

**ANALYZING THE DETERMINANTS, PSYCHOLOGICAL CORRELATES, AND INTERVENTION STRATEGIES FOR ONLINE GAMING ADDICTION AMONG AVIATOR BET USERS IN NAIROBI COUNTY, KENYA**

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**ABSTRACT**

The rapid proliferation of digital gaming and betting platforms has fundamentally transformed patterns of leisure, economic participation, and behavioral health across the globe, with particularly acute implications for emerging digital economies in sub-Saharan Africa. The small but growing niche occupied by hybrid types of gaming-gambling games, like the Aviator Bet service, has combined real-time wagering systems with the high frequency nature of gaming in ways that increase the susceptibility to compulsive and addictive behavior. The overlap of efforts to provide a mobile financial infrastructure, most prominently M-Pesa, and a greater Sony number of more advanced online betting technologies has provided a space in which younger adult online gambling addicts are uniquely predisposed to form behavioral addiction patterns. The paper explores the predictors, mental factors, and treatment consequences of online gaming addiction between the users of Aviator Bet in the Nairobi County, Kenya with the two-fold aim of defining the extent of the issue, and analyzing evidence-based interventions. To obtain convergent qualitative and quantitative data, a parallel mixed-methods approach was used that combined quantitative survey data that was gathered on 248 participants who are adults and qualitative information obtained via the in-depth interview. The study sample was selected using stratified sampling in the different sub-counties in Nairobi, which is a diverse city and peri-urban area. The high prevalence of moderate to severe online gaming addiction was found as quantitative results, where 62.5% of the participants fit the criteria of engaging in a way that was considered to be clinically significant. Regression analysis proved the severity of addiction as a significant predictor of psychological distress (0.48,  $p < .001$ ) and significant positive correlation was identified between addiction severity and anxiety ( $r = .52$ ), depression ( $r = .49$ ) and perceived stress ( $r = .46$ ). Social outcomes were also evident with high addiction levels showing the existence of financial strain ( $r = 0.41$ ,  $p < .01$ ), interpersonal conflict ( $r = -0.37$ ,  $p < .01$ ). It is the qualitative data that complemented these quantitative trends by pointing to cognitive distortions such as illusions of control and gambler-type fallacy thinking, maladaptive coping styles, vulnerability of socioeconomic status and peer normalization as primary psychosocial influences in perpetuating and maintaining compulsive involvement. Individuals experiencing the Cognitive Behavioral Therapy (CBT) intervention groups had statistically and clinically significant mean skin scores for both addiction severity

( $\Delta M = -1.32$ ,  $p < .01$ ) and the level of psychological distress ( $\Delta M = -1.15$ ,  $p < .01$ ) which supports the validity of the structured psychological therapy in this group.

Substantive contributions to the sparse empirical research on hybrid gaming-gambling addiction in sub-Saharan Africa are also made in this research. It expands theoretical knowledge by combining Cognitive Behavioral Theory and Addiction Syndrome Model within a locally relevant context, and offers an evidence base on CBT-based intervention programming, specific to the Kenyan context of digital betting. Discussed are policy and clinical implications.

**Keywords:** online gaming addiction; hybrid gaming-gambling; Aviator Bet; cognitive behavioral therapy; behavioral addiction; psychological distress; Kenya; sub-Saharan Africa

## 1.0 INTRODUCTION

The rise of the digital economy has greatly transformed the world of recreational activities, economic involvement, and mental well-being. Sub-Saharan Africa has witnessed this change which has been stimulated by a convergence of technology development, growing mobile telecommunications infrastructure with the rapid use of mobile financial services. Specifically, Kenya has become a leader in digital financial inclusion in the region due to a high rate of adoption of M-Pesa and related mobile money services, which has reduced the costs of conducting financial transactions among millions of citizens who have been underserved in the past (Ndung'u, 2018). With these advances, although opening up significant economic potential, also emerged vehicles of risk which include most prominently easing access among psychologically and financially vulnerable populations to online environments of gaming and betting that are frequently predisposed to their addictive properties (Griffiths, 2017).

In Kenya, online gambling and internet betting have expanded exponentially, due to rising affordability of smart phones, increased mobile internet connectivity, and recent institutionalization of sports betting as a type of financial aspiration among young adults. The Kenya National Bureau of Statistics (2021) found that an estimate of male young men aged 18 to 35 in Urban Kenya showed that about 76 percent of men have participated in some type of sports betting or online gambling, which is yet other pointers to the magnitude of the phenomenon. Among the platforms that have come up prominently in this rapid landscape is the Aviator Bet, which stands out structurally. In contrast to conventional sports betting, Aviator Bet is a hybrid gaming-gambling gamut, where the combination of an exponential multiplier and real-time decision-making in a fast and immersive environment have been linked to a high addictive potential (Derevensky and Gainsbury, 2016).

The behavioral addiction perspective can note that the Aviator Bet has structural features of interest. The platform is based on the principle of fast betting cycles taking between ten and sixty seconds during which the player is expected to make a decision on which multiplier point to redeem their money before a virtual airplane flies away. This structure takes advantage of the fundamental psychological processes, such as variable ratio schedules of reinforcement, near-miss effects and illusion of controllable skill, which have been empirically correlated with the occurrence and persistence of compulsive gambling behaviors (Langer, 1975; Griffiths, 1993). The social comparison dynamics in a combined live chat feature and public leaderboards

are another advantageous integration that contributes to the influence of peers in facilitating longer engagement. All these characteristics make Aviator Bet a platform of high concern in the view of a mentally sound society.

The establishment of the classification of video gaming disorder as a formal diagnosis in the International Classification of Diseases, Eleventh Edition (ICD-11) by the World Health Organization (2019) marked a breaking point in scientific community resources on the clinical importance of behavioral gaming addiction. A gaming disorder is a recurring or persistent pattern of gaming in which there is a loss of control of gaming, progressive substitution of other interests in other activities in life with gaming and despite the appearance of some negative effects, gaming persists or increases. Empirical findings have persistently reported that gaming disorder is strongly related to various negative psychic consequences, such as anxiety, depression, feelings of loneliness, and social dysfunction (Király et al., 2022; Andreassen et al., 2016).

Although the numbers of individuals developing an addiction to Aviator Bet are increasing rapidly in Kenya and adjacent nations due to the emergence of digital betting, its impact on addictive behavior remains under study. Most of the extant studies on the topic of addiction to online gaming were carried out in high-income areas of Western or East Asia, and very little has been done to explore the unique socioeconomic, cultural, and infrastructural factors that define sub-Saharan Africa (Otieno et al., 2023). The above geographical and contextual gap in the literature is a great weakness to both the development of theory as well as the development of evidence-based policies. This set of socioeconomic circumstances, which prevails in the city of Nairobi and is being marked by high unemployment rates among young people and a condition of economic precarity, aspirational financial strains, and the lack of any formal recreational infrastructure, can be significantly determinative of the channels through which online gaming addiction is constituted and perpetuated in ways that have been materially different than those on more affluent settings.

This research fills these gaps by convergent parallel mixed methods analysis of these determinants, psychological correlates and intervention outcomes of online gaming addiction among adult Aviator Bet users in the Nairobi County in Kenya. The research study is guided by three broad research questions: First, to define the prevalence and severity of the online gaming addiction among this population, Second, to investigate the psychological and social correlates of the severity of addiction, and Third, to ascertain the efficacy of Cognitive Behavioral Therapy (CBT) as an intervention measure that has the effect of reducing the severity of the addiction and its associated psychological distress.

This research has three scholarly contributions. First, it produces empirical evidence of hybrid gaming-gambling addiction in an African, sub-Saharan setting, which answers an important and under-researched geographical gap in the world of behavioral addiction literature. Second, it incorporates both Cognitive Behavioral Theory and the Addiction Syndrome Model into a unified consistent theoretical framework, a multi-dimensional view of the interactions between individual cognitive processes and platform design features and the general state of the socioeconomic situation that produces and maintains the state of addicted behavior. Third, it assesses the practicality of CBT-based interventions in the Kenyan context to add practice-

based evidence to mental health practitioners, policymakers and platform regulating forces that work in comparable emerging digital economies.

## 2.0 LITERATURE REVIEW

### 2.1 Structural Determinants of Online Gaming Addiction

Addictive qualities of online gaming platforms are immensely dependent on the structural design properties of the platform, the exact mechanics, the reward architecture and the social system that is engineered into the platform that determine how individuals respond psychologically to it. Griffiths (2017) is one of the most prolific theorists in defining the interrelation between the structural properties and addictive involvement, hypothesizing that signs like randomly changing schedules of rewards, high rate of events, and the inclusion of near-miss results are the most important psychoactive constituents of gambling and gaming products. Variable ratio reinforcement of schedule where the reinforcers are provided at random times and after random numbers of responses has long formed the basis of being the least vulnerable schedule to extinction, i.e. the behaviors reinforced by this schedule are the most intractable and obsessive (Skinner, 1938; Blaszczynski and Nower, 2002).

Hybrid gaming-gambling models integrating traditional gameplay features like character avatars, storylines, leaderboards and real-life interaction with real-money gaming are the continuation of these structural risks. According to King et al. (2020), the inclusion of financial resources in gaming arrangements has a strong influence on emotional arousal in the game and reinforces the positive loops of reinforcement which generate compulsive engagement. The high rate of events of service to platforms like Aviator Bet (with one round taking up to ten seconds) multiplies these effects by multiplying enormously the number of potential reinforcement events per session, which accelerates the establishment of habitual and eventually compulsive betting patterns.

The effect of near-misses, where the outcome is near, but not a win, has been found to activate the similar neural reward systems as outcomes actually obtained, cited as motivation to continue playing even when they result in losing (Clark et al., 2009). In Aviator Bet, with its multiplier mechanic where players externally decide when to cash out before the plane crashes, a structural analogue to the near-miss effect is players that cash out early in a game (with a low multiplier) and watch the plane continue to climb has a near-miss phenomenon, whereas players that wait too late and fail to cash out as well have the classic near-miss phenomenon. This twofold near-miss interaction might be especially powerful in maintaining compulsive play.

### 2.2 Psychological Findings of Online Gaming Addiction.

The literature on problematic gaming and gambling has psychological correlates and was overall robust in showing associations between severity of addiction and anxiety, depression, stress, loneliness, and low self-esteem (Király et al., 2022; Kuss and Griffiths, 2012). The direction assumption of such relationships is also a matter of theoretical speculation, with data both supporting a vulnerability hypothesis, according to which addictive gaming results in secondary psychological distress due to social, economic, and occupational disability, and

supporting a consequence hypothesis, according to which addictive gaming is preceded by underlying psychological distress (Andreassen et al., 2016; Billieux et al., 2015).

The aspect of cognitive distortions is particularly central in developing and maintaining addictions related to gambling. According to Delfabbro and King (2015), some types of erroneous thinking that reinforced compulsive gambling behavior are illusion of control, where gamblers overestimate the extent to which their decision would affect randomness, the gambler fallacy, where gamblers assume that past losses would increase their future wins, and optimism bias, where gamblers tend to focus on and remember gains and downplay losses. The conventions of most gambling services encourage these distortions, and they feature services like skill-signaling interfaces and win celebrations that reinforce the illusion of control and preferable results (Griffiths, 2017).

Another psychology correlate and causal pathway of online gaming addiction is emotional dysregulation. Brand et al. (2019) suggest that gaming and gambling habits are maladaptive coping strategies of those struggling to control negative affective states and offer temporary relief of emotional distress at the same time supporting avoidant coping behavior and fuelling underlying psychological vulnerability. This model is based on the conceptual framework of emotion regulation and avoidance coping, and has been proven empirically correct in many cross-sectional and longitudinal studies (Carver and Connor-Smith, 2010; Koob and Volkow, 2016).

### **2.3 Sub-Saharan Africa Socioeconomic/Cultural Context.**

Although the current body of literature on online gaming addiction has potentiated a sound evidence-base with respect to psychological processes involved, relatively little has been attributed to the influence of socioeconomic and cultural factors on addiction susceptibility, especially in the sub-Saharan African context. Otieno et al. (2023) comprised one of the few Kenya-based studies concerning the behavior of online betting and discovered that only economic aspiration (the willingness to add income to it in circumstances of low access to formal jobs) was identified as the most frequent, still, motivation to persistent engagement in betting activity among the young Nairobi men. This result highlights the significance of locating the online gaming addiction studies in the wider socioeconomic context of the populations being studied.

Kenyan youth unemployment (estimated at around 35% of people between 15 and 24 by the World Bank (2022)) when it causes claims of financial precarity and motivational vulnerability can potentially interact with online betting designs features in extraordinarily productive ways. Cognitive framing of risk and loss when it becomes evident that betting can be viewed as a viable alternative source of revenue as opposed to a mere source of entertainment also changes the psychological boundaries that would otherwise curb the compulsive and obsessive involvement in betting (Derevensky and Gainsbury, 2016; Otieno et al., 2023).

Peer influence is another important aspect of the socioeconomic environment under which Aviator Bet addiction is carried out in Kenya. Peer normalization, or the idea that betting is trivially seen as a normal and expected social behavior by the reference group, has always served as a contribution to both initiation and persistence of problematic gambling behaviors

according to qualitative studies (Otieno et al., 2023). Social characteristics inherent in the Aviator Bet platform design, such as shared betting rooms, community leaderboard, and the ability to chat with others, can directly enhance peer influence dynamics as the social aspects of betting become strongly apparent and salient during the playing process.

## 2.4 CBT Interventions Gaming Addiction.

CBT has become the empirically validated psychological treatment of gambling and gaming disorder and a significant amount of randomized controlled laboratory evidence has been found to support the utility of CBT in various populations and contexts (Cowlshaw et al., 2012; Merkouris et al., 2016). CBT of gambling disorder is usually aimed at the cognitive distortions that perpetuate compulsive behaviors and behavior patterns (such as avoidance coping and habitual gaming patterns) that perpetuate addictive cycles. The main components of CBT are cognitive restructuring, conducted to alter inaccurate gambling beliefs, behavioral activation to create new rewarding pastimes, training in problem-solving skills, and relapse-planning (Petry et al., 2006).

There has been an increasing amount of evidence on behavioural addiction adaptation of CBT to digital and technology-based behavioural addictions such as online gaming disorder and problematic social media use. It was shown that one of the CBT protocols, CBT-IA, which is a specially designed CBT protocol tailored to the problem of internet addiction, is effective in the alleviation of the compulsive online activities and related psychological distress (Young, 2011). These results have later been augmented by other research to gaming unique addiction situations, restricting Muesser and Gingerich (2011) registering important enhancements in functioning and psychological condition of participants handled by modified CBT plans to gaming ailment.

In the African setting, there is limited empirical nature of CBT-based interventions in behavioral addiction settings, but the theoretical basis of applicability of CBT across cultural settings is well established (Bhui and Morgan, 2007). The current research also adds to this emerging literature by assessing the effectiveness of CBT intervention on a Kenyan sample of online game addicts by offering context-specific evidence to support the implementation of evidence-based strategies to the sub-Saharan African context.

## 3.0 THEORETICAL FRAMEWORK

### 3.1 Cognitive Behavioral Theory

The paper will be mainly based on the Cognitive Behavioral Theory (CBT), as described by Beck (2011) and applied to the context of behavioral addiction, by Blaszczynski and Nower (2002) in their Pathways Model of problem gambling. CBT imagines addictive behavior as the outcome of the interaction between maladaptive cognitive schemas, automatic thoughts, and learned behavioral responses, which are perpetuated by reinforcement contingencies, and avoidance patterns. Translated to online gaming addiction, CBT offers the interplay between distorted notions regarding the gaming results (illusions of control, gambler/fallacy thinking, cognitive distortions towards the selective attention to win) and emotional distress and responses of avoidance to reinforce the compulsive action.

Cognitive model by Beck (2011) holds that core beliefs or, in other words, deep, usually automatic beliefs about the self, others and the world generate intermediate beliefs and thoughts on an automatic basis, which influence the emotional responses and choice of behavior in certain scenarios. Core beliefs, like I can overcome the system, being a clever gamer or being deserving of winning because I need the money, can interact with automatic thoughts in the gameplay in the Aviator Bet addiction, justifying irrational risk-taking and the persistence of the game to my losses continue. CBT addresses various points up this cognitive ladder, both at surface levels (using thought records and Socratic questioning) to address surface-level automatic thoughts; and at the deeper core belief systems using schema-focused interventions.

### 3.2 Addiction Syndrome Model.

As proposed by Shaffer et al. (2012), the Addiction Syndrome Model does not resulted to a group of independent disorders that are only differentiated by a object of addiction, it instead should be viewed as a unit underlying syndrome that manifests itself through a variety of behavioral manifestations, varying depending on vulnerabilities and environmental exposures, and the behavioral options open to the individual. This model is especially applicable to hybrid gaming-gambling addiction as it explicitly considers the role of platform-specific factors, peer setting, and the socioeconomic status in the development of the behavioral manifestation of a manifestative addictive syndrome.

The Addiction Syndrome Model suggests that the emergence of addiction follows a shared pathway as indicated by antecedent factors, such as genetic predisposition, stressful environments during formative years, exposure to rewarding platforms, or a major financial victory; triggering, such as further reinforcement, socialization of addictive behaviors, and the formation of cognitive rationalizations; and sustaining, such as peer pressure to adopt addictive behaviors or the emer This multidimensional etiological model is very similar to the multicausal, complex image of Aviator Bet addiction that is formed on both based on the literature review and based on the qualitative data that are obtained in the given study.

The combination of CBT and the Addiction Syndrome Model into the contextual framework allows the current study to expand accounts on both the micro-levels of cognitive and emotional phenomena that determine individual addictive behavior and the macro-level of social, economic, and environmental phenomena that primes and exemplifies the vulnerability and expression of addiction at the population-wide levels. This theoretically integrative method is especially appropriate towards the multifaceted, contextually entrenched phenomenon of online gaming addiction among urban Kenya.

### 4.0 CONCEPTUAL FRAMEWORK

The theoretical propositions of the CBT and the Addiction Syndrome Model have become operationalized in the conceptual framework of this study and on the context of Aviator Bet addiction in the Nairobi County. The online gaming addiction is regarded as the multidetermined result of online interaction in three main areas: psychological, social, and platform-related.

Psychological processes include cognitive distortions, namely, the constellation of untrue beliefs and attribution patterns that maintain irrational use of the site, and emotional

dysregulation in the form of the implementation of gaming as a maladaptive tool to cope with negative affective states of anxiety, boredom and/or depression. Peer influence, social pressure to engage in community betting, and the influence of financial aspirations determined by the apparent social success of individuals who seem to win through betting are all the social forces. Platform characteristics are the structural design elements of Aviator Bet, such as its variable reward schedule, fast rate of event, near-miss mechanics, and social features of engagement, which play off their psychological vulnerabilities and increase their addictive capacities.

In this theoretical model, CBT interventions are theorized to act in two ways, cognitive restructuring, that targets the distorted beliefs and automatic thoughts that maintain the compulsive engagement, and behavioral skills training, that develops other coping repertoires and decreases the functional reliance of gaming, as a regulation mechanism. The anticipated CBT intervention outcome is a decrease in severity of addiction and related psychological distress that are mediated by the modification of the level of cognitive distortions and quality of coping strategies. The framework contrasts the testable hypotheses that will be tested in the quantitative part of the study, and the qualitative thematic analysis scaffolded by interpretive interactions.

## 5.0 METHODOLOGY

### 5.1 Research Design

The current study adopted a convergent parallel mixed-methods design which involved collecting and analyzing quantitative and qualitative data concurrently and later integrate the results during the interpretation phase (Creswell & Plano Clark, 2018). The design has been chosen due to the possibility of complementary triangulation of results, where quantitative approaches can be used to provide statistical descriptions of prevalence levels, patterns of association, and magnitude of intervention effects, and where qualitative approaches can shed light on the experiential, motivational, and contextual aspects of addiction that is not adequately represented by standardized self-report measures.

The convergent parallel design is especially applicable to studies on intricate phenomena of behavior like online gaming addiction where the numerical parameters that define the problem under consideration and the lived experiences that endow those parameters with meaning are critical parts of a holistic explanation. This design allows producing both empirically rigorous and practically applicable rich, contextually based findings by considering both quantitative and qualitative results in the interpretation phase instead of prioritizing one approach over the other.

### 5.2 Study Population and Sampling.

The sample population included adult Aviator Bet users who are aged 18 years and above and those living in the Nairobi County, Kenya. The study site was the Nairobi County due to its position as the biggest urban location in Kenya and the main concentration of digital economic facilities in the nation, which also entails on-line betting and online gambling. The stratified sampling method has been used to give a representative ratio within the various urban sub-counties of Nairobi, the strata being based on geographic zone, gender, and age group.

The quantitative sample included 248 participants who were recruited in the community of the Aviator Bet users reached via an alliance of online applications, community-based associations, and peer-referral networks. The determination of sample size was informed by power analysis taking into consideration sufficient power ( $1 - \beta = .80$ ) to identify medium effect sizes at the traditional alpha (.05) in multiple regression tests. The size of the qualitative sub-sample of 18 subjects was purposely chosen among the general quantitative sample to ensure that the research will have as many types of addiction severity levels as possible, represent both genders, and demonstrates socioeconomic backgrounds, which is true of purposive maximum variation sampling that is employed in qualitative research (Patton, 2015).

### 5.3 Data Collection Instruments

A set of tested standardized psychometric tests were used to collect data in the form of quantitative data. The Internet Gaming Disorder Scale, Short Form (IGDS9-SF; Pontes et al., 2015), a nine-item scale derived to fit the DSM-5 requirements of Internet Gaming Disorder, and with good internal consistency (Cronbach  $\alpha = .87$ ) and convergent validity to existing measures of gambling were used to measure online gaming addiction severity. Psychological distress was measured in terms of Depression Anxiety Stress Scale-21 (DASS-21; Lovibond Lovibond, 1995), a psychological measure consisting of three different subscales of depression, anxiety, and stress, which are all shown to have good psychometric measures in different cross-cultural contexts. In social consequences, adapted questions based on the SOGS (Lesieur and Blume, 1987), the financial strain and the interpersonal conflict, which could be attributed to gambling and gaming practices, were used.

The semi-structured one-on-one interviews in either English or Kiswahili (depending on the participant) were used to gather qualitative data, which were later transcribed and translated by qualified bilingual research assistants. The interview guides were formulated on the conceptual framework of the study and contained open-ended questions on the exploration of initial motivations behind the participants gaming behavior as well as their description of the gaming behavior patterns, perceived results of gaming, cognitive and emotional experiences during their play, social and financial effects and their perceptions of help-seeking and intervention. Tapes were audio-recorded during the interviews with the consent of the participants and transcribed verbatim.

### 5.4 Intervention Protocol

Those participants who achieved the moderate or severe online gaming addiction level (IGDS9-SF score  $\geq 21$ ) were provided with an opportunity to participate in a structured CBT intervention program conducted within six sessions each about 60 minutes in the form of a weekly session. CBT protocol had been based on empirically-tested treatment manuals of gambling disorders developed/tested in the works of Petry et al. (2006) and Young (2011), and the adjustments were made to fit the cognitive distortions/behavioral patterns peculiar to the Aviator Bet activity. The type of information presented in the session was psychoeducation regarding the mechanics of online gaming addiction, the structural organization of Aviator Bet, cognitive experiments and cognitive restructuring practices with relation to platform-specific erroneous cognitions, behavioral activation and alternative activity

assembly, training in platform-specific errors on problem-solving and relapse prevention planning.

The IGDS9-SF and DASS-21 were used as pre-and postintervention measures that made it possible to obtain the mean change scores and statistically evaluate the effectiveness of interventions. A drawback is that, as a limitation, the analysis of the intervention was not designed on a randomized controlled trial basis, considering that no control condition was used, and a subsequent comparison of change scores on pre- and post-intervention should be treated with due caution.

## 5.5 Data Analysis

An analysis of the quantitative data was carried out with help of the IBM SPSS Statistics Version 26. To describe the sample and set the prevalence estimates, descriptive statistics were calculated. Pearson product-moment correlations were done to measure bivariate relationships of variables of addiction severity versus variables of psychological distress. The analysis was done using multiple regression analysis to investigate the predictive covariance of the severity of addiction and psychological distress, and eliminate the threat produced by appropriate socio-demographic covariants. The comparisons utilized the paired-samples t-tests in pre-post interventions and results were measured in terms of Cohen d.

Reflexive thematic analysis has been used to analyze qualitative data based on the six steps outlined by Braun and Clarke (2006, 2021): familiarization with data, first round of coding, theme creation, reviewing and refining themes, theme definition and naming, and report creation. It was performed following iterative procedures of engaging in an analytic process through repeated coding and constant comparisons of all cases to reach analytic rigor. A subset of the participants, called the member checking, was done to check the interpretive framework created by the thematic analysis.

## 5.6 Ethical Considerations

The KCA University Institutional Review Board gave ethical approval of this study. All the subjects signed a written informed consent before the study and were comprehensively aware of their right to pull out of the study anytime with no ramifications. It ensured participant anonymity by assigning each participant a special identifier code and keeping all identifying details in a separate storage, apart of research data, following data protection laws. Individuals who underwent high-levels of psychological distress were also provided with referral to relevant mental-health services. The qualitative interviews were made to be private to facilitate confidentiality of the participant disclosures.

## 6.0 RESULTS

### 6.1 Characteristics of the samples and prevalence of addictions.

The overall sample of analysis included 248 participants who used Aviator Bet in the state of adulthood, including 178 (71.8) men and 70 (28.2) women, which was representative of the overall distribution of Online Betting users in Kenya. The age of the participants was between 18 and 47 years, with a mean age of 26.3 years (SD = 5.7) which is in line with the fact that

online gaming populations are mostly made up of young adults. Educationally, 43.5% had secondary school certificates, 38.7% had undergraduate degrees or diplomas, and 17.8% had post-graduate qualifications. Most participants (62.1) had monthly incomes of less than KES 30,000 and 34.7% identified as unemployed or casually employed which underscores the financial precarious nature of Aviator Bet activities where most of the activities take place.

Prevalence analysis showed that 62.5% of the participants ( $n = 155$ ) had moderate to severe levels of online gaming addiction based on the IGDS9-SF. In particular, 38.3% ( $n = 95$ ) had moderate cases (IGDS9-SF scores 21-35) and 24.2% ( $n = 60$ ) had severe case (IGDS9-SF scores 36 or more). The rest (37.5 percent,  $n = 93$ ) were mild or subclinical engagements. These prevalence rates are considerably higher than the rates of gaming disorder found in general population studies that are conducted in high-income countries and are usually valued between 1% and 10% (Przybylski et al., 2017), which makes the profile of the Aviator Bet users particularly vulnerable to this socioeconomic area.

## 6.2 Correlation of psychological variables with the severity of addiction.

The relationship between the severity of addiction and total psychological distress (DASS-21 total score) was put through multiple regression analysis to assess the predictive value with age, gender, educational attainment, and monthly income held. The entire regression equation was significant,  $F(5, 242) = 23.47$ ,  $p < .001$ ,  $R^2 = .326$ , and this implies that the entire set of predictors explained the variance of psychological distress, which was approximated to be 32.6. The level of addiction was found to be the most significant personal predictor of psychological distress ( $\beta = 0.48$ ,  $p < .001$ ) and the standardized coefficient is significant, showing a positive relationship.

The bivariate correlation analysis showed that there were significant positive relationships between the severity of addiction and all three subscales of psychological distress of anxiety ( $r = .52$ ,  $p < .001$ ), depression ( $r = .49$ ,  $p < .001$ ), and perceived stress ( $r = .46$ ,  $p < .001$ ). These levels of correlation are comparable to the same ones in meta-analytic reviews of the gaming disorder literature (Mihara and Higuchi, 2017) and indicate that the psychological burden linked with problematic Aviator Bet activity is strong and statistically significant. Anxiety was most closely related to addiction severity, which could be attributed to an increased physiological arousal and rise of anticipatory concern related to the high-stakes fast-paced nature of Aviator Bet gameplay.

Regression analyses also showed that financial strain ( $\beta = 0.41$ ,  $p < .01$ ) and interpersonal conflict ( $\beta = 0.37$ ,  $p < .01$ ) were significantly related to higher levels of addiction beyond their sociodemographic variables. These social consequences are congruent with theoretical models, in which financial incapacity and relationship-damage are main indicator of the shift between recreational and problematic gambling behaviour (Blaszczynski and Nower, 2002). Financial strain association was especially high in the subsample of individuals who were in the severe addiction group, with 78.3% of them stating having borrowed money to finance their gaming habits, and 54.2% stating having missed bill payments due to betting spending.

## 6.3 Qualitative Results: Thematic Analysis.

Semi-structured interviews of the population yielded semi-structured interview data, which were subjected to the thematic analysis to reveal four main themes that shed light on psychosocial processes underlying the development of Aviator Bet addiction in the population: (1) cognitive distortions and illusions of control; (2) emotional dysregulation and maladaptive coping; (3) peer normalization and social embeddedness; and (4)

The former, cognitive distortions and illusions of control, was the most common theme in which participants tended to give credit to their betting defeats to skills and strategy as well accumulated experience, as opposed to randomness. Several respondents cited detailed methods that they used to know when the multiplier was about to run out of control, such as tracking past results of rounds, finding hot and cold times in the gaming sessions, and scheduling their participation based on their rhythms in the behavior of the platform. These stories are based on a textbook illusion of control, where the Aviator Bet algorithm is controlled by a certified random number generator that is by definition unpredictable to patterns. The fact that these distorted beliefs and ideas persisted even with acknowledgment of the participants in the experiment that they frequently lost, points toward the strength of the established gaming addiction in terms of cognitive entrenchment.

The second theme, emotional dysregulation and maladaptive coping, was apparent in several participant reports on the use of Aviator Bet as an emotional distress coping mechanism, especially anxiety, boredom, the mental burden of unemployment and financial hardship. They gave a typical emotional cycle of the observed process: excitement and anticipatory pleasure at the time of the login and early playing, increasing anxiety at the time of active betting, a sense of euphoria or deep disappointment at the conclusion of the round, a compulsive desire to re-involve themselves at the loss, prompted by the need to get the money back and the emotional situation linked to the loss. This process can be superimposed onto the emotional processing model of gambling disorder, developed by Sharpe (2002), and helps justify the idea that Aviator Bet engagement can be considered a type of affect regulation behavior.

The third theme was peer normalization and social embeddedness that emphasized the importance of social context that is instrumental in maintaining engagement. Players referred to gambling as a very social act, and they gamble in groups at cyber cafes, in shared residential areas, and even in WhatsApp groups where they share tips, rejoice over victories, and mourn over losses. It was the apparent achievement of other others, which the informal social network and the inherent leaderboard/live chat functionality of the platform increased, that generated strong social comparison pressures that internally influenced them to keep engaging more and more. Some of those interviewed indicated that attempting to stop or cut their betting socially threatened them because they would risk ostracizing themselves within or among others in things connected to Aviator Bet such as ranking it as an activity central to peer groups and networks.

The fourth, economic aspiration and financial entrapment, best embodied the unique role in helping Kenya's socioeconomic context to define the meaning and purpose of Aviator Bet involvement among young adults with constrained formal opportunities in the economy. Overwhelmingly, participants explained their first involvement by stating that it occurred due to economic reasons as they hoped to offset inadequate formal earnings or that they needed money toward a particular financial aim, like school fees, rent or family needs. This aspirational

framing, however, over time was gradually replaced by a loss chasing pattern whereby players more and more bet in an effort to restore past losses, instead of gaining new profits. This rising financial desperation compounded psychological distress and entrenched compulsive participation in a self-perpetuating cycle of financial entrapment.

## 6.4 Intervention Outcomes

Among the 155 respondents who qualified to be categorised into moderate or severe addicts, 87 (56.1) respondents accepted to join the CBT intervention program. Statistically significant pre-to-post decreases in the extent of addiction and the level of psychological distress were found with paired-samples t-tests. Mean IGDS9-SF scores decreased from 31.6 (SD = 6.3) at baseline to 30.3 (SD = 5.8) at post-intervention, representing a statistically significant mean reduction ( $\Delta M = -1.32$ ,  $t(86) = 3.84$ ,  $p < .01$ ,  $d = 0.41$ ). Mean DASS-21 total scores decreased from 28.7 (SD = 8.1) at baseline to 27.6 (SD = 7.6) at post-intervention, again representing a statistically significant improvement ( $\Delta M = -1.15$ ,  $t(86) = 3.21$ ,  $p < .01$ ,  $d = 0.35$ ). The small to medium effect sizes are similar to those seen in short-term studies regarding Intervention with gambling disorder using CBT in similar environments (Cowlshaw et al., 2012).

These data on outcome were additionally interpreted with qualitative interview data of the intervention participants to provide more context. Cognitive restructuring exercises were especially helpful in challenging their long-standing untested faith in ability and control in Aviator Bet, with many citing a process of gradually acknowledging the structural randomness of the platform and its incompatibility with their self-originated strategies. Components of behavioral activation that help the participants to gain other rewarding activities to occupy their work time in gaming were rated to be highly acceptable and useful in practice. Some participants saw relapse prevention components as less salient, which is an indicator of the initial recovery phase within the six-session protocol time period.

## 7.0 DISCUSSION

### 7.1 Population and the extent of Online Gaming Addiction.

The fact that 62.5 percent of the sample of Aviator Bet users were moderate to severely addicted is an eye-opener and sobering portrayal of the magnitude of the behavioral health issue that hybrid gaming-gambling sites present in urban Kenya. Such a prevalence rate is well above the estimates based on general population samples and even based on the samples of online gamblers in high-income countries (Przybylski et al., 2017; Mihara and Higuchi, 2017), indicating that Aviator Bet might be a particularly high-risk exposure compared to other forms of gaming and gambling. The structural properties of the platform, namely its fast rate of events, multiplier, and sociality are also likely causative factors in this high prevalence rate, as it saturates the occurrence of reinforcement events per unit of time and ingrains addictive interaction in highly normalized social structures.

These results are aligned with the theoretical model of drinking in King et al. (2020), as the places hybrid gaming-gambling platforms into a superior, more powerful risk of behavioral addiction than either conventional gambling products or online conventional games. They also coincide with the accumulating literature on the association between high event frequency gambling designs including electronic gaming machine and internet-based rapid-cycle betting

with high levels of problem gambling among general population sample (Blaszczynski and Nower, 2002). The current results are the first to apply this evidence base to the sub-Saharan African context, showing empirically that the addictive risk with higher frequency formats of gaming-gambling is not limited to high-income Western environments.

## **7.2 Psychological Correlates and Theoretical Implications.**

The high level of correlation between the severity of addiction and anxiety, depression, and stress in the current sample support and enrich the current literature on the psychological correlates of the gaming disorder (Király et al., 2022). The regression result that the severity of addictions is the only most robust predictor of psychological distress controlling sociodemographic variables indicates that addictive gaming engagement and psychological ill-health are not simply a result of confounding socioeconomic disadvantage, but indicate a direct, strong relationship. This observation fits a bi-directional projection of gaming addiction, where already existing psychological distress acts as a predisposing variable of putting an individual at risk of addictive involvement, and long-lasting addictive involvement also produces extra dimensions of psychological distress, based on monetary, relationship, and job losses.

The current research lends CBT theory by showing how the special design characteristics of the particular game Aviator Bet make the use and exaggeration of the identified cognitive distortion, illusion of control, gambler of fallacy and optimism bias as the core perpetuating supports of addictive behavior. The observation that the members of both the paradigms of addiction severity supported detailed, internally consistent predictive strategies of anticipating the random results of the platform sheds a rich qualitative picture of the constructs of cognitive distortions and illusion of control because they anchored the abstractions to the certain phenomenological reality of Aviator Bet addiction in Nairobi. These qualitative results back the theoretical rationale of CBT as the tool of choice of intervention in this population.

## **7.3 Socioeconomic and the Addiction syndrome Model.**

The qualitative theme of economic aspiration and financial trappings offers especially good evidence of the Addiction Syndrome Model to study the contingency between the particular vulnerabilities of an individual and the external environmental factors to become an addictive behavior developer and sustainer (Shaffer et al., 2012). The unique Kenyan socioeconomic situation, with extremely high unemployment rates among young people, aspirational stress, and cultural legitimization of betting as a valid method of income generation, can be seen as a potent contextual risk factor that works via increasing the addictive potential of the already risky structural features of Aviator Bet. This process of interaction between the psychology of an individual and environmental context cannot sufficiently be explained by a cognitive model of addiction and demonstrates the theoretical importance of embracing a wider and more multidimensional approach that is provided by the Addiction Syndrome Model.

The peer normalization theme is also used to demonstrate the social-environmental aspects of addiction etiology that have been pointed out by the Addiction Syndrome Model. This particular embedding of Aviator Bet into peer group social structures, supported by the social design features of the platform itself, implies that the phenomenon of addictive behavior is not an idiosyncratic individual pathology but a social phenomenon structured and enforced in a

collectively organized way. This contains significant implications in the way interventions are designed: purely individual oriented CBT interventions will only be partially effective unless they are complemented by other interventions that have to address the social and environmental perpetrators of addictive engagement at the community-level.

## 7.4 Effectiveness and Clinical Implications of the Intervention.

The statistically significant changes in the severity of the addiction and the psychological distress that occurred between pre- and post-CBT intervention are positive but small-scale signs of the prevalence of CBT in curbing the damage that Aviator Bet addiction has caused in the Kenyan population. The small-to-medium effect sizes found can be compared to those found in short-term CBT intervention of gambling disorder in general (Cowlshaw et al., 2012), and will probably underscore the possible efficacy of more intensive or prolonged treatment regimens. The six-session intervention format used in the current study is a pragmatic margin that can be provided to prove the effective application of the intervention in a research scenario, yet clinicians, who work with severely addicted people, would be encouraged to provide them with more of an intensive treatment package, including the utilization of more sessions, group formats, and motivational enhancement elements.

Qualitative intervention exit interview data showed that cognitive restructuring was found to be the most effective part of CBT program and exercises that directly targeted the platform-specific cognitive distortions of the participants in terms of pattern recognition and strategy based on skill. This result is consistent with the conclusion of the CBT theory that no other therapeutic approach is as powerful as the one that directly aims at the particular cognitions that sustain addictive behaviour instead of offering a general training in coping mechanisms. It also notes how CBT protocols need to be adapted to the particular content of the cognition one is targeting rather than trying to implement the gambling treatment protocols developed previously to gambling-based situations to the hybrid gambling-gaming setting of Aviator Bet.

## 8.0 STUDY LIMITATIONS

The findings of this study have a few limitations that need to be taken into consideration. To begin with, the cross-sectional nature of the main survey does not allow to make a causal conclusion about the directionality of the identified relationships between the severity of addiction and psychological distress and social consequences. The longitudinal research design that uses repeated measurements with time are needed in order to obtain the time precedence to draw conclusions about the causality and to follow the natural course of the Aviator Bet addiction among the population of interest.

Second, the use of self-reported data to measure the severity of addiction, psychological distress, and social impact results exposes the risk of bias in responses, such as social desirability bias, recall bias, and underreporting of responding to socially disapproved behaviors. The triangulation of self-reported data with recording and information of behavior (e.g. platform use logs) and informant-reported data (e.g. family members or close peers) would be advantageous in future research to strengthen the validity of the addiction severity measurements.

Third, the geographic focus of the study to Nairobi County limits generalizability of findings to other Kenyan locations, such as smaller urban centers and countryside, which might be different than Nairobi in terms of socioeconomic makeup, digital infrastructure, cultural attitudes towards betting, and availability of mental health services. A study that goes beyond Kenya to other geographic areas and into other sub-Saharan African nations which have similar digital betting landscapes would enhance the body of evidence significantly.

Fourth, the analysis of intervention was not done using a randomized controlled trial design. There is no randomized control condition that allows concluding that pre-to-post differences in the severity of the addictions and psychological distresses are unambiguously due to the CBT intervention, as it could be possible that they are some consequences of a regression to the mean, or some natural processes of recovery, and are not necessarily a result of the specific CBT techniques used. The evaluation of CBT in Aviator Bet addiction should be a priority of future research employing the method of randomized controlled trials with active control groups to determine the efficacy of causal interventions.

Fifth, the purposive selection method of qualitative participants, though maximizing variability, cannot be claimed to be representative of qualitative results to the general population of Aviator Bet users. The lived experiences and views documented in the qualitative data must be interpreted as representative and theoretically reflective as opposed to being statistically representative.

## 9.0 CONCLUSION

In this study, the most thorough and hitherto known empirical exploration of online gaming addiction amongst Aviator Bet users in the Nairobi County, Kenya has been conducted as quantitative data of prevalence and association and qualitative data of thematizing understandings combine to create a multidimensional image of a mass and a growing behavioral health concern. The result of almost two-thirds of the Aviator Bet users included in the sample having moderate to severe addiction qualifies the high-levels seriousness of the need to respond with evidence-based interventions at both clinical and policy levels.

The high correlations between the severity of addictions and anxiety, depression, stress, financial stress, and interpersonal conflict report the pronounced individual and social expenditures of Aviator Bet addiction, and makes it a behavioral health concern requiring similar attention and resource investment as other developed national mental health priorities in Kenya. The qualitative thematic results serve as an insight into the psychosocial processes by which the design elements of the platform are configured with the unique socioeconomic context of Nairobi and generate the subject matter of superior addiction risks, especially in the context of economically precarious young men who find betting to be an aspirational sense maker approach to income generation.

Although the pre-experimental level of intervention analysis precludes strong evidence that CBT proves effective in minimizing the severity of the addiction and the psychological distress, the evidence presented supports the importance of prioritizing CBT-based methods in the developing behavioral addiction treatment facilities in Kenya. Cognitive Behavioral Theory and the Addiction Syndrome Model as integrated in a culturally situational context provides a

theoretically based base to view the multidetermined nature of the Aviator Bet addiction and to develop interventions that can address both the cognitive and environmental predictors.

## 10.0 IMPLICATIONS AND RECOMMENDATIONS

### 10.1 Policy Recommendations

The results of this research have important implications on the regulation of the hybrid gaming-gambling infrastructure in Kenya. Mandatory changes to the structures of the platforms with high addictive risk profiles (such as minimum round length so that the number of events can be reduced) and restrictions on the maximum amount of money deposited within a day should be considered by the Betting Control and the Licensing Board. Rigid gambling structures like Aviator Bet must be held accountable to incorporate responsible gambling, e.g. self-exclusion, reality check, and direct connection to mental health support services as operating licensure conditions.

Further messaging campaigns on the topic of online betting addiction among young adults should focus on the structural aspects of the issue in Kenya because aspirational economic frames of betting that arise in the qualitative data can be defined as a key cause of initial and long-lasting obsession. These campaigns could use co-designing with the affected community members to achieve cultural relevance and credibility.

### 10.2 Clinical Recommendations

In Kenya, mental health systems need to create and publish standardized CBT-based regimens of treatment that were further customized to hybrid gaming-gambling addiction. The assessment and treatment of behavioral addiction should be included into the training of counseling psychologists, clinical social workers and community health workers, and special emphasis should be placed on the peculiarities of the digital gambling addiction as a separate disorder, compared to the gambling disorder in the traditional understanding. Since inexpensive and convenient elevators to mental health service are not economically available to the majority of the Aviator Bet users (largely young, 25 and under) phenotyped in this study, the further development of low cost and technology-based forms of CBT, such as digital CBT programs delivered via mobile phone should be given priority investment.

### 10.3 Research Recommendations

Future research on the same ought to focus on longitudinal studies that can be used to determine the developmental pathway of Aviator Bet addiction and the causal directionality of its links on psychological distress and social effects. Randomized controlled trials comparing CBT and other interventions such as motivational interviewing, acceptance and commitment therapy, and family-based interventions would contribute significantly to improving the clinical practice evidence base. A study that goes further to other hybrid gaming-gambling systems that have become prevalent in Kenya and the locales and a compare and contrast study across the sub-Saharan African environments would add to a more coherent local evidence base. The design and testing of culturally suitable instruments of assessing behavioral addiction in the African people is also a priority as there are shortcomings with using instruments designed and normed in the west.

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