

Internet Addiction and Psychological Well-Being Among Adult Internet Users in Rwanda: A Cross-Sectional Study of Sociodemographic Correlates with Implications for Population Mental Health and Service Planning

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Abstract

Background

The rapid expansion of internet accessibility has transformed social, educational, and economic activities but has also contributed to the emergence of internet addiction as a growing behavioral health concern. Internet addiction has been associated with impaired psychological functioning; however, evidence from Sub-Saharan Africa, including Rwanda, remains limited. This study aimed to examine the association between internet addiction and psychological well-being among adult internet users in Rwanda, its sociodemographic correlates.

Methods

A quantitative analytical cross-sectional study was conducted among 510 adult internet users in Rwanda aged 18 years old and above, conveniently recruited using online platforms. Data were collected using Kobo toolbox and participants completed sociodemographic questionnaire, the Internet Addiction Test and the WHO Psychological Well-Being Index. Data were analyzed using descriptive statistics, Spearman's rank correlation, multiple linear regression, and moderation analysis using JASP Software (Version 0.96.0) and all necessary assumptions were tested.

Results

Internet addiction demonstrated a strong negative association with psychological well-being ($p = -0.655$, $p < .001$, 95% CI: -0.702 to -0.603). Multiple regression analysis confirmed that internet addiction remained an independent predictor of poorer psychological well-being after adjusting for sociodemographic factors ($\beta = -1.390$, $p < .001$), explaining 48.45% of the variance in psychological well-being. Higher educational attainment was associated with better psychological well-being ($\beta = 1.048$, $p = .006$). Although socioeconomic status and middle adulthood showed positive associations with psychological well-being, most sociodemographic characteristics were not independently associated with outcomes. Moderation analysis revealed that age significantly modified the relationship between internet addiction and psychological well-being ($\beta = -0.0015$, $p = .027$), with stronger negative effects observed among older adults. Other factors, including sex, marital status, education, employment, and residence, did not significantly moderate this association.

Conclusion

Internet addiction is an important behavioral health correlate of reduced psychological well-being among adult internet users in Rwanda. The findings highlight the need to integrate digital behavioral health into mental health promotion, prevention, and early identification strategies. Population-based digital well-

being initiatives, age-sensitive interventions, and integration of internet addiction screening into healthcare and community mental health services may strengthen Rwanda's response to emerging mental health challenges associated with digital transformation.

Background

Internet-based technologies have become a fundamental component of contemporary society, transforming patterns of communication, information exchange, education, healthcare delivery, commerce, and social engagement. The widespread adoption of internet-enabled devices, including smartphones, computers, and digital platforms, has accelerated digital transformation by reshaping individual behaviors, interpersonal interactions, and participation in social and economic activities [1, 2] .

Despite these substantial benefits, excessive and poorly regulated internet use has increasingly emerged as an other types of behavioral addictive disorder known as internet addiction, characterized by excessive and uncontrolled engagement in internet-related activities accompanied by symptoms such as salience, impaired control, compulsive use, tolerance, withdrawal symptoms, and functional impairment [3]. Globally, internet addiction and related digital behavioral addictions have emerged as increasingly important public health and psychological concerns. A meta-analysis conducted in 2020 estimated that approximately 7% of the global population experienced symptoms consistent with internet addiction, with adolescents and young adults identified as particularly vulnerable groups [4]. More recently, a large-scale meta-analysis including more than 2 million participants from 2,004 studies reported pooled prevalence estimates of 26.99% for smartphone addiction, 17.42% for social media addiction, 14.22% for internet addiction, 8.23% for cybersex addiction, and 6.04% for gaming addiction [(5)]. Collectively, these findings highlight the increasing global burden of maladaptive digital behaviors and emphasize internet addiction as an emerging behavioral health challenge with important implications for population mental health. As digital technologies become increasingly integrated into everyday life, understanding the distribution, determinants, and psychological consequences of internet addiction is essential for informing evidence-based prevention strategies, early identification, and the planning of responsive mental health services.

In Africa, internet addiction has similarly emerged as a growing behavioral health concern, coinciding with rapid increases in internet accessibility, smartphone adoption, and digital transformation across the continent. A systematic review and meta-analysis involving 13,365 participants from seven African countries reported a pooled prevalence of internet addiction of 40.3%, with slightly higher prevalence estimates observed in Northern African countries (44.6%) compared with other regions of Africa [6]. These findings highlight the increasing relevance of internet addiction as an emerging psychological and public health concern in African populations. They further underscore the need for context-specific evidence to guide mental health promotion, identify high-risk populations, and support the development of prevention strategies and service delivery models that are responsive to the rapidly evolving digital environment. Evidence from East Africa further highlights the growing regional burden of internet addiction. In Tanzania, the prevalence of internet addiction was estimated at 31% [6] while a Kenyan

study among young adults reported prevalence rates as high as 81.5% [7]. Similarly, a recent study conducted among medical students in the Democratic Republic of Congo reported a prevalence of 24.5% for social media addiction [8] while in Rwanda the prevalence stands on 24.1% [9] increasingly prevalent across East African populations.

This growing public issues affects people psychological well-being referring to a positive psychological functioning, encompassing dimensions such as autonomy, environmental mastery, personal growth, purpose in life, and positive relationships [(10)]. However, existing literature indicates that internet addiction may negatively influence psychological well-being through multiple psychosocial and behavioral pathways. Individuals experiencing internet addiction have been reported to exhibit higher levels of loneliness, low self-esteem, emotional dysregulation, depressive symptoms, and anxiety, alongside personality-related vulnerabilities such as impulsivity and certain patterns of extroversion. These factors may contribute to maladaptive patterns of internet engagement and increase the likelihood of impaired psychological functioning and reduced overall well-being [(4,10)]. Collectively, these studies have demonstrated a negative association between internet addiction and psychological well-being meaning that individuals with higher levels of internet addiction often report lower life satisfaction, increased loneliness, and reduced emotional stability while excessive internet engagement may displace real-life social interactions and contribute to emotional dysregulation, thereby reducing overall well-being. From a population mental health perspective, understanding the relationship between internet addiction and psychological well-being is increasingly important as countries continue to expand digital access and integrate digital technologies into education, employment, healthcare, and everyday life. Identifying populations at increased risk of internet addiction can facilitate early screening, targeted prevention, mental health promotion, and timely referral to appropriate services. Such evidence is particularly valuable in low- and middle-income countries where mental health resources remain limited and health systems increasingly require data to support efficient planning and resource allocation .

However, the strength and direction of this relationship may vary depending on individual characteristics and contextual factors, particularly sociodemographic variables. In this frame, sociodemographic and behavioral correlates, including younger age, male gender, higher socioeconomic status, have also been consistently associated internet addiction [11]. It has also been linked to a wide range of adverse physical, psychological, social, and functional outcomes. In this regard, internet addiction has been associated with several physical health consequences, including sleep disturbances, fatigue, unhealthy dietary behaviors, and reduced levels of physical activities [12, 13]. Psychologically, affected individuals by internet addiction, frequently experience depressive symptoms, anxiety, emotional distress, and reduced psychological well-being [14–16]. Excessive internet use has also been associated with impaired academic and occupational functioning, poor interpersonal relationships, ineffective time management, and diminished social competence[10] .

Although internet addiction has been extensively investigated in high-income countries, empirical evidence from Sub-Saharan Africa, including Rwanda, remains limited. Existing studies in the region have

largely focused on estimating prevalence rates, with fewer investigations examining comprehensive models that integrate internet addiction, psychological well-being, and the potential influence of sociodemographic factors. Moreover, little evidence is available to inform how these relationships may contribute to population mental health planning or support the development of preventive mental health services in Rwanda. Understanding how sociodemographic characteristics influence internet addiction and psychological well-being is essential for identifying vulnerable populations, guiding targeted prevention initiatives, strengthening early detection strategies, and informing culturally appropriate mental health policies and service planning.

Therefore, this study aims to examine the relationship between internet addiction and psychological well-being among adult internet users in Rwanda while assessing the role of sociodemographic correlates. Beyond advancing the understanding of behavioral addiction in the Rwandan context, the study seeks to generate evidence with direct implications for population mental health and mental health service planning by identifying population groups at elevated risk of poor psychological well-being associated with internet addiction. The findings are expected to support the development of targeted prevention strategies, inform routine screening initiatives, and contribute to evidence-informed mental health policies and service planning within Rwanda's evolving digital environment. Specifically, the study addresses the following the following specific objectives:

1. 1. To determine the association between internet addiction and psychological well-being among adult internet users in Rwanda.
2. 2.To identify sociodemographic correlates associated with internet addiction among adult internet users in Rwanda.
3. 3.To assess whether sociodemographic correlates moderate or explain the relationship between internet addiction and psychological well-being among adult internet users in Rwanda

Method

Participants and Procedures

A quantitative analytical cross-sectional study was conducted among adult internet users in Rwanda to examine the relationship between internet addiction and psychological well-being and to assess the moderating role of sociodemographic factors. Participants were recruited using a convenience sampling approach, with the survey link purposively distributed through online platforms, including WhatsApp, Facebook, Instagram, and other digital networks. Data were collected electronically using KoboToolbox after obtaining informed consent. A total of 510 participants were included in the study. Eligible participants were adults aged ≥ 18 years, residing in Rwanda, using at least one internet-enabled device, able to complete the questionnaire in Kinyarwanda or English, and willing to participate. Participants who did not provide consent, were unable to complete the questionnaire, or had conditions affecting reliable responses were excluded. The online recruitment and data collection approach was considered appropriate given the study focus on internet-related behaviors among active internet users.

Measure

Sociodemographic informations

Sociodemographic characteristics included age, sex, marital status, education level, employment status, and residence were collected to describe the study population and evaluate their potential moderating effects on the relationship between internet addiction and psychological well-being.

Internet Addiction

The Internet Addiction was assessed using Internet addiction Test. It is a 20-item self-report instrument designed to assess the severity of internet addiction symptoms [17]. Participants rate the frequency of internet-related behaviors and experiences using a 6-point Lickert scale ranging from 0 (rarely) to 5 (always) and the total scores range from 20 to 100, with higher scores indicating greater severity of internet addiction symptoms. The Internet addiction Test classifies severity levels as follows: <30 (no addiction), 31–49 (mild), 50–79 (moderate), and 80–100 (severe). A score of ≥ 50 is commonly used in previous research as an indicator of clinically relevant internet addiction symptoms[17]. Prior to the present study, the Internet addiction Test was culturally adapted and psychometrically validated among adult internet users in Rwanda. The validation study demonstrated satisfactory reliability and validity, and the manuscript is under review in journal. The adapted Internet addiction Test showed excellent internal consistency in the current study, supporting its suitability for assessing internet addiction symptoms in the Rwandan context. Cronbach's $\alpha = .98$

Psychological Well-being

Psychological well-being was assessed using WHO Psychological Well-being index. It was developed by the World Health Organization (1998) and further reviewed [18], is a brief self-report instrument designed to assess subjective psychological well-being over the preceding two weeks. It consists of five positively worded items that capture core aspects of well-being, including positive mood, vitality, and interest in daily activities. Respondents rate each item on a 6-point Lickert scale ranging from 0 ("at no time") to 5 ("all of the time"), with total scores ranging from 0 to 25; higher scores indicate better psychological well-being. In the present study, the reliability of the questionnaire was excellent, Cronbach's $\alpha = .95$.

Data analysis

Data were analyzed using JASP (Jeffreys's Amazing Statistics Program). It was used for descriptive statistics, reliability analysis, correlation, multiple linear regression, and moderation analyses. Data quality assessment was conducted for all 556 participants, after screening for missing data and outliers, 46 participants were removed due to missing data exceeding 10% meaning they were no longer suitable participants in the study and the process yield 510 participants who constituted the final sample size.

Normality assumption was evaluated using skewness, kurtosis, Shapiro-Wilk test, deviations from normality supported the use of non-parametric procedures.

Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participants sociodemographic characteristics. The relationship between internet addiction and psychological well-being was assessed using Spearman's rank correlation coefficient. Multiple linear regression analysis was conducted to examine the prediction of internet addiction on psychological well-being, while moderation analysis was performed to evaluate whether sociodemographic factors modified this relationship between internet addiction and psychological well-being after testing multiple linear regression assumptions.

Results

Sociodemographic characteristics of participants

A total of 510 participants were included in the study. The sample comprised 269 males (52.75%) and 241 females (47.25%), with a mean age of 36.54 years ($SD = 13.55$). Most participants were aged 18–35 years ($n = 265$, 51.96%), followed by those aged 36–59 years ($n = 211$, 41.37%), while a smaller proportion were aged 60 years and above ($n = 34$, 6.67%). Regarding marital status, half of the respondents were single ($n = 259$, 50.78%), followed by those who were married ($n = 236$, 46.27%), while divorced ($n = 9$, 1.76%) and widowed ($n = 6$, 1.18%) participants represented a small minority. In terms of income level, most participants reported high income ($n = 308$, 60.39%), followed by moderate income ($n = 172$, 33.73%), and low income ($n = 30$, 5.88%). Concerning educational attainment, secondary education ($n = 246$, 48.24%) was the most common, followed by university education ($n = 219$, 42.94%), while vocational training ($n = 23$, 4.51%), primary education ($n = 18$, 3.53%), and illiteracy ($n = 4$, 0.78%) were less frequent. The majority of participants were employed ($n = 329$, 64.51%), while 181 (35.49%) were unemployed. Geographically, participants were mainly from the City of Kigali ($n = 234$, 45.88%), followed by the Southern Province ($n = 134$, 26.27%), Northern Province ($n = 59$, 11.57%), Western Province ($n = 46$, 9.02%), and Eastern Province ($n = 37$, 7.25%).

In relation to internet use patterns, 273 participants (53.53%) reported spending two or more hours online per day, while 237 (46.47%) spent less than two hours daily. Smartphones were the dominant device used for internet access ($n = 433$, 84.90%), followed by computers ($n = 60$, 11.76%), whereas television ($n = 7$, 1.37%), radio ($n = 6$, 1.18%), and tablets ($n = 4$, 0.78%) were rarely used. Regarding online activities, the most frequently reported were social media use ($n = 328$, 64.31%), followed by information seeking ($n = 176$, 34.51%), pornography viewing ($n = 178$, 34.90%), chatting/messaging ($n = 161$, 31.57%), and internet gaming ($n = 107$, 20.98%). Other activities included online betting ($n = 122$, 23.92%), movie and series watching ($n = 70$, 13.73%), streaming/binge-watching ($n = 56$, 10.98%), online shopping ($n = 38$, 7.45%), sports viewing ($n = 22$, 4.31%), and online friendship activities ($n = 22$, 4.31%). Overall, the findings indicate that the sample was predominantly composed of young to middle-aged adults with high smartphone penetration and substantial engagement in diverse internet-based activities

Relationship between internet addiction and Psychological well-being

The findings consistently demonstrate a strong and statistically robust negative relationship between internet addiction and psychological well-being. The Spearman's rank correlation analysis revealed a substantial inverse association ($\rho = -0.655$, $p < .001$, 95% CI [-0.702, -0.603]), indicating that higher levels of internet addiction are associated with markedly lower psychological well-being at the bi-variate level.

Some Sociodemographic variables were significantly associated with psychological well-being as evidenced by weak positive correlation with adults aged 36–59 years ($r_s = 0.093$, $p = 0.037$, 95% CI: 0.006–0.178) and with high income ($r_s = 0.088$, $p = 0.048$, 95% CI: 0.0005–0.173), suggesting that middle-aged participants and those with higher incomes tended to report slightly better psychological well-being. In contrast, moderate income was weakly negatively associated with psychological well-being ($r_s = -0.115$, $p = 0.009$, 95% CI: -0.200 to -0.029). No statistically significant associations were observed between psychological well-being and sex, younger (18–35 years) or older (≥ 60 years) age groups, marital status, educational level, employment status, or vocational training (all $p > 0.05$).

This relationship between internet addiction and psychological well-being was further supported by the multiple regression analysis, which confirmed that internet addiction remains a significant independent predictor of psychological well-being even after controlling for relevant sociodemographic and contextual variables. Specifically, internet addiction significantly predicted lower psychological well-being ($\beta = -1.390$, $p < .001$), demonstrating a strong and persistent negative effect within the multi-variable model that explains 48.45% of the variance in psychological well-being ($R^2 = .4845$), $F(9, 500) = 52.21$, $p < .001$.

In contrast, education was found to be a significant positive predictor of psychological well-being ($\beta = 1.048$, $p = .006$), suggesting a protective influence of higher educational attainment. Age, however, did not exert a statistically significant direct effect on psychological well-being ($\beta = 0.069$, $p = .067$), indicating that age alone does not independently account for differences in well-being once other factors are considered. Notably, a significant interaction between age and internet addiction was observed ($\beta = -0.0015$, $p = .027$), indicating that age moderates the strength of the association between internet addiction and psychological well-being. Specifically, the negative impact of internet addiction intensifies with increasing age, as reflected in the progressively stronger conditional effects at age 22 ($\beta = -0.1717$), age 33 ($\beta = -0.1880$), and age 54 ($\beta = -0.2192$). This pattern suggests that older adults experience a more pronounced decline in psychological well-being associated with increasing internet addiction.

All other tested interaction effects were non-significant, including internet addiction with gender ($p = .7332$), marital status ($p = .7439$), education ($p = .5328$), employment status ($p = .8816$), and residence ($p = .1642$), indicating that these sociodemographic factors do not significantly alter the relationship between internet addiction and psychological well-being.

Overall, these converging results from both correlation and regression analyses provide strong evidence that internet addiction is a key and consistent risk factor for reduced psychological well-being. While its negative effect is broadly stable across most sociodemographic groups, it becomes progressively stronger with age, highlighting older adults as a particularly vulnerable subgroup.

Discussion

The discussion of the results were done in accordance with study specific objectives.

Association between internet addiction and psychological well-being among adult internet users in Rwanda context

The present study identified a consistent negative association between internet addiction and psychological well-being among adult internet users in Rwanda. The association remained significant after multi-variable adjustment, indicating that internet addiction is an independent correlate of poorer psychological functioning beyond sociodemographic differences. These findings support the view of internet addiction as a behavioral addiction with important implications for mental health, particularly in the context of Rwanda's expanding digital environment.

Excessive internet use may negatively affect psychological well-being by displacing protective offline activities such as social interaction, physical activity, productive engagement, and adequate sleep. This behavioral displacement may contribute to emotional dysregulation, impaired relationships, reduced self-control, and lower life satisfaction. Consistent with behavioral addiction models, compulsive internet use may be maintained through reward-driven mechanisms despite harmful consequences [19]

The findings are consistent with previous evidence linking internet addiction with reduced quality of life, lower life satisfaction, depressive symptoms, anxiety, loneliness, and impaired psychological functioning across diverse populations [20, 21] Similar associations reported among adolescents, university students, and adults further support internet addiction as an emerging behavioral health concern [22]. The results also align with the Interaction of Person-Affect-Cognition-Execution (I-PACE) model, which highlights the role of individual vulnerabilities, emotional processes, cognitive responses, and executive control in the development of internet addiction [23]

From a population mental health perspective, these findings highlight the need to integrate internet addiction into prevention, early identification, and mental health promotion strategies. Routine monitoring of internet addiction and related psychological outcomes may support identification of vulnerable groups and inform evidence-based policies. In Rwanda, incorporating screening for internet addiction into primary healthcare, community mental health services, and preventive programs, alongside digital well-being interventions, may strengthen responses to emerging digital behavioral health challenges.

At the policy level, collaboration between health, education, and information technology sectors may promote digital literacy, responsible internet use, and preventive interventions. Addressing internet addiction through population-based prevention, targeted support, and integration into mental health services may enhance Rwanda's capacity to respond to the psychological consequences of rapid digital transformation

Sociodemographic determinants significantly associated with psychological well-being among adult internet users in Rwanda context

The findings showed that only a limited number of sociodemographic factors were independently associated with psychological well-being. Middle adulthood and higher socioeconomic status were linked to better psychological well-being, suggesting that social and economic resources may enhance psychological resilience. These findings emphasize the importance of addressing social determinants of mental health in population-level interventions.

Higher income may improve psychological well-being by facilitating access to healthcare, stable living conditions, education, and social participation while reducing financial stress. This interpretation is consistent with evidence showing that economic security contributes positively to subjective well-being and mental health [24, 25]. Similarly, education emerged as a protective factor, potentially through improved health literacy, problem-solving abilities, emotional regulation, and access to socioeconomic opportunities [26]

Conversely, gender, marital status, employment status, residence, and vocational trainings were not independently associated with psychological well-being. This suggests that psychosocial and behavioral factors, including social support, coping strategies, and health behaviors, may contribute more strongly to psychological functioning than demographic characteristics alone [27]. Therefore, mental health promotion should prioritize modifiable determinants rather than relying exclusively on demographic risk identification.

From a population mental health perspective, these findings support integrated approaches combining social support, resilience-building, digital health literacy, and healthy coping strategies. Strengthening collaboration between health, education, labor, and social protection sectors may help reduce inequalities and improve access to preventive mental health services in Rwanda. Overall, enhancing psychological well-being requires interventions that address both behavioral factors and broader social determinants to strengthen mental health systems and respond effectively to emerging challenges such as internet addiction.

Moderating role of sociodemographic factors in explaining the relationship between internet addiction and psychological well-being among adult internet users in Rwanda context.

Findings showed that sociodemographic factors had a limited moderating effect on the association between internet addiction and psychological well-being. Among the examined characteristics, only age significantly modified this relationship, with the negative effects of internet addiction becoming stronger among older adults. This finding suggests that age-related vulnerability should be considered in mental health promotion and service planning.

Older adults may experience greater psychological consequences of excessive internet use because problematic online engagement may disrupt established routines, social participation, sleep patterns, and physical activity. Reduced opportunities for social interaction and alternative activities may further increase vulnerability. Consistent with this interpretation, previous research has reported that older adults with internet addiction experience greater loneliness, reduced social connectedness, and poorer psychological adjustment [28]. These findings extend existing knowledge by demonstrating that age influences not only psychological well-being but also the magnitude of the association between internet addiction and mental health outcomes.

In contrast, gender, marital status, education, employment status, and residence did not modify this association, suggesting that the negative psychological effects of internet addiction are relatively consistent across demographic groups. This aligns with behavioral addiction theory, which proposes that clinically significant internet addiction can produce adverse outcomes regardless of demographic characteristics [19].

From a population mental health perspective, these findings support universal digital well-being strategies while emphasizing additional support for older adults. Preventive interventions promoting balanced online-offline lifestyles, responsible technology use, and healthy digital behaviors may reduce the psychological burden associated with excessive internet use.

For mental health service planning in Rwanda, age-responsive approaches should be incorporated into assessment and intervention strategies. Integrating internet addiction screening into primary healthcare, community mental health services, and psychological assessments may facilitate early identification and support, particularly among middle-aged and older adults. Strengthening healthcare provider capacity and promoting collaboration across health, education, social protection, and information technology sectors may improve responses to emerging digital behavioral health challenges.

Overall, addressing internet addiction requires both population-level prevention and targeted interventions. Combining universal digital health promotion with age-sensitive strategies may strengthen psychological outcomes and support mental health systems in adapting to increasing digitalization.

Strengths of the Study

This study adds to the emerging evidence on behavioral addictions by providing data from Rwanda, a context where research on adult internet addiction remains limited. By examining the association between internet addiction and psychological well-being in a Sub-Saharan African setting, the study contributes to addressing gaps in digital behavioral health research in low- and middle-income countries.

The application of both bi-variate and multi-variate analyses strengthened the validity of the findings, while the moderation analysis provided further insight into population groups that may require tailored prevention and intervention strategies.

A key strength of this study is its relevance to population mental health and service planning. By identifying internet addiction as an independent correlate of poorer psychological well-being and exploring sociodemographic influences, the findings provide evidence to support mental health promotion, early detection, and digital well-being initiatives. Furthermore, the results may assist policymakers and healthcare planners in integrating behavioral addiction screening into primary healthcare and community mental health services, while guiding preventive strategies and resource allocation within Rwanda's rapidly evolving digital environment..

Limitations

Several limitations should be considered when interpreting these findings. The cross-sectional design limits causal interpretation; therefore, the direction of the relationship between internet addiction and psychological well-being cannot be established. Longitudinal studies are needed to clarify whether internet addiction contributes to poorer psychological outcomes, whether reduced well-being increases vulnerability to internet addiction, or whether both processes interact over time. The use of self-reported measures may have introduced recall and reporting biases. Future research incorporating objective digital behavior indicators, clinical assessments, and mixed-method approaches could provide deeper insights into the psychological consequences of internet addiction. Additionally, unmeasured factors such as personality traits, sleep quality, social support, coping strategies, physical health, and pre-existing mental health conditions may partially explain the observed associations.

Despite these limitations, the study provides important evidence for population mental health and service planning. The association between internet addiction and poorer psychological well-being highlights the need for continued surveillance of digital behavioral health and integration of behavioral health indicators into mental health monitoring systems. Future research should evaluate digital well-being interventions, behavioral addiction prevention strategies, and integrated mental health approaches to guide context-specific policies and strengthen Rwanda's capacity to respond to emerging challenges related to digital transformation.

Conclusion

This study contributed important evidence on internet addiction and psychological well-being among adult internet users in Rwanda, addressing a gap in digital behavioral health research in Sub-Saharan Africa. The findings demonstrate that internet addiction is independently associated with poorer psychological well-being, identifying internet addiction as an emerging behavioral health concern with implications for individual functioning and population mental health.

Although higher socioeconomic status, education, and middle adulthood were associated with better psychological well-being, most sociodemographic factors showed limited influence. These findings highlight the importance of addressing modifiable behavioral, social, and psychological determinants rather than relying solely on demographic characteristics. The moderating effect of age further indicates greater vulnerability among older adults, supporting the need for life-course approaches in behavioral health interventions.

From a population mental health perspective, integrating digital behavioral health into prevention, screening, and mental health promotion strategies is essential in Rwanda's rapidly evolving digital environment. Incorporating internet addiction assessment into healthcare and community mental health services, alongside digital well-being interventions, may enhance early identification and prevention. Although causal relationships require confirmation through longitudinal research, these findings provide a foundation for strengthening mental health systems and developing responsive strategies to address behavioral addictions in an increasingly digital society.

Abbreviations

CI: Confidence Interval

JASP: Jeffreys's Amazing Statistics Program

SD: Standard Deviation

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of the University of Rwanda, College of Medicine and Health Sciences with approval reference number CMHS/IRB/890/2025, issued on 22/12/2025. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and its later amendments version adopted in October 2024 with respect of key principles including primacy of participant rights, physician responsibility, informed consent, scientific validity and social value, risk-benefit assessment, community engagement, transparency and oversight, environmental considerations, global and local compliance.

Consent for publication

Not applicable. This manuscript does not contain any individual personal data or identifiable information.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

PM contributed to conception, data collection, and analysis, research report, CM contributed to conception and data analysis, JCN and PU contributed to the proof-reading.

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