

Stress and gambling

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Abstract

Gambling is a multi-billion-dollar industry that many people engage with on a regular basis with no adverse effects. For many, gambling is a fun hobby that does not negatively impact their lives. There is, however, a significant minority whose gambling is maladaptive and causes significant adverse consequences, which may lead to personal and financial devastation. Stress and how one responds to stress may be a significant factor in determining who may gamble with impunity versus those who lose control and develop gambling disorder. In this paper, we outline three points at which stress and gambling intersect: 1) gambling to escape stress, 2) gambling as a stressor, and 3) altered stress physiology as a predisposing factor for gambling disorder. Below we describe these intersections and how they may influence the development and maintenance of gambling disorder.

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Gambling is a popular form of entertainment and a lucrative business [1]. Gambling disorder is a psychiatric disorder classified as a behavioral addiction in the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* [7]. The disorder affects about 1% of the general population and another 3-4% experience subclinical problems (i.e., problem gambling; [2]). Gambling disorder is more commonly found in populations that experience elevated stress, such as individuals with substance use disorders and individuals within the criminal justice system [3,4]. The purpose of this paper is to succinctly review the intersections of gambling disorder and stress.

Gambling to escape stress

The first intersection between stress and gambling is gambling as a means to escape stress [5,6]. This intersection is recognized within the DSM-5 diagnostic criteria set for gambling disorder (i.e., gambling when feeling distressed [criterion #5]; [7]), a criterion that is absent for substance use disorder. In this context, the terms distress and stress are often used interchangeably, especially with regard to subjective emotional states. First, stress is associated with the development of gambling disorder. For example, a history of childhood stress and lifetime exposure to traumatic stress is strongly related to the development of gambling disorder [8-10]. Adolescent problem gamblers report higher perceived stress [11] compared to those without gambling problems. Further, emerging adults (aged 18-20) with problem gambling report using gambling as a way to cope with stress [12]. In fact, the combination of distress and frequent gambling behavior predicts gambling disorder status with greater accuracy than gambling behavior alone in emerging adults [13]. These findings in adolescence and young adulthood, when problem gambling is most likely to develop [14], suggest that poor coping mechanisms begin early in the development of gambling disorder and may interfere with the implementation of appropriate stress coping strategies such as solution-focused coping [15,16]. Stress is not only associated with the development of gambling disorder, it is also associated with gambling disorder severity. In a nationally-representative sample of over 40,000 people from the National Epidemiologic Survey on Alcohol and Related Conditions, high stress was related to increased problem gambling severity; 71.7% of those with problem gambling reported high stress in the past year [17]. Additionally, increased problem gambling severity and stress were related to comorbid substance-related addictions and Cluster-B personality disorders (e.g., antisocial personality disorder). It is important to note that antisocial personality disorder is associated with a blunted stress response [18], while other personality disorders such as avoidant and borderline types are associated with higher stress responses [19]. Recent thinking on the relationship between stress and addiction suggests that too high and too low stress reactivity may be related to negative outcomes and that a robust stress response may be a sign of resilience [20]. (See discussion below on Gambling Disorder Subtypes for further discussion on the relation between personality and gambling disorder). The experience of stress, whether acutely or more chronically during adolescence and young adulthood, is a significant factor in the development of gambling disorder as well as other psychiatric comorbidities.

Stress is frequently identified as a trigger to gambling behavior. Almost 50% of individuals with gambling disorder undergoing cognitive behavioral therapy identified negative emotional states, such as stress, as a strong trigger to gamble [21]. Stress also contributes to relapse, a common and significant challenge in addiction treatment broadly [22,23], and gambling treatment specifically [24]. Indeed, increased life stress is a significant predictor of subsequent relapse

among in-treatment problem gamblers [25]. Stress may make individuals with gambling disorder more likely to relapse, as self-reported stress increases gambling craving among those with gambling disorder, over and above reports of anxiety or depression [26]. Stress and gambling craving may rely on similar neural processes, leading to the suggestion that stress may serve to sensitize individuals toward pathological gambling behavior [27]. Individuals with gambling disorder who relapsed to gambling two weeks after quitting reported greater stress reactivity and negative affect, and were less likely to complete a laboratory stress challenge, compared to a group with gambling disorder who had successfully maintained abstinence from gambling for over three months [28]. The stress of attempting to stop gambling may combine with other life stressors to make relapse more likely. One important nuance to consider regarding gambling disorder is that a specific form of stress – financial pressures – can potentially be “solved” by the addictive behavior itself. If a person were to win a large amount of money from gambling, theoretically the financial stress of their gambling problems would be solved. This relationship sets gambling disorder apart from other addictions, such as substance use disorders. In substance use disorders, repeated use of a substance virtually guarantees a loss of financial resources. By contrast, those with gambling disorder always have the possibility of ‘solving’ their financial problems through the continuation of their addictive behavior. The financial pressures engendered by this situation are endemic to gambling disorder and are a common precipitant to relapse [29]. See *Gambling as a Stressor* section below for more details on this relationship.

Gambling disorder subtypes and stress

There are considerable individual differences among those with gambling disorder, both in terms of types of gambling behavior [30] as well as the motivation and intensity of the behavior [31]. This heterogeneity among those with gambling disorder has led to the development of models to explain the various etiological mechanisms that lead to and maintain the disorder. The Pathways Model of Gambling Disorder [5,32] proposes three different risk-factor pathways for the development of the disorder. The Behaviorally Conditioned Subtype (Cluster 1) includes those who develop gambling disorder based on the behavioral contingencies of gambling, but who do not show pre-morbid psychopathology. Individuals within this subtype tend to show low gambling severity and may show depression and anxiety, but primarily in response to the sequelae of gambling such as financial difficulties. The Emotionally Vulnerable subtype (Cluster 2) often have premorbid mood and/or anxiety disorders and a history of negative life experiences, which may contribute to gambling behavior becoming a stress coping mechanism. Specifically, gambling may provide relief or distraction from negative emotional states. Finally, the Antisocial, Impulsive Risk Taking Subtype (Cluster 3) shows a combination of premorbid mood and/or anxiety disorders as well as antisocial and impulsive tendencies (i.e., comorbid addictions). They may show premorbid cognitive deficits in attention and increased impulsivity [33]. A recent study assessed the utility of the pathways model using a newly developed questionnaire, the Gambling Pathways Questionnaire (GPQ), in treatment seeking problem gamblers (N > 1,110) [34], demonstrated high validity and reliability of the GPQ in classifying problem gamblers into the three subtypes. Gambling to escape stress may be a primary coping strategy for the Emotionally Vulnerable Subtype, whereas stress may lead the Antisocial, Impulsive Risk Taking Subtype to seek out risky gambling and/or substance-related opportunities. The Emotionally Vulnerable Subtype may experience stressors more sensitively than the other groups and find that gambling serves as an escape or distraction from stress,

although research has not addressed potential differences in stress reactivity across the different gambling disorder subtypes.

Gambling as a stressor

The second intersection between stress and gambling is the fact that gambling itself may become a stressor. Questionnaires about gambling disorder often include items on this issue, such as "*Loss of sleep due to stress or worry about gambling or gambling-related problems.*" (from the Problem Gambling Severity Index). This item was endorsed by 48% of problem gamblers compared to less than 3% of non-problem and low risk gamblers [35]. The financial losses due to gambling become a stressor in and of themselves. This, in turn, may lead to a feedback cycle in which gambling losses induce stress, which leads to more gambling and more stress. In support of the cyclical nature of stress and gambling is a two-year longitudinal study that examined the relationship between life events and severity of gambling problems via cross-lagged analyses. This study found a relationship between a greater number of life events that may be deemed stressful (e.g., injury or illness, financial status change, having trouble with one's boss) and greater gambling problems 12-months later [36]. While valence was not assigned to these life events, findings suggest that problem gamblers may be particularly vulnerable to the presence of life stress. Another study assessed real-time subjective reports of stress-like states in gamblers. Seventeen gamblers reported their anxiety and arousal levels via mobile phones before, during, and after actual gambling sessions. Results showed increased anxiety/arousal after losing and decreased anxiety/arousal after winning. Recent work using ecological momentary assessment (EMA) of gambling behavior indicated that gamblers high in anxiety sensitivity were more likely to gamble alone and to gamble more than those lower in anxiety sensitivity. These findings suggest that gambling losses, which are the most common gambling outcome, may be a cause (and effect) of increased anxiety and arousal [37, 38].

Another DSM-5 criterion for gambling disorder is characterized by chasing losses, or returning to gambling after losing money in an attempt to recoup losses (criterion #6 from DSM-5). Treatment-seeking individuals with gambling disorder reported that negative emotional states and financial stress are significant consequences of their gambling behavior [21]. The Behaviorally Conditioned Subtype may be especially susceptible to experiencing gambling as a stressor. This Subtype's pattern of developing gambling disorder in response to behavioral contingencies, followed by the stress of losing money and chasing losses, may serve as a feedback mechanism, which maintains the addiction. The initial loss of money leads to stress and chasing losses, followed by more gambling behavior, and so on until the individual is faced with severe financial challenges. Notably, the burden of financial stress is associated with suicidality among gamblers, and family conflict mediates this relationship [39]. These findings suggest that the accumulation of these financial and familial stressors, which are likely accompanied by negative emotional states, place problem gamblers at risk for deadly consequences.

Altered stress reactivity as predisposing factor

The third intersection highlights a potential preexisting factor that may make an individual more likely to succumb to gambling disorder. The act of gambling is associated with increased activity of the sympathetic nervous system and hypothalamic pituitary adrenocortical (HPA) axis, both in

recreational and problem gamblers [40,41]. Although exaggerated stress reactivity has well-documented negative health consequences [42], recent work shows that *reduced* reactivity to stress is also associated with poor health outcomes, including addiction [43-45]. A robust stress response may serve as a protective factor against the development of addiction [20]. The stress-related biological and behavioral characteristics of substance use disorders suggest an addiction phenotype that includes a blunted hormonal and cardiovascular response to stress [23,43]. A relationship among blunted physiology, impulsivity, and risk taking has been reported in the general population. Lower resting heart rate is associated with more risky decision making in healthy young adults [46], suggesting that these relationships lie on a continuum, with problem gamblers at one extreme and risk averse individuals at the other.

Much of the research on stress reactivity in addiction has been conducted in substance use disorders. Common genetic variants between those with substance use disorders and gambling disorder suggests that the altered stress physiology of substance use disorders may also be found in those with gambling disorder [47]. Indeed, similar associations between blunted stress physiology and risky behavior have been reported with gambling disorder [48-51]. Longer duration [52] and greater severity [51] of problem gambling is associated with lower baseline cortisol levels, suggesting that the abnormal physiology in gambling disorder may serve as a marker for addiction severity. Recent work from our lab has demonstrated that lower levels of morning cortisol in those with problem gambling is associated with more risky behavior and less sensitivity to monetary losses [53]. Such results suggest that a pattern of blunted cortisol and sympathetic nervous system activity may play a role in the behavioral changes that accompany the development of a specific subtype of individuals with gambling disorder.

Potential Mechanisms and Future Directions

Gambling behavior can serve as a distraction from and a means to cope with life stressors. Although many people gamble with little to no negative impact on their lives, some gamblers develop gambling disorder. In a comprehensive group comparison of demographic, psychosocial, and cognitive characteristics, those with gambling disorder differed from professional gamblers only in self-reported distress and psychopathology [54]. The act of gambling elicits physiological reactivity, including activity of the sympathetic nervous system and HPA axis [40,41,55]; such reactivity reflects the arousing and sometimes stressful nature of the gambling experience. This physiological activity may serve as a bodily signal of the stressful nature of the experience that, when functioning properly, guides an individual away from persistent gambling in risky situations (*ala*, the somatic marker hypothesis; [56,57]). The blunted physiological responses to stress observed in those with gambling disorder may make the experience of losses less punishing, resulting in these individuals making more risky decisions. In turn, the risky gambling behavior leads to a cycle of pathological behavior due to occasional wins serving as potent positive reinforcement. The three intersections between stress and gambling may serve as a positive feedback cycle wherein an individual initially seeks to escape stress by gambling, the act of gambling and losing becomes a stressor, but the individual's physiological reactivity to losses fails to reduce gambling behavior. Such a cycle may persist for years ultimately resulting in catastrophic financial losses and even suicide [39].

Challenges for future research include identifying those at-risk for gambling disorder by examining a combination of physiological and psychological characteristics such as blunted physiological reactivity and patterns of coping with stress. Additionally, organizing existing research and conducting future research according to different gambling subtypes may help to understand those who are most at-risk for relapse, treatment dropout, and the potentially different role stress plays for each subtype. Ecological momentary assessment studies or the use of wearables or mobile health apps would yield significant data to address these important questions about the role of stress and stress physiology in relapse. Those identified as high-risk may be provided with coping-skills training to shift away from emotion-focused coping and toward problem focused coping. Moreover, alternative interventions that restore stress physiology to healthy functioning are needed.

Conflict of interest statement

Nothing declared.

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