Dilla Journal of Education
https://www.du.edu.et/duj

Effects of Nomophobia, Academic Distress and Introvert Personality on Academic - Achievement among Dilla, Hawassa, and Wachamo University Students

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Received: 22 January 2024 Accepted: 31 March 2024 Published: 21 April 2024

ARTICLE INFO.

Key words/phrases: Academic achievement, Academic distress, Introverted personality, Nomophobia, University students

Abstract

In today's digital age, the pervasive use of smartphones has given rise to nomophobia, or the fear of being without one's mobile device. This study investigates the impact of nomophobia, academic distress, and introverted personality traits on the academic achievement of university students at Dilla, Hawassa, and Wachamo Universities. A correlational design was utilized, employing stratified and simple random sampling to select 432 participants from 17,280 students, alongside 9 purposively selected teachers for interviews. Data analysis using SPSS Version 25.0 revealed significant effects of nomophobia, academic distress, and introverted personality on academic achievement (F (3, 406) = 7.52, p =.032). Notably, nomophobia scores differed between males (M = 3.81, SD = 2.23, N = 254) and females (M = 3.12, SD = 3.41, N = 157), as did academic achievement scores (males: M = 4.13, SD = 4.091, N = 253; females: M = 4.85, SD = 3.950, N = 157), both at the.05 significance level. These findings underscore the need for interventions to mitigate the impacts of nomophobia and academic distress, particularly for introverted students, suggesting that universities implement workshops and counseling services focused on digital wellness and stress management to enhance academic performance and contribute to students' long-term success.

1 Introduction

1.1 Background of the Study

Academic achievement among university students is a critical indicator of educational success and future career opportunities. However, various factors can significantly influence this achievement, including nomophobia, academic distress, and personality traits such as introversion. Recent studies indicate that the pervasive use of smartphones has led to an increase in nomophobia, which not only heightens anxiety levels but also distracts students from their academic responsibilities (Yildirim & Correia, 2015; Keles *et al*., 2020). This excessive reliance on mobile devices can detract from students' focus and motivation, ultimately impacting their performance. Today's students, especially those attending universities, spend more time using their phones for various purposes. A study by Lepp, Barkley, Sanders, Rebold, and Gates (2013) suggested that as everyday life becomes more digitalized, using a mobile phone for daily tasks becomes the norm, which in turn fosters nomophobia, academic distress, and low social contact among university students.

These days, not every college student possesses a smartphone (King, 2013). The overuse of this technology has created conditions for nomophobia. There are several ways to describe nomophobia; it is defined as "the fear of being without your phone" by Cherry (2020). The pathological fear or anxiety associated with not having a mobile

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Article DOI: 10.20372/dje.v03i01.05

network, being out of communication, or having insufficient balance or charge is known as nomophobia. This fear is also referred to as "no mobile phone phobia" (Gezgin & Akr, 2016; Yildirim & Correia, 2015). Research on mobile phone use by college students frequently examines the detrimental effects of this usage, usually focusing on the negative impacts of non-academic use, such as distracting the student, encouraging cheating, and causing distraction for neighboring students (Benjamin, 2016). Consequently, students' ability to concentrate on their regular tasks is adversely affected (Yildirim & Correia, 2015).

Stress is an inevitable component of daily life for humans. Regardless of age, profession, social standing, race, cultural background, or any other factor, everyone experiences stress (Lal, 2014). Daily stressors on campus, such as exams, grades, group projects, and academic expectations, are among the biggest sources of stress for university students and currently attract the interest of researchers (Misra & Michelle, 2018). Academic distress is the combined effect of academic-related requirements that exceed an individual's available adaptive resources. Students are significantly affected by academic distress due to the multitude of stressors they encounter, such as the pressure to perform well in class and the need to succeed. Research by Lal (2014) defines academic distress as a condition in which a student's cognitive resources, both internal and external, are insufficient to meet the demands of their studies. Various studies indicate that overcrowded lecture halls, a lack of resources, a heavy workload from courses or assignments, academic pressure, limited opportunities, and intense competition all contribute to fear, tension, and anxiety, which in turn affect students' academic performance and practices (Chua, Ng, & Park, 2018). Students' lives are filled with academic stress, which seems to have a detrimental impact on their mental and physical well-being as well as their academic success (Prakash, 2016).

Every human being on the planet has a unique personality with distinct traits; no two people are the same. One of the most crucial concepts in psychology research is personality, which influences whether students succeed or fail in their academic endeavors in both elementary and university education (Hakimi *et al*., 2011; Prakash, Singh, & Yadav, 2016). A person's behavior, habits, nature, and character define their personality and serve as their distinguishing characteristics (Aşçi *et al*, 2015). Heredity and environment are the two main factors that shape a person's personality, and both can contribute to whether someone has positive or negative traits. An introvert is a personality type that tends to exhibit traits such as being quiet and shy, being more cautious, managing their emotions well, having few friends, finding it difficult to build relationships, enjoying solitude and concentration, preferring to work independently, and being less social (Afshan, Askari, Sam, & Manickam, 2015). When it comes to group projects and class discussions, introverted students often find it challenging to voice their thoughts or opinions (Prakash, 2016).

Recent studies on nomophobia among university students reveal mixed findings regarding gender differences. Bulbuloglu and Yılmaz (2021) found that female students exhibit higher levels of nomophobia, while Korkmaz *et al*. (2020) highlighted significantly elevated scores among females, suggesting greater dependency on smartphones. Females tend to engage more intensively in smartphone use, especially for social media, which heightens anxiety related to disconnection (Yildirim & Correia, 2021). Additionally, psychosocial factors such as emotional dependence and socialization patterns contribute to greater emotional distress among females when separated from their devices, exacerbating anxiety and fear of missing out (Aydın *et al*., 2021). However, Hossain and Hossain (2022) reported no significant gender differences in nomophobia levels. Korkmaz and Demirtaş (2023) also indicated that gender did not significantly influence nomophobia, highlighting the need for further research on this complex issue. A systematic review by Korkmaz *et al*. (2020) found that both genders exhibit similar levels of nomophobia, suggesting that the fear of being without a mobile phone affects male and female students equally. Furthermore, a meta-analysis by Voyer and Voyer (2021) reinforced these findings, indicating that gender does not significantly predict nomophobia levels. Overall, the research emphasizes that nomophobia is a widespread issue affecting all students, regardless

of gender (Mendez & Gonzalez, 2022; Smith *et al*., 2023).

Nowadays, the majority of university students experience a range of unsatisfying practices due to issues with nomophobia, academic distress, and introversion. University students often squander their study time searching for answers online; if they are unsuccessful, they may experience anxiety and panic. Educational institutions are concerned that this could lead to poor academic performance. While scholars in industrialized nations have shown interest in this topic, it remains largely untapped in developing countries like Ethiopia. To fully understand the impact of academic stress, introversion, and nomophobia on academic practices and achievement, the researchers believe that additional research is necessary. Thus, the main objective of this study is to examine the effects of nomophobia, academic stress, and introverted personality type on academic practices and achievement among students at Dilla, Hawassa, and Wachamo universities.

To the best of the researchers' knowledge, nomophobia, academic distress, and introverted personality types seem to have significant negative effects on academic practices and achievement among university students. However, there is a knowledge gap in the literature regarding the effects of nomophobia, academic stress, and introverted personality on academic practices and achievement in the study areas. Additionally, the researchers undertook this study because there have been no local studies in this field. Most existing research has focused on examining the effects of nomophobia on academic achievement, gender differences, and usage duration at the international level. Nationally, only one study on nomophobia and academic achievement has been conducted at Wollega University among health science students, while studies on the effects of introverted personality and academic distress on academic achievement have involved small sample sizes. Furthermore, no comprehensive studies have been conducted on the combined effects of nomophobia, academic stress, and introverted personality on academic practices and achievement among university students. Thus, this study is designed to fill the previous research gaps and the needs of local research. Based on the backdrop of the existing problem, the following questions are formulated for inquiry to attain the intended research objectives.

As a result, this study was focused on the following research questions:

1. To what extent do nomophobia, academic distress, and introverted personality predict academic achievement among the study participants?
2. Is a statistically significant difference existing between Nomophobia across sexes among the study participants?
3. Is a statistically significant difference existing between academic achievements across sexes among the study participants?

1.2 Objective of the study

General objective of the study

The major objective of this study is to investigate the effect of Nomophobia, academic- distress, and introvert personality on academic practice and achievement among students at Dilla, Hawassa, and Wachamo universities.

Specific objectives

1. To examine the extent of nomophobia, academic distress, and introverted personality predict academic achievement among the research participants.
2. To scrutinize the extent of the difference between Nomophobia across sexes among the study participants;
3. To find out the extent of the difference between academic achievement across sex among the study participants;

1.3 Operational definition of the terms

Academic-Achievement: In the present study, it is operationally defined as a ratio level measurement that refers to the respondents' total score on the Grade Point Average (GPA) during the data collection period.

Academic distress: is the body's worrisome symptom due to an imbalance of academic demand or

exceeding adaptive capabilities. In this study, it is operationally defined as a ratio level measurement that refers to the respondents' total score on the academic stress Scale during the data collection period.

Introvert personality: In the present study, it is operationally defined as a ratio level measurement that refers to the respondents' total score on the adapted introvert personality Scale during the data collection period.

Nomophobia: is a specific form of phobia defined as a feeling of discomfort or anxiety caused by the absence of a mobile phone). In the current study, it is operationally defined as a ratio level measurement that refers to the respondents' total score of the Nomo-phobia Scale during the data collection period.

1.4 Conceptual Framework

This is the framework on effects of nomophobia, academic distress, and introverted personality on academic achievement.

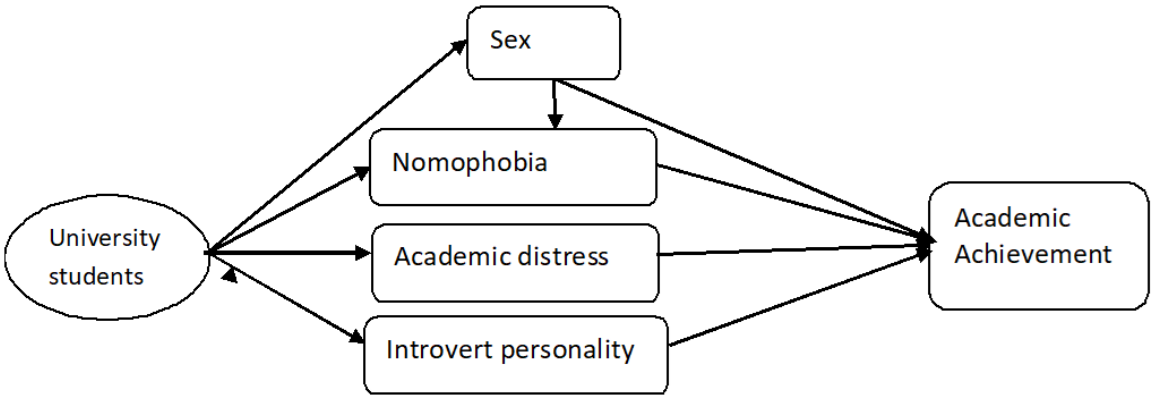

Figure 1: Conceptual Framework between Study Variables

According to Figure 1 above, the researchers made a brief discussion on the contents in the suggested framework regarding the effects of nomophobia, academic distress, and introverted personality on academic achievement. This conceptual framework shows the dependent variables, which are academic achievement, while the independent factors are nomophobia, academic distress, introverted personality, and sex. The academic achievement depends on the aforementioned four variables.

2 Research Design and Methods

2.1 Study area

To clarify the research problem, it is essential to provide background information regarding the study area. This research was carried out at Dilla, Hawassa, and Wachamo Universities because of their accessibility and reliable transportation options. These locations were chosen to help manage the research effectively within budget, time, geographic, and weather limitations, while also ensuring that sufficient data could be gathered to improve the reliability and validity of the findings. As a result, the study was restricted to Dilla, Hawassa, and Wachamo Universities.

2.2 Study design, and period

From May 21 to June 13, 2023, the researchers collected quantitative and qualitative information gathered from selected students and teachers. A correlational research design is beneficial as it allows researchers to explore the strength and di rection of relationships between variables, such as nomophobia, academic distress, and academic achievement, without manipulation. This method integrates both quantitative and qualitative data for a comprehensive understanding, identifies patterns that can inform further research, and offers flexibility to adapt to various contexts.

2.3 Study participants

There were 17,280 students (9724 M & 5756 F), from this, Dilla University, 5205(2811male & 2394 female), Hawassa University,6311 (3766 male & 2545 females) and Wachamo University, 5764 (3147 Male and 2617 Female) who were available during the data collecting period.

2.4 Sample and sampling techniques

To select participants for this study, a mixed probability sampling approach combining stratified and simple random sampling enhances the study by ensuring representation of key subgroups (university, year level, and gender), reducing selection bias, and increasing precision in estimates. This method allows for efficient resource use, facilitates meaningful comparisons between groups, and ultimately improves the generalizability and reliability of the findings. The final sample included 432 students from three universities, covering all year levels and gender categories, with a 10% contingency included. Sample sizes were determined using Krejcie and Morgan's (1970) sample size calculation formula. Consequently, the population (N = 17,280) was assessed with a 95% confidence level and a maximum error margin (e) of 5% for the entire population. Based on the assumptions made above, the sample size will be:

$$n = \frac{N}{1+N(e)^2}$$

Equation 1: Formula to estimate sample size from the given population size, Where, n = the desired sample size, N = total population, and e = the maximum discrepancy (.05). Therefore, $n = \frac{17{,}280}{1+17{,}280(0.05)^2}$=393. Considering the response rate of 10% of the sample size (n = 393*.10 =39). Hence, the sample size accounts for 393 + 39 = 432.

2.5 Data collection instrument

In this study, the primary source of data was used. The primary source of data was distributed to 432 actual samples of the study through a questionnaire (Likert Scale) but clear data was collected from 410 students, and in-depth interviews with nine teachers.

2.6 Methods of data collection

To gather reliable and well-organized information the following procedures were used for the Likert Scale survey questionnaire, and In-depth interview.

2.7 Questionnaire

Nomophobia measured by a five-point Likert Scale questionnaire adapted by the researchers from (Yildirim, C.& Correia, A.P, 2015). Initially, the instruments were Adapted and checked by an English Language expert and then translated into the Amharic language. They modified and translated the questionnaire into Amharic (the local language) in order to make it clear to the respondents. The total number of indicators/ items are 10. Examples from the items; If I did not have my smartphone with me, I would feel anxious because my constant connection to my family and friends would be broken.

Academic stress was measured by a five-point Likert scale questionnaire adopted by the researchers (Sheu *et al*., 2014). This measure contains 10 items (e.g., "How often have you felt nervous or stressed because of schoolwork?"), rated using a 5-point (1–5) scale. After reverse scoring four positively stated items, higher scores indicate higher levels of perceived academic stress. The Cronbach's alpha for this measure was .81. Initially, the instruments were Adapted modified, and checked by an English Language expert and then translated into the Amharic language. They modified and translated the questionnaire to be clear for the respondents.

2.8 In-depth interview

An in-depth interview is a method used to gather detailed information about a participant's perspective on a research topic, with the aim of capturing a comprehensive and vivid picture. For this particular study, the researcher purposefully selected 9 teachers (7 males and 2 females), with 3 teachers chosen from each university. Each interview session lasted for a duration of thirty minutes, and every interviewee from the sample participated in an individual session.

2.9 Document Observation

In this study, the researcher collected the grade point average (GPA) of students from the selected universities registrar office based on their ID No that were collected when they filled out the questionnaire. The participants who did not write their ID No when they filled out the questionnaire were not taken from the registrar office, and automatically, they were excluded from being part of the analysis of the study.

2.10 Data collection procedure

The researchers organized the adapted questionnaires and, then translated it into the Amharic language by subject experts to ensure clarity for the participants. When the questionnaires were ready for the survey, then an introductory letter was collected from the department of department of Psychology field research to be allowed access to certain relevant documents and some valuable information which researchers needed for the study. The introductory letter was handed to the sample universities. A total of 410 copies of questionnaires were produced by the researchers and distributed to the sample students of 3 selected universities. The instruments were administered with field assistants, who were trained on questionnaire distribution and test administration. The participants filled out the questionnaire in the presence of the researchers and their assistant. Ample time was provided for participants to comprehend and complete the questionnaire. The data collection started on May 21st and ended on June 13, 2023, and lasted 30 minutes per individual. After the completion, the researcher collected back the questionnaires for analysis.

Table 1: Internal consistency coefficient for the scale

Scale	Total items in the original scale	Cronbach alpha for the pilot study	Cronbach alpha for the modified scales
Nomophobia	20	.95	.863
Academic Distress	20	.84	.801
Introvert personality	22	.81	.789
Academic Practice	18	.88	. 890

Data analysis In this study, the researcher employed both qualitative and quantitative data analysis techniques. The collected quantitative data were edited, coded, summarized, and analyzed using SPSS software. Different statistical analyses were applied af- ter the data was coded and entered into the computer via SPSS version 20. The quantitative data was analyzed using descriptive and inferential statistics, including Multiple linear regression and independent - t-test was used. Qualitative data began with coding, classifying, and categorizing the obtained text data from interviewees through note-taking and tape recording, into concepts or codes. The qualitative information from the interview was transcribed by the investigator in the local language, Amharic. The transcription was done word for word from the audio recordings. Various speech figures or body languages expressed by interviewees were taken into consideration during the translation process.

Validity and Reliability The content validity of the instrument was checked by five experts on the subject matter. The three experts were PhD candidates in the English language department at Dilla University. The valuable comments and feedback from experts helped the researcher in validating of the instrument by taking into account the experts' suggestions through modification.

A pilot study was conducted to check the reliability of the instrument and to get an insight into the instrument which measures what the researcher intends to test and also to make modifications based on the result of the pilot study before administering the instrument for the main study. The questionnaire was carried out for pilot study with students who were equal level in education or ability within the college with the main samples (participants) of the study. Those students who were included in the pilot study was not included in the actual part of the study.

3 Results

The researcher used different statistical methods to analyze the findings of the research by answering basic research questions.

Hypothesis 1: The extent of Nomophobia, academic distress and introvert personality no predict on academic achievement among study participants.

Table 2: Multiple linear regression was employed extent of Nomophobia, academic distress and introvert personality predict on academic achievement

Model Summary [b]											
Model	R	R Square	Adjusted R Square	SE of the Estimate	R Square Change	Change Statistics				Standardized beta coefficient	Durbin Watson
						F Change	df1	Df2	P		
1	.058[a]	.003	-.006	.31679	.003	7.52	3	406	.032	28	1.893

a. Predictor: (constant), Nomophobia, Academic distress, introvert personality
b. Dependent variable: academic achievement of participants'

To analysis the hypothesis, the researchers employed multiple linear regression models were compared. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. A test of the full model for containing three independent variables against the constant-only model was statistically significant (F (3, 406) = 7.52, p =.032) and explained 28% (R2 =.28) of variance in academic achievement. The three variables made a significant contribution to the model. Only one academic achievement dimension, (β =.28, p <.032), made a significant contribution to the model.

In support of this, key participants of interview from teachers: affirmed that:
Nomophobia can impair cognitive functions such as memory, attention, and problem-solving. Students may spend significant amounts of time on their phones, checking messages or engaging in non-academic activities, which can kill their study time. Excessive smartphone use can lead to distractions during study time, impacting concentration and productivity. Students may be more inclined to check social media, play games, or engage in other non-academic activities, which can hinder their ability to focus on their studies. This can result in rushed or incomplete assignments, inadequate preparation for exams, and ultimately lower academic performance. As a result, they may struggle to meet deadlines or have to sacrifice quality for timeliness, negatively impacting their academic achievement.

Academic distress can have a significant im- pact on the academic achievement of university students. It can manifest in various ways, including increased stress levels, anxiety, depression, burnout, and decreased motivation. distress can hinder students' cognitive functioning, concentration, and memory retention. It can also lead to procrastination, poor time management, and reduced engagement in learning activities. As a result, students may struggle to meet deadlines, perform poorly in exams or assignments, and experience a decline in their overall academic practices. Persistent academic distress can also lead to a loss of interest in studies, disengagement from educational goals, and even dropout from university. Excessive stress can lead to feelings of anxiety, depression, and burnout. These emotional challenges can further impede academic achievement. Also, it can lead to decreased motivation and engagement in learning activities which may experience a loss of interest in their studies and a decline in their desire to excel academic achievement.

An introverted personality can have an impact on the academic achievement of university students. Introversion is a personality trait characterized by a preference for solitude, introspection, and a tendency to be more reserved and thoughtful in social interactions. While introverts may not typically seek out large group engagements. Collaboration and networking are important aspects of academic life. While introverts may find large social gatherings or networking events challenging, they can

still develop meaningful connections on a more individual level. Introverts may prefer one-on-one meetings or smaller group collaborations, where they can form deeper connections and contribute their unique perspectives. For introverted students, the learning environment and social dynamics of university can present certain challenges. Many academic settings emphasize group work, class discussions, and active participation, which may not align with the natural inclination of introverted individuals. They may find it more difficult to engage in class discussions, speak up in large groups, or form study groups easily. This can sometimes lead to feelings of anxiety or discomfort in social settings, potentially hindering their academic performance.

In contradiction to this, key informants of interviews from teachers: said that

Introverted students often thrive in quieter, more reflective environments where they can focus deeply on their studies and engage in independent learning. They tend to excel in tasks that require concentration, critical thinking, and ex- tensive reading or research. Therefore, they may perform exceptionally well in individual assignments, written exams, or research projects that allow them to leverage their introspective nature and analytical skills. it's important to recognize that introversion is not synonymous with poor academic performance. Many introverted individuals excel academically by utilizing their strengths, such as their ability to concentrate for extended periods, their attention to detail, and their introspective thinking. Introverted students can often bring unique perspectives and insights to their academic work.

Hypothesis 2: There is no significant gender difference in Nomophobia.

Table 3: Independent t-test of difference in Nomophobia behavior between male and female students

	Male			Female					
	M	SD	n	M	SD	n	Df	T	P
Nomophobia	3.81	2.23	253	3.12	3.41	157	407	1.121	0.004

α=0.05

Table 3 shows the descriptive statistics of students' Nomophobia among genders; it reveals that the male students had a slightly higher mean score of 3.81, with a standard deviation of 4.23 in Nomophobia behavior associated with the female counterparts who had a mean score of 3.12, with a standard deviation of 3.41 at.05 significant level. The independent t-test result reveals significant differences between males and females on the level of Nomophobia. [t (407) =1.121, p=0.004] at P* <.05 significant level. Given that, a statistically significant difference was established, the null hypothesis was rejected.

In support of this, key participants of the interview from teachers: affirmed that:

I hope that females may experience higher levels of nomophobia compared to males. This could be attributed to various factors, including differences in socialization, communication patterns, and how individuals use their mobile phones. Females might be more likely to use their phones for social interactions and maintaining relation- ships, which could contribute to a higher level of dependence and anxiety when separated from their devices.

In contradiction to this, key informants of interviews from teachers: said that:

I don't think Nomophobia has any significant gender differences in nomophobia. These findings suggest that the experience of nomophobia may be influenced by individual differences, personal circumstances, and cultural factors rather than gender alone. It is also important to consider that the prevalence and impact of nomophobia can vary across different populations.

Hypothesis 3: There is a statistically significant gender difference in academic achievement.

Table 4: Independent t-test of difference in academic achievement between male and female students

	Male			Female					
	M	SD	n	M	SD	n	Df	T	P
Academic Achievement	4.13	4.091	253	4.85	3.950	157	407	1.061	0.012

α=0.05

Table 4 shows the descriptive statistics of students' academic achievement among genders; it indicates that the male students had a slightly lower mean score of 3.79, with a standard deviation of 3. 91 in academic achievement associated with the female counterparts who had a mean score of 4.25, with a standard deviation of 4. 83 at P* <.05 significant level. The independent t-test result reveals significant differences between males and females on the level of Nomophobia. [t (407) =1.061, p=0.012] existed between gender and academic achievement.

In support of this, key participants of the interview from teachers: affirmed that:

Historically, there have been observed differences in academic achievement between genders, with some studies suggesting that females tend to outperform males academically. Factors such as motivation, study habits, and engagement in learning have been explored as potential contributors to these differences. Additionally, females have been found to have higher rates of university enrollment and graduation in many countries.

In contradiction to this, key informants of interviews from teachers: said that

However, it is important to consider that gender differences in academic achievement are not universal and can vary across disciplines, cultures, and contexts. Other studies have found no significant gender differences or even observed males outperforming females in certain academic areas. It is crucial to avoid generalizations and recognize the inherent diversity and individual variations within each gender.

4 Discussion

The major purpose of this study was to explore the effects of nomophobia, academic stress, and introverted personality on academic achievement among university students. The present study findings discussed with previous studies are as follows.

H_1**:** To what extent do Nomophobia, Academic distress, and introverted personality predict academic achievement among study participants?

The current study demonstrates that three factors, namely nomophobia, academic stress, and introverted personality, have a statistically significant impact on the academic achievement of the participants. The findings regarding nomophobia align with previous research that suggests the use of phones in the classroom leads to disengagement, distractions, and lower GPA (Adnan & Gezgin, 2016; Froese *et al*., 2012; Lee *et al*., 2017; Mendoza *et al*., 2018; Thornton *et al*., 2014). Empirical evidence indicates that approximately 30% of information is lost when students are texting while taking notes during a lecture (Froese *et al*., 2012). Moreover, further research supports the notion that a ringing phone in class disrupts not only the individual receiving the call but also others who hear the ringing. Even notifications on vibrate mode are disruptive and decrease individuals' performance on tests regarding lecture content (Lee *et al*., 2017).

Contrary to the aforementioned findings, a study has revealed that the mere presence of a cell phone, even if it does not belong to the individual, can diminish attention (Thornton *et al*., 2014). Despite the evidence highlighting the disadvantages of having a phone in the classroom, students persistently use their cell phones as they are reluctant to forgo the benefits offered by mobile technology (Mehdipour & Zerehkafi, 2013). Furthermore, research indicates that college students believe that utilizing their phones to access external information and supplement their comprehension of course content enhances their learning experience (Ali *et al*., 2020). Some studies have even demonstrated that cell phones can be advantageous for self-directed learning in certain situations (Mehdipour & Zerehkafi,

2013; Rashid & Ashgar, 2016). These findings provide optimism that cell phones could potentially be employed as innovative teaching strategies, particularly in online learning environments.

According to Thornton *et al*.2014), academic stress has been found to impede and hinder learning. Sohail (2013) conducted a study on medical students to investigate the impact of academic stress on academic success and found a significant negative relationship between academic distress and academic achievement. Similarly, Ali *et al*. (2020) indicated that students experience significant stress in their academic lives, which negatively affects their academic performance. The study found by Lee *et al*., 2017) reported that academic distress contributes to lower academic performance. Shukla, Tombari, Toland & Danner (2015) concluded that parental support catalyzes academic success and a negative correlation between academic stress and academic outcomes.

Contrarily, Chua, Ng & Park (2018) discovered that university students did not anticipate a decline in academic performance despite experiencing high levels of academic distress. Jones (2018) highlighted that student anxiety can lead to academic concerns. Similarly, Bataineh (2013) found no substantial impact of academic stress on students' academic achievement. However, the negative correlation between academic stress and academic performance was influenced by acquired resourcefulness. High levels of academic stress adversely affected the grades of students with low resourcefulness, while it had no impact on highly resourceful students.

The presence of an introverted personality in an active learning classroom can lead to heightened anxiety and performance pressure. Collaborative learning environments may not align well with the traits of introverted students, causing them to experience increased levels of pressure and anxiety (Green *et al*., 2019). It is important for teachers to expand their understanding of classroom participation in order to provide students with more opportunities for learning and success (Rosheim, 2018). When instructors employ active learning techniques without considering the needs of introverted learners, it can result in an unfair learning environment. The fast-paced and dynamic nature of active classrooms often does not allow introverted students sufficient time to process information and formulate a response (Rosheim, 2018).

In contradiction to the present study, students with introverted personalities have a much higher level of concentration and motivation than extroverts when carrying out physical education lectures (Hartono, Berliana, & Mulyana, 2019). The same finding was reported by a previous study which explained that higher academic achievement in students with introverted personality types was due to their having effective study habits and higher concentration abilities in the classroom (Hakimi *et al*., 2011).

H_2**:** What is the statistically significant difference between Nomophobia across sex among study participants?

The study from a gender perspective, the results indicate that female university students demonstrated higher levels of nomophobia com- pared to their male counterparts. This finding is consistent with previous research, which consistently shows that females are more likely to exhibit nomophobia and are more profoundly affected by it than males (Gezgin & Cakir, 2016; Hwang, Yoo, & Cho, 2012; SecurEnvoy, 2012; Tavolacci et al., 2015; Yildirim et al., 2016). Additionally, some studies have found that both female and male students display elevated levels of nomophobia, aligning with numerous earlier studies (Gowda *et al*., 2019; Gutiérrez-Puertas *et al*., 2019; Mallya *et al*., 2018; Yildirim *et al*., 2016). However, there are inconsistent findings suggesting that males may experience higher levels of nomophobia than fe- males (Yildiz *et al*., 2020; Takao *et al*., 2009).

Research indicates that females tend to be more dependent on internet services and are at a greater risk of developing smartphone addiction (Kalaskar, 2015). They are also less likely to participate in outdoor activities and events, preferring to connect with friends via social media (Slaih *et al*., 2019). Females often use their smartphones in public settings to alleviate feelings of loneliness, while males generally use their phones more for professional and technological purposes rather than socializing. Moreover, females experience heightened anxiety

when they cannot stay updated on social media (Mallya *et al*., 2018).

Studies have also shown that males experience lower levels of social stress and use smartphones less for social interactions (Van Deursen *et al*., 2015). Females typically use smart- phones more for planning social gatherings and engaging in gossip, reflecting their social anxieties regarding public speaking, self-expression, group discussions, and communication with strangers (Je- naro *et al*., 2007). This supports the conclusion that females utilize smartphones primarily for social purposes, while males tend to use them for business and technological needs (Bianchi & Phillips, 2005). Additionally, a statistical survey indicated that a higher percentage of females (48%) prefer using mobile devices for leisure activities compared to males (36%) (Mobi Roller, 2014).

In contrast to the findings by Dixit *et al*. (2010), which reported no gender differences in nomophobia levels among students, certain factors may help explain the observed gender disparity. Karaaslan and Budak (2012) suggested that this difference could be linked to female students' greater inclination to use smartphones for communication compared to their male peers. RQ-3: What is the statistically significant difference between Academic achievements across sexes among study participants?

Previous research has consistently highlighted differences in academic achievement between males and females, often showing that female students tend to have an advantage (Voyer & Voyer, 2014). Numerous studies have focused on gender differences in academic performance, particularly in mathematics, spatial abilities, and verbal skills. For instance, Finn and Peterson (2021) and Wamdeo (2013) have documented notable disparities in these areas. Additionally, research by Armot, David, and Weiner (2016) and Stump (2015) supports the idea that females excel in verbal fluency measures, such as vocabulary, listening, speaking, comprehension, fluency, and spelling, while males generally perform better in mathematical and spatial skills.

In contrast to these findings, Armot, David, and Weiner (2016) argued that the United Kingdom and Scotland have achieved "gender parity" in education for a considerable time. Their study found that the proportion of boys and girls receiving top grades at age 18 (A level) is approximately equal, with girls performing at similar levels. Furthermore, a study by Davidson *et al*. (2014) indicated no significant gender effect on active learning strategies.

5 Conclusion

This study addressed the topic of the effect of nomophobia, academic distress, and introverted personality on academic achievement among university students. The study's findings revealed that the effects of nomophobia, academic distress, and introverted personality have a significant impact on academic achievement ($F(3, 406) = 7.52$, $p = .032$). Notably, nomophobia scores differed be- tween males ($M = 3.81$, $SD = 2.23$, $N = 254$) and females ($M = 3.12$, $SD = 3.41$, $N = 157$), as did academic achievement scores (males: $M = 4.13$, $SD = 4.091$, $N = 253$; females: $M = 4.85$, $SD = 3.950$, $N = 157$). The results suggest nomophobia, academic distress, and introverted personality. Educators and legislators should consider the effects of nomophobia, academic distress, and introverted personality on the academic achievements of university students and should design programs to raise awareness of the possible effects of nomophobia, academic distress, and introverted personality. Further studies should explore how students manage these factors in academic contexts.

The Strengths and Limitations of the Study

This study represents a groundbreaking effort in Ethiopia, exploring the links between nomophobia, academic distress, and introverted personality traits, thus filling a significant gap in the current literature. Its emphasis on the challenges encountered by university students is crucial for educational stakeholders, including policymakers and educators. By employing self-report measures, the research gathers meaningful qualitative data that reflects students' experiences, which can contribute to improving academic achievement. This foundational insight also lays the groundwork for future inquiries.

Nonetheless, there are certain limitations. The study's concentration on university students limits

the applicability of its findings to other demographics, such as high school students or professionals. Furthermore, the dependence on self-report measures may introduce biases, as participants could provide responses that they perceive as socially acceptable. This raises questions about the validity of the findings and highlights the necessity for future research to examine nomophobia across various populations and contexts for a more thorough understanding of the issue.

Declaration of Interest's statement

The author (s) declare no potential conflict of interest

Ethical approval

Informed consent was obtained from participants before data collection. They were informed about the study's nature and purpose and were made aware of their right to withdraw from the study at any time. Participants were assured of the confidentiality of their data. No incentives were provided for participation in the study. The study was conducted in accordance with the procedures recommended by the Research Ethics Committee of Dilla University and comparable ethical standards.

Consent for publication: Not applicable

Availability of data

The datasets generated and analyzed during the current study were not publicly available but will be available from the corresponding author upon reasonable request.

Funding

This study was supported by the Dilla University Research, Publication, Ethics, and Dissemination Directorate (DURPEDD) under grant number 6126.

Author Contributions

AP, developed the study's Concept, conducted the literature review, data gatherings and analysis. MM, designed the methodology, selected questionnaires, data collection, performed statistical analyses, and authored the discussion while drafting and incorporating feedback, and provided critical input during revisions. AB, supported data analysis and interpretation and participated in the literature review. All authors read and approved the final manuscript.

Acknowledgments

We would like to thank the students and faculty members of Dilla, Hawassa, and Wachamo Universities for their cooperation and participation in this study. We also acknowledge the Dilla University Research, Publication, Ethics, and Dissemination Directorate (DURPEDD) for their research funding. Finally, we extend our gratitude to all authors for their significant contributions and efforts in this research.

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