelihood of gambling as a temporary means of achieving cognitive-affective regulation.

3. Attentional control and its possible role in gambling

Attentional control can be conceptualized as the ability to control attention in inhibiting a dominant response in favour of a less accessible, subdominant response that may be more functional (Derryberry & Reed, 2002; Rothbart & Bates, 1998). Derryberry and Reed (2002) have suggested three typologies of ability to voluntarily control attention: (1) attention focusing (e.g. "When I am working hard on something, I still get distracted by events around me"); (2) attention shifting (e.g. "I can quickly switch from one task to another"); and (3) flexible control of thought (e.g. "It takes me a while to get really involved in a new task'). Evidence has demonstrated that high levels of attentional control enable the modulation of reflexive emotional responses, whereas low levels of attentional control increase vulnerability to acting on dysfunctional emotional responses (Derryberry & Reed, 2002).

According to the S-REF model the activation and persistence of the CAS under conditions of stress will result in a reduction of the cognitive resources available to control attention, in turn influencing the efficiency of processing and belief change (Wells, 2009). Moreover, it is possible

that metacognitions may in part bias the overall ability to control attention. In support of this view, Spada, Georgiou, and Wells (2010) found that attention shifting and focusing negatively correlate with metacognitions (negative beliefs about thoughts concerning uncontrollability and danger and beliefs about the need to control thoughts). Research has also shown the presence of attentional bias towards gambling related stimuli in problem gamblers (for review see Hønsi, Mentzoni, Molde, & Pallesen, 2013). This includes both initial orienting towards gambling stimuli as well as delayed disengagement from stimuli (Brevers et al., 2011; Wolfling et al., 2011) which may be interpreted as deficits in attentional control.

4. Aims of the current study

To date, no study has investigated the association between attentional control and gambling. In addition, the only study which investigated the relationship between metacognitions and gambling (Lindberg et al., 2011) employed a convenience sample of participants. On the basis of the findings discussed we decided to test the following hypotheses in a sample of problem gamblers: (1) metacognitions (negative beliefs about thoughts concerning uncontrollability and danger, cognitive confidence, and beliefs about the need to control thoughts) will be positively correlated with severity of gambling; (2) attentional control will be negatively correlated with severity of gambling; (3) metacognitions will be negatively correlated with attentional control; and (4) metacognitions and attentional control will predict severity of gambling when controlling for negative affect. Negative affect was included as a control variable as it has been shown to correlate highly with problem gambling (Petry et al., 2005).

5. Method

5.1. Participants and procedure

The sample comprised of 126 participants (111 men) who reported being regular gamblers and scored above 8 on the Problem Gambling Severity Index (PGSI; Wynne, 2003). Inclusion criteria were: (1) 18 years of age or above; (2) consenting to the study; and (3) understanding spoken and written English. The mean age of the sample was 33.5 years (SD = 10.9) and ranged from 19 to 70 years. The mean score on the PGSI was 10.3 (SD = 2.4) and ranged from 9 to 18. The sample was 88.9% White, 5.6% Asian, 1.6% Black, 1.6% Chinese, 1.6% Mixed and 0.8% from another non-specified background.

Ethics approval for the study was obtained from an institution of higher education in the UK. A web link directing potential participants to the study website was sent to registered members of various gambling organizations. A total of 317 individuals took part in the

Table 1
Means, standard deviations, ranges and Spearman rho inter-correlations of variables.

	X	SD	Range	MCQ-30-PBW	MCQ-30-NBT	MCQ-30-CC	MCQ-30-BNT	MCQ-30-CS	ACS-F	ACS-S	ACS-FCT	PGSI
1. DASS-21	9.8	7.5	0–30	0.35**	0.57**	0.20*	0.31**	0.27**	−0.38**	−0.30**	−0.34**	0.35**
2. MCQ-30-PBW	9.6	3.9	6–24	–	0.56**	0.21*	0.29**	0.25**	−0.26**	−0.13	−0.13	0.35**
3. MCQ-30-NBT	10.1	4.1	6–24	–	–	0.26**	0.46**	0.33**	−0.31**	−0.27**	−0.21*	0.37**
4. MCQ-30-CC	10.0	4.0	6–24	–	–	–	0.17	0.14	−0.23**	−0.19*	0.26**	0.18*
5. MCQ-30-BNCT	11.0	3.9	6–24	–	–	–	–	0.47**	−0.37**	−0.04	−0.17	0.42**
6. MCQ-30-CS	14.3	4.9	6–24	–	–	–	–	–	−0.10	0.11	0.13	0.08
7. ACS-F	24.0	4.5	11–35	–	–	–	–	–	–	0.44**	0.32**	−0.34**
8. ACS-S	18.3	3.6	8–28	–	–	–	–	–	–	–	0.52**	−0.22*
9. ACS-FCT	11.9	2.1	7–16	–	–	–	–	–	–	–	–	−0.26**

Note. n = 126. DASS-21 = Depression Anxiety and Stress Scales 21; MCQ-30-PBW = Metacognitions Questionnaire 30-Positive Beliefs about Worry; MCQ-30-NBT = Metacognitions Questionnaire 30-Negative Beliefs about Thoughts; MCQ-30-CC = Metacognitions Questionnaire 30-Cognitive Confidence; MCQ-30-BNCT = Metacognitions Questionnaire 30-Beliefs about the Need to Control Thoughts; MCQ-30-CS = Metacognitions Questionnaire 30-Cognitive Self-consciousness; ACS-F = Attentional Control Scale-Focusing; ACS-S = Attentional Control Scale-Shift; ACS-FCT = Attentional Control Scale-Flexible control of thought; PGSI = Problem Gambling Severity Index.

* p < .05.
** p < .01.

Table 2

Hierarchical multiple linear regression statistics with problem gambling severity as outcome variable and metacognitions and attentional control as predictor variables.

Predictor	R^2	β	t	p	95% confidence interval	
					LL	UL
Step 1						
DASS-21		0.45	5.60	.01	0.10	0.20
	0.20**					
Step 2						
DASS-21		0.23	2.20	.03	0.01	0.14
MCQ-30-PBW		0.04	0.45	.65	−0.08	0.13
MCQ-30-NBT		0.09	0.72	.48	−0.09	0.20
MCQ-30-CC		0.14	1.77	.08	−0.01	0.18
MCQ-30-BNCT		0.26	2.82	.01	0.05	0.28
	0.31**					
Step 3						
DASS-21		0.18	1.60	.11	−0.01	0.13
MCQ-30-PBW		0.04	0.46	.65	−0.08	0.13
MCQ-30-NBT		0.07	0.51	.61	−0.11	0.19
MCQ-30-CC		0.11	1.30	.20	−0.03	0.16
MCQ-30-BNCT		0.26	2.65	.01	0.04	0.28
AC-F		−0.09	−0.92	.36	−0.15	0.06
AC-S		−0.09	−0.94	.35	−0.20	0.07
AC-FCT		0.03	−0.28	.78	−0.26	0.19
	0.33					

Note. $n = 126$. DASS-21 = Depression Anxiety and Stress Scales 21; MCQ-30-PBW = Metacognitions Questionnaire 30-Positive Beliefs about Worry; MCQ-30-NBT = Metacognitions Questionnaire 30-Negative Beliefs about Thoughts; MCQ-30-CC = Metacognitions Questionnaire 30-Cognitive Confidence; MCQ-30-BNCT = Metacognitions Questionnaire 30-Beliefs about the Need to Control Thoughts; ACS-F = Attentional Control Scale-Focusing; ACS-S = Attentional Control Scale-Shift; ACS-FCT = Attentional Control Scale-Flexible control of thought.

 * $p < .05$.
 ** $p < .01$.

study. One hundred and seventy seven participants completed the study with 126 selected for the final analysis (score on the PGSI greater than 8). The first page of the study website explained the purpose of the study: "To investigate the relationship between negative affect, thinking styles, and gambling". Participants were then directed, if consenting to participate in the study, to a second page containing basic demographic questions and the self-report instruments. On completion participants were asked to click on the "Submit" button. Once participants had clicked on "Submit", their data was forwarded to a generic postmaster account. This ensured that participants' responses were anonymous. A second submission from the same IP address was not allowed so as to avoid multiple submissions from the same participant.

5.2. Self-report instruments

5.2.1. Depression Anxiety Stress Scales 21 (DASS-21; Crawford & Henry, 2003)

This self-report instrument assesses depression, anxiety and stress. It consists of three factors assessed by twenty one items in total. The three factors measure depression (e.g. "I felt that I had nothing to look forward to"), anxiety (e.g. "I felt scared without any good reason") and stress (e.g. "I was intolerant of anything that kept me from getting on with what I was doing"). Higher scores indicate higher levels of depression, anxiety and stress. The DASS-21 has been reported to have adequate psychometric properties (Crawford & Henry, 2003; Lovibond & Lovibond, 1995).

5.2.2. Meta-Cognitions Questionnaire 30 (MCQ-30; Wells & Cartwright-Hatton, 2004)

This self-report instrument assesses individual differences in metacognitions, judgments and monitoring tendencies. It consists of five factors assessed by 30 items in total. The five factors measure the following dimensions of metacognition: (1) positive beliefs about

worry (e.g. "worrying helps me cope"); (2) negative beliefs about thoughts concerning uncontrollability and danger (e.g. "when I start worrying I cannot stop"); (3) cognitive confidence (e.g. "my memory can mislead me at times"); (4) beliefs about the need to control thoughts (e.g. "not being able to control my thoughts is a sign of weakness"); and (5) cognitive self-consciousness (e.g. "I pay close attention to the way my mind works"). Higher scores indicate higher levels of maladaptive metacognitions. The MCQ-30 possesses good internal consistency and convergent validity, as well as acceptable test–retest reliability (Spada et al., 2008; Wells & Cartwright-Hatton, 2004).

5.2.3. Attentional Control Scale (ACS; Derryberry & Reed, 2002)

This self-report instrument assesses the ability to voluntarily control attention. It consists of three factors assessed by 20 items in total. The three factors measure attention focusing (e.g. "My concentration is good even if there is music in the room around me"), attention shifting (e.g. "After being distracted or interrupted, I can easily shift my attention back to what I was doing"), and flexible control of thought (e.g. "I can become interested in a new topic very quickly if I need to"). Higher scores predict more resistance to interference in Stroop-like spatial conflict tasks, greater disengagement from threat stimuli among highly anxious people (Derryberry & Reed, 2002) and greater activation in brain areas related to executive functioning while looking at fear-related pictures (Mathews, Yiend, & Lawrence, 2004). The ACS possesses good internal reliability and predictive utility (Derryberry & Reed, 2002; Judah, Grant, Mills, & Lechner, 2014).

5.2.4. Problem Gambling Severity Index based on the Canadian Problem Gambling Index (PGSI; Wynne, 2003)

This self-report instrument assesses the severity of gambling behaviour. It consists of a single factor assessed by nine items in total. Items cover problem gambling behaviour (loss of control, motivation, chasing and borrowing) and adverse consequences of gambling (problem recognition, personal consequences and social consequences). Higher scores indicate higher levels of gambling severity. Scores of 0 are taken to indicate a non-problem gambler, 1–2 a low-risk gambler, 3–7 a moderate risk gambler and 8 or above a problem gambler. The PGSI possesses strong reliability and validity (McMillen & Wenzel, 2006; Wynne, 2003).

6. Results

6.1. Data description

Descriptive statistics for all the study variables are presented in Table 1. An inspection of skewness coefficients and levels of significance on Kolmogorov–Smirnov tests indicated that several measures were not normally distributed. Spearman's rho correlations revealed that negative affect, four out of five metacognitions factors (positive beliefs about worry, negative beliefs about thoughts concerning danger and uncontrollability, cognitive confidence, and beliefs about the need to control thoughts) and all attentional control factors (focusing, shifting and flexible control of thought) were correlated, in the predicted directions, with severity of gambling. These same metacognitions were also found to be correlated, in the predicted directions, with attention focusing, however only negative beliefs about thoughts concerning danger and uncontrollability and cognitive confidence were found to be correlated with attention shifting and flexible control of thought.

6.2. Hierarchical regression analysis

In relation to the assumptions relevant to running a hierarchical regression analysis, no evidence of multicollinearity in the dataset was observed (no correlations greater than $r = 0.9$, no Tolerance Indexes below 0.10, and all Variance Inflation Factors of less than 10). Additionally, the Durbin–Watson test suggested that the assumption

of independent errors was tenable. Histograms and normality plots indicated that residuals were normally distributed and plots of the regression-standardized residuals against the regression standardized predicted values suggested that the assumptions of linearity and homoscedasticity were met.

To evaluate whether metacognitions and attentional control independently predicted the severity of gambling, a hierarchical regression analysis (see Table 2) was run with all variables found to be significant in the correlation analysis. Negative affect was entered on step 1, the four metacognitions factors were entered on step 2, and all three attention control factors were entered on step 3. The final equation showed that beliefs about the need to control thoughts were the only independent and significant predictor of severity of gambling.

7. Discussion

Overall, the results from this study support the hypotheses as well as previous findings by Lindberg et al. (2011) in that they show that metacognitions (in the form of beliefs about the need to control thoughts) predict the severity of gambling controlling for negative affect. This finding has: (1) greater potential clinical relevance than Lindberg et al. (2011) original study in that the sample being investigated is entirely constituted by problem gamblers; and (2) reiterates the crucial importance of beliefs about the need to control thoughts in predicting problematic gambling. Why should beliefs about the need to control thoughts be crucial in understanding problem gambling? The argument follows that already outlined by Lindberg et al. (2011). According to the S-REF model metacognitions are associated with the activation of particular thinking styles and strategies of mental control (the CAS) in response to negative thoughts and emotions. Beliefs about the need to control thoughts refer to beliefs that if certain negative thoughts/emotional states are experienced they may lead to negative consequences if not controlled. In the case of problem gamblers such inner experiences may be related to gambling urges, low mood or heightened anxiety. The problem gambler may thus engage in CAS-related activity as a means of achieving control over such unwanted inner experiences, leading to their exacerbation and the increasing likelihood on engaging in gambling as a means of retaining, albeit temporarily, a degree of mental control. This view would be in line with research which has shown how gambling may be driven by affective motivations, such as coping with negative internal states and moods (e.g. Stewart, Zack, Collins, Klein, & Fragopoulos, 2008). It also provides further support for studies which have identified specific metacognitions about the benefits of gambling in helping to achieve cognitive–affective regulation (Spada, Giustina, Rolandi, Fernie, & Caselli, 2014).

The findings from this study also broadly support the association between metacognitions and attentional control, and attentional control and severity of gambling however results suggest that beliefs held about the capability to resist distraction and prioritize attention (attention focusing) are subsumed by beliefs about the need to control thoughts in predicting severity of gambling. As argued by Spada et al. (2010) the measurement of attentional control on the ACS relates, fundamentally, to beliefs about executive control over attention, rather than an actual index of attention control, and can therefore be conceptualized as a form of metacognitive knowledge.

From a therapeutic perspective the present findings suggest that MCT (Wells, 2009) may be helpful in tackling problem gambling and possibly address areas not covered by CBT. MCT directly targets the modification of metacognitions with the aim of simultaneously introducing flexible and alternative ways of relating to mental events. A variety of strategies are used to accomplish metacognitive change, including re-structuring exercises and the facilitation of skills that promote the modification and interruption of CAS configurations (e.g. attention training and detached mindfulness).

This study has several limitations which will have to be addressed by future research. Firstly social desirability, self-report biases, context effects, and poor recall may have contributed to errors in self-report measurements. This is to an extent unavoidable as there are no objective or interview measures of metacognitions however in the case of attentional control a behavioural test (e.g. a spatial orienting task; Derryberry & Reed, 2002) could be employed. Secondly a cross-sectional design was adopted and this does not allow causal inferences. Thirdly the sample was almost exclusively of male gender and there was no control group. Fourthly there was no possibility to verify objectively whether the sample represented a typical problem gambler. Fifthly there could be time-dependent risk factors that were not considered and that may have had an effect of the aspects of metacognition identified. Finally, in view of the relatively nascent phase in which both CBT for problem gambling and MCT for addictive behaviours find themselves, cautiousness is recommended when interpreting the findings and their possible generalizability to treatment.

Prospective studies in samples suffering from higher levels of problem gambling or diagnosed with gambling disorder are needed to examine the independent influence of attentional control on severity of gambling. Research involving experimental manipulation of attentional control to test if its enhancement results in lower levels of gambling (whilst controlling for individual differences in metacognitions) may also prove valuable. Finally, examining whether changes in both metacognitions and attentional control occur during the process of treatment would be of interest.

Disclosures

We confirm that we have not conflicts of interest to disclose.

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