Personality, gambling motives and cognitive distortions in electronic gambling machine players

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ABSTRACT

This study examined gambling motives, distorted beliefs about gambling, and personality traits in a paid community sample of frequent electronic gambling machine (EGM) players from Manitoba, Canada. Participants completed the Problem Gambling Severity Index, the Gambling Motives Questionnaire, the Informational Biases Scale, and the NEO PI-R in group testing sessions. The Five Factor Model facets of Neuroticism, Extraversion, Agreeableness and Conscientiousness were divided into 'aspects' that align with self-regulation and the Behavioral Approach and Inhibition systems of revised Reinforcement Sensitivity Theory. Regression analysis found that problem gambling severity scores were independently predicted by older age, being female, having distorted gambling beliefs, and by gambling to win money and to cope with negative emotional states. Problem gambling scores were also correlated positively with Withdrawal (N) and Volatility (N), and negatively with Enthusiasm (E), Compliance (A), and Industriousness (C). Mediation tests found that low scores on the Industriousness facet of Conscientiousness were associated with increased problem gambling severity through an effect on the gambling to cope motive. Distorted beliefs about gambling also mediated low Industriousness, as well as high Withdrawal and Volatility. Poor self-regulation and avoidance motivation contribute to problem gambling among frequent EGM players through increased cognitive distortion and escapism.

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1. Personality, gambling motives and cognitive distortions in electronic gambling machine players

Access to legal gambling is a feature of modern life in many industrialized countries, with a small percentage of people who gamble excessively and who may experience financial and social harm (Williams, Volberg, & Stevens, 2012). Some forms of gambling may present high risk for negative impacts, and electronic gambling machines (EGM) have been more strongly implicated in problem gambling (Dowling, Smith, & Thomas, 2005) than bingo games (Moubarac, Shead, & Derevensky, 2010) or ticket lotteries (Thege & Hodgins, 2014). Likewise, some frequent gamblers may be more prone to negative effects than others, and problem gamblers have been well characterized in terms of their demographic and social risk factors (Hodgins et al., 2012). Problem gamblers also have different motives for gambling than nonproblem players (Stewart & Zack, 2008), and they rely more on misplaced illusions of control (Langer, 1975) that derive from heuristics like the

gambler's fallacy (Tversky & Kahneman, 1971) and hot hand fallacy (Gilovich, Vallone, & Tversky, 1985) which imply that random outcomes can be predicted.

In terms of personality, meta-analysis has found that problem gamblers score higher than nonproblem gamblers on traits reflecting Negative Affect, Disinhibition and Antagonism (MacLaren, Fugelsang, Harrigan, & Dixon, 2011) conceived within a hierarchical structural model (Markon, Krueger, & Watson, 2005). Such an integrative approach allows a reconciliation of different taxonomies derived from the lexical and biological traditions. This is an important issue because advances in the revised Reinforcement Sensitivity Theory of personality (rRST; Corr & McNaughton, 2008) have outstripped the psychometric tools available to quantify its constructs. It has long been argued (e.g. Smillie, Pickering, & Jackson, 2006) that traits like Extraversion and Neuroticism have counterparts in the Behavioral Activation System (BAS) and Fight/Flight/Freeze or Behavioral Inhibition System (FFFS/BIS), and these domains do contain facets that appear to map onto these joint subsystems (Corr, DeYoung, & McNaughton, 2013). Indeed, factor analysis has found that Neuroticism facets may be grouped into a Withdrawal aspect reflecting the anxiety component of BIS, and a Volatility aspect representing the escape and defensive

attack functions of FFFS (DeYoung, Quilty, & Peterson, 2007). Extraversion may be likewise split into Enthusiasm, Assertiveness and Sensation Seeking aspects that correspond to the Reward, Drive and Sensation Seeking of the BIS/BAS scales (Quilty, DeYoung, Oakman, & Bagby, 2014). A different approach to improving measurement of rRST constructs has been to create new self-report questionnaires (e.g. Corr & Cooper, in prep.; Heym, Ferguson, & Lawrence, 2008; Jackson, 2009) but the scope of these instruments is rather limited, as is also the case with more popular measures of reward and threat sensitivity like the BIS/BAS scales (Carver & White, 1994) and the Sensitivity to Reward and Sensitivity to Punishment Questionnaire (SPSRQ; Torrubia, Ávila, Moltó, & Caseras, 2001). In the present study, we used aspects of Extraversion and Neuroticism from the NEO PI-R (Costa & McCrae, 1992) as operational definitions of rRST constructs. The advantage of this approach is that it allows aspects of Conscientiousness and Agreeableness that correspond to the Disinhibition and Antagonism domains to also be examined concurrently. This is important because the Conscientiousness domain has impulsivity facets (Whiteside & Lynam, 2001) that differ between problem and nonproblem gamblers (MacLaren et al., 2011).

The conceptual framework used to understand problem gamblers' personality traits is an important consideration because some findings appear difficult to reconcile with rRST. Risk taking and reward seeking are obvious features of excessive gambling, yet problem gamblers do not differ from nonproblem gamblers on Extraversion or Sensation seeking (MacLaren et al., 2011) and correlations between BAS and gambling have been mixed (e.g. Atkinson, Sharp, Schmitz, & Yaroslavsky, 2012; Loxton, Nguyen, Casey, & Dawe, 2008; MacLaren & Best, 2013; O'Connor, Stewart, & Watt, 2009). Even more puzzling is the positive correlation between Sensitivity to Punishment scores and frequency of playing EGMs (Balodis, Thomas, & Moore, 2014). We even found a positive correlation between BIS and problem gambling symptoms among EGM players (MacLaren, Fugelsang, Harrigan, & Dixon, 2012). Why there should be any positive relationship between fearfulness or anxiety and a proclivity to participate in this most harmful form of financial risk-taking has not been well explained.

One reason for temperamentally fearful and anxious gamblers' preference for EGMs might be their motivation for playing as a temporary distraction from other problems, with 'escape gambling' sustained by *negative* reinforcement (Stewart & Zack, 2008; Thomas, Allen, & Phillips, 2009). This would be a situation analogous to high Negative Affect increasing problem drinking through Coping-depression (Willem, Bijttebier, Claes, & Uytterhaegen, 2012), as measured by the Drinking Motives Questionnaire (Grant, Stewart, O'Connor, Blackwell & Conrod, 2007). Another possibility is that modern multi-line EGMs may be attractive to these gamblers because they are designed with the potential for large monetary rewards, while also giving the sense that risk of loss can be minimized. This is because players can adjust the size and number of simultaneous wagers per spin and this indirectly shifts the average magnitude (Haw, 2009) and frequency (Templeton, Dixon, Harrigan, & Fugelsang, 2014) of wins. Experienced EGM players know how to manipulate these outcomes (MacLaren, in press), and this might promote an illusion of control over their chances of turning a profit by increasing how often and how much they can win. However, exercising this control requires betting more money and the *payback percentage* programmed into an EGM (i.e. the average proportion of wagers that are returned to players as prizes) is always less than 100% and is mathematically independent of the frequency and size of wins (Harrigan, Dixon, MacLaren, Collins, & Fugelsang, 2011). Control over the reinforcement rate also allows players to avoid long losing streaks, which may further encourage heuristic decision-making (Harrigan, MacLaren, Brown, Dixon, & Livingstone, 2014). Cognitive theories of problem gambling

postulate a central role for such cognitive distortions (Blaszczynski & Nower, 2002; Ladouceur & Walker, 1996), and the design of modern multi-line EGMs seems aptly suited to capitalize on problem gamblers' susceptibility to illusions of control and the gambler's fallacy (Goodie & Fortune, 2013). In a large sample of frequent EGM players, we previously confirmed that problem gamblers were indeed more motivated to gamble as a way to escape negative emotional states than nonproblem players (MacLaren, Harrigan, & Dixon, 2012), and that they had more cognitive distortions about gambling (Dixon, Fugelsang, MacLaren, & Harrigan, 2012). The present study was aimed at identifying motivational and cognitive mechanisms through which basic personality dimensions may have indirect effects on the likelihood of problem gambling among frequent EGM players.

2. Method

2.1. Participants

The sample included 273 participants aged 18–68 years ($M = 34.0$, $SD = 11.2$). There were 146 women, 123 men, and 4 who did not disclose their sex and 5 who did not disclose their age. Volunteers were recruited from Brandon, Manitoba using an advertisement on a popular community internet site (www.eBrandon.ca). The ad offered $50 giftcards redeemable at stores in a local shopping mall for volunteers who were at least 18 years old, who were not in any form of treatment for problem gambling, and who "played VLTs at least twice a month for the past year". In Canada, the acronym 'VLT' refers to Video Lottery Terminals, which are government run slot machine games that are located in privately owned bars and licensed restaurants. The participants completed the questionnaires anonymously in group testing sessions with up to 40 participating at any time, after signing and returning an informed consent form.

2.2. Measurement instruments

2.2.1. Problem Gambling Severity Index

The 9-item PGSI was given as a module within the Canadian Problem Gambling Inventory (Ferris & Wynne, 2001). PGSI items were answered with a 4 point Likert scale (0 = never, 1 = sometimes, 2 = most of the time, 3 = always or almost always) and were summed to give a total score that could range from 0 to 27. PGSI scores greater than 8 are typically interpreted as indicating high likelihood that the respondent is a problem gambler. Inter-item reliability in the present sample was Cronbach's $\alpha = .91$.

2.2.2. Revised Neuroticism, Extraversion and Openness Personality Inventory

The NEO PI-R measures five factors of adult personality: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness, with each domain containing 6 facets (Costa & McCrae, 1992). The items are scored from 0 to 4 on a 5-point Likert scale (0 = strongly disagree, 1 = disagree, 2 = neutral, 3 = agree, 4 = strongly agree), and each facet score can range from 0 to 32. Following standard scoring rules for the NEO PI-R, facet scores were only included if at least 6 of the 8 items were answered, and no scores were included if a respondent failed to answer at least 180 of the 240 items. The NEO PI-R developers reported that its subscales are internally consistent, with Cronbach's α ranging from .70 to .82. Scores on the Openness domain were not analyzed because meta-analytic evidence has rejected the validity of that domain as a correlate of relevant clinical syndromes (Kotov, Gamez, Schmidt, & Watson, 2010; Samuel & Widiger, 2008), and because it taps general intelligence rather than being purely a dimension of personality (DeYoung, Quilty, Peterson, & Gray, 2014). Facet