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A Digital Counter-Gambling Intervention for Online Gambling Students Using Interactive Mobile Application Messaging

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Background and Purpose: Gambling Disorder (GD), particularly in its online form, presents a significant public health concern, especially among young university students in contexts like Kenya. This study aimed to develop and evaluate a strategy for promoting responsible online gambling among second- and third-year students at Kisii University.
Methods: Utilizing a diagnostic design across three phases, the research first investigated the prevalence and patterns of Online Gambling Disorder (OGD) among a randomly selected sample of 500 students (429 respondents, 86% response rate) using the South Oaks Gambling Screen (SOGS) and Problem Gambling Severity Index (PGSI). Based on this diagnosis, a structured digital intervention framework, named the ICGIM system, was designed and developed. The system's creation followed an iterative methodology grounded in User-Centered Design (UCD) and Agile principles, incorporating insights from behavioural psychology and stakeholder consultations. The intervention was then implemented over 12 weeks with students identified as pathological or high-risk gamblers. A post-intervention evaluation assessed the system's effectiveness and usability.
Results: Results indicated that the ICGIM system was effective in reducing gambling frequency. Key features, including daily motivational messages, a call sponsor function, and chat support, were highly valued for providing emotional and psychological support, reinforcing positive behavioural change, and enhancing accountability.
Conclusions: The findings underscore the potential of a tailored digital intervention, integrating automated and human-centered support mechanisms, to mitigate online gambling disorder within a university student population.

Keywords: Online Gambling, Problematic Gambling, Responsible Gambling, University Students, Digital Intervention

1 Introduction and Background

Gambling disorder (GD) is a public health concern, and more so online gambling among university students. Diagnostic and Statistical Manual (DSM V) by Sharma, et al. [1] defines GD as a condition that describes a gambler's inability to control their gambling despite the detrimental consequences of the behavior. University administrators are increasingly getting concerned with online gambling among university students who spend most of their time on online gaming ad gambling, leading to problematic gambling, hence the need to address poor student outcomes (e.g. debt, mental health concerns, failure of courses, withdrawal from programs) due to excessive and high prevalence of gambling behavior, that has led to psychosocial and financial distress. Gambling was legalized in Kenya in 1966 [2] and currently, there has been proliferation of online gambling options that have made gambling an easy activity.

Most Kenyan online gamblers are young (18-25 years) and are either students or come from a low-income background, and see online gambling not only as a chance to relax but as a way to create a source of supplementary income [3]. According to Statistica [4], the revenue from the online gambling market in

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Kenya reached US$87m in 2023, and is projected to get to US$121m by 2027, and the average revenue per user was projected to be US$326.30 in 2023. This is driven by the massive and aggressive online gambling campaigns leveraging social media, internet adverts, and traditional platforms including radio, television, and billboards. As a result, Kenya reported the highest number of youths participating in online gambling in Sub-Saharan Africa (SSA) in 2021, with at least 80 percent of respondents indicating that they had gambled or betted at least once. According to Bitanihirwe and Ssewanyana [5], youths who indulge in gambling were found to perform poorly in their studies, lose their school/tuition fees in gambling related activities, and to engage in risky behavior, such as alcohol and drug abuse and high-risk sexual behavior and some end up having gambling disorders. With the expansion of the gambling industry in Kenya, opportunities to engage in gambling are numerous. Given the high level of youth unemployment and the low wages in Kenya, an increasing number of youths find themselves participating in gambling-related activities without being aware of the potential undesirable effects that may culminate from gambling addiction

In Kenya, like in many other African countries, gambling is classified and positioned as a legitimate recreational and leisure activity, regulated by the Betting, Lotteries and Gaming Act Cap 131 of 1966 which does not mention online gambling in any form. Although Kenyan laws set the minimum age to gamble at 18 years, access to gambling has rapidly evolved recently. The seamless integration of mobile money wallets and sports betting platforms, opening up of new markets as well as the innovative marketing campaigns has made gambling very easy. The growth of gambling industry has been on the rise, hence the high rate of disordered gambling among the youth. According to Kisambe [6] nearly 300,000 Kenyans play the multi-shilling jackpot each week. Most of these players are the youth who do not have strategies to guide them on responsible gambling. Based on the fast growth of gambling, the project sought to focus on the use of technology to address the online gambling impact. The technology referred to as the Internet-based Counter-Gambling Interactive Messages (ICGIM) intervention was built on the premise that media coverage is used by the gambling and betting industry to encourage the youth to use their services. The same media coverage through the intervention could therefore be used to promote responsible gambling. ICGIM was envisaged as a robust strategy to increase youth education and awareness regarding online gambling disorder.

The goal of this project was to develop a strategy for promoting responsible online gambling among second- and third-year students at Kisii University, Kenya. To achieve this, the project focused on the following specific objectives:

i. To investigate the prevalence and patterns of online gambling disorder among second- and third-year students at Kisii University.
ii. To design a structured digital intervention framework, named ICGIM, aimed at addressing online gambling disorder among the target student population.
iii. To develop and implement the ICGIM digital intervention system tailored to support second- and third-year students struggling with online gambling disorder at Kisii University.
iv. To evaluate the effectiveness and usability of the ICGIM intervention system in mitigating online gambling disorder among second- and third-year students at Kisii University.

2 Literature Review

In an exploratory analysis of a randomized controlled trial, Grahlher, et al. [7] investigated the "Meine Zeit ohne" (MZo) mobile app, a voluntary commitment program aimed at reducing substance use, gambling, and digital media use among vocational school students. Their study found the intervention’s effectiveness was domain-specific, with no spillover effects between behaviors; success was primarily driven by "congruent use," where participants selected a challenge directly aligned with their personal high-risk behavior. The authors concluded that this low-threshold app shows promise in reaching adolescents and raising awareness before habits solidify into addictions [7].

In a systematic review, Giroux, et al. [8] examined the characteristics and efficacy of online and mobile interventions for problem gambling, alcohol, and drug use, noting a significant gap as no study addressed gambling. Their analysis of 18 studies found that most interventions were grounded in motivational or cognitive-behavioral approaches and demonstrated short-term reductions in substance use, which were generally maintained at six-month follow-ups. The review concluded that such digital interventions are

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promising for reaching a workforce-integrated adult population seeking initial help but underscored the need for more long-term efficacy studies with follow-ups extending to 12 months [8].

A study by Merkouris, et al. [9] developed and evaluated the usability of a smartphone-based Ecological Momentary Intervention (EMI) designed to help manage gambling cravings in real-time. The app, which delivered brief, self-directed activities (e.g., urge surfing, breathing exercises) triggered by Ecological Momentary Assessment (EMA) prompts, was tested with a sample of people who gamble, clinicians, and researchers over seven days. Results indicated that the intervention was rated as acceptable and helpful, with participants reporting they would recommend it and that it could effectively reduce short-term cravings; however, feedback suggested improvements were needed in visual appeal, engagement, and personalization options. The findings demonstrate the feasibility and potential of EMI delivered via smartphone as a tool for managing gambling urges and supporting harm reduction [9].

In a content analysis, St Quinton and Morris [10] systematically reviewed the inclusion of Behaviour Change Techniques (BCTs) in 40 freely available gambling prevention mobile applications sourced from the Apple and Google Play stores. Their analysis, using the BCTTv1 taxonomy, revealed that apps incorporated a limited range of BCTs (mean = 2.82 per app), with the most prevalent being "Social support (unspecified)," "Self-monitoring of behaviour," and "Remove access to the reward." The authors concluded that while these apps are a popular tool, their current design draws upon a narrow set of change strategies and recommended that future developers utilize a greater variety of evidence-based BCTs to enhance their potential effectiveness [10].

In a systematic evaluation of publicly available mobile health applications, McCurdy, et al. [11] et al. (2024) assessed the quality of 14 problem-gambling-specific apps using the Mobile App Rating Scale (MARS). The study found that while app functionality was generally well-rated, overall engagement scores were low; however, the inclusion of specific evidence-based features was associated with higher quality ratings. Apps incorporating cognitive-behavioral therapy (CBT) content demonstrated significantly better information quality and aesthetics, and those featuring in-app communities showed improved engagement, aesthetics, and information scores. The authors concluded that to enhance the public health impact of these tools, future app development should prioritize the integration of engaging, evidence-based features like CBT and social support communities to improve user experience and potential efficacy.

In a review of mobile health applications for problem gambling available in Australia, Brownlow [12] identified and analyzed 17 apps from the Google Play and Apple iTunes stores. The study found that while these apps were generally low-cost or free, they suffered from low popularity in terms of downloads and ratings, infrequent updates, and offered a limited range of in-app functions. The author concluded that although these apps provide a foundational intervention tool, there is significant room for improvement in their quality, functional diversity, and update frequency to enhance user engagement and effectiveness, and that a greater number of competing apps could foster market improvements [12].

In an evaluation of Australian mobile applications for problem gambling, Ridley, et al. [13] examined apps from major app stores and found a significant disparity, with apps promoting gambling far outnumbering those designed for treatment. Their analysis revealed that the available treatment apps primarily aimed for total cessation but rarely employed recognizable therapeutic models, most frequently offering only a single tool such as a "sober time tracker." The authors concluded that while mobile apps present a novel and accessible treatment avenue, their current design is limited and requires more thoughtful, evidence-based development—ideally in association with reputable services—to be effective and compete with the more appealing design of gambling-promotion apps.

Building upon this analysis, the present research was motivated by the critical opportunity to synthesize these observed gaps into a cohesive intervention. The literature revealed a consistent absence of key supportive features in existing tools: namely, integrated peer communities, direct sponsor access, financial tracking, AI-driven motivational messaging, recovery story repositories, site-blocking functionality, and personal journaling capabilities. By engaging directly with the student population, it was further confirmed that these are not merely technical omissions but represent unmet psychosocial and behavioral support needs. Therefore, to address this significant shortfall in comprehensive, user-centered support, this study proposed the development and evaluation of a holistic mobile application designed dubbed ICGIM specifically to empower college students in mitigating gambling-related harms through a multifaceted, supportive digital ecosystem.

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It should be noted that we came across no literature testing gambling apps among African university students, indicating a clear gap. Furthermore, the lack of qualitative feedback on gambling app features is rarely discussed, representing another gap that motivates this study.

2.1 Conceptual Framework

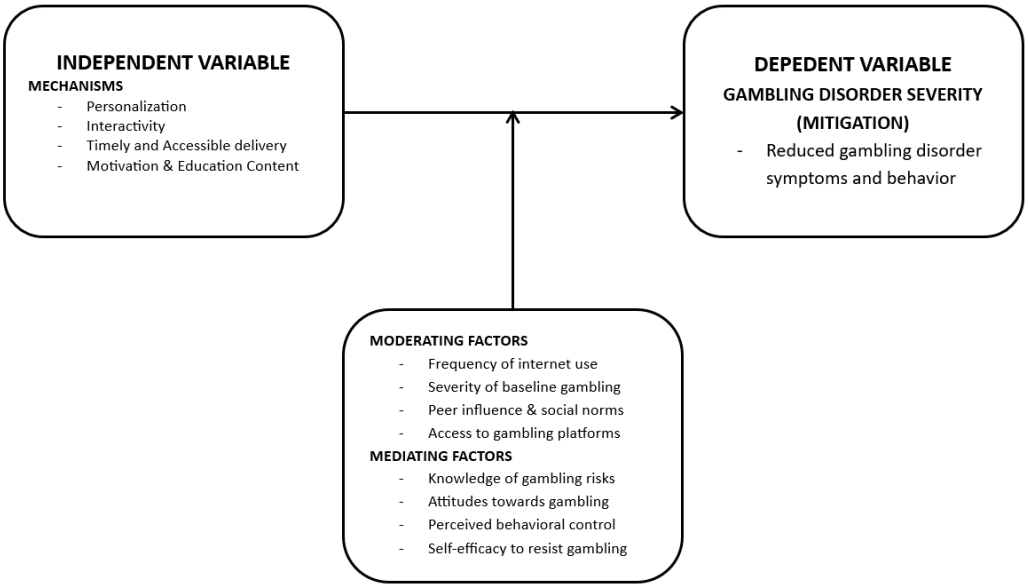

Figure 1: Conceptual Framework of the study

The conceptual framework (Figure 1) guides the methodological design of this study by illustrating the hypothesized relationships among the study variables. It postulates that internet-based interactive counter-gambling messages, delivered through accessible digital platforms such as mobile phones, tablets, and computers, influence specific psychological, behavioral, and technological factors among online gambling students in Kenyan universities, thereby leading to a reduction in the severity of gambling disorder.

In this study, the independent variable is the internet-based counter-gambling interactive messages delivered through the Internet-Based Counter Gambling Interactive Messages (ICGIM) mobile application. The intervention comprises personalized and frequent interactive messages presented in the form of questions, quizzes, motivational prompts, recovery journals, daily check-ins, chat-based support, financial tracking tools, recovery goal-setting features, reflective exercises, and related digital content. These components are systematically delivered over the intervention period to ensure consistent exposure and engagement.

The mediating variables include psychological and technological factors that are expected to explain the mechanism through which the intervention influences gambling behavior. These mediators include attitudes toward reducing gambling, perceived behavioral control, self-efficacy, perceived ease of use and accessibility of the digital intervention, level of digital literacy, and the frequency and intensity of baseline online gambling behavior. These variables are measured using structured questionnaires and in-app usage metrics at baseline and post-intervention.

The moderating variables account for individual and contextual differences that may influence the strength or direction of the relationship between the intervention and the outcome. These include frequency of internet use, baseline severity of gambling behavior, peer influence and social norms, and access to online gambling platforms.

The dependent variable, which represents the primary outcome of the study, is the severity of gambling disorder. This outcome is operationalized through changes in participants' self-reported gambling behavior, including reduced frequency and intensity of gambling activities, increased intention to reduce or cease

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gambling, and improved self-reported self-control over gambling behavior following exposure to the intervention.

3 Methodology

The project design was a diagnostic design that explored the problem of online gambling among Kisii University students and developed an intervention to address it. This research design addressed the problem in a structured form divided into three phases - the issue's inception, diagnosis of the issue, and solution through the ICGIM App. The target population comprised of 2,645 second and third-year students from Kisii University's eight schools. This population did not include the fourth and first-year students due to the fact that the fourth-year students were at the tail end of their studies, while the first years were newly admitted into the university and were still acclimatizing with the university environment.

To begin with, from each school, 10% of the population was randomly selected. This gave a total of 500 students. The 500 students were surveyed at baseline using the SOGS and PGSI tools so as to identify the severity of the gambling disorder. The students whose scores from the SOGS tool were or more were categorized as pathological gamblers, while those whose scores were from 8 to 27 under the PGSI were categorized as high-risk gamblers who might be experiencing gambling related problems. The students identified were then exposed to the ICGIM intervention for 12 weeks. After that period, an assessment was done to check for any changes after using intervention.

A post-intervention assessment was done to help evaluate the ICGIM digital intervention system. It enabled the research team to gather critical insights into both the effectiveness and usability of the solution developed to address online gambling disorder among second- and third-year students at Kisii University. One of the primary purposes of the assessment was to determine whether the intervention had a meaningful impact on students' behavior, awareness, and attitudes toward online gambling. This evaluation was essential in verifying if the system achieved its intended outcomes.

4 Results

Out of the 500 questionnaires that were given to students, 429 were filled and returned. This was a response rate of 86%, which was adequate and excellent to yield reliable and consistent results [14]. Additionally, during sampling, all schools in the university were represented. From the responses, most students were from the School of Business 78 (15.9%), followed by Agriculture 120 (24%), the School of Law 44 (8.9%), Education 51 (10%), Applied Sciences 46 (9%), the School of Health 53 (10.8%), and the School of Information Technology 37 (7.5%). This indicated the varied nature of the students' academic interests. The study utilized the South Oaks Gambling (SOGS) tool that identifies helps identify how often one engages in gambling. Table 1 below presents the information on how often university students engage in different types of gambling, broken down by whether they "not at all," "less than once a week," or "once a week/more."

Table 1: Online Betting and Gambling Type Among University Students

Gambling Activity	Not at all (%)	A week or less (%)	A week or more (%)
Play cards for money	81 (16.5%)	182 (37.0%)	229 (46.5%)
Bet on horses, dogs, or other animals	424 (86.2%)	51 (10.4%)	17 (3.4%)
Bet on sports	21 (4.3%)	142 (28.7%)	329 (66.9%)
Play dice games	123 (25.0%)	177 (36.0%)	192 (39.0%)
Play casino games	39 (7.9%)	108 (22.0%)	345 (70.1%)
Play numbers on lotteries	52 (10.6%)	207 (42.1%)	233 (47.3%)
Play bingo	319 (64.8%)	102 (20.7%)	71 (14.5%)
Play stock/market games	245 (49.8%)	154 (31.3%)	93 (18.9%)
Play slot/poker machines	87 (17.7%)	229 (46.5%)	176 (35.8%)
Bowled/pool/golf for money	73 (14.8%)	218 (44.3%)	201 (40.9%)
Play pull tabs/paper games	194 (39.4%)	247 (50.2%)	51 (10.4%)

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Other gambling activities	79 (16.1%)	265 (53.8%)	148 (30.1%)

4.1 Prevalence of Gambling Disorder

The prevalence of different behaviors and emotions associated to gambling disorders are as presented in Table 2.

Table 2: Prevalence of Online Gambling Disorder

Symptom	**Yes (%)**	**No (%)**
Have problems with betting and gambling	423 (86.0%)	69 (14.0%)
Gamble more than you intend to	389 (79.1%)	103 (20.9%)
Have people criticize you for betting	287 (58.3%)	205 (41.7%)
Feel guilty when betting	292 (59.3%)	200 (40.7%)
Want to stop betting but cannot	308 (62.6%)	184 (37.4%)
Hide betting slips from others	181 (36.8%)	311 (63.2%)
Argue with people about how to handle money	267 (54.3%)	225 (45.7%)
Lost a lot of time due to betting	431 (87.6%)	61 (12.4%)
Borrow money to bet and fail to repay	359 (73.0%)	133 (27.0%)

From the findings, a substantial majority 423 (86%) admit to having a problem with gambling or betting. Much of the population 389 (79.1%) gambles more than they plan to. More than half of the participants 287 (58.3%) stated that they receive criticism for their betting practices. Following a wager, a sizable portion 292 (59.3%) experience guilt. The majority (62.6%) say they would like to quit betting but are unable to do so. More than one-third (36.8%) keep their betting slips secret. Moreover half 267 (54.3%) disagree with others about their financial management practices. The majority of people 431 (87.6%) bet a lot of time. Nearly three-quarters 359 (73%) of those who borrow money to wager find it difficult to repay. This forms the basis of the present study, which focuses on the creation, design, and implementation of an innovative digital application intended to support students by tracking their behaviors and actively engaging them. The application aims to enhance students' self-awareness and motivation, ultimately encouraging responsible gambling behaviors or supporting complete cessation of gambling in the long term.

4.2 Intervention Design and Development

The development of the ICGIM system was guided by a rigorous, iterative methodology rooted in the principles of User-Centered Design (UCD) and the Agile development framework. This approach was selected to ensure that the final product was not merely a theoretical intervention but rather a practical, accessible, and effective tool tailored to the complex needs of individuals struggling with gambling disorder. The methodology was interconnected with several other phases and feedback loops to ensure continuous development. The process commenced with a foundational research phase that included a proper understanding of the problem domain. This happened through a thorough literature review on behavioral psychology, Cognitive-Behavior Therapy, and Transtheoretical Model of Change, to ground the system's interactive components in establishing therapeutic principles. Different stakeholders were met and interviews with potential users and clinicians were undertaken and data collected informed the design and development of the ICGIM intervention system. As more stakeholders were met, their data catalyzed the redesigning and development of the system resulting in an improved system that accommodated the needs of all the stakeholders resulting in a User-Centered Design Framework for the development of ICGIM.

Once the prototype of the ICGIM application was completed, a group of 30 participants was given the opportunity to interact with the system over a period of several weeks. Participants received brief training on how to use the various features of the application. Following this usability testing phase, they provided extensive feedback and suggestions aimed at improving the system. All suggestions were carefully

considered, and the application was subsequently redesigned, incorporating additional insights from domain experts, including medical psychologists and other healthcare practitioners. Among the features most frequently used and positively received by participants were the interactive motivational messages, which were delivered daily to encourage responsible gambling behavior, as illustrated in Figure 3.

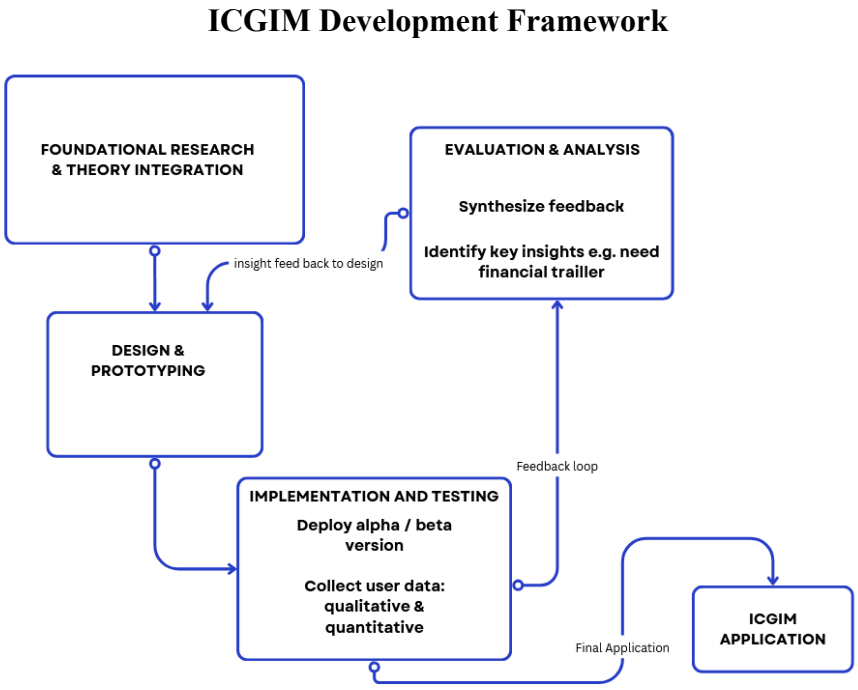

Figure 2: ICGIM Development Framework.

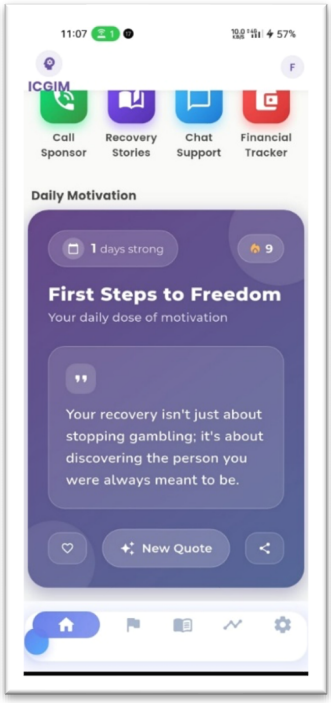

Figure 3: Personalized interactive messages sent to user of the ICGIM application

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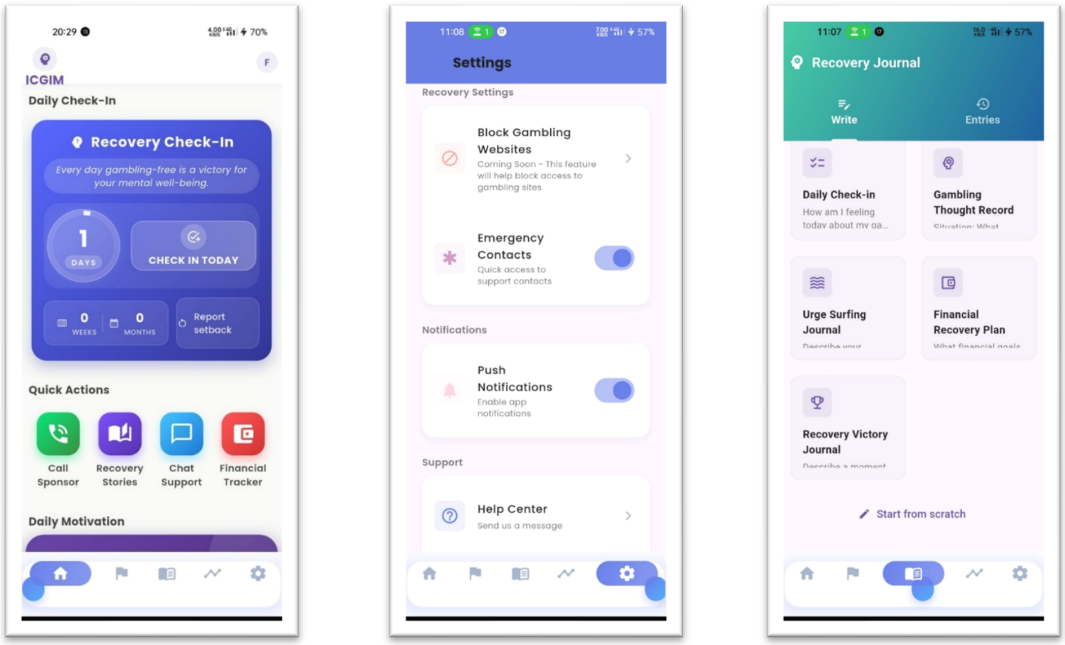

Figure 4: Snapshots of the different interactive interfaces of the ICGIM mobile App

4.3 Effectiveness of ICGIM digital intervention

After the system was updated and upgraded, five students were purposively selected to use the improved Internet-Based Counter Gambling Interactive Messaging (ICGIM) system over a period of several weeks to evaluate whether the application was fully optimized and had effectively incorporated the key suggestions provided by earlier participants. At the end of the intervention period, the participants completed a post-intervention survey designed to assess system usability and features, as well as perceived impact and well-being outcomes. Responses were captured using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), and the results are presented in the subsequent figures.

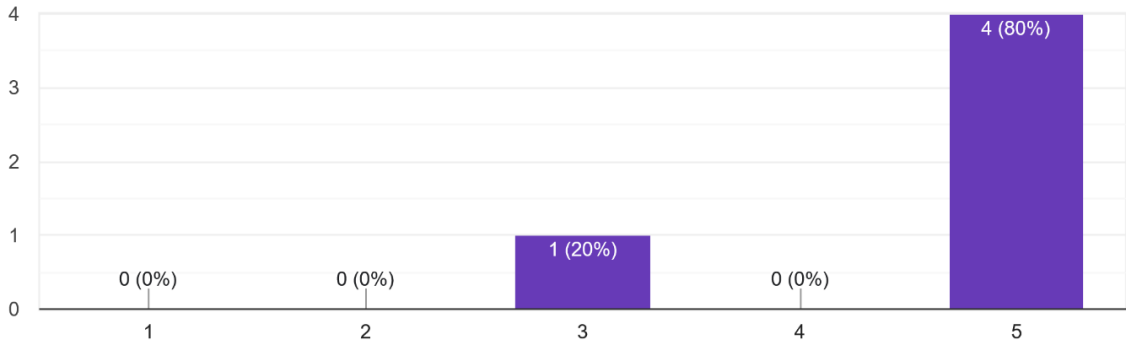

Figure 5: Response on how chat feature was supportive in providing emotional assistance

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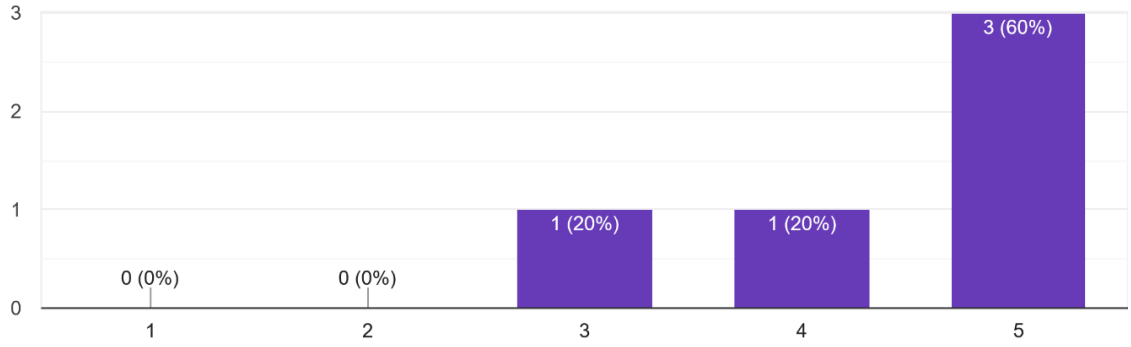

Figure 6: Response on how the call sponsor feature made them feel supported and accountable

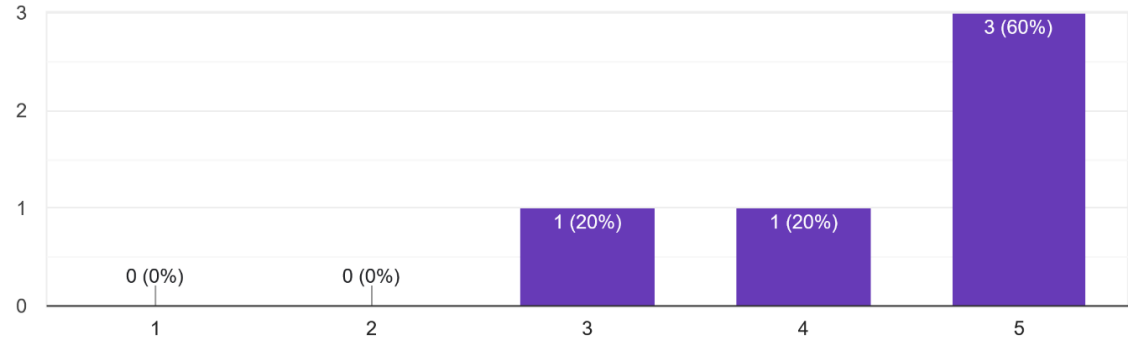

Figure 7: Response on how daily motivational messages helped reduce their urge of gambling

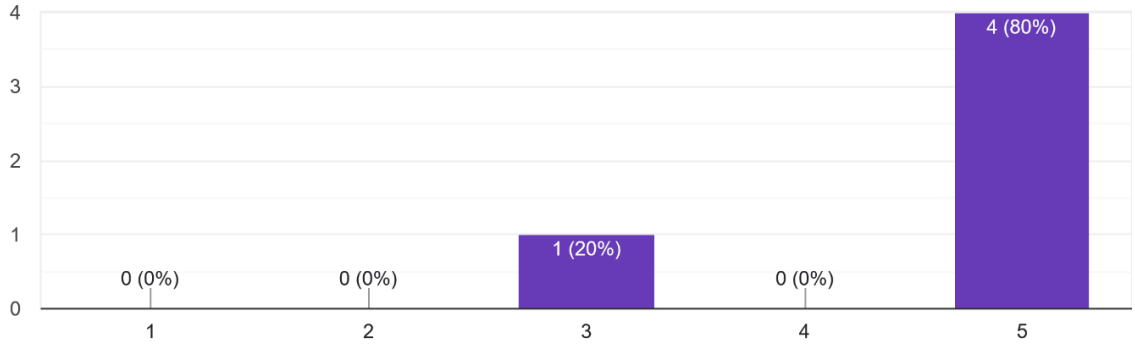

Figure 8: Response on how gambling frequency has reduced since using the ICGIM system

The post-intervention survey results indicate that the ICGIM system was effective in reducing the frequency of gambling among participants. Users reported that the daily motivational messages played a significant role in reducing gambling urges by reinforcing positive behavioral change and self-awareness. In addition, the call sponsor feature was highly valued, as it enhanced participants' sense of accountability and provided consistent social support throughout the intervention period. The chat support feature was also positively received, with participants noting that it offered timely emotional assistance from experts and trained champions, particularly during periods of heightened vulnerability. The findings demonstrated that the ICGIM system provided strong emotional and psychological support through its interactive messaging features, highlighting the importance of integrating both automated and human-centered support mechanisms in digital interventions aimed at mitigating gambling disorder among university students.

The qualitative feedback from participants indicates that the improved ICGIM system contributed positively to users' efforts to reduce or stop gambling. Several users reported that the system provided

factual information, real-life stories, and timely advice that inspired behavior change and helped them manage gambling urges, with some noting that they chose to engage with the application instead of visiting gambling websites when tempted.

"It has given me more facts and stories that have inspired me"

Others highlighted the value of progress tracking, particularly in relation to financial stability, with one participant emphasizing that the system supported a gradual return to healthier financial habits.

"*I began using the app with no hopes of being helped to stop gambling but as time goes by, there were fruits of regaining a healthy financial stability*"

Regarding new and improved features, users most frequently cited the enhanced navigation and user interface, as well as the introduction of financial tracking tools, which were perceived as critical in promoting accountability and awareness of personal spending. Participants also acknowledged that their earlier recommendations had been incorporated, noting improvements in accessibility, visual appeal, and the inclusion of financial trackers and testimonials, all of which made the system more engaging and motivating.

"Our recommendations were incorporated"

5 Discussion

5.1 Sociodemographic and Behavioral Correlates of Gambling Disorder Among University Students

The results of this study shows that university students' gambling habits are highly influenced by sociodemographic characteristics. The study's gender gap (79.5% male vs. 20.5% female) is consistent with earlier research showing that men are more likely to gamble at greater stakes [15]. Students between the ages of 19 and 25 are especially vulnerable to gambling disorders, making age another important consideration. This result supports research that indicates a higher risk of gambling-related problems for younger people [16]. Findings that show financial instability can worsen gambling disorders are in line with the research's emphasis on financial help, especially from the Higher Education Loans Board (HELB) [17]. Echoing findings from Hing Hing, et al. [18] that imply family dynamics can influence gambling problems, the study also finds a substantial association between gambling behaviors and family type. In the work done by Suomi, et al. [19], they found that gambling behaviors are strongly influenced by familial support systems, and students from single-parent families showed higher gambling disorder scores.

According to the current study, students are likely to play casino games and wager on sports, which is in line with Valenciano-Mendoza, et al. [20] findings about comparable patterns in their demographic. The propensity to "chase losses," as observed in this study, is consistent with the findings of Yau and Potenza [21], who found that this behaviour is suggestive of problem gambling. Findings by Estévez, et al. [22], who connected gambling difficulties with mental health issues, are supported by the significant prevalence of anxiety and depression among students with gambling disorders in this study. Interestingly, the regression analysis showing that depression is significantly predicted by income source is consistent with earlier studies showing that financial stress is a factor in psychological discomfort [23].

The findings of the current study are consistent with those of Mofatteh [24], who discovered that psychological distress is more prevalent among younger students. The intricate relationship between sociodemographic characteristics and gambling behaviors is highlighted by this study overall, highlighting the necessity of focused interventions for populations that are at risk. It emphasizes how crucial it is to treat gambling addiction and related mental health conditions in order to lessen their negative effects on students' life [25].

The hallmarks of gambling illness include a developing obsession with gambling and a need to place more frequent and larger bets [21]. More so than the severity of the overall gambling disorder, the style of gambling can influence how frequently a person gambles. Compared to other forms of gambling, including

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playing bingo or placing bets on animals, sports betting and casino games seem to be more popular (participation rates are higher) [20]. Since up to 5% of teenagers and young adults who gamble go on to have a problem, young people are particularly vulnerable. It is believed that 96% of individuals with gambling disorders also suffer from at least one other mental illness [16]. Research indicates that between 1.2% and 6.0% of people globally suffer from gambling addiction. Up to 90% or more of those who struggle with gambling never ask for assistance [15].

5.2 ICGIM Intervention Outcomes: Engagement, Feature Feedback, and Preliminary Behavioral Changes

The ICGIM's daily motivational messages were effective in helping users manage and reduce gambling urges, reinforcing positive behavioral change on a consistent basis. Most participants also agreed that the system contributed to a noticeable reduction in the frequency of their gambling activities. Collectively, these outcomes demonstrate that the integrated support structure of the system—combining emotional support, accountability mechanisms, and motivational reinforcement—was instrumental in influencing healthier decision-making and promoting sustained behavioral change among users.

The ICGIM app operationalizes the four independent constructs on the conceptual framework as follows: Personalization through iterative user-centered design and stakeholder feedback; Interactivity via chat, sponsor calls, and two-way motivational messages; Timely & Accessible delivery through daily push notifications on mobile devices; and Motivation & Education Content using CBT and Transtheoretical Model-based messaging. The dependent variable (gambling disorder mitigation) is assessed through self-reported behavioral changes, though we acknowledge the small sample as a limitation.

While the sociodemographic correlates above provide important contextual background, the primary contribution of this study is the ICGIM mobile app itself. During the usability testing phase (n=30), the most frequently used and positively received features were the interactive motivational messages, delivered daily based on the Transtheoretical Model of Change. Of the 30 participants, 27 (90%) reported opening the motivational messages consistently throughout the testing period. The chat feature was used by 18 participants (60%), while the call sponsor feature was used less frequently (n=8, 27%), potentially due to perceived discomfort with directly contacting a sponsor. In the post-intervention evaluation (n=5, purposively selected), all five participants confirmed that the motivational messages were "helpful" or "very helpful" in recognizing gambling triggers.

Regarding gambling disorder severity mitigation (the dependent variable in our framework), two of the five post-intervention participants reported a self-perceived reduction in gambling frequency from daily episodes to 2–3 times per week. One participant reported complete abstinence during the final week of the study. While these results are not statistically generalizable due to the small sample size (n=5) and purposive sampling, they provide preliminary evidence that the ICGIM mechanisms (personalization, interactivity, timely delivery, and motivational content) may contribute to symptom reduction.

Participants also provided constructive feedback for future iterations. Three participants requested additional educational content on financial management. Two participants suggested integrating a self-exclusion timer that locks the app during high-risk hours (e.g., late night). These suggestions have been documented for Version 2.0 of ICGIM.

6 Conclusion

This study demonstrates that sociodemographic factors play a critical role in shaping gambling behaviors and the prevalence of gambling disorders among university students. Male students, those aged 19–25 years, individuals with financial dependency—particularly loan reliance—and students from single-parent households were found to be more vulnerable to problematic gambling. The strong associations between gambling disorder, financial stress, anxiety, and depressive symptoms highlight the need for holistic interventions that integrate mental health and economic support. These findings underscore the importance of targeted, context-sensitive prevention and intervention strategies within university settings, alongside institutional efforts to raise awareness, strengthen support systems, and mitigate the adverse effects of gambling on students' well-being.

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The study further concludes that the Internet-Based Counter Gambling Interactive Messages (ICGIM) system is a highly promising and effective digital intervention for supporting recovery from gambling addiction. Through a co-development and iterative refinement process, the system demonstrated high usability, effectiveness, and positive behavioral impact, achieving a very high user satisfaction rate among participants. Users particularly valued the financial tracking feature for enhancing accountability, as well as the integrated emotional and social support components, including inspirational content and real-time assistance. In conclusion, the ICGIM's multi-faceted, user-centered design provides a robust framework for reducing gambling behaviors and supporting sustained recovery, with future refinements expected to further enhance its relevance and scalability.

Ethical Considerations

Ethical approval for the study was obtained from the Kisii University Institutional Scientific and Ethics Review Committee (ISERC) under reference number KSU/ISERC/0034/04/25. All participants provided written informed consent, confirming their voluntary participation and their willingness for their involvement to contribute to the development and evaluation of the Internet-Based Counter Gambling Interactive Messages (ICGIM) digital intervention.

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Statement on conflicts of interest

No conflict of interest.

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