

The relationship between physical activity engagement and internet addiction among students in rural academia

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ABSTRACT

This study explores the relationship between physical activity engagement and internet addiction among university students in a rural Philippine academic setting—an understudied context where digital reliance and limited physical access converge. Employing a rigorous quantitative approach through a descriptive-correlational design, the study involved 892 respondents selected via simple random sampling from a premier state university. Data were gathered using the culturally adaptable international physical activity questionnaire (IPAQ) and the internet addiction test (InAT), both established and reliable tools for assessing physical activity levels and problematic internet use. Descriptive and inferential statistics, including Pearson correlation coefficient, were utilized to analyze patterns and relationships within the data. The results indicate a significant negative correlation between physical activity engagement and internet addiction, suggesting that higher physical activity is associated with lower levels of problematic internet use. This finding underscores the protective role of physical activity against digital overdependence and highlights the need to contextualize behavioral health strategies within rural academic environments. The study offers valuable insights for policymakers, educators, and researchers aiming to support student well-being through integrative health and technology-use frameworks.

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1. INTRODUCTION

Internet addiction refers to a behavioral pattern characterized by excessive and uncontrollable use of the internet, which negatively impacts an individual's daily functioning, well-being, and interpersonal relationships. Coined by Lozano-Blasco *et al.* [1], the concept encompasses compulsive online behaviors such as prolonged browsing, gaming, or social media usage, often leading to neglect of responsibilities, sleep disturbances, and mood changes. Internet addiction has been associated with symptoms of withdrawal, such as irritability or anxiety when offline, and a persistent preoccupation with returning to online activities [2]. While not yet formally recognized as a disorder in the diagnostic and statistical manual of mental disorders

(DSM-5), researchers acknowledge its similarities to other behavioral addictions, such as gambling, and emphasize its potential for significant psychological and social consequences [3]. With the growing accessibility of digital technology, understanding internet addiction has become crucial for addressing its implications on mental health and daily life [4].

On the other hand, physical activity engagement refers to the involvement in bodily movements produced by skeletal muscles that require energy expenditure and contribute to physical health and overall well-being. It encompasses a broad spectrum of activities, including structured exercise, recreational sports, household chores, and active commuting, all of which vary in intensity from light to vigorous [5]. Regular physical activity is associated with numerous health benefits, such as improved cardiovascular function, enhanced mental health, and reduced risk of chronic conditions like obesity, diabetes, and hypertension. Beyond physical health, active participation in physical activity promotes social interaction, stress reduction, and cognitive function, underscoring its role in a balanced lifestyle [6].

The rise of internet addiction among students has become a pressing concern, exacerbated by the growing reliance on digital technology for education, entertainment, and social interaction. Excessive internet use has been linked to negative outcomes such as decreased academic performance, sleep disturbances, and heightened levels of anxiety and depression [7]. Students often experience a cycle of compulsive online behaviors, such as prolonged gaming or social media scrolling, which disrupt their focus on academic responsibilities and personal development [8]. Concurrently, physical activity engagement among students has declined, with sedentary lifestyles becoming more prevalent due to extended screen time and a lack of accessible recreational opportunities. This inactivity poses significant health risks, including obesity, cardiovascular diseases, and weakened mental health, further compounded by the psychological strain of academic pressures [9].

Further, recent studies have extensively examined internet addiction, focusing on its prevalence, risk factors, and psychological implications. Research highlights that internet addiction is particularly prevalent among adolescents and university students, often driven by the accessibility of digital platforms and their role in education, communication, and entertainment [10]. Factors such as loneliness, stress, and low self-esteem have been consistently linked to excessive internet use, making young people more susceptible to compulsive online behaviors. Furthermore, studies have shown a strong association between internet addiction and mental health issues, including anxiety, depression, and sleep disturbances [11].

Furthermore, research works have highlighted critical insights into students' physical activity engagement, revealing its benefits and the barriers limiting participation. Studies indicate that regular physical activity significantly enhances students' physical health, cognitive function, and emotional well-being, with active individuals reporting better academic performance and reduced stress levels [12]. However, global trends suggest a concerning decline in physical activity among students, attributed to increased screen time, academic pressures, and limited access to recreational facilities [13]. Gender differences have also been noted, with male students typically engaging in more vigorous activities than their female counterparts, who often face cultural and societal barriers [14].

Despite the growing body of research on internet addiction and physical activity engagement among students, a notable gap remains in understanding the correlation between these two behaviors. While studies have explored the individual impacts of excessive internet use and physical inactivity, no comprehensive research has yet examined how these two factors intersect and influence each other within the context of student populations. The existing literature primarily addresses the detrimental effects of internet addiction on mental health, academic performance, and physical well-being, as well as the benefits of physical activity on students' overall health [15]. However, there is a lack of research focusing on the relationship between physical activity engagement and internet addiction, especially in the unique context of students in rural communities. The general research question guiding this study is: what is the relationship between physical activity engagement and internet addiction among students in a rural academia?

This study presents a novel contribution to the academic discourse by exploring the understudied relationship between physical activity engagement and internet addiction among students in rural academic settings. Students in rural settings often exhibit unique digital behavior, characterized by increased reliance on online platforms due to limited access to diverse recreational and social opportunities. At the same time, physical activity may be constrained by environmental, infrastructural, or programmatic limitations, making the interplay between screen time and movement particularly relevant and complex in these communities. In an era where digital dependency is increasingly prevalent, particularly among the youth, this research sheds light on how physical activity may function as a buffer against the psychological and behavioral impacts of excessive internet use.

For students in rural areas—who may face limited access to structured recreational outlets yet high exposure to digital environments—the findings offer a unique perspective on balancing virtual engagement with physical well-being. Beyond its relevance to student health, the study expands the existing body of

knowledge by bridging two distinct yet interrelated domains: behavioral addiction and physical activity. In doing so, it fills a critical gap and opens pathways for future studies aimed at promoting holistic student wellness.

2. METHOD

2.1. Research design

This research employed a quantitative research design, specifically descriptive correlation, to examine the relationship between physical activity engagement and internet addiction among university students in a rural academic setting. Quantitative research focuses on the collection and analysis of numerical data to identify patterns, trends, or relationships, making it suitable for studying measurable variables [16]. Descriptive correlation, on the other hand, is a research approach that seeks to identify and describe the relationship between two or more variables without manipulating them. The choice of a quantitative research design, particularly descriptive correlation, is justified given the nature of the research questions and the variables involved. This approach allows for the measurement of both physical activity engagement and internet addiction in a structured and systematic way, enabling the researcher to assess their relationship within a larger population of students [17].

2.2. Respondents and sampling

The study involved 892 respondents from Southern Philippines, who were selected using simple random sampling. Simple random sampling is a probability sampling method where every individual in the population has an equal chance of being selected, ensuring that the sample is representative of the population [18]. The respondents are comprised with a diverse group of students across various academic programs, with a nearly balanced gender distribution and a majority coming from low to middle-income households, reflecting the typical socio-economic landscape of rural academic communities in the Philippines. This technique was chosen because it minimizes selection bias and allows for the generalization of the findings to the larger student population. By using simple random sampling, the study ensured that each respondent had an equal opportunity to participate, which enhances the reliability and validity of the results. Furthermore, this approach is particularly suitable for studies with a large and diverse student population, like this one, where a fair and unbiased representation is crucial for examining the relationship between variables.

2.3. Research instrument

This research adapted the international physical activity questionnaire (IPAQ) to measure the physical activity engagement of university students. Developed by Craig *et al.* [19], the IPAQ is a widely used instrument with a high reliability index, evidenced by a Cronbach's alpha ranging from 0.80 to 0.90, ensuring consistent and valid results across different populations. Additionally, the internet addiction test (InAT) was adapted to assess the level of internet addiction among respondents. The InAT has demonstrated strong reliability, with a Cronbach's alpha of 0.92, confirming its effectiveness in measuring problematic internet use. Both instruments are well-established in their respective fields and are appropriate for capturing the variables of interest in this study. While the IPAQ and InAT are widely recognized for their reliability and validity, they are particularly suitable for rural Filipino students due to their cross-cultural adaptability, straightforward language, and prior successful use in diverse populations, including in Southeast Asian contexts.

2.4. Statistical analysis

This research utilized both descriptive and inferential statistics to analyze the data. Descriptive statistics, including frequency count, percentage, mean, and composite mean, were used to summarize and describe the physical activity engagement and internet addiction levels of the students. For the test of relationship between these two variables, the Pearson correlation coefficient was employed. Pearson correlation is the most appropriate statistical test for this study because it measures the strength and direction of the linear relationship between two continuous variables, allowing for a clear assessment of how physical activity engagement and internet addiction are related.

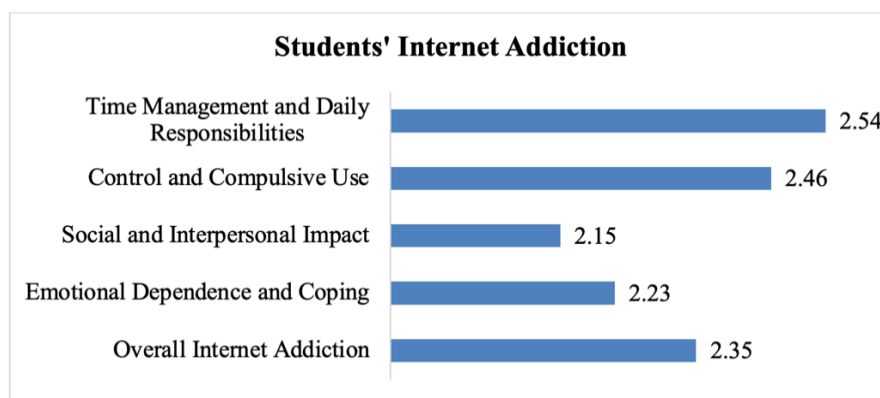
3. RESULTS

Table 1 illustrates the distribution of physical activity engagement among the student respondents. It categorizes their engagement into three levels: low, moderate, and high, providing a clear overview of how students are participating in physical activities. This figure highlights the varying degrees of physical activity engagement, offering insight into the general activity levels of students within the study.

Figure 1 presents the overall internet addiction levels among the student respondents. The figure categorizes the respondents' internet addiction into four levels, ranging from mild to severe addiction, providing a comprehensive view of the students' relationship with internet use. This visualization helps to better understand the extent of internet addiction within the student population and its varying degrees of impact. Table 2 displays the results of the test examining the relationship between students' physical activity engagement and their level of internet addiction. The table shows the Pearson correlation coefficient and the corresponding p-value, indicating the statistical significance of this relationship. This analysis provides insight into how these two variables interact and whether one influences the other among the student respondents.

Table 1. Respondents' physical activity engagement

Physical activity engagement	Frequency (n=892)	Percentage (%)
Low activity	219	25
Moderate activity	390	44
High activity	283	31



Note: 1.00–1.49: Strongly disagree (minimal or no internet addiction)
 1.50–2.59: Disagree (mild internet addiction)
 2.60–3.49: Agree (moderate internet addiction)
 3.50–4.00: Strongly agree (severe internet addiction)

Figure 1. Students' internet addiction

Table 2. Relationship between the respondents' physical activity engagement and internet addiction

Paired variables	Pearson correlation coefficient	p-value	Interpretation $\alpha=0.05$
Physical activity engagement and internet addiction	-0.074	0.028	Significant

4. DISCUSSION

4.1. Physical activity engagement of students

Table 1 shows the students' physical activity engagement. Of the 892 respondents, 219 (25%) reported low physical activity engagement, 390 (44%) reported moderate physical activity engagement, and 283 (31%) reported high physical activity engagement. This means that the majority of students (75%) engage in some level of physical activity, with a significant proportion (44%) participating at a moderate level. However, the data also reveals that nearly a quarter of the students have low physical activity engagement, highlighting a potential area of concern for health and wellness interventions. The relatively smaller proportion of students engaging in high physical activity (31%) suggests that there may be barriers or challenges preventing students from reaching higher levels of physical activity, which could be explored further in the context of their academic and lifestyle habits.

The results of the physical activity engagement levels among students highlight important implications for their overall health and well-being. While a significant portion of students engage in moderate or high levels of physical activity, the presence of a considerable number with low physical activity engagement suggests that a portion of the student population may be at risk for various health issues, such as obesity, cardiovascular diseases, and mental health challenges. Physical activity is crucial not only for maintaining physical health but also for enhancing cognitive function and emotional well-being, both of which can impact academic performance.

Physical engagement is essential for students as it plays a vital role in maintaining both physical and mental health, which ultimately contributes to their academic success and overall well-being. Regular physical activity has been shown to improve cardiovascular health, increase strength and flexibility, and reduce the risk of chronic diseases, such as obesity, diabetes, and hypertension [20]. Additionally, engaging in physical activity has been linked to enhanced cognitive function, including better memory, attention, and learning capacity, which are critical for academic achievement [21]. Beyond physical and cognitive benefits, physical activity is also known to have a positive impact on mental health by reducing symptoms of depression, anxiety, and stress, common challenges faced by university students [22].

4.2. Students' internet addiction

Overall internet addiction. The overall internet addiction of students is reported to have a composite mean of 2.35, which corresponds to a mild internet addiction interpretation. This implies that while students may not exhibit severe internet addiction, their internet usage may still be a source of concern, potentially affecting various aspects of their academic and personal life. Mild internet addiction suggests a moderate level of dependency, where students may experience occasional disruptions in daily activities and may struggle to control the amount of time spent online.

The findings of this study are consistent with previous research, which indicates that mild levels of internet addiction are common among students, affecting their productivity and well-being [23]. Similarly, a study by Ding *et al.* [24] highlighted that university students often experience moderate levels of internet addiction, which can interfere with their academic performance. Additionally, other studies [25], [26] further reinforce the prevalence of mild internet addiction in student populations, emphasizing the need for awareness and monitoring of internet usage habits.

In terms of time management and daily responsibilities, it has a composite mean of 2.54, which corresponds to a moderate internet addiction interpretation. This means that students are experiencing some level of disruption in managing their time and fulfilling daily tasks due to their internet usage. This implies that their internet use is beginning to have a noticeable impact on their academic, social, and personal responsibilities, potentially leading to a decline in productivity and a struggle to balance various aspects of their lives. This finding aligns with previous studies that indicate a moderate level of internet addiction among students can hinder their ability to manage time effectively [25]. Similarly, a study by Lin [27] found that excessive internet use can cause significant disruptions in students' academic performance and time management. Furthermore, Rogowska and Libera [28] also supports this by showing that internet addiction among university students often results in neglect of essential tasks and a decline in overall life satisfaction.

In terms of control and compulsive use, it has a composite mean of 2.46, which corresponds to a mild internet addiction interpretation. This means that students are experiencing some degree of difficulty in controlling their internet use, but the compulsion to use the internet is not overwhelming. This implies that while internet use may sometimes feel uncontrollable, it does not yet significantly interfere with their ability to function in daily life. This finding is consistent with studies showing that moderate levels of compulsive internet use can result in an ongoing struggle to limit online activity, without reaching a level that severely disrupts daily functioning [29]. Similarly, a study by Marciano *et al.* [30] found that individuals with mild internet addiction often exhibit compulsive behaviors but are able to maintain some degree of control. Additionally, research by Putra *et al.* [31] suggests that mild internet addiction is characterized by a desire to use the internet excessively, though not to the extent that it leads to major life disruptions.

The result indicates that students exhibit mild internet addiction in terms of social and interpersonal impact, as reflected in the composite mean of 2.15. This implies that while internet use is not severely disrupting students' social interactions or relationships, it is still affecting their ability to engage meaningfully in face-to-face interactions. Mild addiction in this area suggests that while students can maintain their social connections, the increasing time spent online may subtly hinder their capacity to form deeper, more fulfilling relationships outside of the digital space. This finding aligns with prior research that suggests mild internet addiction can lead to social withdrawal and a decrease in face-to-face communication [32]. Similarly, other study reported that excessive time online may lead to reduced quality of offline interactions [33]. While the current study found that the social impact is mild, it still mirrors broader concerns about the influence of excessive internet use on socialization [34].

Emotional dependence and coping. The result indicates that students experience mild emotional dependence on the internet, with a composite mean of 2.23. This implies that while the internet provides some emotional relief or coping mechanism for students, it is not significantly replacing or overpowering other means of managing emotional well-being. Students may be using the internet to escape or distract themselves from negative emotions, but this dependence is not yet severe enough to cause major disruptions in their emotional or psychological functioning.

These findings are consistent with studies showing that individuals with mild emotional dependence on the internet often use it as a coping mechanism for stress or negative emotions [35]. Other research has

indicated that online activities such as gaming or social media use can serve as emotional outlets, but when used excessively, they may hinder other healthy coping strategies [36]. Similarly, it has been found that while mild emotional dependence on the internet is common among students, it does not always lead to serious psychological issues [37].

4.3. Relationship between the respondents' physical activity engagement and internet addiction

On the test of relationship between the respondents' physical activity engagement and internet addiction, the Pearson correlation coefficient of $-.074^{**}$ and a p-value of $.025$ indicate a statistically significant negative relationship. This implies that as the physical activity engagement of students increases, their level of internet addiction decreases, though the strength of this relationship is weak. The negative correlation suggests that more physically engaged students may be less likely to exhibit signs of internet addiction.

These findings align with previous research showing that increased physical activity can serve as a protective factor against internet addiction [38]. Studies have indicated that physical engagement in activities can help reduce the time spent online, which may prevent the development of addictive behaviors [39]. Additionally, it has been found that students who regularly participate in physical activities have improved mental well-being, reducing their likelihood of using the internet as a coping mechanism [40].

The results imply that physical activity engagement may play a role in mitigating internet addiction among students. Given the statistically significant negative correlation between physical activity and internet addiction, institutions may consider promoting physical activity as part of their broader mental health and well-being strategies. Encouraging students to engage in regular physical activities could help alleviate some of the adverse effects associated with excessive internet use, fostering a healthier balance between online and offline behaviors. These findings support the notion that incorporating physical activity into students' daily routines can improve mental health and reduce the risks associated with internet addiction [3]. Several studies have shown that physical activity not only enhances physical health but also acts as an effective intervention to reduce the reliance on the internet for emotional and social fulfillment.

The relationship between behavioral addiction and physical health has been well-established in the literature; however, current frameworks often treat them as separate domains. To deepen the understanding of how students navigate the balance between internet use and physical activity, integrating psychological frameworks such as dual-process theory could provide a more nuanced explanation. This theory distinguishes between automatic, impulsive behaviors and deliberate, reflective decision-making processes, which may help explain why students in rural settings might default to excessive screen time despite awareness of its negative effects. Similarly, applying self-determination theory offers a valuable lens through which to examine the role of intrinsic motivation and fulfillment of psychological needs—such as autonomy, competence, and relatedness—in shaping students' choices between online engagement and physical activity.

The findings align with the Department of Education (DepEd) and the Commission on Higher Education (CHED) policies that emphasize the importance of physical education and holistic student well-being within the Philippine educational system. Furthermore, the results resonate with the World Health Organization's Global Action Plan on Physical Activity, which advocates for reducing sedentary behavior and promoting active lifestyles, particularly among youth. By positioning physical activity as a potential buffer against internet addiction, this study supports these institutional priorities and offers empirical evidence that can inform school-based wellness programs, policy development, and strategic initiatives aimed at fostering healthier learning environments in both rural and urban settings.

5. CONCLUSION

The findings of this study reveal that most students demonstrate moderate levels of physical activity engagement, indicating that while many are physically active, a substantial portion remain only partially engaged. This highlights the need for greater institutional focus on fostering active lifestyles, as regular physical activity is vital to students' holistic well-being and academic functioning. The results underscore the importance of supportive academic environments that encourage students to integrate physical activity into their daily routines as part of maintaining balance and wellness.

In contrast, the study also identified a notable prevalence of internet addiction among students, particularly characterized by compulsive use, emotional dependence, and disruptions in daily responsibilities. These patterns suggest that excessive internet use continues to pose challenges to students' productivity, social relationships, and emotional stability. The findings indicate that internet addiction extends beyond individual behavior, reflecting a wider social and institutional concern that demands awareness and understanding within the academic community.

Finally, the significant negative relationship between physical activity engagement and internet addiction demonstrates the potential of physical activity as a buffer against the harmful effects of excessive

internet use. Students who engage more actively in physical pursuits tend to exhibit lower levels of internet addiction, emphasizing the value of balanced routines in safeguarding mental health and enhancing quality of life. Future studies may build on these findings by exploring the specific types and intensities of physical activities that most effectively reduce digital dependency and by assessing their long-term impacts on student well-being.

This study, while comprehensive, has several limitations that should be acknowledged. First, it relied on self-reported data, which may be subject to response biases such as social desirability or inaccurate recall. Second, the cross-sectional nature of the research limits the ability to establish causality between physical activity engagement and internet addiction. Additionally, the study was conducted within a single rural academic institution, which may affect the generalizability of the findings to students in urban or more diverse educational settings. Finally, the absence of qualitative data limits a deeper understanding of the personal, environmental, and cultural factors influencing the respondents' behaviors.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization

M : **M**ethodology

So : **S**oftware

Va : **V**alidation

Fo : **F**ormal analysis

I : **I**nvestigation

R : **R**esources

D : **D**ata Curation

O : Writing - **O**riginal Draft

E : Writing - Review & **E**diting

Vi : **V**isualization

Su : **S**upervision

P : **P**roject administration

Fu : **F**unding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

ETHICAL APPROVAL

The research related to human use has been complied with all the relevant national regulations and institutional policies in accordance with the tenets of the Helsinki Declaration and has been approved by the authors' institutional review board or equivalent committee.

DATA AVAILABILITY

The authors confirm that the data supporting the findings of this study are available within the article.




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