Post traumatic stress symptoms, Alcohol use and online gambling in European people: a prospective study on the mediating role of self-esteem, brain-behavioral system, sensory processing sensitivity and positive rumination

Introduction

Gambling is a behavioral addiction that has received increased attention in research in recent years. This condition has been categorized as one of the substances related and other addictive disorders in the Diagnostic and Statistical Manual of Mental Disorders, Version 5 (DSM-5) (American Psychiatric Association 2013a) due to similarities in public health implications, and genetic and phenotypic features (American Psychiatric Association 2013b; Stein et al. 2018). An increased rate of PTSS has been found in substance-abusing populations (for a review, see Edalati and Krank 2016), including in South Africa (Jewkes et al. 2010). The question can be raised whether the experience of PTSS (which comprises physical, emotional and sexual abuse, and emotional and/or physical neglect) may also be prevalent in individuals with behavioral addictions such as GD.

Further, since PTSS has been associated with various psychiatric conditions (e.g. Barrett et al. 2015; Hughes et al. 2016) and is not a unique phenomenon in individuals with GD, there is thus emerging evidence that the link between PTSS and GD may be more complex than previously assumed. also, the constant rumination of emotions like PTSS (Horak et al.,2021) and anger (Law et al.,2021), has been found to be a significant predictor of the initiation and persistence of anxiety, as well as Lack of self-control and impulsive or dysfunctional behaviors, such as gambling (Law et al., 2021).

When individuals encounter negative experiences, it triggers the activation of positive rumination regarding the efficacy of rumination as a means of threat monitoring. Consequently, individuals may engage in rumination as a strategy to navigate through adverse circumstances, gain insights into a problem, or facilitate its resolution (Kubiak et al.,2014). therefore, gambling addicts could not effectively control themselves, (Goudriaan et al.,2005) and lower self-control tends to stimulate more impulsive gambling behaviors (Shi W and Li N., 2023). but this question is raised, from what pathway negative experiences, activate of positive rumination?

Changes in the processing of multiple sensory inputs have been demonstrated to influence various positive rumination functions (Alais et al., 2010; Wallace et al., 2020), emotional responses (Klasen et al., 2012), social interactions (Baranek et al., 2018; Stevenson et al., 2018; Thye et al., 2018), and self-perception (Panksepp and Northoff, 2009; Tsakiris, 2017), all of which are broadly affected in disorders related to trauma. In this context, a neurobiologically grounded viewpoint is presented to examine conditions stemming from trauma, emphasizing the role of sensory processing in an organism's capacity to manage physiological arousal, emotions, and behaviors (Harricharan et al., 2021). The discussion centers on the significance of somatic senses, particularly the vestibular and somatosensory systems, due to their direct impact on the physical body, their evolutionary and developmental precedence, and their crucial functions in modulating and coordinating our multisensory perception in the immediate present. possible the findings support a link between PTSS and GD, with Positive rumination as a promoter variable, and may be useful for future individualized therapeutic strategies.

Also, Gray presented a biological model in the theory of sensitivity to reinforcement, which includes three behavioral systems, according to Gary, these brain-behavioral systems are the basis of individual differences and the activity of each of them leads to different emotional reactions, the first system, the behavioral activation system, responds to conditioned stimuli of reward and absence of punishment (Gray and McNaughton, 2003). The activity of this system causes a positive emotional state and behavioral activation, reducing self-control and craving. The second system is the behavioral inhibition system, which responds to the conditioned stimuli of punishment and lack of reward. The third system is the fight-avoidance system, which is structurally related to the amygdala and hypothalamus, and is sensitive to disturbing stimuli (Mohammadi et al., 2014).
Therefore, it seems that the high behavioral activation system conceptualizes an additional risk factor for gambling. In people with more behavioral activation, positive rumination was active ,this increases their readiness for behaviors similar to those seen in gambling, and seems behavioral activation appears to be a risk factor for problem gambling (Kimbrell et al., 2010), and on the other hand, PTSS seems to be related to high behavioral activation and gambling, In this way, probably PTSS through behavioral activator, positive rumination can disrupt behavioral control and intensify impulsivity and gambling behavior.

In the other hand, PTSS, Cause of decrease of capacity in higher-level brain pathways and also, increase of sensory hypersensitivity in lower-level, so person tries to escape from memories, unpleasant emotions and weak self-esteem related to PTSS. Since that, it is proven that ambiguous situations such as gambling, create self-esteem in these people, probably, they use positive rumination to achieve immediate rewards and increase self-esteem, so gambling behavior as a self-control strategy to achieve immediate rewards and increase self-esteem.

Current study

gambling place an excessive burden on society, which requires effective treatment and prevention, so the importance and contribution of the project can be clinical (prevention), but also theoretical (advancing cognitive models of gambling, alcohol use among Adolescence to adulthood). In order to improve treatment and prevention interventions, factors associated with groups at high risk must be identified. Therefore, increasing our knowledge about the psychological processes affecting gambling at Adolescence to adulthood will be one of the most important objectives of the current project. Further, an innovative aspect of the present study is that it examines the positive rumination, self-esteem, BAS, SPS, and alcohol, gambling among European. Another innovative aspect of the current research is that it investigates these variables prospectively, as a result, the findings of this research can have more reliability and generalizability than cross-sectional studies.

Research objectives and hypotheses

The objective of the current study is to further elucidate the role of BIS, self-esteem, SPS, and positive rumination as mediators of the relationship between PTSS and alcohol use in later gambling with a prospective design including Adolescence to adulthood assessed at three-time points, with 2 months between them (T1, T2, and T3), I hypothesize that (1) PTSS will significantly predict BIS, self-esteem, SPS, and positive rumination, (2) the High self-esteem, high sensitivity, and use of positive rumination at a one-time point will predict gambling severity at the following time point, (3) and the relationship between PTSS , alcohol use and gambling will be at least partially mediated by BIS, SPS, and positive rumination.

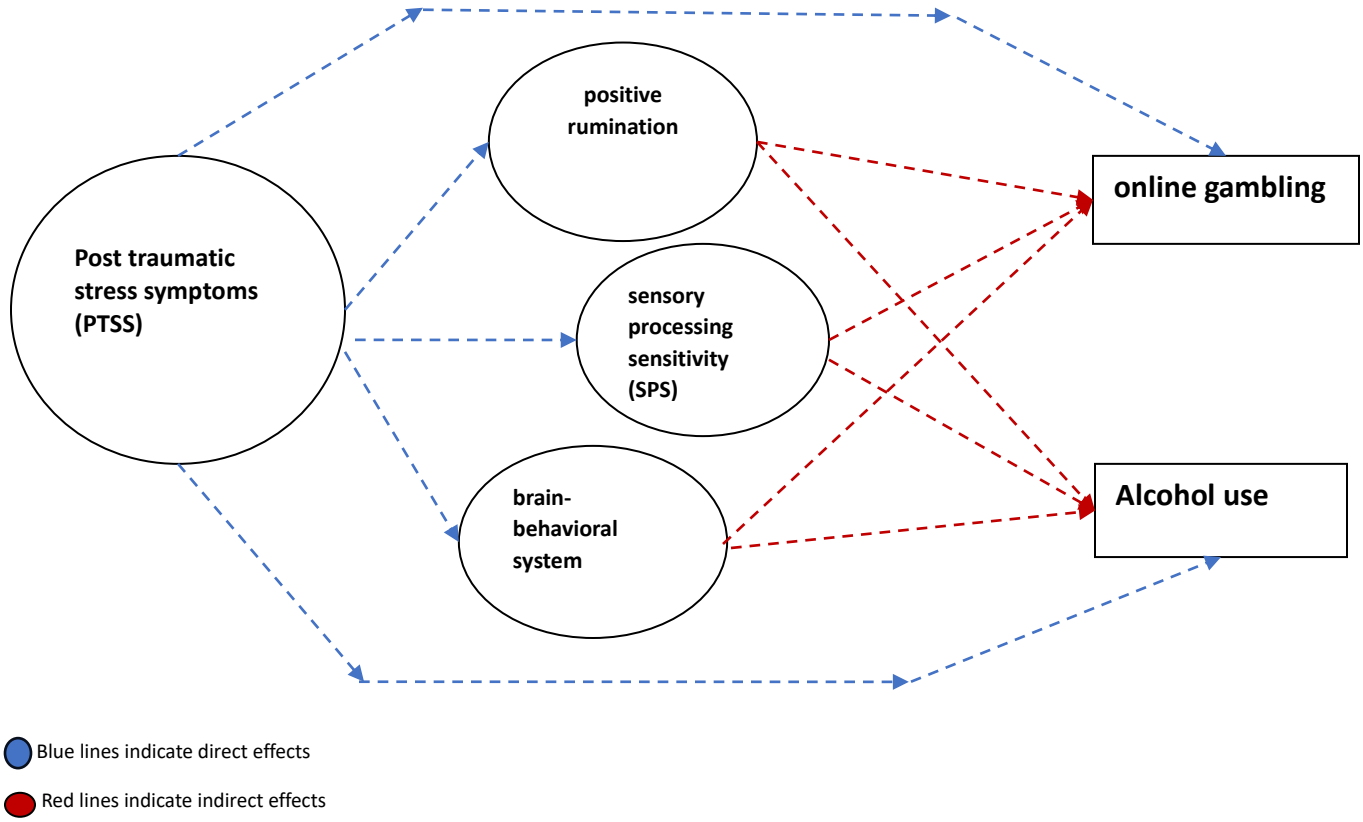
The project will have three secondary objectives culminating in three planned publications. The working titles are (1) PTSS as a predictor of BIS, self-esteem, SPS, and positive rumination for Adolescence to adulthood people with gambling, alcohol use (2) The changes in BIS, self-esteem, SPS, and positive rumination in the following time point in comparing baseline time points for Adolescence to adulthood people with gambling, (3) The mediation role of BIS, self-esteem, SPS, and positive rumination in the relationship of PTSS, gambling, and self-esteem for Adolescence to adulthood people with alcohol use and gambling.

Method

Design: Prospective

In this study, I will use a prospective design. gambling and alcohol use are the dependent variables, and PTSS will be considered an independent variable. BIS, self-esteem, SPS, and positive rumination will be considered as mediating variables. The mediating variable is a variable that indirectly affects the direction or extent of the relationship between the independent variable and the dependent variable. Based on the literature, I assume a hypothetical model (Figure 1), in which I can examine the direct and indirect effects of mediating variables on the main variables of the research, as well as temporal relations between the independent variable, mediators, and the dependent variables.

Figural. The proposed causal relationship between PTSS(CT), online gambling (OG), and self-esteem (SE) in European among Adolescence to adulthood people with hypothesized mediators' (positive rumination (PR), sensory processing sensitivity (SPS), and brain-behavioral system).



Participants and procedure

The study will use a prospective cohort design with 1500 Adolescence to adulthood across European. Participants will be recruited from tertiary educational institutions, as well as the community to increase the generalizability of findings beyond Casino samples. The data collection will be online using Survey Xact. So, Participants were selected for inclusion in the study based on their confirmation of engaging in gambling activities, as indicated by a positive response to the query: "Have you ever participated in gambling? This encompasses any of the subsequent activities: purchasing scratch-offs, purchasing lottery tickets, playing the stock market, betting on sports, going to casinos, playing keno, playing slots or video poker, playing games for money, or playing fantasy sports for money."

Data will be collected by using European versions of validated questionnaires (see measures below). Most researchers would recommend using sample sizes of at least 200/5 or 10 cases per variable for structural equation models (36). With 6 predicting and mediating variables, the target sample size is approximately 1200 participants. I will oversample 1500 participants due to potential attrition from the study from T1 to T2. Data will be collected in 2024 and part of 2025. The gambling, self-esteem, SPS, positive rumination, and brain-behavioral system will be measured repeatedly at a baseline, then 2 months and 4 months follow-up. Participants have to be 15- 64 years of age and provide written informed consent before entering the study. Participants will complete a 30-minute online survey anonymously (T1). Subsequently, they will be invited via e-mail to complete a follow-up survey after 2 months (T2), and 4 months (T3). Recruitment will be conducted through universities and other websites (social networking websites). The study will be registered at the European Data Protection Agency and conducted in accordance with the Helsinki Declaration II, and ethical approval will be applied to University's ethical research committee.

Instruments

The South Oaks Gambling Screen (SOGS) (Lesieur., 1987) with 20 items (Echeburúa et al.,1994) that screening questionnaire discriminates between probable pathological, problem and non-problem gamblers. PTSS Questionnaire−Short Form (CTQ-SF; Bernstein & Fink,1998). The CTQ-SF is a 28-item was designed by Hernandez et al (2013) self-report instrument that assesses retrospective child abuse and neglect. Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ-20; Aluja & Blanch, 2011), with 20 items was designed by (Aluja & Blanch, 2011) that measure with a dichotomous response (Yes or No). The Highly Sensitive Person Scale (HSPS) (Licht et al,2020) with 27 items was designed by Elaine et al (Aron & Aron,1997) to assess sensory processing sensitivity and its three facets. Meta-Cognitions Questionnaire-30 (MCQ-30; Wells & Cartwright-Hatton, 2004) with 30 items was designed by (Ramos-Cejudo, 2013) that measure assesses individual differences in positive rumination, judgments and monitoring tendencies.

Analyses

Cross-lagged panel and longitudinal mediation analyses with structural equation modeling will be used to test the predictive value of BAS, self-esteem, SPS, and positive rumination beliefs, on gambling and alcohol use and their mediating role in the association of PTSS and gambling, alcohol use. The following strategies will be used for data analysis: (1) Stepwise Linear Regression statistical test in SPSS software will be used to predict BAS, self-esteem, SPS, and positive rumination beliefs based on PTSS(research question 1), (2) Multivariate Analysis of Variance (MANOVA), regression statistical test in SPSS software

will be used for the assessment of changes in BAS, self-esteem, SPS, and positive rumination beliefs at a one-time point in predicting alcohol use in gambling at the following time point (research question 2), and (3) the Structural Equation Modeling (SEM), mediation analysis model of this project (Figure 1) in the AMOS 21.0 software will be used for the assessment of mediating role of BAS, self-esteem, SPS, and positive rumination beliefs in the relationship between PTSS , alcohol use and gambling (research question 3).

Ph. D. overall timeline

Below I show the main activities to be carried on during the three-year program, both in relation to the research program and other educational activities.

Table 1. the periodic table of the project's stages of execution and progress

Executive stages of the study	First year		Second year		Third year	
	Months		Months		Months	
	1-5	6-12	1-6	7-12	1-4	5-12
Recruitment process of student, compilation of the proposal, and obtaining ethical approval						
Data collection, data analysis of study 1, pass courses of university, and teaching						
Writing and submitting paper 1, data analysis (study 2 and 3), pass courses of university, and teaching						
Writing and submitting paper 2 and 3, pass courses of university, and teaching						
Research abroad, pass courses of university, and teaching						
Complete and submit the Ph.D. thesis						

References

Harricharan, S., McKinnon, M. C., and Lanius, R. A. (2021). How processing of sensory information from the internal and external worlds shape the perception and engagement with the world in the aftermath of trauma: Implications for PTSD. Front. Neurosci. 15:625490. doi: 10.3389/fnins.2021.625490

Tsakiris, M. (2017). The multisensory basis of the self: From body to identity to others. Q. J. Exp. Psychol. 70, 597–609. doi: 10.1080/17470218.2016.118 1768

Thye, M. D., Bednarz, H. M., Herringshaw, A. J., Sartin, E. B., and Kana, R. K. (2018). The impact of atypical sensory processing on social impairments in autism spectrum disorder. Dev. Cogn. Neurosci. 29, 151–167. doi: 10.1016/j.dcn.2017.04. 010

Panksepp, J., and Northoff, G. (2009). The trans-species core SELF: The emergence of active cultural and neuro-ecological agents through self-related processing within subcortical-cortical midline networks. Conscious. Cogn. 18, 193–215. doi: 10.1016/j.concog.2008.03.002

Stevenson, R. A., Segers, M., Ncube, B. L., Black, K. R., Bebko, J. M., Ferber, S., et al. (2018). The cascading influence of multisensory processing on speech perception in autism. Autism 22, 609–624. doi: 10.1177/1362361317704413

Law, K. C., Rogers, M. L., Tucker, R. P., Bauer, B. W., Capron, D. W., Anestis, M., & Joiner, T. E. (2021). Rumination in the context of anger and sadness: Diferential efects on state agitation. Journal of Afective Disorders, 280, 89–96. https://doi.org/10.1016/j.jad.2020.11.071

Baranek, G. T., Woynaroski, T. G., Nowell, S., Turner-Brown, L., DuBay, M., Crais, E. R., et al. (2018). Cascading effects of attention disengagement and sensory seeking on social symptoms in a community sample of infants at-risk for a future diagnosis of autism spectrum disorder. Dev. Cogn. Neurosci. 29, 30–40. doi: 10.1016/j.dcn.2017.08.006

Klasen, M., Chen, Y. H., and Mathiak, K. (2012). Multisensory emotions: Perception, combination and underlying neural processes. Rev. Neurosci. 23, 381–302. doi: 10.1515/revneuro-2012-0040

Wallace, M. T., Woynaroski, T. G., and Stevenson, R. A. (2020). Multisensory integration as a window into orderly and disrupted cognition and communication. Annu. Rev. Psychol. 71, 193–219. doi: 10.1146/annurev-psych-010419-051112

Alais, D., Newell, F. N., and Mamassian, P. (2010). Multisensory processing in review: From physiology to behaviour. Seeing Perceiving 23, 3–38. doi: 10.1163/ 187847510X488603

Gray JA, McNaughton N. (2003). The neuropsychology of anxiety: An enquiry into the function of the septo-hippocampal system. Oxford university press; 2003.

Mohammadi Masiri, Farhad, Hajlo, Nader, and Abolghasemi, Abbas. (2014). Investigating the relationship between behavioral activation and inhibition systems, difficulty in emotional regulation and shyness with social anxiety disorder in normal Adolescence. Journal of Shahrekord University of Medical Sciences, 17(6), 10-21. SID. https://sid.ir/paper/58676/fa(persion).

Kimbrel NA, Mitchell JT, Nelson-Gray RO. (2010). An examination of the relationship between behavioral approach system (BAS) sensitivity and social interaction anxiety. J Anxiety Disorders 2010; 24, 372–8

Zhou, H., Liu, H., Ma, X. et al. The psychometric properties of positive and negative beliefs about the rumination scale in Chinese undergraduates. BMC Psychol 11, 107 (2023). https://doi.org/10.1186/s40359-023-01111-8

Horak NS, Eagle G, Stein DJ, Lochner C. Gambling Disorder and PTSS : A Complex Association. J Gambl Stud. 2021 Jun;37(2):515-528. doi: 10.1007/s10899-020-09983-w. Epub 2020 Oct 1. PMID: 33006105.

Jewkes, R. K., Dunkle, K., Nduna, M., Jama, P. N., & Puren, A. (2010). Associations between childhood adversity and depression, substance abuse and HIV and HSV2 incident infections in rural South African youth. Child Abuse and Neglect, 34(11), 833–841.

Edalati, H., & Krank, M. (2016). Post traumatic stress symptoms and development of substance use disorders: A review and model of cognitive pathways. Trauma, Violence, & Abuse, 17(5), 454–467.

Dalbudak, E., Evren, C., Aldemir, S., & Evren, B. (2014). The severity of internet addiction risk and its relationship with the severity of borderline personality features, PTSS s, dissociative experiences, depression and anxiety symptoms among Turkish university students. Psychiatry Research, 219(3), 577–582.

Kubiak T, Zahn D, Siewert K, Jonas C, Weber H. Positive beliefs about rumination are associated with ruminative thinking and affect in daily life: evidence for a metacognitive view on depression. Behav Cogn Psychother. 2014;42(5):568–76.

Chou, K.-L., & Afifi, T. O. (2011). Disordered (pathologic or problem) gambling and axis psychiatric disorders: Results from the national epidemiologic survey on alcohol and related conditions. American Journal of Epidemiology, 173, 1289–1297. https://doi.org/10.1093/aje/kwr017

Grubbs JB, Chapman H, Shepherd KA. Post-traumatic stress and gambling related cognitions: Analyses in inpatient and online samples. Addict Behav. 2019 Feb;89:128-135. doi: 10.1016/j.addbeh.2018.09.035. Epub 2018 Sep 28. PMID: 30292070.

Chan EMLC, Dowling NA, Jackson AC, Shek DT. Gambling-related family coping and the impact of problem gambling on families in Hong Kong. Asian Journal of Gambling Issues and Public Health. 2016;6(1):1. doi: 10.1186/s40405-016-0009-9.

Grant JE, Potenza MN, Weinstein A, Gorelick DA. Introduction to behavioral addictions. Am J Drug Alcohol Abuse. (2010) 36:233–41. doi: 10.3109/00952990.2010.491884

Estevez A, Jauregui P, Lopez N, Lopez-Gonzalez H, Griffiths M. Difficulties in emotion regulation, coping, and dysfunctional psychological symptoms in family members of people with gambling disorder. International Journal of Mental Health and Addiction. 2020;18(5):1196–1208. doi: 10.1007/s11469-019-00117-x.

Dowling NA, Rodda SN, Lubman DI, Jackson AC. The impacts of problem gambling on concerned significant others accessing web-based counselling. Addictive Behaviors. 2014;39(8):1253–1257. doi: 10.1016/j.addbeh.2014.04.011.

Melero A, Yela JR, Crego A, Cortés-Rodriguez M, Gómez-Martínez MA. Eficacia del programa de reducción de estrés basado en atención plena (REBAP) aplicado a familiares de jugadores patológicos [Effectiveness of the mindfulness-based stress reduction program (REBAP) applied to family members of pathological gamblers] Behavioral Psychology/Psicología Conductual. 2019;27(3):355–373.

Estévez A, Jauregui P, Momeñe J, Macía L, Etxaburu N. Mediating Role of Rumination Between Anger and Anxious-Depressive Symptomatology in Family Members of People with Gambling Disorder. J Gambl Stud. 2023 Sep;39(3):1225-1238. doi: 10.1007/s10899-022-10178-8. Epub 2022 Dec 26. PMID: 36572842; PMCID: PMC10397117.

American Psychiatric Association. (2013a). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013b). Highlights of changes from DSM-IV-TR to DSM-5. Retrived January 6, 2015, from https://www.dsm5.org/Documents/changesfromdsm-iv-trtodsm-5.pdf.

Stein, D. J., Billieux, J., Bowden-Jones, H., Grant, J. E., Fineberg, N., Higuchi, S., et al. (2018). Balancing validity, utility and public health considerations in disorders due to addictive behaviours. World Psychiatry, 17(3), 363–364.

Edalati, H., & Krank, M. (2016). Post traumatic stress symptoms and development of substance use disorders: A review and model of cognitive pathways. Trauma, Violence, & Abuse, 17(5), 454–467.

Jewkes, R. K., Dunkle, K., Nduna, M., Jama, P. N., & Puren, A. (2010). Associations between childhood adversity and depression, substance abuse and HIV and HSV2 incident infections in rural South African youth. Child Abuse and Neglect, 34(11), 833–841.

Barrett, E. L., Teesson, M., Chapman, C., Slade, T., Carragher, N., & Mills, K. (2015). Substance use and mental health consequences of PTSS : An epidemiological investigation. Drug and Alcohol Dependence, 146, e217–e218.

Hughes, K., Lowey, H., Quigg, Z., & Bellis, M. A. (2016). Relationships between adverse childhood experiences and adult mental well-being: Results from an English national household survey. BMC Public Health, 16(1), 222.

Goudriaan, A. E., Oosterlaan, J., De Beurs, E., and van den Brink, W. (2005). Decision making in pathological gambling: a comparison between pathological gamblers, alcohol dependents, persons with Tourette syndrome, and normal controls. Brain Res. Cogn. Brain Res. 23, 137–151. doi: 10.1016/j.cogbrainres.2005.01.017

Shi W and Li N (2023) The effects of cognitive bias and cognitive style on trait impulsivity in moderate-risk gambling: The moderating effect of self-control. Front. Psychol. 14:1089608. doi: 10.3389/fpsyg.2023.1089608

Wells A., & Cartwright-Hatton S. (2004). A short form of the metacognitions questionnaire: Properties of the MCQ-30. Behaviour Research and Therapy, 42, 385–396. http://dx.doi. org/10.1016/S0005-7967(03)00147-5

Ramos-Cejudo, J., Salguero, J. M., & Cano-Vindel, A. (2013). European version of the meta-cognitions questionnaire 30 (MCQ-30). *The European journal of psychology*, *16*, E95.

Aluja A., & Blanch A. (2011). Neuropsychological behavioral inhibition system (BIS) and behavioral approach system (BAS) assessment: A shortened sensitivity to punishment and sensitivity to reward questionnaire version (SPSRQ-20). *Journal of Personality Assessment*, 93(6), 628–636. doi: 10.1080/00223891.2011.608760

Hernandez, A., Gallardo-Pujol, D., Pereda, N., Arntz, A., Bernstein, D. P., Gaviria, A. M., ... & Gutiérrez-Zotes, J. A. (2013). Initial validation of the European PTSSquestionnaire-short form: factor structure, reliability and association with parenting. *Journal of interpersonal violence*, *28*(7), 1498-1518.

Bernstein, D. P., & Fink, L. (1998). PTSSQuestionnaire: A retrospective self-report (CTQ). San Antonio, TX: NCS Pearson, Inc

García-Castro, F. J., Bendayan, R., & Blanca, M. J. (2023). Validity Evidence for the Brief Self-Control Scale in the European Adult Population: A Systematic Study. *Journal* of Personality Assessment, 1-10.

Lesieur HR, Blume SB. The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. Am. J. Psychiatry. 1987;144:1184–8. doi: 10.1176/ajp.144.9.1184.

Echeburúa E, Báez C, Fernández J, Páez D. Cuestionario de juego patológico de South Oaks (SOGS): Validación española (South Oaks Gambling Screen (SOGS): European validation) Análisis Modif. Conduct. 1994;20:769–91.

Licht CL, Mortensen EL, Hjordt LV, Stenbæk DS, Arentzen TE, Nørremølle A, Knudsen GM. Serotonin transporter gene (SLC6A4) variation and sensory processing sensitivity—Comparison with other anxiety-related temperamental dimensions. Molecular genetics & genomic medicine. 2020 Aug;8(8):e1352.

Aron EN, Aron A. Sensory-processing sensitivity and its relation to introversion and emotionality. J Pers Soc Psychol. 1997 Aug;73(2):345.