Cognitive distortions, reward-related decision-making, and trait impulsivity in community gamblers: a structural equation model study

Magdalen Schluter[1] and David Hodgins[1]

1. Department of Psychology, University of Calgary, Calgary AB

Introduction

- Maladaptive reward-related decision making (RRDM), trait impulsivity, and cognitive distortions (CDs) are core features of problematic gambling and contribute to the etiology of gambling disorder.
- We are still expanding our understanding of the interplay between these processes and gambling severity.

Project Rationale

- Research has not yet examined simultaneous hypotheses of causal relationships between these variables and their contribution to problem gambling severity across a spectrum of gambling involvement.
- Trait impulsivity is dissociable from impulsive RRDM, including impulsive choice (the relative preference for small-immediate rewards over larger-delayed rewards) and risky choice (reward preferences under conditions of uncertainty).
- Impulsivity (trait and impulsive RRDM) confers a risk to the development of problem gambling.
- Impulsive RRDM is likely influenced by emotional processes, suggesting a critical role of affective and motivational aspects of impulsive traits.
- CDs may be a key mechanism by which impulsivity and increased gambling severity are associated.

Purpose: Examine the suitability of a model of the hypothesized relations between these variables and gambling severity in a community sample of individuals who gamble.

Hypotheses

A. A constellation of impulsivity traits would predict greater cognitive distortions, gambling severity and poorer performance on behavioral measures of RRDM.
B. Impaired RRDM processes would also predict greater cognitive distortions.
C. Distortions would, in turn, predict greater problem severity.

Methods

Sample

- 347 participants (53.6% female; M_{age} = 38.17) recruited through Amazon's Mechanical Turk (MTurk).

Measures:

- *Demographics Questionnaire:* Lab-developed questionnaire of general demographic information.
- *Gambling Participation Instrument (GPI):* Engagement across types of gambling activities that assesses the frequency, hours and money spent on each activity.
- *Problem Gambling Severity Index:* 9-item measure of gambling problem severity.
- *UPPS-P Impulsive Behaviour Scale:* Measure of impulsive personality traits across five subscales: negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking.
- *Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ):* Measure of responsiveness to reward and punishment.
- *Gambling Cognitions Inventory (GCI):* Measure of gambling-related cognitions related to skill/attitude and luck/chance.
- *5-Trial Adjusting Delay Discounting Task (DDT)* – Rapid measure of impulsive choice. Higher k values indicate greater impulsive choice.
- *Iowa Gambling Task (IGT)* – Behavioural measure of risky decision-making. Performance is measured as the difference between advantageous and disadvantageous choices.

Data Analytic Plan

- Primary methods: confirmatory factor analysis (CFA) and structural equation modeling (SEM).
- Robust standard errors with the Satorra-Bentler test statistic for the SEM were applied.
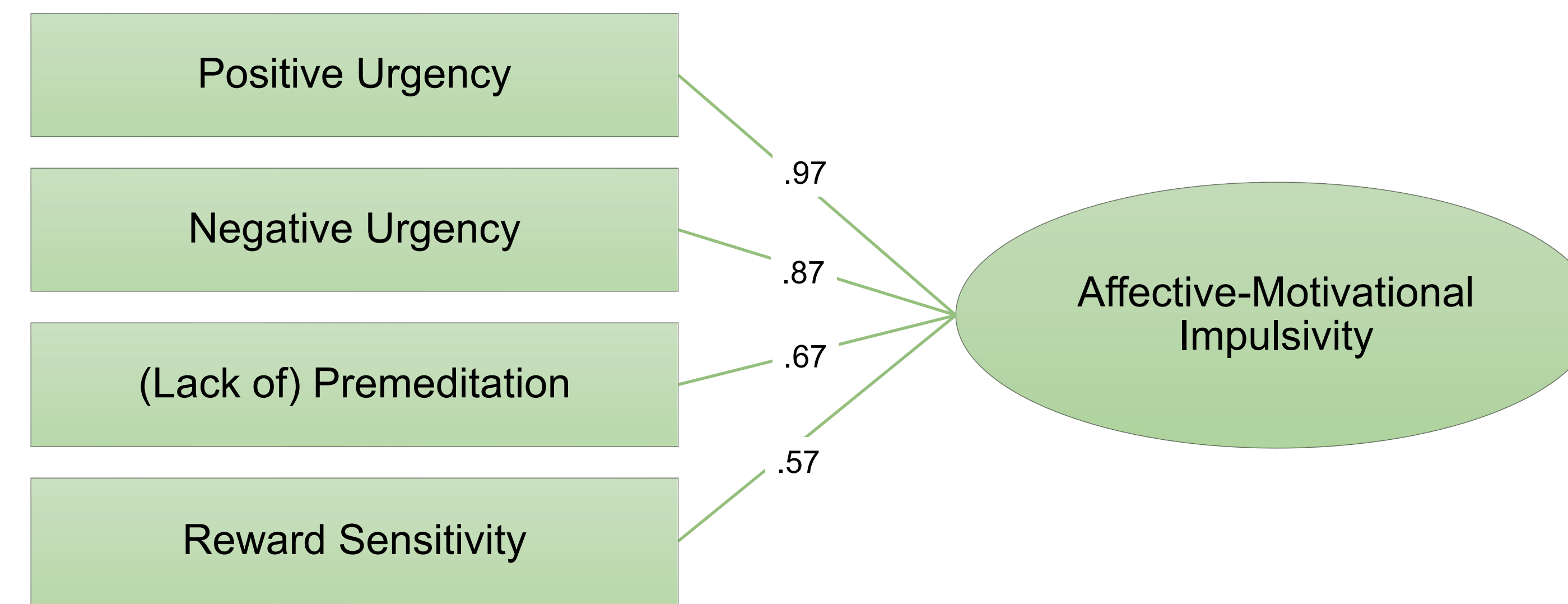
Figures

Figure 1. Results of the exploratory factor analysis with three sub-scales from the UPPS-P (positive urgency, negative urgency, and premeditation) and two SPSRQ subscales (reward sensitivity and punishment sensitivity) as indicators. The standardized coefficients are presented. R^2 = 0.95; Fit indices: χ^2 (6) = 746.47, p < .001; CFI= 1.00; RMSEA = .01; SRMR = .01.
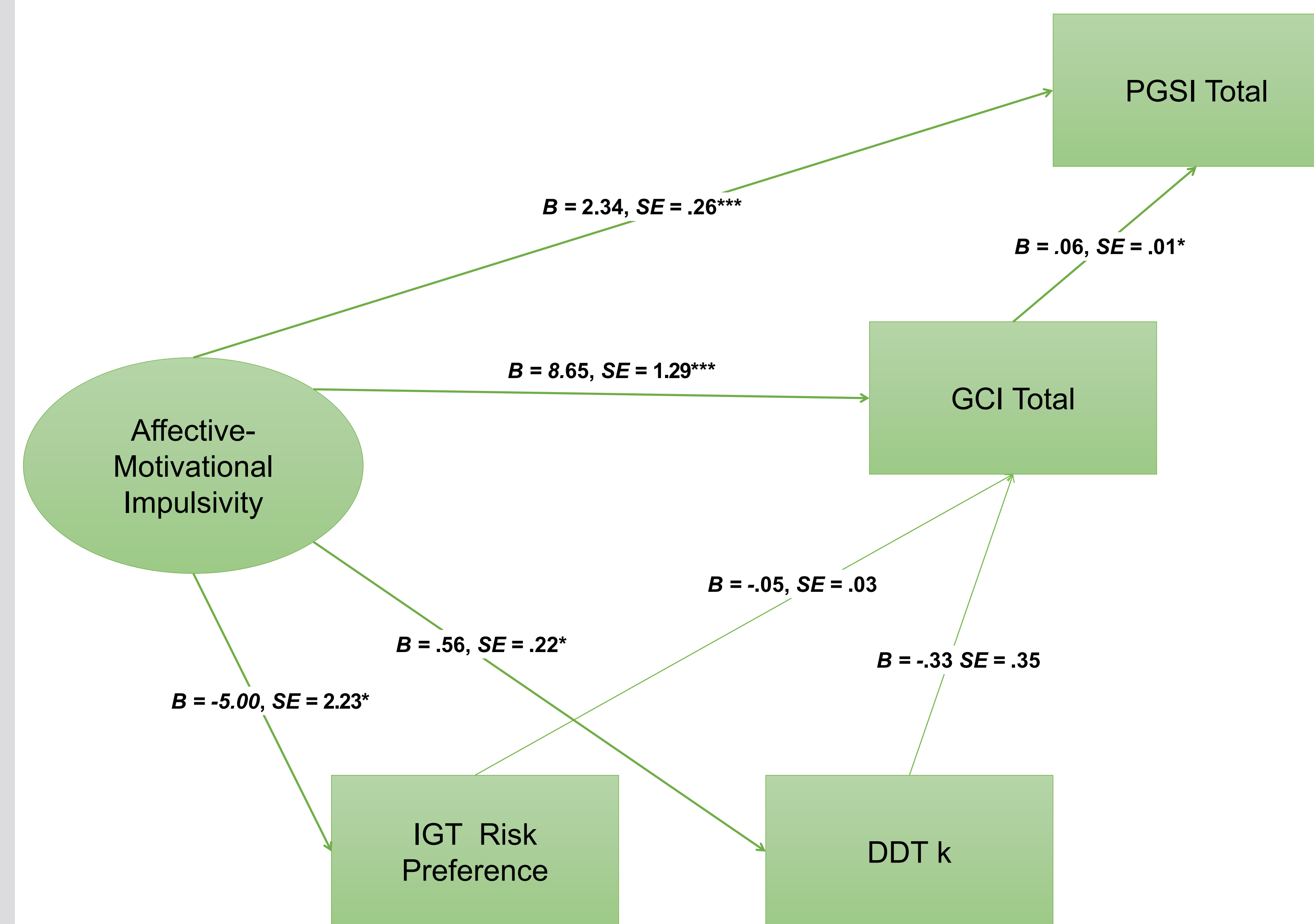

Figure 2. Structural model of the association between an impulsive decision-making style, gambling-related cognitive distortions (GCI), performance on tasks of reward-related decision-making (IGT risk preference and DDT k), and gambling severity (PGSI total). Previously defined impulsive decision-making style indicators are not shown. Rectangles represent directly observed variables and the oval represents the latent construct. Arrows depict regression paths. The unstandardized coefficients and standard error shown in parentheses reflect the inclusion of all variables in the model. Fit indices: of the hypothesized SEM indicated a reasonable fit, χ^2 (15) = 27.25, p = .03, CFI = .99; RMSEA = .05, 90% CI = [.02, .08]; SRMR = .03.

*** p < .001; ** p < .01; * p < .05

Results

- CFA confirmed a latent construct indicated by affective-motivational impulsive personality traits (Figure 1).
- The hypothesized model of the relations among the variables of interest showed acceptable fit (Figure 2).
- Hypothesis A was supported: Affective-motivational impulsivity significantly predicted greater gambling severity, greater impulsive choice, and risky decision-making.
- Hypothesis B was partially supported: Affective-motivational impulsivity predicted greater overall levels of gambling-related cognitive distortions. However, cognitive distortions were not predicted significantly by impulsive choice. Neither was it predicted by risky decision-making. But, based on the 95% confidence interval of this effect [-.11, .00], it is likely that the true estimate is in the predicted direction.
- Hypothesis C was partially supported: Gambling severity was predicted by cognitive distortions. Distortions also mediated the relationship between an impulsive decision-making style and gambling problem severity (P_M = 17%). Neither impulsive choice nor risky decision making significantly predict gambling severity through cognitive distortions.

Supplemental Analyses

- Separate SEM models were conducted with each of the GCI subscales (luck/chance and attitude/skill) in place of the total scale. The luck subscale model showed superior fit compared to the model which included the attitude/skill subscale.

Discussion

- RRDM is likely influenced by emotional processes.
- Our model suggests one possible conceptualization of affective and motivational impulsive traits.
- CDs mediate the relationship between affective-motivational impulsivity and problem severity.
- Affective-motivational traits associated with impulsivity may contribute to more impulsive decision-making on tasks of RRDM.
- Affective-motivational traits associated with impulsivity may be more strongly related to gambling-related CDs generally than impulsive and risky choice specifically.
- A supplemental model which included only luck-related cognitive distortions demonstrated better fit to the data when compared to the model which included skill-related distortions. This suggests that impulsive decision-making may predict luck-related distortions in particular.

Implications

- Targeting gambling misbeliefs may therefore be a particularly critical treatment intervention target among individuals with higher levels of impulsivity.
- Additionally, cognitive interventions may benefit from an emphasis on emotional reasoning, particularly in settings where a clinician is limited in the number of sessions they have to work with a client.

References

- Augustine, A. A., & Larsen, R. J. (2011). Affect regulation and temporal discounting: Interactions between primed, state, and trait affect. *Emotion, 11*(2), 403-412.
- Ciccarelli, M., Griffiths, M. D., Nigro, G., & Cosenza, M. (2017). Decision making, cognitive distortions and emotional distress: A comparison between pathological gamblers and healthy controls. *Journal of Behavior Therapy and Experimental Psychiatry, 54*, 204-210.
- Devos, M. G., Clark, L., Bowden-Jones, H., Grall-Bronnec, M., Challet-Bouju, G., Khazaal, Y., Maurage, P., & Billieux, J. (2020). The joint role of impulsivity and distorted cognitions in recreational and problem gambling: A cluster analytic approach. *Journal of Affective Disorders, 260*, 473-482.
- Goodie, A. S., & Fortune, E. E. (2013). Measuring cognitive distortions in pathological gambling: Review and meta-analyses. *Psychology of Addictive Behaviors, 27*(3), 730-743.
- MacKillop, J., Weafer, J., C. Gray, j., Oshri, A., Palmer, A., & de Wit, H. (2016). The latent structure of impulsivity: impulsive choice, impulsive action, and impulsive personality traits. *Psychopharmacology, 233*(18), 3361-3370.
- Michalczuk, R., Bowden-Jones, H., Verdejo-Garcia, A., & Clark, L. (2011). Impulsivity and cognitive distortions in pathological gamblers attending the UK National Problem Gambling Clinic: a preliminary report. *Psychol Med, 41*(12), 2625-2635.

Contact: magdalen.schluter@ucalgary.ca