

Exploring the Relationship Between Internet Addiction, Physical Activity, and Quality of Life Among College Students

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ABSTRACT

Background: With the rapid development of digital technology, the internet has become an indispensable part of college students' daily lives. However, excessive internet use may lead to internet addiction, which can negatively impact quality of life. Physical activity not only improves physical health but also has positive effects on mental health and overall quality of life.

Objective: This study explored the relationships of internet addiction, physical activity, and quality of life among college students.

Method: One hundred forty-one college students ($N = 141$, $M_{age} = 21.45$, $SD = 1.38$ years) in Taiwan participated in this study. Among the participants, 39.7% were male ($n = 56$; $M_{age} = 21.6$, $SD = 1.42$) and 60.2% were female ($n = 85$; $M_{age} = 21.4$, $SD = 1.29$). Levels of internet addiction were measured using the Internet Addiction Test (IAT), physical activity was measured by the International Physical Activity Questionnaire (IPAQ), and quality of life was measured by the World Health Organization Quality of Life-BREF (WHOQOL-BREF).

Results: Significant negative correlation between internet addiction and quality of life, while physical activity was significantly positively correlated with quality of life. Among the participants, students in foreign languages, mathematics and science, and engineering majors had higher internet addiction than those in life sciences.

Conclusion: These findings suggest that physical activity may play an important role in reducing the risk of internet addiction and enhancing the quality of life among college students.

Keywords: Internet addiction, physical activity, quality of life, college students

1. INTRODUCTION

In the digital age, the internet has become integral to college students' daily lives. The proliferation of social media, online learning, and various digital applications has led to growing dependence on internet use (Adhikari et al., 2022). While online platforms offer educational and social benefits, excessive use is associated with internet addiction,

mental health issues, and reduced quality of life (Chen et al., 2022). Internet addiction, distinguished from problematic internet use and screen time, is defined as a more severe and persistent pattern of internet use that significantly impairs daily functioning. It is characterised by symptoms such as compulsive behaviour, withdrawal, and tolerance, which align



with the diagnostic criteria for addiction (Cheng et al., 2025). On the other hand, problematic internet use indicates that the internet usage may interfere with daily functioning but does not meet the clinical criteria for addiction. This term describes behaviours that are excessive and may lead to negative consequences, yet do not exhibit the full spectrum of addiction (Derbyshire et al., 2013). Besides, screen time refers to the total duration spent on electronic devices, encompassing activities such as internet browsing, social media usage, and gaming, irrespective of whether these activities are perceived as problematic (Browne et al., 2021). Specifically in Taiwan, the prevalence of internet addiction among the student population is approximately 17.4%, which has drawn considerable attention from society (Lin et al., 2018). According to a nationwide survey conducted in Taiwan, younger individuals, unemployed persons, and students are more likely to develop internet addiction disorder, highlighting a growing public concern regarding its potential impact on students' mental health, academic performance, and overall wellbeing (Wu et al., 2019).

Internet addiction, characterised by compulsive and uncontrolled online behaviour, could impair students' academic performance, daily functioning, and social relationships (Kuss & Lopez-Fernandez, 2016; Shaw & Black, 2008). Internet addiction has been linked to anxiety, depression, and heightened psychosocial stress (Hasan & Jaber, 2019), and these challenges are amplified in the university context, where students face academic pressure, social demands, and identity development, further increasing college students' vulnerability to problematic internet use (Jia et al., 2021). The adverse effects of internet addiction on college students' mental health have been well-documented. Prolonged internet addiction is associated with heightened emotional disturbances, including increased symptoms of anxiety and depression (Hasan & Jaber, 2019). Excessive internet reliance may also diminish students' capacity to cope with real-world challenges, thereby lowering life satisfaction and overall wellbeing. College students often turn to the internet as a means of escaping stress; however, this coping strategy may worsen the underlying psychological distress over time (Joshi et al., 2023). Furthermore, internet addiction can impair social functioning. As students increasingly engage in online communication, particularly in the context of remote learning, they may experience reduced face-to-face interaction, leading to declines in social skills and difficulties

in forming and maintaining interpersonal relationships (Truzoli et al., 2021).

Regular physical activity has been shown to positively impact both mental health and quality of life. Exercise not only improves physical health but also enhances psychological resilience and social functioning (Yan et al., 2024), it also promotes the release of endorphins, which can alleviate symptoms of anxiety and depression (Luo et al., 2024). Notably, increasing physical activity has been shown to decrease internet addiction and improve life satisfaction (Yan et al., 2024), while excessive internet use may reduce engagement in outdoor activities, leading to lower physical activity and diminished quality of life (Lin & Liu, 2022). As internet addiction poses increasing risks to students' mental health and life satisfaction (Saini et al., 2020), understanding how physical activity influences college students' quality of life and its potential role in mitigating internet addiction therefore is essential for promoting overall wellbeing. Specifically, investigating behavioural patterns in response to internet addiction, and how increased physical activity might counteract the adverse effects of internet addiction, is a critical issue in need of immediate attention.

Quality of life is defined as an individual's perceived satisfaction and wellbeing across multiple domains, including physical, psychological, social, and environmental aspects (Phyo et al., 2020). For college students, a high quality of life not only supports academic performance but also contributes to overall wellbeing (Joshi et al., 2023) and is closely associated with positive mental health. On the other hand, low quality of life is linked to anxiety, depression, and other psychological issues (Hossin et al., 2022). College students encounter significant transitions that influence their quality of life, such as independent living, new social relationships, and academic stress, which can be influenced by factors like social support, physical health, and psychological adaptability (Kim et al., 2023). Additionally, high academic pressure has been associated with increased internet addiction, which may, in turn, reduce physical activity levels and impair quality of life (Jun & Choi, 2015; Steare et al., 2023; Teuber et al., 2024). However, limited research investigated the effective strategies to enhance college students' quality of life, particularly regarding the role of physical activity.

While prior research has examined the relationship between internet addiction and mental health, there is a relative paucity of studies investigating

how physical activity influences this relationship among college students in Taiwan. Existing literature often focuses on individual factors, such as internet addiction or physical activity in isolation, with limited analysis of their interactive effects. Moreover, the roles of demographic variables such as gender, year level, and field of study remain underexplored. Therefore, the present study aims to address these gaps by examining the associations among internet addiction, physical activity, and quality of life across different demographic groups (e.g. gender, year, and field of study) in a college student population. Specifically, we hypothesise that: H1. Level of physical activity is negatively associated with internet addiction; H2. Internet addiction is negatively associated with quality of life; H3. Physical activity is positively associated with quality of life among college students. This research seeks to enhance the understanding of how internet addiction relates to quality of life and to provide evidence-based insights that can inform targeted physical activity interventions and health promotion strategies in higher education settings.

2. METHODS

2.1 Study Population

One hundred forty-one participants were recruited through purposive sampling from universities and colleges in Taiwan. The age range of participants was between 19 and 27 years. Prior to data collection, the researchers provided all participants with a clear explanation of the study's objectives and procedures. Only those with basic proficiency in reading Chinese were eligible to participate. Informed consent was obtained from all participants before administering the survey. Given that this was an anonymous questionnaire-based study conducted among healthy adults and posed minimal risk, it did not undergo formal ethical review by an Institutional Review Board (IRB) or any other Ethics Committee. Post-hoc statistical power was estimated using G*Power 3.1 software (Faul et al., 2009) based on a two-tailed *t* test for correlation analysis. Assuming an effect size of 0.3, an alpha level of 0.05, and a sample size of 141 participants, the achieved power ($1-\beta$) was calculated to be 0.95. This result suggests that the present study had adequate statistical power to detect medium-sized effects.

2.2 Study Instrumentations

Chinese Internet Addiction Scale (CIAS)

This study employed the Chinese Internet Addiction Scale revised by Chen et al. (2003) to assess the level of internet addiction among college students. The scale consists of 26 items rated on

a 4-point Likert scale, ranging from 1 ('strongly disagree') to 4 ('strongly agree'), with total scores ranging from 26 to 104. Higher scores indicate a greater tendency towards internet addiction, and a score above 64 is considered indicative of problematic internet use. The scale has demonstrated good internal consistency (Cronbach's $\alpha = .93$) and structural stability, and it has been widely used in internet addiction research.

International Physical Activity Questionnaire-Short Form (IPAQ-SF)

To assess physical activity levels among college students, this study utilised the Mandarin version of the International Physical Activity Questionnaire-Short Form (IPAQ-SF), translated by Liou et al. (2008). The questionnaire comprises seven items evaluating physical activity over the past week, including domains such as work-related activity, transportation, household and gardening tasks, leisure-time activity, and sedentary behaviour (e.g. sitting time). It captures both activity types and intensity levels (walking, moderate, and vigorous activity), allowing estimation of total energy expenditure. Based on total metabolic equivalent (MET) minutes per week, physical activity levels are categorised as low (0–599 MET-min/week), moderate (600–2,999 MET-min/week), or high ($\geq 3,000$ MET-min/week). The IPAQ-SF demonstrates strong content validity (CVI > 98%), with intraclass correlation coefficients for translation accuracy and semantic equivalence ranging from 0.72 to 0.93.

Taiwanese version of the World Health Organization Quality of Life-BREF (WHOQOL-BREF Taiwan Version)

This study employed the WHOQOL-BREF Taiwan Version (Yao, 2002) to assess college students' quality of life. The instrument consists of 26 items rated on a 5-point Likert scale and evaluates subjective perceptions across four domains: physical health, psychological health, social relationships, and environmental conditions. Domain scores are calculated by averaging the scores of items within each domain and multiplying by four; the overall quality of life score is obtained by summing these domain scores, with higher scores indicating better perceived quality of life. Items three, four, and 26 are reverse-coded, calculated by subtracting the item score from six. The scale demonstrates good internal consistency, with an overall Cronbach's α of .91, and subscale α values ranging from .70 to .77.

2.3 Statistical Analysis

Descriptive statistics for demographic variables (gender, field of study, and year level) were presented as frequencies (*N*) and percentages (%).

Questionnaire and scale data were summarised using means and standard deviations ($M \pm SD$). To examine differences across demographic groups in each domain, one-way ANOVA was conducted. Given that some fields of study contained limited number of participants, the data were categorised by merging conceptually related departments into broader categories. Departments ‘mass communication’ and ‘arts’ were merged into the ‘social and psychology’, whereas ‘math’, ‘information technology’, ‘engineering’, and ‘life sciences’ have been grouped under ‘sciences and engineering’. This procedure was performed to ensure adequate group sizes and to meet the assumptions of the one-way analysis of variance (ANOVA). Additionally, Pearson’s product-moment correlation analysis was used to explore the relationships of physical activity, internet addiction, and quality of life. Correlation coefficients were interpreted as follows: values below 0.3 indicated weak correlation, 0.3–0.7 moderate correlation, and above 0.7 strong correlation (Schober et al., 2018). Statistical significance level was set at $\alpha = .05$. Where significant main effects or interactions are observed, Tukey post hoc comparisons will be conducted to control for Type I error. Effect sizes will be reported as partial η^2 for ANOVA

results and Cohen’s d for pairwise comparisons. All statistical analyses were performed using IBM SPSS Statistics software 29.0 (Armonk, NY: IBM Corp.).

3. RESULTS

3.1 Demographic Analysis

A total of 147 questionnaires were collected, with 141 deemed valid after excluding six invalid responses. Participants had an average age of 21.45 years ($SD = 1.38$), 39.7% were male ($n = 56$; $M = 21.6$, $SD = 1.42$) and 60.2% were female ($n = 85$; $M = 21.4$, $SD = 1.29$). In terms of field of study, the majority were from finance and economics (35.5%), followed by law and political science (12.8%), management (12.8%), social sciences and psychology (10.6%), recreation and sports (7.1%), literature, history, and philosophy (6.4%), foreign languages (5.0%), natural sciences (2.8%), mass communication (2.1%), arts (2.1%), information science (1.4%), engineering (0.7%), and life sciences (0.7%). Regarding year level, sophomores comprised the largest group (37.1%), followed by juniors (27.7%), freshmen (18.9%), and seniors (11.4%) (see Table 1).

Table 1. Summary of demographic variables of participants (N = 141)

Variable and Subcategory	Number	Percentage
Gender		
Male	56	39.7%
Female	85	60.2%
Field of Study		
Finance & Economics	50	35.5%
Law & Politics	18	12.8%
Management	18	12.8%
Social & Psychology	15	10.6%
Leisure & Sports	10	7.1%
Humanities & Philosophy	9	6.4%
Foreign Languages	7	5.0%
Math, Physics, & Chemistry	4	2.8%
Mass Communication	3	2.1%
Arts	3	2.1%
Information Technology	2	1.4%
Engineering	1	0.7%
Life Sciences	1	0.7%
Year Level		
Freshman	28	18.9%
Sophomore	55	37.1%
Junior	41	27.7%
Senior	17	11.4%

3.2 Internet Addiction, Physical Activity, and Quality of Life

The average total score for internet addiction among participants was 59.21 ($SD = 11.14$), 44 participants (23.6%) were identified as addicted to internet ($M = 71.55$, $SD = 5.32$). Regarding physical activity, 58.1% ($n = 82$) of students reported high levels of physical activity, 34.0% ($n = 48$) reported

moderate levels, and 7.8% ($n = 11$) reported low levels. For quality of life, the average scores ($\pm SD$) across domains were as follows: physical health (11.85 ± 1.86), psychological wellbeing (12.63 ± 2.23), social relationships (14.14 ± 2.07), and environment (13.78 ± 2.08), with a total mean score of 59.02 ($SD = 7.68$) (see Table 2).

Table 2. Summary of internet addiction, physical activity, and quality of life status

Variable and Subcategory	Number	Percentage	M	SD
Internet Addiction				
Yes	44	23.6%	71.55	5.32
No	97	76.3%	53.61	8.17
Physical Activity				
High	82	58.1%	7,226.89	4,464.83
Moderate	48	34.0%	1,768.39	711.94
Low	11	7.8%	240.36	191.75
Quality of Life				
Physical Domain			11.88	1.87
Psychological Domain			12.66	2.25
Social Domain			14.14	2.08
Environmental Domain			13.78	2.11
Total Score			59.02	7.68

Note: M = mean; SD = standard deviation.

3.3 Analysis of Differences in Internet Addiction, Physical Activity, and Quality of Life Across Demographic Variables

No significant gender differences were found in internet addiction ($F_{(1,139)} = 3.12$, $p = .079$) or physical activity ($F_{(1,139)} = 1.25$, $p = .266$). However, a significant difference was observed in overall quality of life ($F_{(1,139)} = 4.53$, $p = .035$), with male students reporting higher scores ($M = 60.70$, $SD = 8.72$) than females ($M = 57.92$, $SD = 6.73$). Among the quality of life domains, only the psychological domain showed a significant gender difference ($F_{(1,139)} = 6.27$, $p = .013$, $\eta^2_p = .004$), with males scoring higher ($M = 13.23$, $SD = 2.12$) than females ($M = 12.28$, $SD = 2.26$). No significant differences were found in the physical, social, or environmental domains.

Regarding field of study, no significant differences were found in internet addiction ($F_{(7,133)} = 0.918$, $p = .495$) and overall quality of life ($F_{(7,133)} = 1.07$, $p = .388$). In contrast, physical activity levels differed significantly across academic fields ($F_{(7,133)} =$

2.10, $p = .047$). Post-hoc analysis revealed that students majoring in recreation and sports academic fields exhibited significantly higher physical activity scores ($M = 9,703.67$, $SD = 7,177.71$) compared with students in humanities and philosophy, business and economics, social and psychology, and law and politics.

In terms of year level, no significant differences were found in internet addiction ($F_{(3,137)} = 1.63$, $p = .186$), physical activity ($F_{(3,137)} = 0.56$, $p = .643$), or overall quality of life ($F_{(3,137)} = 2.38$, $p = .072$). However, significant differences were observed in the psychological ($F_{(3,137)} = 2.86$, $p = .039$, $\eta^2_p = .06$) and social domains ($F_{(3,137)} = 2.77$, $p = .044$, $\eta^2_p = .06$). Post hoc comparisons indicated that sophomores ($M = 13.00$, $SD = 2.19$) scored significantly higher in psychological wellbeing than seniors ($M = 11.29$, $SD = 2.28$) and juniors ($M = 14.63$, $SD = 2.12$), and scored higher than seniors ($M = 12.94$, $SD = 1.82$) in the social domain (see Table 3).

Table 3. Differences in demographic variables, internet addiction, physical activity, and overall quality of life scores

Variable	Internet Addiction				Physical Activity				Overall Quality of Life			
	M	SD	F	p	M	SD	F	p	M	SD	F	p
Gender												
Male	57.18	12.17	3.12	.079	5,340.75	5,294.06	1.25	.266	60.70	8.72	4.54	.035*
Female	60.54	10.26			4,482.94	3,819.28			57.92	6.73		
Field of Study												
Business & Economics	57.48	9.92	.918	.495	4,762.74	4,615.18	2.10	.047*	59.77	7.59	1.07	.388
Law & Politics	58.67	9.38			4,104.06	4,092.08			58.56	9.48		
Management	60.35	13.67			4,666.33	3,905.91			56.64	6.46		
Social & Psychology	58.30	10.93			4,229.86	3,147.53			59.52	7.91		
Recreation & Sports	57.40	12.29			9,703.67	7,177.71			61.80	8.03		
Humanities & Philosophy	61.27	9.57			3,551.17	3,120.63			56.18	5.74		
Foreign Languages	66.57	8.73			4,112.90	3,629.89			56.14	4.95		
Science & Engineering	63.62	17.67			5,113.24	4,579.68			62.25	8.70		
Grade												
Freshman	59.57	10.54	1.63	.186	5,641.08	5,351.32	0.56	.643	58.46	6.83	2.38	.072
Sophomore	58.85	9.53			4,876.93	4,786.82			59.64	7.48		
Junior	57.32	13.42			4,534.90	3,928.60			60.34	8.22		
Senior	64.29	10.18			4,001.14	2,850.10			54.76	7.34		

Note: *M* = mean; *SD* = standard deviation; * $p < .05$.

Departments 'mass communication' and 'arts' were merged into the 'social and psychology'. Departments 'math', 'information technology', 'engineering', and 'life sciences' were categorised as 'sciences and engineering'.

3.4 Impact of Internet Addiction on Quality of Life

A significant difference was found in overall quality of life scores between students with and without internet addiction ($F_{(1,139)} = 16.76, p < .001, \eta^2_p = .11$). Students identified as internet-addicted reported significantly lower overall quality of life ($M = 55.30, SD = 5.66$) compared to those without addiction ($M = 60.71, SD = 7.90$).

In the physical domain, a significant difference was also observed ($F_{(1,139)} = 12.31, p < .001, \eta^2_p = .08$), with internet-addicted students scoring lower ($M = 11.09, SD = 1.54$) than non-addicted students ($M = 12.24, SD = 1.90$).

In the psychological domain, internet-addicted students again scored significantly lower ($M = 11.66, SD = 1.99$) than their counterparts ($M = 13.11, SD = 2.22$), with the difference reaching statistical significance ($F_{(1,139)} = 13.87, p < .001, \eta^2_p = .09$).

In the social domain, a significant difference was found ($F_{(1,139)} = 5.89, p = .017, \eta^2_p = .04$), with internet-addicted students reporting lower scores ($M = 13.52, SD = 1.76$) compared to non-addicted

students ($M = 14.42, SD = 2.15$).

Finally, in the environmental domain, the difference was also significant ($F_{(1,139)} = 11.14, p = .001, \eta^2_p = .07$), with lower scores observed among internet-addicted students ($M = 12.93, SD = 1.73$) compared to those without addiction ($M = 14.16, SD = 2.15$).

3.5 Impact of Physical Activity Levels on Quality of Life

A significant difference was found in overall quality of life across physical activity levels ($F_{(2,138)} = 5.27, p = .006, \eta^2_p = .007$). Tukey's post hoc analysis revealed that students with high levels of physical activity ($M = 60.68, SD = 7.89$) scored significantly higher than those with moderate ($M = 57.13, SD = 6.86$) and low ($M = 54.91, SD = 6.41$) activity levels. However, no significant difference was found between the low and moderate groups.

In the physical domain, significant differences were also observed ($F_{(2,138)} = 4.16, p = .018, \eta^2_p = .06$), with the moderate activity group ($M = 11.35, SD = 1.92$) scoring significantly lower than the high activity group ($M = 12.26, SD = 1.79$). In the psychological

domain, physical activity levels had a significant effect ($F_{(2,138)} = 4.04, p = .02, \eta^2_p = .06$). Post hoc analysis indicated that the moderate group ($M = 12.13, SD = 2.16$) scored significantly lower than the high group ($M = 13.10, SD = 2.26$). No significant difference was found in the social domain ($F_{(2,138)} = 2.04, p = .551$). In the environmental domain, a significant effect of physical activity level was observed ($F_{(2,138)} = 4.48, p = .013, \eta^2_p = .006$), with the low activity group ($M = 12.18, SD = 1.66$) scoring significantly lower than the high activity group ($M = 14.10, SD = 2.18$). No other significant differences were found.

3.6 Correlation Analysis Among Internet Addiction, Physical Activity, and Quality of Life

Pearson's correlation analysis revealed no significant relationship between internet addiction and physical activity ($r = -0.126, p > .05$). Still, internet addiction was significantly negatively correlated with all domains of quality of life, including physical ($r = -0.407, p < .01$), psychological ($r = -0.366, p < .01$), social relationships ($r = -0.362, p < .01$), and environmental ($r = -0.361, p < .01$), as well as the overall quality of life score ($r = -0.446, p < .01$) (see Table 4).

Table 4. Correlation between internet addiction, physical activity, overall quality of life, and different domain quality of life

	IA	PA	QoL	PHY	PSY	SO	EN
IA	1.00						
PA	-.126	1.00					
QoL	-.446**	.191*	1.00				
PHY	-.407**	.138	.806**	1.00			
PSY	-.366**	.177*	.826**	.615**	1.00		
SO	-.362**	.185*	.760**	.507**	.510**	1.00	
EN	-.361**	.123	.800**	.565**	.537**	.511**	1.00

Note: IA = internet addiction, PA = physical activity, QoL = overall quality of life, PHY = physical domain quality of life, PSY = psychological domain quality of life, SO = social domain quality of life, EN = environmental domain quality of life. * $p < .05$, ** $p < .01$.

Physical activity was significantly positively correlated with the psychological domain ($r = 0.177, p < .05$) and social relationships domain ($r = 0.185, p < .05$) in quality of life, while no significant correlation was found with the physical ($r = 0.138, p > .05$) and environmental domains ($r = 0.123, p > .05$), as well as internet addiction ($r = -0.126, p > .05$). Notably, physical activity showed a significant positive correlation with the overall quality of life score ($r = 0.191, p < .05$).

4. DISCUSSION

This study investigated the relationships of internet addiction, physical activity, and quality of life among college students in Taiwan, based on 141 valid responses from students of different genders, fields of study, and year levels. The sample included 39.7% males and 60.2% females, with sophomores accounting for the largest proportion (37.1%). Approximately 23.6% of students met the criteria for internet addiction, while 58.1% were classified as having high physical activity levels. Although gender was not significantly associated with internet addiction, it was significantly related to overall quality of life, with male students reporting higher scores.

No difference in internet addiction was observed across academic disciplines. However, significant differences were observed in physical activity levels among students from different fields of study. Year level was not significantly associated with internet addiction or overall quality of life. Internet addiction was found to negatively impact psychological health, social relationships, environmental satisfaction, and overall quality of life. Conversely, higher levels of physical activity were associated with better outcomes in the physical and psychological domains, as well as overall quality of life. Correlational analyses further revealed significant negative associations between internet addiction and all domains of quality of life, whereas physical activity showed weak but positive correlations with psychological wellbeing and social relationships.

Internet addiction has a significant negative impact on college students' quality of life, particularly in the domains of psychological wellbeing and social interactions. This finding aligns with previous study which indicated that excessive internet use can lead to emotional problems, anxiety, and social isolation (Wang & Ashokan, 2021). In modern society, internet use among students has become increasingly common, posing potential

threats to their physical and mental health (Li et al., 2024). Prior research has also highlighted the mediating role of sleep quality in the relationship between internet addiction and wellbeing (Afzaal et al., 2023). Internet addiction is significantly associated with both poor sleep quality and compromised physical and mental health (Huang et al., 2023), and sleep has been found to partially mediate this relationship (Meratwal et al., 2023), suggesting that the effects of internet addiction are multidimensional and operate through various pathways. One notable concern is the widespread habit of prolonged technology use before bedtime, which has become a serious and pervasive issue across age groups (Sampasa-Kanyinga et al., 2018). This behaviour is particularly worrisome among college students, as it can lead to sleep deprivation and poor sleep quality, which may in turn increase the risk of depression and further reinforce patterns of internet addiction (Huang et al., 2023).

Understanding internet addiction among college students requires a multifaceted perspective, as it is influenced by developmental, psychological, and social factors. At this life stage, students face academic stress, social pressure, and identity challenges. Many college students turn to the internet as a coping mechanism, but excessive use may increase feelings of isolation and anxiety, thereby reinforcing dependence on the internet, and create a vicious cycle (Bailey et al., 2023; Kumar et al., 2024; Xie et al., 2022). This study confirmed a significant link between internet use and addiction, aligning with previous research highlighting the vulnerability of digital native generation (Soroya et al., 2021; Yang et al., 2023). Additionally, underdeveloped self-regulation in college students may increase their susceptibility to problematic internet use (Li et al., 2015). Effective prevention should therefore consider usage motives, frequency, and available social support, applying a stratified and targeted intervention approach (Cemiloglu et al., 2022; Ding & Li, 2023). Ultimately, prevention remains the most critical strategy (Throuvala et al., 2019).

This study found that physical activity positively influences quality of life, consistent with previous research showing that regular exercise improves not only physical health (Dhuli et al., 2022; Wang & Ashokan, 2021), but also psychological resilience and social competence (Arida & Teixeira-Machado, 2021; Li & Zhang, 2025). Physical activity is particularly beneficial for mental wellbeing (Huang et al., 2022; Mahindru et al., 2023; White et al., 2024), possibly due to its role in stimulating

endorphin release, which enhances mood and reduces anxiety (Al-Wardat et al., 2024; Favieri et al., 2023). A systematic review further identified physical health and medical status as robust mediators between physical activity and mental health outcomes (White et al., 2024). These findings suggest that the benefits of physical activity extend beyond direct physiological improvements, potentially operating through multiple mechanisms, such as neurochemical regulation and enhanced physical health, to support psychological wellbeing and overall quality of life. The positive association observed in this study supports the integration of physical activity into mental health promotion and internet addiction prevention strategies (Lavados-Romo et al., 2023).

This study offers several key strengths that help address gaps in existing literature. Unlike many studies focusing on a single variable, this study adopts an integrative approach to examine the interrelationships of internet addiction, physical activity, and quality of life in Taiwanese college students. By incorporating demographic variables such as gender, year level, and field of study, the study enhances analytic depth and identifies high-risk subgroups, offering practical insights for targeted health promotion. However, this study also has limitations. The use of self-reported questionnaires may introduce response and recall biases, affecting data accuracy. Its cross-sectional design precludes causal inference and fails to capture changes over time, limiting understanding of long-term behavioural patterns. Additionally, although the study focuses on core variables, it lacks consideration of other influential factors such as academic stress, family environment, social support, and emotional regulation, which are known to shape psychological wellbeing and quality of life. Future research should incorporate these dimensions to improve explanatory power and intervention design.

To enhance the reliability and external validity of future research, several methodological improvements are recommended. Longitudinal designs or the integration of experimental and follow-up studies could better clarify causal relationships and capture long-term trends in internet use and physical activity among college students. Employing mixed methods, such as combining quantitative surveys with qualitative approaches like in-depth interviews or focus groups, would enrich understanding of students' subjective experiences and coping mechanisms, revealing potential mediating and moderating psychosocial variables. Expanding the sample to include diverse regions and institutions and using

larger, more representative cohorts would improve the generalisability and cultural relevance of findings. Additionally, incorporating objective tools, such as wearable devices for tracking physical activity, and refining the measurement of internet use by distinguishing between purposes like socialising, studying, or entertainment, would offer deeper insights into behavioural impacts. Future studies should also include broader psychosocial constructs such as family functioning, social support, personality traits, and emotional regulation to fully capture the complex challenges faced by students in the digital age and to support the development of precise and effective intervention strategies.

5. CONCLUSIONS

This study utilised self-reported survey data from Taiwanese university students to examine the relationships among internet addiction, physical activity, and quality of life. The results revealed that approximately 23.6% of students met the criteria of internet addiction, with no significant difference on what discipline they are studying. Notably, internet addiction is negatively correlated with quality of life, whereas higher physical activity levels predict better overall quality of life, especially in physical and psychological dimensions. Moreover, individuals with internet addiction reported significantly lower scores in psychological wellbeing, social relationships, and environmental satisfaction compared to their non-addicted peers. Although the cross-sectional and self-reported nature of the data limits causal inference, the findings provide practical insights for targeted health promotion.

Conflicts of Interest: The authors declare no conflict of interest.

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