



St. Paul's Hospital Millennium Medical College

Graduate Study Program

**Problematic Internet use and its associated factors among resident physicians
at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia:
a cross-sectional study**

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Addis Ababa, Ethiopia

January, 2024 G.C



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a cross-sectional study**

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**A thesis report submitted to the Department of Psychiatry Presented in
Partial fulfillment of the Requirements of Specialty certificate of Psychiatry at
St. Paul's Hospital Millennium Medical College**

Addis Ababa, Ethiopia

January, 2024 G.C

Declaration

I, the undersigned, declare that this thesis is my original work and has never been presented for a degree at any other university, and that all sources of material used for the thesis have been duly acknowledged.

Name of the student: _____

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Approval of the Primary Advisor

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Approval of the Co-Advisor

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Signature: _____

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St. Paul's Hospital Millennium Medical College
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Table 1: Table Summary of the project

Name of investigator	Yiknashewa Solomon, MD
Full title of the research project	Problematic Internet use and its associated factors among resident physicians at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia: a cross-sectional study
Duration of the project	From September 1 to November 25, 2023 G.C.
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Abstract

Background: Problematic internet use (PIU), also known as internet addiction, is a growing concern in today's society. PIU has been linked to a range of negative outcomes. There is still much that is not understood about the prevalence and consequences of PIU especially in Africa including Ethiopia.

Objective: This study aimed to assess the prevalence of Problematic internet use and its associated factors among resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia.

Methods: An institutional-based cross-sectional study was conducted from September 1, 2023, to November 25, 2023, G.C. at SPHMMC. The sample size was 417 residents who were selected by using multistage random sampling techniques, and Young's Internet addiction test was used to assess PIU. To look for associations, logistic regression analysis, both binary and multivariable, was done. The variables with an association with the outcome variable with a p-value of <0.05 were used to declare statistical significance in the final multivariable logistic regression.

Result: This study included 414 participants with a response rate of 99.3%. The prevalence of PIU was 46.6%, with a 95% CI of 41.7–51.6%. The multivariable logistic regression model revealed that being married (AOR: 0.42, 95% CI = 0.19, 0.91), residents of the obstetrics and gynecology department (AOR: 0.32, 95% CI = 0.13, 0.81), using the internet for 5 or more hours per day (AOR: 1.84, 95% CI = 1.14, 2.99), having less than 7 hours of actual sleep per night (AOR: 2.16, 95% CI = 1.03, 4.53), and having depression (AOR: 7.98, 95% CI = 2.47, 25.78) were significantly associated with PIU.

Conclusion: This study revealed a high PIU use among resident physicians at SPHMMC. Being married, residents of the obstetrics and gynecology department, using the internet for 5 or more hours per day, having less than 7 hours of actual sleep per night, and having depression were found to be significantly associated with PIU. Thus, creating awareness among medical residents and involving all stakeholders' to reduce the prevalence and effect of PIU is recommended.

Keywords: Problematic Internet Use (PIU), Internet Addiction (IA), Resident Physicians, Ethiopia

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Thank you all for your contributions and support.

Yiknashewa Solomon, MD

Acronyms and Abbreviations

A.A. - Addis Ababa

AOR- Absolute odds ratio

APA- American Psychiatric Association

CI- Confidence interval

COR- Crude odds ratio

DSM-5-TR- Diagnostic and Statistical Manual of Mental Disorders Text Revision

GAD- 7- General Anxiety Disorder-7

GCBT- Group cognitive-behavioral therapy

IA- Internet Addiction

IAS- Internet Addiction Score

IAT- Internet Addiction Test

ICD11- International Classification of Diseases 11th Revision

IRB- Institutional review board

ITU- International Telecommunication Union

OR- Odds ratio

PHQ-9- Patient Health questioner- 9

PIU- Problematic internet use

PSQ- Poor sleep quality

SD- Standard Deviation

SPHMMC- Saint Paul Hospital Millennium Medical College

WHO- World Health Organization

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1. Introduction

1.1 Background

The term "problematic Internet use" (PIU), which refers to Internet use that is dangerous, excessive, or impulsive and has negative life outcomes, notably physical, emotional, social, or functional impairment, is used to describe this ongoing health concern among teenagers and young adults (1).

Globally, there are 4.9 billion internet users, with 89% men and 88% women, according to the International Telecommunication Union (ITU) (4). However, there is a generational divide in internet usage, as 71% of young people (i.e., those aged 15 to 24) use the internet, compared to 57% of people in other age categories. Geographically, Europe has the highest rate of internet access (87%) (1). From 120 million users in 2014 to 270 million users in 2019, more people in Africa are using the Internet (4).

In literature, problematic internet use and internet addiction are used interchangeably. Whether "internet addiction" is a distinct disorder that is general or if the disorder is restricted to certain online activities (such as video gaming, shopping, and gambling) is a topic of debate (2). Because internet addiction is not formally acknowledged, it is described in the literature using a range of terms (such as problematic internet use, compulsive use, excessive use, Internet addiction, or gaming addiction) which makes the construct more unstable and complex. Over one in ten people in the US and Europe suffer from an online addiction. Teenagers, many of whom are students, make up the majority of those affected (2).

Internet gaming disorder has thus far only been recognized as an emerging field that requires further study by the Diagnostic and Statistical Manual of Mental Disorders Text Revision (DSM-5-TR), American Psychiatric Association (APA), 2022. Internet gaming is purportedly regarded as "addiction" by the Chinese government and is viewed as a public health problem in South Korea, where treatment and prevention mechanisms have been put in place. Many Asian countries, as well as the United States and other high-income nations, have reported on the treatment of this ailment in medical publications (3).

PIU shares many characteristics with substance addictions, such as tolerance, withdrawal, repeated failures to cut use, and impairment of daily functioning. Additionally, the disorder's inclusion in ICD-11's Mental, Behavioral, and Neurodevelopmental Disorders chapter and Section III of the DSM- 5- TR was justified by the disorder's apparent high prevalence rates in both Western and Asian nations. Despite its diversity, Internet addiction is not yet classified as a separate illness in the DSM-5-TR or the World Health Organization's ICD-11 (3). Yet Young presented diagnostic criteria for Internet addiction that were based on the pathologic gambling diagnostic criteria, which included impulse control issues, symptoms common to other dependence, and considerable impairment in daily life (4).

1.2 Statement of the problem

In a study in 15 countries, PIU among adults was slightly lower in European countries; rates ranged from 1.1% to 10.1% (1) compared to the prevalence among students from Southeast Asia, where severe PIU ranged from 0 to 47.4% (6). Among medical professionals and students, the prevalence ranges from 5.5% to 41.3% (7)(8).

The prevalence is higher in African countries, which ranges from 21.7% among Tunisian students to as high as 65.6% among Egyptian adolescents (9)(10). In Ethiopia, the prevalence varies from 12.6% in undergraduate students in southern universities to more than one-third among students at Bahir Dar University and as high as 85% among students at Wollo University (11-13). Internet users in Ethiopia accounted for 17% of the country's population in 2021 (36).

According to a meta-analysis, medical students use the internet problematically five times as often as the general population, which is a significant cause for concern within this population subgroup (16).

Research on the prevalence of problematic internet use among medical residents and the contributing factors is limited (7). PIU among medical residents ranges from 5.5% to 37.3% (7)(14), which is lower than the average estimate of Internet addiction (IA) in the world and is linked to higher levels of depressive symptoms, perceived stress, and burnout, as well as an increased risk of experiencing violence at the hands of patients (15).

PIU was linked to low self-esteem and depression (17), anxiety and being male was also significantly associated with PIU (9). Age group 20–24 years, being single, suicidal attempts, using online games and poor general health were found to have relationship with PIU (18). PIU was found to be associated negatively with academic performance (21).

Risks for internet addiction include living in an urban area, having access to the internet at home, being female, spending more time online, using the internet for amusement, pornography, online gaming, and substance use (4). Insomnia, social anxiety, phobias, panic attacks, daytime sleepiness, and eye strain were associated with PIU (4)(7)(6)(10)(11) and group cognitive behavioral therapy has a significant benefit in treating PIU (19).

To the investigator knowledge, there has been no research done on problematic internet use among medical residents in Ethiopia. The purpose of this study was to assess the prevalence of problematic internet use and associated factors among medical residents in Addis Ababa (A.A.), Ethiopia. It is essential to gather information about the prevalence of problematic internet use among medical residents, which will help in developing appropriate interventions that would mitigate the adverse effects of such disorders. Hence the findings from this study can be used by health planners and policymakers to curb the prevalence of internet addiction among medical residents.

1.3 Significance of the Study

Globally, researchers have examined the deteriorating effects of problematic internet use and discovered that PIU is linked to a variety of social and psychological issues. Even though problematic Internet use is becoming a serious global health concern around the world, particularly for adolescents and adults, and results in a significant loss of productivity in companies and schools as well as serious health issues, there remains a knowledge gap. The purpose of this study was to investigate the prevalence and factors associated with PIU among resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia.

To the best of the investigator's knowledge, there was little information on PIU among resident physicians worldwide, and it had not yet been established in Ethiopia; thus, this study would fill the knowledge gap so that academicians, medical professionals, and other stakeholders can use it

to apply the study's recommendations based on its findings. It can also offer suggestions for carrying out important interventions, be used to create policies to address PIU among residents, and develop programs to help residents develop healthy internet use habits. It can also serve as a basis for additional research on the topic.

1.4. Objectives of the study

1.4.1 General objective

This study aimed to assess the prevalence of PIU and associated factors among resident physicians in SPHMMC from September 1 to November 25, 2023 G.C.

1.4.2 Specific objectives

- ✓ To determine the prevalence of PIU among resident physicians in SPHMMC.
- ✓ To identify the associated factors of PIU among resident physicians in SPHMMC.

1.5. Research question

It is stated above that the magnitude of the problem needs to be critically evaluated. This study concentrated on the listed research questions:

1. What is the prevalence of PIU among resident physicians in SPHMMC?
2. What are the specific factors that influence PIU among resident physicians in SPHMMC?

2. Literature Review

2.1 Global Overview:

In the modern world, people utilize the internet in many different aspects of their everyday lives, including education, research, sharing of knowledge, social interaction, business, science, and recreation (41,42). The Internet has perhaps had the most impact on people's lives of any technological advancement, but little is understood about how it affects psychological functioning, mental health, and overall well-being (5). Globally, PIU prevalence has been difficult to determine due to disagreements over diagnostic criteria and a lack of significant epidemiological investigations.

In research conducted among United States college students, 10% of undergraduate students reported problem internet use or computer gaming, with a statistically significant correlation of mental health symptoms (21).

In a nationwide survey done in Japan on problematic internet use among adolescents, the prevalence was 7.9%. The research concludes that urgent planning and implementation of preventative and control measures are necessary because it has shown that issues related to excessive Internet use have already gotten serious (22). In another study done on Bangladeshi students, the prevalence of PIU was 32.6%, and depressive symptoms and stress were strongly related to PIU. In addition, PIU was relatively more common among male students, even if it was not statistically significant. A review of social media, internet use, and suicide attempts in adolescents' results showed that in seven studies, an independent, direct link between extensive social media and internet use and an increase in suicide attempts (adjusted ORs varied from 1.03 to 5.10) was found. According to two studies, using social media or the internet occasionally may result in fewer suicide attempts than not using them at all (23)(24)(39).

In a study published in 2016 in Pakistan, the prevalence of severe PIU among medical students was 5.9%. An increment in a 2020 cross-sectional study report with a profound and slight addiction to the internet was found to be 9.09% and 41.99%, respectively (25)(26).

In a systematic review done among Southeast Asian students, the prevalence of severe PIU was found to range from 0 to 47.4%, while that of internet overuse or possible addiction was found to range from 7.4% to 46.4%. Problem users also reported physical difficulties such as insomnia (26.8%), daytime tiredness (20%), and eye strain (19%). In China, the overall prevalence of IA among adolescents was 23.7% (6)(27). In a 2023 G.C. meta-analytic review, depressive symptoms and anxiety were moderately positively associated (38).

In a national survey among Iranian university students, PIU affected over one-third of students studying medical sciences (18), which is increasing from 12.5% of what was in 2014–15 G.C. (50). This unsafe behavior was linked to poor overall health and a higher likelihood of suicidal ideas and behaviors (18). In another study done in 2021 G.C. among medical students in Western Iran, the prevalence of internet addiction was 25% (37).

A systematic review and meta-analysis published in 2020 with samples from Asian and Western countries reported that persistence in the PIU aggregate estimate for 1-year was 50% (CI: 40–61%), but results were heterogeneous, with prevalence and persistence estimates generally higher in Asian countries (5).

A cross-sectional study among resident doctors of a tertiary care hospital in North India showed that the prevalence of PIU among resident doctors is 8.24% which is a third of the finding in an Oman Medical Specialty Board research study, where it reaches 37.3% with 36.2% of those with addictions also reported having depression. Additionally, PIU is linked to an increased risk of experiencing violence at the hands of patients and their caregivers, a poor opinion of seniors in terms of their ability to empathize with patients, and their bias toward residents (14)(15).

5.5% of Naval Medical Center San Diego residents and military medical and nursing students at the Uniformed Services University of the Health Sciences reported PIU, which is less than the global average estimate of IA. Also interestingly, the strongest correlation between an increasing Internet Addiction Score (IAS) and social media use during sleep hours was found (7).

2.2. Overview of PIU in Africa:

Data on PIU in Africa is lacking, even though Internet use has increased in Africa (4). In a systematic review and meta-analysis done in Africa published in 2022 the pooled prevalence of IA was 40.3% (95% CI: 32.2%–48.7%), with substantial heterogeneity (51). According to 2020 Tunisian research, 21.7% of students use the internet problematically. Male students have a higher PIU rate than female students do. Students with PIU had considerably higher anxiety traits and states than students without PIU (9).

In a different study of teenagers in Egypt, 65.6% reported internet addiction, which is greater than the study in Tunisia, where 61.3% of participants reported game addiction and 92.8% reported Facebook addiction. The findings revealed that among teenagers who were addicted,

prevalent comorbidities included depression, dysthymia, suicide, social anxiety, panic, and phobias (10).

Regarding the intervention for PIU, research from Nigeria with a total of 40 college students aged 18 to 30 who were pathological internet users (PIUs) participated in the study and were randomly assigned to treatment and control groups on the efficacy of group cognitive-behavioral therapy (GCBT) for pathological internet use among undergraduates demonstrated that participants in GCBT had significant reductions in PIU symptoms compared to controls, and the benefits persisted at follow-up (19). Interventions like electroacupuncture and cognitive-behavioral therapy can be useful in reducing symptoms of PIU, according to a systematic review of 10 randomized controlled trials conducted in May 2023 G.C. that examined treatments for young people and teenagers who are addicted to the internet. Promising approaches include brief manualized CBT programs and school-based interventions (36).

The pattern in PIU in South Africa shows an increment from between 1.67% and 5.29% (28) eighteen years ago to approximately a quarter in a 2020 research paper published with the title "The COVID-19 pandemic and problematic usage of the internet: Findings from a diverse adult sample in South Africa." Impulsive and compulsive symptoms and traits, pandemic stress, and age were all significantly related to PUI in the study (29). Overall, the studies in Africa showed higher prevalence compared to the USA and Europe and higher findings than those in Asia.

2.3. Problematic Internet use in Ethiopia:

Although Ethiopia has a high prevalence of internet addiction, demonstrating the problem's influence on public health in the area, little is known about the problem's prevalence rate (13). In a community-based cross-sectional study conducted among Wollo University students in 2019, IA among current internet users was 85% among a sample size of 603 students. Spending more time on the internet, having mental distress, playing online games, current khat chewing, and current alcohol use were associated with internet addiction (13). In a comparable study done on medicine and health science students at Ambo University in 2022, 79% were found to have an IA (30), which is higher than the study done at Bahir Dar University (34.8%) (12).

In southern Ethiopian universities, factors linked to problematic social media use among undergraduate students during the COVID-19 pandemic included depression, substance abuse,

and urban residence. The mean scores for problematic Smartphone and problematic social media use were $17 \pm 3.3/36$ and $12.7 \pm 2.2/30$, respectively (11). Seventy-five percent of teenagers with internet addiction had PSQ in a 2021 community-based exploratory cross-sectional study conducted in the communities of Mizan-Aman, Bonga, and Tepi, involving adolescents ages 10 to 19 (31).

In a recent study published in April 2023, G.C. Internet addiction among Jimma University regular undergraduate students was 53.6% (95% confidence interval (CI); 49.99%, 57.15%), and depression had significant associations with internet addiction (35).

Given the above information, this study investigated and analyzed PIU in St. Paul's Hospital and provided recommendations based on the findings, as there has not been a study in Ethiopia that describes the prevalence of PIU among resident physicians.

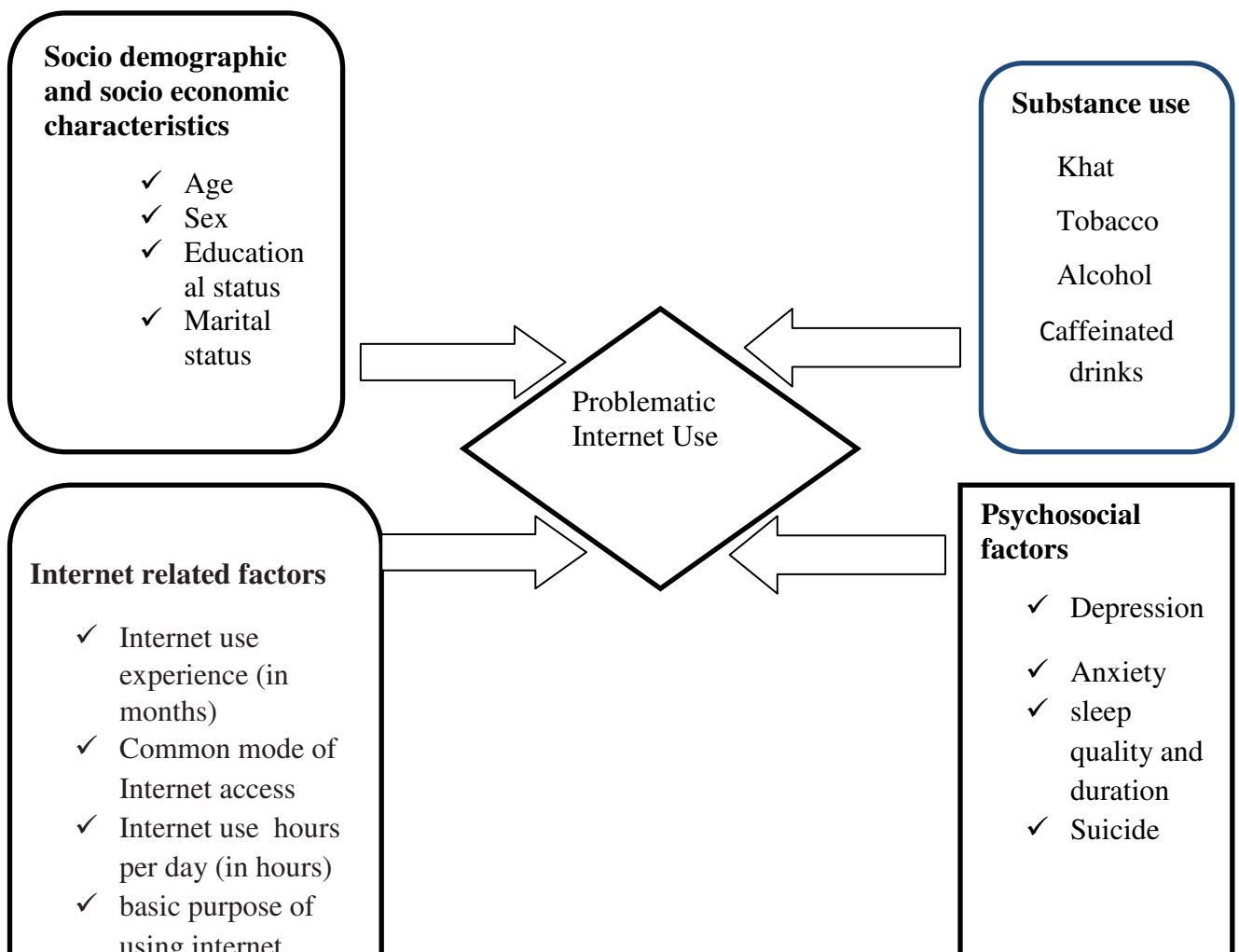


Figure 1: Conceptual framework developed from literature review

(20)(24)(26)(12)(31)(11)

3. Materials and Methodology

3.1. Study area and period:

St. Paul's Millennium Medical College, which is found in Addis Ababa, which is the capital city of Ethiopia as it is known today, was established through a decree of the Council of Ministers in 2010, although the medical school opened in 2007 and the hospital was established in 1968 by the late Emperor Haile Selassie. It is governed by a board under the Federal Ministry of Health. In its undergraduate medical courses, the College developed Ethiopia's first integrated modular and hybrid problem-based curriculum. It is at present adding the postgraduate studies and broadening the scope of its undergraduate program options. It has 922 residents currently learning in 19 departments. The study was conducted among medical residents in the college from September 1 to November 25, 2023 G.C.

3.2. Study Design:

An institutional-based cross-sectional study was conducted among resident physicians at SPHMMC.

3.3. Population:

3.3.1. Source population:

All resident physicians at SPHMMC

3.3.2. Study Population:

All resident physicians at SPHMMC volunteered to participate in the study that fulfilled the inclusion criteria.

3.4 Inclusion and Exclusion criteria

3.4.1 Inclusion criteria: All resident physicians at SPHMMC were asked to participate in the study based on their consent.

3.4.2 Exclusion criteria: Residents who were absent at the study site and refused the purposes of the study

3.5 Sample Size Determination and Sampling Procedures

3.5.1. Sample size Determination

The formula for single population proportion was used to determine the sample size. The sample size was determined in advance based on the assumption of 95% confidence interval and a 5% margin of error. Taking the prevalence of PIU done in Bahir Dar University is 34.8% (12).

n= the desired sample size

p= prevalence 34.8%

Z= is the standard normal score set at 1.96 (95% confidence interval)

d= is the margin of error to be tolerated (5%)

The formula outlined below for single population proportion was used to determine the sample size: $n = (Z \alpha/2)^2 pq/d^2$ where $q = 1-P$

$$n = (1.96)^2 \times (0.348) (0.652) / (0.05)^2$$

$$n = (3.8416) (0.227) / 0.0025$$

$$n = 0.872 / 0.0025$$

$$n = 349$$

$$n = 349$$

Since the source population was less than 10,000, a correction formula was required. There were a total of 922 residents in SPHMMC.

$$\begin{aligned}
&= n / (1+n/N) \\
&= 349 / (1 + 349/922) \\
&= 349 / (1.379) \\
&= 253.1 \\
&= 253
\end{aligned}$$

Adding up the 10% non-response rate gave a final sample size of 278 residents.

Since multistage stratified sampling technique was used to select participants, using design effect the sample size was multiplied by 1.5, and the final number of the study subject became = 417

3.5.2. Sampling Procedures

The number of clinical departments and residents in SPHMMC was identified, then ten departments were selected by the lottery method, and the representative study participants were identified by simple random sampling method. The final sample size was allocated proportionally among the ten departments. This was done by dividing the number of residents in each department by the total number of residents in the ten departments, and this was multiplied by the sample size, which were 417. Out of this, 414 participants completed the questionnaire.

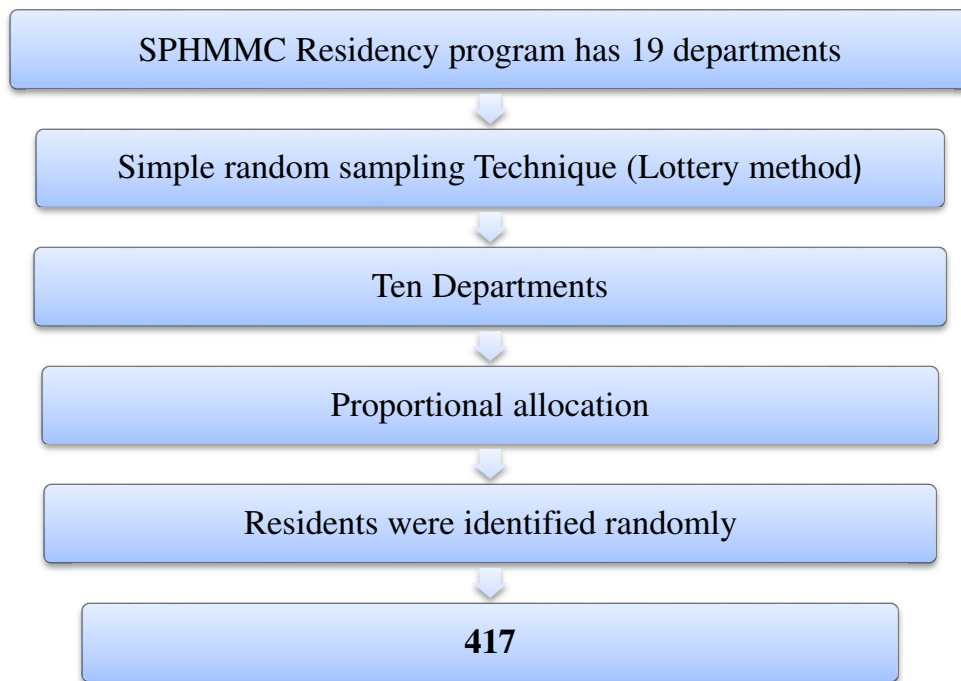


Figure 2: Proposed sampling procedure for assessing PIU and associated factors among resident physicians in SPHMMC, Addis Ababa, Ethiopia.

3.6. Variables of the Study

3.6.1. Dependent variable

- ✓ Problematic internet use

3.6.2. Independent variables

Sociodemographic

- ✓ Age
- ✓ Sex
- ✓ Marital status
- ✓ Living arrangement
- ✓ academic achievement
- ✓ Educational status

Internet use experience

- ✓ Common mode of Internet access
- ✓ Internet use hours per day (in hours)
- ✓ basic purpose of using internet

Psychosocial and behavioral related

- ✓ Depression
- ✓ Anxiety
- ✓ sleep quality and duration
- ✓ substance related factors
- ✓ Suicide

3.7. Data Collection Tools and Procedure

3.7.1 Questionnaires for dependent variable

- ✓ A self-administered English questionnaire in Google Form was used for data collection. The questionnaires included socio-demographic information about the participants and the 20-item Young's Internet addiction test. While the YIAT was primarily designed for adolescents and young adults, its use has been extended to other age groups in previous research, including individuals over 40 years old (7). A normal level of Internet usage was defined as falling between 0 and 30 points; mild Internet addiction was indicated by scores between 31 and 49; moderate Internet addiction was indicated by scores between 50 and 79; and severe Internet dependence was indicated by scores between 80 and 100 (32). The Cronbach's alpha value in this study (0.919) was similar to that reported in previous research done among undergraduate university students in Ethiopia (0.89) (13), indicating excellent internal consistency and reliability in the context of medical residents.

3.7.2 Questionnaires for independent variable

- ✓ PHQ-9 is a standardized tool for assessing depression, having nine questions in total with none given zero, several days given 1, more than half days given 2, and almost every day given 3 points for each of the questions. Depression severity was classified as follows according to the total score: (5 to 9) mild depression, (10 to 14) moderate depression, (15 to 19) moderately severe depression, and (≥ 20) severe depression. And a cutoff of ≥ 10

considered to screen for depression (33). The PHQ-9 questionnaire has been validated among Ethiopian patients, with specificity and sensitivity of 67% and 86%, respectively (34).

- ✓ The seven-item self-report questionnaire, General Anxiety Disorder-7 (GAD-7), was used to screen for anxiety over the previous two weeks. On a scale of 0 (not at all) to 3 (nearly every day), each question is rated: mild (5–9), moderate (10–14), and severe (15–21) anxiety. Excellent reliability was demonstrated at a cut-off score of ≥ 10 (Cronbach's $\alpha = 0.85$) (11).

3.7.3 Data Collection Procedure

The data was collected using an online self-administered google form and medical internes facilitated the data collection process.

3.8 Data Quality Assurances

An orientation was provided to the data collectors on the study and the use of the study tool. The supervisor, alongside the principle investigator, was supervising the data collection process to ensure accuracy and avoid bias.

3.9 Data Management and Analysis

The completeness of the questionnaire was checked before data entry, and the data was coded, entered, stored on a computer, and analyzed using SPSS version 28. Descriptive statistics were conducted using text, tables, and figures. Means, standard deviations, percentages, and ratios were calculated. The association of independent variables with the dependent variable was explored using binary logistic regression analysis. The variables that showed an association with the outcome variable at the bivariate analysis with a p-value of <0.25 were entered into the final multivariable logistic regression to control for potential confounders. An adjusted odds ratio (AOR) along with a 95% confidence interval was estimated to assess the strength of the association, and a P value <0.05 was considered to declare the statistical significance of the multivariate analysis.

3.10 Operational definition

- ✓ **Problematic internet use:** YIAT was used, and a score of 31 to 100 points was considered to reflect the presence of problematic internet use (32).

- ✓ Depression was measured using the PHQ-9, and a score of ≥ 10 was considered to screen for depression (33).
- ✓ Anxiety was assessed using the General Anxiety Disorder-7 (GAD-7), and a score of ≥ 10 was considered to have anxiety (11).
- ✓ Substance use was considered as the current use of alcohol, tobacco, khat and caffeinated drinks (20).

3.11 Ethical considerations

Ethical clearance was obtained from the Institutional Review Board of SPHMMC (reference number Pm23/237). After all permission requests were granted, a permission letter that explained the purpose of the study and the rights of participants was sent to each participant. Throughout the study period, participants were guaranteed the right to withdraw from the study whenever they chose.

Informed consent was obtained from every participant. Participants were given their written informed consent after receiving adequate information about the study, and issues of confidentiality and privacy were also maintained.

3.12 Plans for Dissemination and Ensuring Utilization of Findings

The findings of the study were submitted to the Department of Psychiatry, and it will be presented as one of the partial fulfillments of the residency program. SPHMMC's academic and research office and each department will receive a final report that includes interpreted findings, discussion, and suggestions. All efforts will be made to publish the results in local and international journals and to present them at national scientific conferences to be accessed by the public, and policy makers.

4. Results

4.1 Socio-demographic characteristics of participant

The study sample size was 417, with a response rate of 99.3%. This study included 414 participants. Two-thirds 274 (66.2%) of the participants were males, and females made up the remaining one-third 140 (33.8%) of the participants. The participants' ages ranged from 24 to 44 years, with a mean age of 30.18 years (SD = 2.583). In terms of marital status, 271 (65.5%) were single, and 143 (34.5%) were married. Of the total participants, 91 (22.0%) were living with family, nearly half of the residents 192 (46.4%) were alone, and nearly a quarter 101 (24.4%) were living with a partner (see Table 2 below).

In terms of the department of study, half of the residents were from internal medicine, obstetrics and gynecology, and pediatrics (87 (21.0%), 73 (17.6%), and 53 (12.8%)), respectively. Regarding the year of study, the majority 175 (42.3%) were second year residents and about 125 (30.2%) of the residents were first-year residents.

The current academic performance of more than two-thirds of the participants was 'B+' (179 (43.2%) of residents, 'A-' (91 (22.0%) residents, and 'B' (87 (21.0%) residents, respectively. The number of years repeated in the residency programs by the participants was 10 (2.4%) and 2 (0.5%) of 1 and 2 years, respectively.

Table 2: Summary of sociodemographic factors of resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa,

Variable	Category	Frequency (%)
Sex	Male	274 (66.2)
	Female	140 (33.8)
Age	Mean (30.18), SD (2.583)	

Marital Status	Single	271 (65.5)
	Married	143 (34.5)
Living arrangement	With family	91 (22.0)
	Alone	192 (46.4)
	With Friends	30 (7.2)
	With partner	101 (24.4)
Department	Anesthesiology and critical care	47 (11.4)
	Dermatovenereology	14 (3.4)
	Emergency and critical care	39 (9.4)
	Otolaryngology- head and neck surgery	9 (2.2)
	Family medicine	21 (5.1)
	Internal medicine	87 (21.0)
	Obstetrics and gynecology	73 (17.6)
	Pediatrics	53 (12.8)
	Psychiatry	22 (5.3)
	Radiology	49 (11.8)
Variable	Category	Frequency (%)
Year of residency	Year 1	125 (30.2)
	Year 2	175 (42.3)
	Year 3	106 (25.6)
	Year 4	8 (1.9)
Current academic performance	A (≥ 85)	36 (8.7)
	A- (80-84)	91 (22.0)
	B+ (75-79)	179 (43.2)
	B (70-74)	87 (21.0)
	C+ (65-69)	18 (4.3)
	C (60-64)	3 (0.7)

Year repeated in number	1	10 (2.4)
	2	2 (0.5)

4.2 Internet use related factors of Participants

The internet use experiences of 361 (87.2%) participants were more than a year. On average, 253 (61.1%) of the residents spent ≤ 5 hours of their time on the internet.

The most common modes of internet use among the participants were both Wi-Fi and mobile internet 162 (39.1%), followed by mobile internet and then Wi-Fi (148 (35.7%) and 85 (20.5%)), respectively, (see Figure below). Finally, it was found that residents use the Internet for social networking, entertainment, academic work, and for more than one purpose (18 (4.3%), 40 (9.7%), 56 (13.5%), and 298 (72.5%)) respectively (see Table 3 below).

Table 3: Internet use and related factors of resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia, September 2023 (n=414)

Variable	Category	Frequency (%)
Internet use experience in months	0 to 6	11 (2.7)
	6 to 12	42 (10.1)

	≥12	361 (87.2)
Internet-use per day (in hours)	≤5 hours	253 (61.1)
	≥5 hours	161 (38.9)
Common mode of internet access	Wi-Fi	85 (20.5)
	Broadband	1 (0.2)
	Mobile Internet	148 (35.7)
	Wi-Fi and Mobile Internet	162 (39.1)
	Wi-Fi and Broadband	3 (0.7)
	Wi-Fi, Broadband and Mobile Internet	15 (3.6)
Basic purpose of using internet	Social networking	18 (4.3)
	Entertainment use	40 (9.7)
	Academic work use	56 (13.5)
	More than one purpose	298 (72.5)

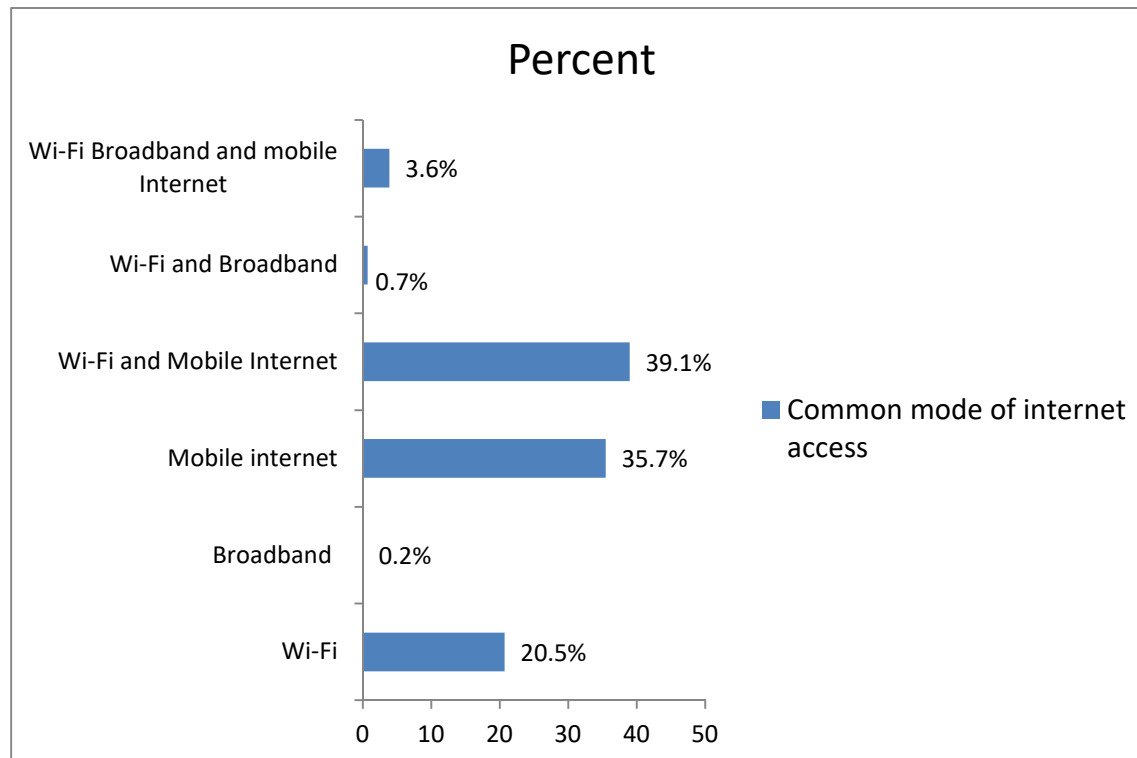


Figure 3: Common mode of internet access among resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia, September 2023 (n=414)

4.3 Psychosocial factors of the participants

The sleep quality was good for more than half of the participants 224 (54.1%), and nearly half of the participants 194 (46.9%) took 16–30 minutes to fall asleep in the past month. The actual sleeping hours of the participants in the past month were 7 or more hours 56 (13.5%), 358 (86.5%) of the participants got <7 hours of sleep per night.

The overall prevalence of depression among the total study participants was 42 (10.1%). While 112 (27.1%), 28 (6.8%), 6 (1.4%), and 8 (1.9%) of participants had mild, moderate, moderately severe, and severe depression, respectively. Suicidal ideation over the past two weeks among participants was 62 (15%), ranging from several days at 49 (11.8%) to nearly every day at 8 (1.9%).

In addition, the prevalence of probable generalized anxiety among the study participants was 27 (6.5%). In regard to anxiety severity, 91 (22.0%), 18 (4.3%), and 9 (2.2%) were found to have mild, moderate, and severe anxiety, respectively.

Half of the residents used caffeinated drinks ever 205 (49.5%), followed by more than one substance use 126 (30.4%), and 62 (15.0%) of the participants never used alcohol, tobacco, or caffeinated drinks. More than three fourth residents 342 (82.7%) used alcohol, tobacco or caffeinated drinks in the past 3 months (see Table 4 below).

Table 4: Psychosocial factors of resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia, September 2023 (n=414)

Variable	Category	Frequency (%)
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Depression Severity (PHQ-9)	Mild depression	112 (27.1)
	Moderate depression	28 (6.8)
	Moderately severe depression	6 (1.4)
	Severe depression	8 (1.9)
Overall depression (PHQ-9)		42 (10.1)
Suicidal ideation over the past two weeks (PHQ-9)	None	352 (85.0)
	Several days	49 (11.8)
	More than half the days	5 (1.2)
	Nearly everyday	8 (1.9)
Anxiety Severity	Mild	91 (22.0)
	Moderate	18 (4.3)
	Severe	9 (2.2)
Overall Generalized anxiety		27 (6.5)
Sleep quality in the past 1 month	Fairly good	224 (54.1)
	Fairly bad	159 (38.4)
	Very bad	31 (7.5)
Variable	Category	Frequency (%)
Amount of time it took to fall asleep in the past 1 month	<15 minutes	110 (26.6)
	16-30 minutes	194 (46.9)
	31-60 minutes	78 (18.8)
	>60 minutes	32 (7.7)
Hours of actual sleep per night in the past one month	≥7 hours	56 (13.5)
	<7 hours	358 (86.5)
Ever been used substance	Alcohol	19 (4.6)
	Tobacco	2 (0.5)
	Caffeinated drinks	205 (49.5)
	None	62 (15.0)
	More than one substance use	126 (30.4)

Use of the substance in the past 3 months	No	72 (17.4)
	Yes	342 (82.7)

4.4 The prevalence of problematic internet use among medical residents at Saint Paul's Hospital Millennium Medical College

The prevalence of PIU was 193 (46.6%), with a 95% CI of 41.7-51.6%. Of these, 153 (37.0%), 38 (9.2%), and 2 (0.5%) had mild, moderate, and severe problematic internet use, respectively (see Figure 4 below).

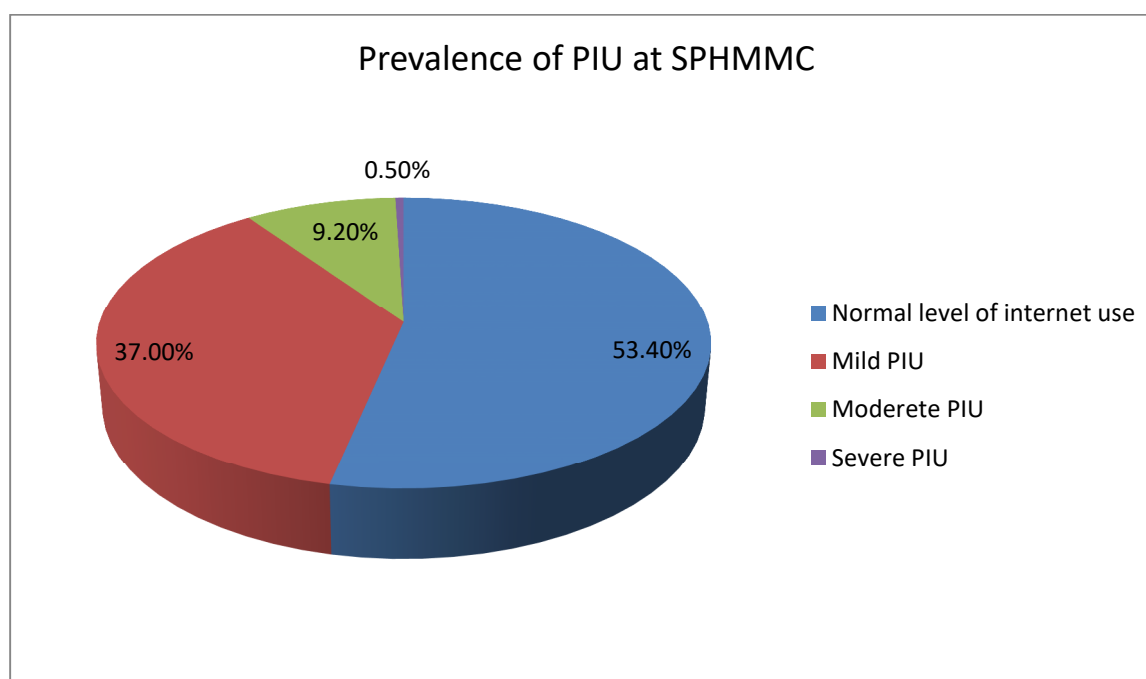


Figure 4: Prevalence and severity of PIU among resident physicians at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia, September 2023 (n=414)

4.5 Factors associated with problematic internet use

4.5.1 Bivariable logistic regression analysis

Bivariable logistic regression analysis was done for age, sex, marital status, living arrangement, department, year of residency, Internet use experience (in months), Internet use per day (in hours), common mode of Internet access, basic purpose of using the internet, current academic

performance, number of years repeated, sleep quality, time needed to fall asleep, hours of actual sleep per night, lifetime substance use, current substance use, depression, and anxiety.

Age, marital status, living arrangement, department, Internet use per day (in hours), basic purpose of using the internet, number of years repeated, sleep quality, time needed to fall asleep, hours of actual sleep per night, depression, and anxiety were significantly associated with PIU at a p-value <0.25 and were entered for multivariable analysis (see table 5).

Table 5: Bivariable logistic regression analysis of factors related to PIU among resident physicians at St. Paul’s Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia, September 2023 (n=414)

Variables	Problematic internet use		COR (95% CI)	pValue
	Yes; N (%)	No; N (%)		
Age			0.86 (0.79, 0.93)	<0.001*
Marital status				
Single	142 (52.4%)	129 (47.6%)	Reference	
Married	51 (35.7%)	92 (64.3%)	0.50 (0.33, .0.77)	<0.001*
Living arrangement				
With family	47 (51.6%)	44 (48.4%)	Reference	0.14*
Alone	94 (49.0%)	98 (51.0%)	0.90 (0.55, 1.48)	0.67
With friends	15 (50%)	15 (50%)	0.94 (0.41, 2.14)	0.88
With partner	37 (36.6%)	64 (63.4%)	0.54 (0.30, 0.96)	0.04*
Department				
Anesthesiology and critical Care	26 (55.3%)	21 (44.7%)	Reference	0.003*
Dermatovenereology	5 (35.7%)	9 (64.3%)	0.45 (0.13, 1.54)	0.20*
Emergency and critical care	18 (46.2%)	21 (53.8%)	0.69 (0.30, 1.62)	0.40*
Otolaryngology- head and neck	7 (77.8%)	2 (22.2%)	2.83 (0.53, 15.1)	0.22*

surgery				
Family medicine	12 (57.1%)	9 (42.9%)	1.08 (0.38, 3.04)	0.89
Internal medicine	42 (48.3%)	45 (51.7%)	0.75 (0.37, 1.54)	0.44*
Obstetrics and gynecology	16 (21.9%)	57 (78.1%)	0.23 (0.10, 0.50)	<0.001*
Pediatrics	30 (56.6%)	23 (43.4%)	1.05 (0.48, 2.32)	0.90
Psychiatry	11 (50.0%)	11 (50.0%)	0.81 (0.29, 2.23)	0.68
Radiology	26 (53.1%)	23 (46.9%)	0.91 (0.41, 2.04)	0.82
Internet-use per day (in hours)				
5 or less hours	95 (37.5%)	158 (62.5%)	Reference	
5 or more hours	98 (60.9%)	63 (39.1%)	2.59 (1.72, 3.88)	<0.001*
Variables	Problematic internet use		COR (95% CI)	pValue
	Yes; N (%)	No; N (%)		
Basic purpose of using internet				
	10 (55.6%)	8 (44.4%)	Reference	0.02*
	28 (70.0%)	12 (30.0%)	1.87 (0.59, 5.89)	0.29
	23 (41.1%)	33 (58.9%)	0.56 (0.19, 1.63)	0.29
	132 (44.0%)	168 (56.0%)	0.63 (0.24, 1.64)	0.34
	More than one purpose of use			
Number of years repeated				
One or two years repeated	3 (25.0%)	9 (75.0%)	Reference	
No year repeated	190 (47.3%)	212 (52.7%)	2.69 (0.72, 10.08)	0.14*
Sleep quality				
Fairly good	101 (45.1%)	123 (54.9%)	Reference	0.24*
Fairly bad	73 (45.9%)	86 (54.1%)	1.03 (0.69, 1.56)	0.87
Very bad	19 (61.3%)	12 (38.7%)	1.93 (0.89, 4.16)	0.94
Time needed to fall sleep				
>60 minutes	23 (71.9%)	9 (28.1%)	Reference	0.004*
<15 minutes	42 (38.2%)	68 (61.8%)	0.24 (0.10, 0.57)	0.001*
16-30 minutes	85 (43.8%)	109 (56.2%)	0.31 (0.13, 0.69)	0.005*

31-60 minutes	43 (55.1%)	35 (44.9%)	0.48 (0.20, 1.17)	0.107*
Hours of actual sleep per night				
Less than 7 hours	171 (47.8%)	187 (52.2%)	Reference	
7 or more hours	22 (39.3%)	34 (60.7%)	0.71 (0.71, 1.26)	0.24*
Depression				
No depression	156 (41.9%)	216 (58.1%)	Reference	
Depression	37 (88.1%)	5 (11.9%)	10.25 (3.94, 26.66)	<0.001*
Anxiety				
No anxiety	170 (43.9%)	217 (56.1%)	Reference	
Anxiety	23 (85.2%)	4 (14.8%)	7.34 (2.49, 21.63)	<0.001*

*(p<0.25) variables which have statistically significant associated with Problematic Internet Use in the bivariable logistic regression analysis

4.5.2 Multivariable Logistic Regression Analysis

A logistic regression was performed to ascertain the effects of age, marital status, living arrangement, department, Internet use per day (in hours), basic purpose of using the internet, number of years repeated, sleep quality, time needed to fall asleep, hours of actual sleep per night, depression, and anxiety on the likelihood that participants have PIU. The logistic regression model demonstrated a good fit to the data, as evidenced by a statistically significant omnibus chi-square test ($\chi^2 (27) = 111.661, p < .0005$). The chi-square value for the Hosmer-Lemeshow test was 5.347, with a significance level of .720. This value is greater than .05, and as a result, it supports the model. This indicates that the overall model significantly predicts the outcome variable. The model explained 31.6% (Nagelkerke R²) of the variance in PIU and correctly classified 71.0% of cases. Analysis of multicollinearity revealed no concerning correlation among predictors (all VIF values <10). Five factors with a p-value of less than 0.05 in the multivariable logistic regression analysis were statistically significant. This includes marital status, department, Internet use per day (in hours), hours of actual sleep per night, and depression.

The odds of having problematic internet use decreased by 58% for married participants compared to single participants (AOR: 0.42, 95% CI = 0.19, 0.91). A reduction of 68% in the

odds of having PIU among residents of the obstetrics and gynecology department was found compared to Anesthesiology and critical Care department (AOR: 0.32, 95% CI = 0.13, 0.81). Using the internet for 5 or more hours per day was found to had nearly twice the odds of having problematic internet use compared to using it for less than 5 hours per day (AOR: 1.84, 95% CI = 1.14, 2.99). Less than 7 hours of actual sleep per night had approximately two times the odds of having PIU compared to residents who sleep seven or more hours of sleep (AOR: 2.16, 95% CI = 1.03, 4.53). Residents with depression had nearly eight times the odds of having PIU compared to residents with no depression (AOR: 7.98, 95% CI = 2.47, 25.78) (see Table 6).

Table 6: Multivariable logistic regression analysis of factors related to PIU among resident physicians at St. Paul’s Hospital Millennium Medical College (SPHMMC) in Addis Ababa, Ethiopia, September 2023 (n=414)

Variables	Problematic internet use		COR (95% CI)	AOR(CI)	P-Value
	Yes; N (%)	No; N (%)			
Marital status					
Single	142 (52.4%)	129 (47.6%)	Reference		
Married	51 (35.7%)	92 (64.3%)	0.50 (0.33, ,0.77)	0.42 (0.19, 0.91)	0.03*
Department					
Anesthesiology and critical Care	26 (55.3%)	21 (44.7%)	Reference		

Dermatovenerology	5 (35.7%)	9 (64.3%)	0.45 (0.13, 1.54)	0.35 (0.08, 1.48)	0.15
Emergency and critical care	18 (46.2%)	21 (53.8%)	0.69 (0.30, 1.62)	0.87 (0.33, 2.31)	0.78
Otolaryngology-head and neck surgery	7 (77.8%)	2 (22.2%)	2.83 (0.53, 15.1)	5.29 (0.76, 37.03)	0.09
Family medicine	12 (57.1%)	9 (42.9%)	1.08 (0.38, 3.04)	2.01 (0.60, 6.73)	0.26
Internal medicine	42 (48.3%)	45 (51.7%)	0.75 (0.37, 1.54)	1.19 (0.52, 2.70)	0.68
Obstetrics and gynecology	16 (21.9%)	57 (78.1%)	0.23 (0.10, 0.50)	0.32 (0.13, 0.81)	0.02*
Variables	Problematic internet use		COR (95% CI)	AOR(CI)	P-Value
	Yes; N (%)	No; N (%)			
Department					
Pediatrics	30 (56.6%)	23 (43.4%)	1.05 (0.48, 2.32)	1.21 (0.48, 3.07)	0.69
Psychiatry	11 (50.0%)	11 (50.0%)	0.81 (0.29, 2.23)	0.94 (0.28, 3.19)	0.92
Radiology	26 (53.1%)	23 (46.9%)	0.91 (0.41, 2.04)	1.14 (0.45, 2.87)	0.79
Internet-use per day (in hours)					
5 or less hours	95 (37.5%)	158 (62.5%)	Reference		
5 or more hours	98 (60.9%)	63 (39.1%)	2.59 (1.72, 3.88)	1.84 (1.14, 2.99)	0.01*
Hours of actual sleep per night					
Less than 7 hours	171 (47.8%)	187 (52.2%)	Reference		
7 or more hours	22 (39.3%)	34 (60.7%)	0.71 (0.71, 1.26)	2.16 (1.03, 4.53)	0.04*
No depression					
No depression	156 (41.9%)	216 (58.1%)	Reference		
Depression	37 (88.1%)	5 (11.9%)	10.25 (3.94, 26.66)	7.98 (2.47, 25.78)	0.00*

*($P < 0.05$) variables which were independently associated with Problematic Internet Use in multivariate analysis

5. Discussion

The Internet has become very essential for our routine activities (4), and with it, PIU is a growing concern all over the world, particularly among college students (44-46). Its uncontrolled use has negative mental health consequences, and many studies have been conducted to determine the prevalence and predictors of internet addiction. However, very limited studies were conducted among medical residents where mental health problems are reported to be common (30).

This study aims to assess the prevalence of problematic internet use and associated factors among resident physicians in SPHMMC, Ethiopia. In this study, 414 medical residents participated and the study revealed that the prevalence of problematic internet use was 46.6%, with a 95% CI of 41.7-51.6%. Being married, residents of the obstetrics and gynecology department, using the internet for 5 or more hours per day, having seven or fewer hours of actual sleep per night, and having depression were significantly associated with PIU.

The findings from this study are comparable to the rates of 51.08% reported among medical students in Pakistan (26), and 41.3% among medical-undergraduate students in a medical college in Delhi (8). This consistency may be due to the sharing of the same study population as well as the use of the same assessment method (IAT) to classify problematic Internet use.

In contrast, the results in the current study are higher than the rates reported among medical and nursing students at the Uniformed Services University of the Health Sciences and residents from Naval Medical Center San Diego (5.5%) (7), among resident doctors of a tertiary care hospital in North India (8.24%) (15), among US college students (10%) (21), among adolescents in Japan (7.9%) (22), and 25% among medical students in Western Iran (37). On the contrary, the results in this study are lower than the rates of 65.5% among Egyptian adolescents (10), 85% among

Wollo University students (13), 79% in a sample of regular undergraduate medicine and health science students at Ambo University (30), 67.5% among undergraduate students in Saudi Arabia (47), 59.2% among Nigerian university undergraduates (49), 59.2% in Namibia, and 70.3% in Uganda college students (48). These differences in results could be attributed to cultural variations in time utilization, Internet access, mental health policies, and also variable sample sizes.

The results of the present study revealed that marital status and internet addiction were significantly related, and singles were more addicted to the internet, which was concurrent with the results of studies performed among medical students in Western Iran (37) and among Iranian university students (18). This can be due to single residents having more leisure time, and the majority of them have no other jobs but studying, whereas married residents need to support their family members financially and sometimes have to work in several places.

To our knowledge, this study is the first to investigate the association between Obstetrics and Gynecology residency and PIU. Our findings demonstrate a striking 68% reduction in the odds of PIU among Obstetrics and Gynecology residents compared to residents in the Anesthesiology and critical care department. Though this finding can't be generalized and is not accounting for individual differences or specific internet use patterns among Obstetrics and Gynecology residents, we suggest future research to confirm our findings with a larger sample size and to study underlying mechanisms. Research conducted on Western Iranian medical students revealed a strong correlation between internet addiction and academic specialty. The study found that internet addiction was more prevalent among medical students than dental and pharmaceutical students (37). Despite a lack of adequate research, this finding opens new avenues for investigating the relationship between professional fields and PIU. And we also need further research to confirm and explore the mechanisms behind this finding.

In this study, residents who spent more time on the internet were found to have two times the odds of developing PIU than those who spent less time. The findings of our study are in line with similar studies done in Wollo University students in Ethiopia (13), among African high school and University Students (4) and among Western Iran medical students (37). The explanation for this can be that time spent on the Internet may be both a symptom and a cause of PIU. However, this study design was cross-sectional, and no causal relationship can be clarified. Further studies ought to examine whether Internet usage time is an essential factor for determining PIU. In

another study among military medical students and residents, no significant association was found (7).

In addition, our study also revealed that fewer hours of actual sleep per night were found to have increased PIU compared to residents who slept 7 or more hours per night. This finding was in line with findings among undergraduate students in Ethiopia (11), medical and nursing students in San Diego (7), and students in South-East Asia (6). This can be explained by the “time displacement theory,” which postulates that as the number of hours taken for Internet use increases, it might compete and displace sleeping hours (40).

Finally, our findings revealed that depression was associated with PIU. This finding was in agreement with study findings among undergraduate students of Jimma University, Ethiopia (35), among resident doctors of a tertiary care hospital in North India (15), and among adults in 15 countries (1). There may be a reciprocal relationship between Internet addiction and depressive symptoms, whereby each condition influences and stimulates the other (15). The possible reason for this may be that individuals suffering from depression have the predisposition to have PIU, as a depressed mood can impair coping with stress, and this could lead participants to use the Internet to get away from the unpleasant experience (20). On the other hand, people who are very involved in online activities often demonstrate less face-to-face social interaction, decreased levels of physical activity, and poor sleeping habits, all of which are conducive to the development of depressive symptoms (14).

To sum up, our findings demonstrated that PIU among medical residents in Ethiopia is high and associated with psychological and mental conditions like decreased actual sleep per night and depression. As a result, stakeholders like psychiatrists and psychologists should include psychoeducation about PIU. Governments should also increase institutional-based mental health services in light of the significance of psychoeducation in addressing PIU among medical residents.

5.1 Strengths and limitations of the study

This study included a relatively large sample size and a group of population not addressed for PIU studies in Ethiopia before. The most important variables associated with PIU, like sleep, substance use, depression, and anxiety, were addressed in this study. In addition, we have used YIAT, which is one of the most widely used assessment tools with good reliability. A multistage

stratified sampling method was used in this research, which increased representativeness and decreased sampling error. We also used a Google Form questioner, which decreased the number of incomplete responses. Our study had several limitations that should be considered when interpreting its findings. The data in this study were collected only from a single medical college, which may not represent all colleges and universities in Ethiopia. But the college in which the data was collected was one of the largest medical colleges in the country that accepts residents from all over the country and abroad too.

Since the data was collected using a self-administered Google Form questionnaire, measurement bias might have occurred, though we had done a pretest on residents at Black Lion Specialized Hospital prior to the data collection. In addition, since we have used YIAT to assess the status of internet use among residents for over a month, recall bias might have occurred. Khat use was not assessed in this study as it was missed in the Google Form, and we recommend it be included in future research even though our study found no association between alcohol, tobacco, caffeinated drinks, and PIU. Finally, our research design was cross-sectional, so no causal relationship could be examined. Therefore, future research can have a longitudinal and an interventional approach.

6. Conclusions and recommendations

6.1 Conclusions

The study revealed a high prevalence of problematic internet use among resident physicians at SPHMMC. Being married, residents of the obstetrics and gynecology department, using the internet for 5 or more hours per day, having seven or fewer hours of actual sleep per night, and having depression were found to be significantly associated with PIU.

6.2 Recommendations

Our findings shed light on various factors associated with PIU in medical residents and call for multifaceted interventions to address the issue. Here are some recommendations for different stakeholders according to the findings of the current study.

Ministry of Health and Policymakers

- Develop national guidelines and policies: Create evidence-based recommendations for healthy internet use and screen time limits for medical residents.

- Fund and promote awareness campaigns: Launch initiatives to educate medical residents and healthcare professionals about PIU risks and healthy coping mechanisms.
- Support research and evaluation: Conduct further research on PIU among healthcare professionals and evaluate the effectiveness of interventions.

Health care professionals

- Promote awareness: educate colleagues about the prevalence and risks of PIU among medical residents, providing information and resources.
- Integrate screening and intervention: Implement routine mental health screenings for medical residents and offer tailored support for those at risk of PIU.
- Set a positive example: model healthy technology use and work-life balance to influence medical residents' behavior and well-being.

We recommend medical residents to:

- Practice time management: Implement strategies to prioritize work, leisure, and personal time to ensure healthy internet use habits.
- Explore alternative activities: engage in hobbies and activities that promote relaxation and well-being, fostering a healthy work-life balance.
- Prioritize sleep: develop a consistent sleep schedule and environment to optimize sleep quality and reduce stress.
- Seek help and support: don't hesitate to reach out to mental health professionals if you struggle with PIU or other mental health concerns.

For Saint Paul's Hospital Millennium Medical College

- The college should implement awareness and education programs on PIU, its impact on mental health, and ways to prevent and manage it.
- The school in collaboration with psychiatry department should provide counseling and support services for medical residents who may be struggling with internet addiction.

For Internet providers in Ethiopia

- Develop educational workshops and resources specifically for medical residents, focusing on topics like digital wellness, and healthy screen time habits.
- Partner with professional organizations like Ethiopian medical association representing medical residents to disseminate information and raise awareness about PIU and its potential consequences.
- Consider implementing digital mindfulness campaigns within hospitals and medical institutions to encourage healthy technology use among medical residents.

For Researchers

- We recommend future researchers do larger longitudinal studies to confirm our findings in the current study populations and to investigate the specific mechanisms underlying associations between PIU and the associated factors in our findings to develop targeted and effective prevention strategies.

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Annex

Annex I- Information Sheet

Introduction:

Greetings, you are being invited to take part in a study that examines how common problematic internet use and associated factors are among resident physicians at Saint Paul's Hospital Millennium Medical College. You were chosen because you were a resident throughout the study's chosen time period. Please pay close attention, and feel free to ask the investigator any questions you may have.

Purpose of the study: To assess the prevalence of problematic internet use and associated factors among medical residents at Saint Paul's Hospital, Millennium Medical College

Procedure: A formal letter will be obtained from the research and ethics committee of SPHMMC, and written informed consent will be obtained from each respondent just prior to the actual data collection. If you agree to this study, you will be asked questions, including important things about you.

Risks: Participation carries no known risk, and whether you choose to take part has no bearing on how your care is provided in the future.

Benefits: It will help us to know the prevalence of problematic internet use and associated factors among medical residents at Saint Paul's Hospital Millennium Medical College and will guide us to act accordingly.

Confidentiality: The study will be anonymous, the findings will be strictly confidential, and your identification will not be mentioned. All information will be kept on a password-protected computer.

Payment: You will not receive any payment for your participation, except gratitude.

Right to refuse or withdraw: You may refuse at any time to participate in the study and can withdraw your consent for the data gathered to be used.

Principal investigator: Yiknashewa Solomon (MD) Tel- +251923258676

❖ If you ready to agree and participate in this research you can sign below

Participant's signature _____ Date:

Annex II: Consent Form

Dear participant; I am.....I am collecting data, and I am an investigator from SPHMMC who is conducting a study on the prevalence of problematic internet use and associated factors among medical residents at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2023 G.C., for partial fulfillment of a specialty in psychiatry. You are selected randomly, and your participation is very important in investigating problematic internet use and associated factors among medical residents at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2023 G.C. So here are some questions for you to answer that are important for the study. For your participation in this study, no payment will be granted or any special privilege given to you. Besides, you're not obligated to answer any question that you do not wish to answer. If you feel uncomfortable responding to any of the questions, please feel free to jump in any time you wish. Filling out the questionnaire will take about 10 minutes. The information that you provided will be kept confidential and won't be accessed by a third party; it will only be used for research purposes.

Annex- III- Questionnaire

Part I: General and Socio-demographic characteristics

S.N	Questions	Response option	Remark
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1	Age	_____	
2	Sex	1)Male 2) Female	
3	Marital status	1)Single 2)Married 3)Divorced 4)Widowed	
4	Living Arrangement	1) With family 2) Alone 3) With friends 4) With partner	
5	Department	1) Anesthesiology and critical care 2) Dermatovenereology 3) Emergency and critical care 4) Otolaryngology- head and neck surgery 5) Family medicine 6) Internal medicine 7) Obstetrics and gynecology 8) Pediatrics	

		9) Psychiatry 10) Radiology	
6	Year of Residency	1)1 2)2 3)3 4)4	
7	Internet-use experience (in months)	1)Never 2)0 to 6 3)6 to 12 4) ≥ 12 5) 5 years or more	
8	Internet-use per day (in hours)	1) ≤ 5 hours 2) ≥ 5 hours	

9	Common mode of internet access	1)Wi-Fi 2)Broadband 3)Mobile internet	
10	Basic purpose of using internet	1) Social networking 2) Entertainment Use 3) Academic work use 4) Online game use	
11	Current academic performance	1) A (≥ 85) 2) A- (80-84) 3) B+ (75-79) 4) B (70-74) 5) C+ (65-69) 6) C (60-64) 7) D (50-59)	
12	Year repeated in number	_____	

13	In the past 1 month how was your sleep quality?	1. Very good 2. Fairly good 3. Fairly bad 4. Very bad	
14	In the past 1 month how long does it take you to fall slept in average?	1. < 15 minutes 2. 16-30 minutes 3. 31-60 minutes 4. > 60 minutes	
15	In the past 1 month how many hours of actual sleep did you get at night?	1. > 7 hours 2. 6-7 hours 3. 5-6 hours 4. < 5 hours	
16	In your life, which of the following substances have you ever used?	1) Alcohol 2) Tobacco 3) Khat 4) Caffeinated drinks 5) None	

17	In the past three months, how often have you used the substances you mentioned?	1) Never 2) Once or twice 3) Monthly 4) Weekly 5) Daily or almost daily	
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Part Two: Young's Internet Addiction Test (IAT)

To begin, answer the following questions by using this scale:

0 Does not apply 1 Rarely 2 Occasionally 3 Frequently 4 Often 5 Always

Question Scale

1. How often do you find that you stay on-line longer than you intended? 1 2 3 4 5 0
2. How often do you neglect household chores to spend more time on-line? 1 2 3 4 5 0
3. How often do you prefer the excitement of the Internet to intimacy with your partner?
1 2 3 4 5 0
4. How often do you form new relationships with fellow on-line users? 1 2 3 4 5 0
5. How often do others in your life complain to you about the amount of time you spend on-line?
1 2 3 4 5 0
6. How often do your grades or schoolwork suffer because of the amount of time you spend on-line?
1 2 3 4 5 0
7. How often do you check your email before something else that you need to do? 1 2 3 4 5 0
8. How often does your job performance or productivity suffer because of the Internet?
1 2 3 4 5 0
9. How often do you become defensive or secretive when anyone asks you what you do on-line?
1 2 3 4 5 0
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet? 1 2 3 4 5 0

11. How often do you find yourself anticipating when you will go on-line again? 1 2 3 4 5 0
12. How often do you fear that life without the Internet would be boring, empty, and joyless?
1 2 3 4 5 0
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?
1 2 3 4 5 0
14. How often do you lose sleep due to late-night log-ins? 1 2 3 4 5 0
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line? 1 2 3 4 5 0
16. How often do you find yourself saying “just a few more minutes” when on-line? 1 2 3 4 5 0
17. How often do you try to cut down the amount of time you spend on-line and fail?
1 2 3 4 5 0

18. How often do you try to hide how long you've been on-line? 1 2 3 4 5 0

19. How often do you choose to spend more time on-line over going out with others? 1 2 3 4 5 0

20. How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line? 1 2 3 4 5 0

Part Three: Patient health questioner-9

Over the past two weeks how often have you been bothered by any of the following problems?				
	None (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
1. Little interest or pleasure in doing things?				
2. Feeling down, depressed or hopeless?				
3. Trouble falling or staying asleep or sleeping too much?				
4. Feeling tired or having little energy?				
5. Poor appetite or Overeating?				
6. Feeling bad about yourself or that you are a failure or have let yourself or your family down?				
7. Trouble concentrating on things such as reading the newspaper or watching				

Television?				
8. Going or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?				
9. Thoughts that you would be better off dead, or of hurting yourself in some way?				

PART Four: Generalized Anxiety disorder-7

Over the last two weeks how often have you been bothered by any of the following problems?				
	None (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
1. Feeling nervous anxious or on edge?				
2. Not being able to stop or control worrying?				

3. Worrying too much about different things?				
4. Trouble relaxing?				
5. Being so restless that it is hard to sit still?				
6. Becoming easily annoyed or irritable?				
7. Feeling afraid as if something awful might happen?				

Thank you for your participation

Name of data collectors _____ signature_____ date _____

Name of supervisor _____signature_____ date _____