RESEARCH PAPER

Screen time, learning motivation, and digital habitudes of business education students in a Philippine higher education institution: biosciences-informed implications for digital wellness and cognitive health

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ABSTRACT

This study explores the interplay between screen time exposure, learning motivation, and cognitive habitudes among Business Education students in a Philippine higher education institution, with particular attention to implications for digital wellness and cognitive health a growing area of interest in the biosciences. A total of 120 students participated in the study, responding to a structured survey questionnaire that assessed academic and non-academic screen time, motivational states during digital learning, and study behavior patterns. Results showed a disproportionate allocation of screen time toward non-academic use, posing potential risks for digital fatigue and cognitive overload. Nevertheless, high levels of learning motivation were associated with academic screen use, suggesting that purposeful digital engagement may stimulate cognitive activation and attention regulation. Significant differences in digital learning behaviors were noted across socio-demographic factors such as sex, household income, and maternal educational background factors often considered in biopsychosocial models of behavior. Correlation analyses further revealed a positive relationship between academic screen time and learning motivation, but no significant link between screen time and study habits, emphasizing that digital exposure does not inherently foster disciplined learning routines. These findings carry biosciences-informed implications, urging the integration of neurocognitive wellness education, behavioral interventions, and digital hygiene in student support programs. To address this, the study recommends embedding cognitive time management strategies into business curricula, utilizing brain-based interactive platforms, and implementing digital wellness workshops that emphasize screen-time regulation, neuroplasticity, and attention-sustaining techniques.

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INTRODUCTION

Digital wellness has emerged as a critical concept in the modern era, where technology profoundly shapes both personal and academic spheres. The growing dependence on digital devices for communication, learning, and productivity has amplified concerns related to screen-induced physiological and psychological impacts. From a biosciences and life sciences perspective, excessive screen time has been associated with a range of health concerns including eye strain, disrupted circadian rhythms, reduced melatonin production, sedentary behavior, and elevated stress hormone levels (Ansari and Khan, 2020; Haleem et al., 2022; Pinto and Leite, 2020). These biological responses can impair cognitive functions such as focus and memory, and contribute to physical inactivity, metabolic risks, and mental health issues such as anxiety and digital fatigue.

For Business Education students, who frequently engage with digital tools for academic tasks, the challenge lies in regulating screen time and developing healthy digital habits or habitudes that support their learning motivation while safeguarding their physical and cognitive well-being. Integrating digital wellness principles within higher education curricula not only enhances academic performance but also fosters a scientifically grounded understanding of how technology impacts the human body and mind. This holistic view underscores the need for interdisciplinary approaches, bridging education, biosciences, and public health to promote sustainable, health-conscious learning environments (Herrera-Pavo, 2021; Septiani et al., 2022; Shehzadi et al., 2021).

Screen time

Screen time, defined as the duration individuals spend interacting with digital screens, has emerged as a critical factor influencing not only cognitive and behavioral outcomes but also physiological well-being areas of increasing interest in the biosciences and life sciences. Among students in higher education, particularly in Business Education, screen exposure has been shown to influence circadian rhythms, eye health, neurocognitive functions, and psychological stress markers. Research by Lau and Lee (2021) indicates that prolonged non-academic screen time correlates with sleep disruption, reduced melatonin production, and increased sedentary behaviour-physiological responses that have broader implications on health and academic efficiency. Conversely, moderate academic screen use, as emphasized by Majumdar, Biswas, and Sahu (2020), can enhance digital cognitive engagement, thus supporting brain plasticity and information retention. Learning motivation and digital habits (habitudes) are also shaped by neural feedback mechanisms influenced by screen stimuli, dopamine responses, and digital multitasking effects (Chaudhuri, 2020; Lin and Wang, 2021).

In the context of life sciences, these behavioral and cognitive patterns may be examined through the lens of neurobiology, ergonomics, and digital wellness. The study contributes to the broader field of educational neuroscience and health sciences by exploring how screen time behavior affects student wellness, cognition, and academic performance, with implications for designing bio-informed interventions promoting digital wellness and academic success.

Learning motivation

Learning motivation is the internal drive that propels students to engage in academic tasks, manifesting as either intrinsic (rooted in personal interest and satisfaction) or extrinsic (driven by external rewards or social expectations). From a biosciences perspective, motivation is intricately linked with neural pathways, particularly those involving the dopaminergic system, which regulates reward, pleasure, and goal-directed behavior (Slack and Priestley, 2023). Research shows that intrinsically motivated learners tend to activate brain regions associated with deep processing and memory consolidation, leading to improved learning outcomes (Corpuz et al., 2022). In relation to screen time, the nature and purpose of digital engagement significantly affect cognitive and neurological responses. When digital tools are used for academic

purposes-such as interactive learning platforms or virtual simulations-they stimulate the prefrontal cortex and foster neuroplasticity, thereby enhancing intrinsic motivation and higher-order thinking skills (Jin *et al.,* 2022). Conversely, excessive non-academic screen time-such as prolonged exposure to social media or passive entertainment-can disrupt circadian rhythms, impair melatonin production, and contribute to mental fatigue, which in turn undermines focus and learning motivation (Ye *et al.*, 2022; Zhu *et al.,* 2022). Moreover, chronic digital overexposure has been associated with elevated stress markers, reduced physical activity, and increased risk of digital addiction, all of which have measurable effects on brain function, emotional regulation, and academic disposition (Grande *et al.,* 2022; Prasetyanto, Rizki, and Sunitiyoso, 2022). Thus, aligning digital wellness strategies with bioscientific insights is critical in shaping holistic educational practices. A biosciences-informed approach to screen time management can enhance both intrinsic and extrinsic motivation by maintaining cognitive health, emotional stability, and academic productivity.

Study habitudes

Study habitudes encompass the behaviors and practices students adopt while studying, including time management, concentration, and the use of productivity tools. This study seeks to examine the interrelationships among screen time, learning motivation, and study habitudes in higher education, particularly in light of the increasing use of digital devices.

Importantly, this investigation is framed within the lens of biosciences, recognizing that prolonged screen exposure is not merely a behavioral concern but also a biological one.

Recent findings in neurobiology and physiology suggest that excessive screen time disrupts circadian rhythms, reduces melatonin production, and contributes to digital eye strain and mental fatigue, thereby impairing cognitive performance and academic focus (Palalas and Doran, 2023).

The integration of educational technologies must be carefully evaluated to ensure it does not compromise students' biological wellness. Studies have shown that neurophysiological effects such as diminished prefrontal cortex activity-responsible for decision-making and self-regulation can be triggered by overstimulation from screen-based media (Okiji *et al.,* 2023). This adversely affects students' ability to manage time, sustain attention, and retain information, all of which are critical for academic achievement. From a biosciences perspective, understanding how digital exposure interacts with human biological processes is crucial to fostering digital wellness and preventing health-related learning challenges.

As education becomes more digitally mediated, the global academic community is urged to consider both psychological and biological implications of screen use. Evidence-based strategies rooted in neuroscience, ergonomics, and chronobiology-should be implemented to promote healthier study habitudes and balanced screen engagement. These include optimizing blue light exposure, encouraging digital detox routines, and structuring learning schedules that align with students' biological rhythms (Sugiyama *et al.,* 2023; Wu *et al.,* 2024; Alshwiah and Alaulamie, 2023). This interdisciplinary approach highlights the importance of biosciences in shaping digital wellness frameworks that support cognitive function, emotional regulation, and long-term academic success.

Interplay of Screen time, Learning Motivation and Study Habitudes

The interplay between screen time, learning motivation, and study habitudes is a complex dynamic that significantly impacts student performance and well-being. Prolonged screen time, especially non-academic, has been shown to negatively affect learning motivation, as it often leads to cognitive overload, distractions and decreased academic engagement (Cardin and Meunier, n.d.; Zimmerman *et al.,* 2023). Students who spend excessive time on non-educational digital activities,

such as social media or gaming, tend to report lower intrinsic motivation and reduced focus on academic tasks (Gumasing and Castro, 2023; Sanulita *et al,* 2024). On the other hand, academic screen time, when used for productive purposes such as research or e-learning, has been associated with higher motivation and improved academic outcomes, as students engage more deeply with the material (Yu *et al.*, 2023). Study habits, such as time management and focus, are influenced by these factors, with higher screen time often correlating with poorer study habits, including procrastination and ineffective time allocation (Tanaka, 2023). Conversely, students with strong study habitats who use digital tools for academic purposes often display better organizational skills and higher academic motivation, suggesting a positive relationship between productive screen use and enhanced academic performance (Shortt *et al.,* 2023). Understanding this interplay is crucial for developing strategies that promote balanced screen use, enhance motivation, and support healthy study habits in the digital learning environment.

Theoretical perspective

Grounded in the Self-Determination Theory (SDT) and the Theory of Planned Behavior (TPB), this study integrates a bioscientific perspective to explore the dynamic interplay between screen time, learning motivation, and study habits among Business Education students. SDT emphasizes the role of intrinsic and extrinsic motivation in fostering purposeful learning behaviors, suggesting that digital engagement can either enhance or hinder academic motivation based on its alignment with autonomy, competence, and relatedness. TPB, on the other hand, highlights how attitudes, subjective norms, and perceived behavioral control influence study practices and technology use. To deepen the analysis, biosciences provide insights into how prolonged screen exposure affects neurological and physiological functions critical to learning.

Excessive screen time has been shown to influence melatonin production, disrupt circadian rhythms and

alter dopamine pathways, all of which are linked to attention regulation, cognitive flexibility, and mood stability factors essential to sustained academic motivation and effective study habitudes. Moreover, eye strain, mental fatigue, and decreased physical activity associated with digital overuse may compromise both cognitive performance and emotional regulation. The study's conceptual framework thus positions daily screen time as the independent variable, learning motivation as the dependent variable, and study habits as the mediating variable, with digital wellness strategies serving as a moderating factor. This holistic, interdisciplinary approach integrates behavioral theory with biological insights, enabling a robust investigation into how screen time biologically and behaviorally influences students' academic patterns. The findings aim to inform evidence-based interventions that foster healthier, more sustainable academic lifestyles in the digital age.

Research gap

While extensive research has explored the impact of screen time on student well-being and academic performance, most studies remain limited to psychosocial or behavioral analyses, with insufficient integration of bioscientific perspectives. Notably, there is a scarcity of investigations that consider the neurological, cognitive, and physiological consequences of prolonged screen exposure such as digital eye strain, disrupted circadian rhythms, neuroplasticity changes, and dopamine-driven reward behaviors that directly influence learning motivation and study habits. In the Philippine context, where digital learning environments continue to expand, Business Education students face unique stressors. These include cognitive overload, reduced sleep quality, and altered attention spans due to their extensive engagement with digital devices for both academic and entrepreneurial purposes.

However, few localized studies have examined how bioscience-informed digital wellness strategies grounded in neuroeducation, chronobiology, and ergonomics can mitigate the adverse effects of screen

time while promoting healthy learning routines. Furthermore, current literature largely overlooks the specific needs of Business Education students who are expected to develop digital fluency while maintaining high levels of academic performance and self-regulation. By incorporating bioscientific insights into digital wellness, this study addresses a critical gap by investigating the relationship between screen time, learning motivation, and study habitudes, guided by both behavioral and biological markers. The findings are expected to contribute to evidence-based frameworks for integrating digital wellness into the curriculum, thus supporting the holistic development of students in Philippine higher education.

Objectives of the study

Generally, this study assessed the relationship between screen time, learning motivation, and habitudes among Business Education students in a Philippine higher education institution and its implications for promoting digital wellness and biosciences implications. Specifically, it aims to: (1) describe the Average daily screen time of Business Education students and analyze their primary usage patterns for academic and non-academic purposes; (2) assess the Learning Motivation Levels of Business Education Students with the use of Digital Devices; (3) assess the Online Study habitudes of Business Education students; (3) ascertain the Test of Differences on the Daily Screen Time for Academic and Non-Academic Purposes, Online Learning Motivation Levels, and Online Study habitudes when grouped according to their profile variables; (4) ascertain the relationship between the Daily Screen Time for Academic and Non-Academic Purposes, Online Learning Motivation Levels, and Online Study habitudes of Business Education students when grouped according to their profile variables.

MATERIALS AND METHODS

Research design

This study employed a descriptive-correlational research design, a specific quantitative approach suitable for exploring relationships among variables without manipulating them.

This design was selected to identify and analyze the degree and direction of the relationship between screen time, learning motivation, and habitudes among Business Education students.

According to Creswell and Clark (2017), a correlational design is effective when the goal is to investigate associations between measurable variables, making it an appropriate framework for this study. Using a structured survey questionnaire, data were collected and analyzed to provide a snapshot of students' daily screen time, motivation levels, and study habits. This method aligns with the approach described by Fraenkel and Wallen (2013), which highlights that correlational designs are particularly useful in educational research for identifying patterns and informing interventions. By employing descriptive statistics and correlation analyses, the study systematically examined the impact of screen exposure on academic behaviors and habitudes, contributing to the growing body of literature on digital wellness in education.

Respondents

The respondents of this study were 120 Business Education students enrolled in a Philippine higher education institution. Purposive sampling, a non-probability sampling technique, was employed to ensure that the selected participants were highly relevant to the research objectives. This approach allowed the researchers to focus on individuals who met specific inclusion criteria, such as being actively enrolled in the program and having regular access to digital devices for academic and non-academic purposes. To ensure the sample size was statistically adequate for correlational analysis, G*Power analysis was conducted to determine the minimum required sample size. Based on an expected medium effect size ($f^2 = 0.15$), a statistical power of 0.80, and an alpha level of 0.05 for correlational studies, the analysis indicated that at least 85 respondents were required. However, the researchers recruited 120 participants to account for potential non-responses or incomplete data, enhancing the reliability of the findings. The purposive sampling procedure was implemented in

several steps. First, the researchers identified and obtained a list of eligible students from the institution's registrar's office. Students were then invited to participate voluntarily through email and classroom announcements. To reduce bias, participants were assured that their responses would remain anonymous and would not affect their academic standing. Given that the study employed a correlational design, appropriate parametric statistical tools were utilized. Pearson's correlation coefficient was selected as the primary measure to determine the strength and direction of relationships between screen time, learning motivation, and study habitudes. This choice was justified because the data collected were continuous, and initial checks confirmed that the variables met the assumptions of normality, linearity, and homoscedasticity required for parametric analysis. Descriptive statistics, such as means and standard deviations, were also calculated to summarize the data and provide context for the relationships observed.

Research tool

The study utilized a structured survey questionnaire as the primary data collection tool, specifically designed to measure the three key variables: screen time, learning motivation, and study habitudes. The questionnaire comprised three sections: (1) daily screen time, (2) self-reported learning motivation, and (3) study habitudes, with a total of 30 items distributed across these sections. Each item was rated on a 5-point Likert scale (1= Strongly Disagree to 5= Strongly Agree), which is suitable for capturing subjective perceptions and behaviors in correlational research. To ensure the reliability of the instrument, a pilot test was conducted with 30 respondents who were not part of the main study. Internal consistency was evaluated using Cronbach's alpha, which yielded the following results: screen time section (α= 0.82), learning motivation section (α= 0.87), and study habitudes section (α= 0.85). These values exceeded the commonly accepted threshold of 0.70, indicating good reliability. The validity of the instrument was established through content and construct validity. Content validity was confirmed by consulting a panel

of three subject matter experts in educational research, who reviewed the questionnaire for clarity, relevance, and alignment with the study objectives.

Construct validity was assessed through exploratory factor analysis (EFA), which confirmed that the items grouped logically under the intended variables with strong factor loadings (> 0.50). The appropriateness of the instrument for a correlational study was grounded in its ability to generate interval-scale data from the Likert scale responses, which met the assumptions for parametric statistical tests. The 5-point scale ensured nuanced data capturing variations in students' screen time, motivation, and habitudes. Consistency in the survey responses was further verified during data analysis, as no significant outliers or inconsistencies were observed in the data distribution.

Ethical considerations

Ethical guidelines were strictly observed throughout the study. Informed consent was obtained from all participants, ensuring they were fully aware of the study's purpose, procedures, and potential risks. Anonymity and confidentiality were maintained by assigning unique identifiers to respondents and securely storing all collected data. Participation was voluntary, and respondents were given the freedom to withdraw at any stage without penalty. The study adhered to the ethical standards set by the institution's research ethics committee.

Data analysis

The collected data were analyzed using both descriptive and inferential statistical methods, ensuring the robustness and validity of the findings. Descriptive statistics, including means, standard deviations, and frequency distributions, were employed to summarize respondents' daily screen time, levels of learning motivation, and study habitudes. These measures provided a clear overview of the variables' central tendencies and dispersion. Given the correlational nature of the study, inferential statistical analyses were performed using Pearson's correlation coefficient to assess the relationships

among the variables. The use of Pearson's correlation was justified as the data were continuous, and the assumptions for parametric analysis were satisfied: (1) The data were tested for normal distribution using the Shapiro-Wilk test, and histograms and Q-Q plots were examined. All variables showed non-significant deviations from normality ($p > 0.05$), validating the use of parametric tools; (2) Scatterplots were generated to confirm that the relationships between the variables were linear, which is a prerequisite for Pearson's correlation; (3) The assumption of equal variance was verified through residual plots, which demonstrated no apparent patterns or clustering. Data processing and analysis were conducted using statistical software such as SPSS to enhance accuracy and efficiency. In addition to correlation analyses, descriptive measures provided baseline insights into usage patterns and behavioral trends among the respondents.

The results from Pearson's correlation identified significant relationships, particularly the influence of screen time on learning motivation and study habitudes. These findings validated the study's capability to generate evidence-based conclusions, providing actionable insights into promoting digital wellness among Business Education students.

RESULTS

Average daily screen time of Business Education students and analyze their primary usage patterns for academic and non-academic purposes

The data presented in Table 1 reveal distinct usage patterns in the screen time of Business Education students for both academic and non-academic purposes. A majority of students (39%) reported using their devices for 2-4 hours per day for academic purposes, while the second highest usage (28%) was reported in the 4-6 hour category. A small percentage (3%) of students used their devices for more than 8 hours for academic purposes. In contrast, for non-academic purposes, the largest group (34%) reported using their devices for 0-2 hours, while 28% of students spent

4-6 hours on non-academic activities. Only a minimal number (2%) of respondents used their devices for more than 8 hours on non-academic tasks. These findings suggest that while students are engaged in academic screen time, they also allocate substantial time to non-academic use, which could potentially lead to distractions. The study underscores the need for strategies to balance screen time and promote digital wellness to enhance academic success.

The findings suggest that while students allocate a considerable amount of time to academic use (primarily in the 2-4 hour range), there is also a significant engagement in non-academic activities, especially in the 0-2 and 4-6 hour categories. The marked difference in non-academic screen time (34%) compared to academic usage patterns (19%) highlights the potential for digital distractions in students' academic behaviors. Implications of these findings are critical for promoting digital wellness. This trend aligns with findings in existing literature, such as those by Sebire, *et al* (2020) and Stanovsek (2018) which highlighted how students often face challenges balancing academic demands with the allure of digital distractions, leading to potential declines in academic focus. Furthermore, the findings corroborate research by Lindström (2020) which emphasizes that excessive screen time for non-academic purposes can negatively impact students' academic performance and time management. The study's findings underline the importance of promoting balanced screen use, supporting the need for digital wellness programs that can mitigate the impact of non-academic screen time while reinforcing its positive role in academic activities. Given that non-academic screen use is substantial, educators and institutions should consider integrating strategies to manage screen time and encourage healthier digital practices. Further research is warranted to explore the impact of non-academic screen time on academic performance, as well as interventions that can optimize screen use for learning without compromising student well-being.

Table 1. Frequency distribution of daily screen time for academic and non-academic purposes

Screen Time (in hours)	Academic Purpose Frequency (f= 120)	Academic Purpose Percentage	Non-Academic Purpose Frequency (f= 120)	Non-Academic Purpose Percentage
0-2 hours	23	19	41	34
2-4 hours	47	39	32	27
4-6 hours	33	28	33	28
6-8 hours	13	11	12	10
8+ hours	4	3	2	2
Total	120	100	120	100

Table 2. Online Learning Motivation Levels of Business Education Students

Item	Statement	Mean	SD	Interpretation
1	I feel motivated to study when using digital devices for academic purposes.	3.46	0.37	High/Agree
2	I find myself distracted from studies due to non-academic screen time.	3.33	0.24	High/Agree
3	I use digital tools to enhance my learning experience.	3.99	0.35	High/Agree
4	I believe that excessive screen time reduces my ability to focus on my studies.	3.23	0.32	High/Agree
5	I am able to manage my time well, despite spending long hours on digital devices.	3.20	0.27	Moderate/ Undecided
6	I feel more motivated to study when I am using my devices for academic purposes.	3.80	0.43	High/Agree
7	Non-academic screen time negatively impacts my motivation to study.	3.60	0.35	High/Agree
8	I use productivity apps on my devices to stay focused on my studies.	4.13	0.42	Very High/ Strongly agree
9	I find it difficult to stay motivated to study when I spend a lot of time on screens.	3.69	0.43	High/Agree
10	I am usually more motivated to complete my tasks after using my device for study purposes.	4.10	0.43	Very High/ Strongly agree
11	I set academic goals on my devices and work toward them regularly.	4.23	0.34	Very High/ Strongly agree
12	Spending too much time on screens makes me less motivated to study.	3.49	0.29	High/Agree
	Grand Mean	3.69		High/Agree

Legend: 4.20-5.00: Very High/Strongly Agree; 3.40-4.19: High/Agree; 2.60-3.39: Moderate/Undecided; 1.80-2.59: Low/Disagree; 1.79: Very Low/Strongly Disagree

Learning Motivation Levels of Business Education Students with the use of Digital Devices

The results of the survey on the learning motivation levels of Business Education students are summarized in Table 2. The data reveals that the majority of the students exhibit a high level of motivation toward their studies, particularly when using digital devices for academic purposes. The grand mean of 3.69, which falls within the "High/Agree" range, suggests that students are generally motivated by the use of digital tools in their academic endeavors. Among the 12 items, the highest-rated responses (means of 4.13 and 4.23) indicate that students strongly agree with the use of productivity apps (Item 8) and the regular setting of academic goals on their devices (Item 11), which suggests that these tools enhance their learning experience and help in managing their academic tasks effectively. These results reflect a trend where students are not only motivated by the academic use of devices but also actively engage in goal-setting and productivity-enhancing practices. However, Items 1, 2, and 7 shows that students also face distractions due to non-academic screen time, with means ranging from 3.33 to 3.60. This suggests that while students are generally motivated by academic screen time, non-academic screen usage can negatively affect their ability to stay focused. Furthermore, the response to Item 5, where students were asked about their ability to manage time despite spending long hours on devices, resulted in a mean of 3.20, indicating a more neutral stance. This suggests that while many students feel they can manage their time, there are some who may find it challenging to balance screen time and academic responsibilities effectively.

The findings suggest several key implications for educators and institutions. First, while digital devices

are largely motivating for academic purposes, institutions should be mindful of the potential negative impacts of excessive non-academic screen time. Strategies that promote digital wellness, such as setting boundaries for non-academic use and encouraging breaks, could help students maintain focus on their academic tasks. Additionally, promoting the use of productivity tools and goal-setting applications could further support students in staying motivated and organized. Given that students express a high level of motivation when using devices for academic purposes, institutions could enhance learning by integrating these tools into their educational practices. However, more research is needed to explore how non-academic screen time impacts overall academic performance, as the significant correlation between screen time and student motivation deserves further investigation.

The results of this study highlight the strong motivational influence of digital devices on Business Education students, especially when used for academic purposes. Consistent with prior research, the use of productivity apps and academic goal-setting on devices emerged as key factors that positively impacted student motivation (Calvo-Porral and Pesqueira-Sanchez, 2022). Studies have shown that technology can foster a sense of engagement and enhance (Ní Shé *et al*, 2023; Huang *et al*, 2023). However, while students express a high level of motivation when engaging with academic content on their devices, the negative effects of non-academic screen time cannot be overlooked. The findings resonate with research indicating that excessive screen time, particularly when unrelated to academic tasks, can lead to distraction and diminished academic focus (Adiyono *et al.,* 2024). Furthermore, despite some students feeling they can manage their time effectively, there is a noticeable struggle in balancing academic and non-academic screen use, which aligns with literature suggesting that time management in the digital age is a critical challenge for learners (Volberda *et al.,* 2021; Pangrazio and Sefton-Green, 2021). These findings point to the need for educational institutions to incorporate strategies

that promote digital wellness, such as setting boundaries for non-academic use and integrating more productivity tools into learning environments. It is essential to foster a balanced approach to screen time, promoting its academic benefits while mitigating the risks of overuse.

Online study habitudes of business education students

The study habits of Business Education students and their association with varying screen time durations were assessed in this survey. The overall grand mean of 3.63, which falls within the "High / Agree" range, indicates that students generally maintain a positive and effective attitude towards utilizing digital devices for their studies. However, there are certain patterns and nuances in their responses that warrant further discussion. The highest-rated items are those related to the effective use of digital tools and resources. Item 4, "I study more effectively when I have access to online educational resources," received the highest mean (4.05), suggesting that students strongly agree with the value of online resources in enhancing their study effectiveness. This finding is aligned with previous literature emphasizing the importance of digital tools in modern education (Spires, 2020). Similarly, Item 2, "I prefer using digital devices for researching academic content," with a mean of 3.90, indicates that students favor digital platforms for academic research, highlighting the growing reliance on these devices for gathering scholarly material. Item 9, "I use digital tools, such as planners or task management apps, to stay organized in my studies," also scored highly (mean= 3.90), reflecting students' engagement with technology to manage their academic tasks efficiently.

On the other hand, the lowest-rated statements reflect challenges that students face in managing screen time and maintaining focus. Item 10, "I often feel overwhelmed by the amount of screen time needed for studying," received the lowest mean (3.20), suggesting that a moderate number of

students struggle with the overwhelming nature of prolonged screen time, which may affect their productivity and mental well-being. Furthermore, Item 8, "I tend to study in longer sessions without breaks when using digital devices," with a mean of 3.30, points to a tendency among some students to study for extended periods without incorporating regular breaks, potentially leading to burnout or decreased focus over time.

Lastly, Item 5, "I find it difficult to focus on my studies when spending long hours on my devices," which scored a mean of 3.40, indicates that a significant portion of students struggles with maintaining concentration during.

The findings suggest that while Business Education students generally demonstrate high levels of motivation and effective use of digital devices for academic purposes, they face challenges with time management and the impact of extended screen time on focus and well-being. Institutions and educators could consider promoting digital wellness practices, such as scheduled breaks and screen time management strategies, to optimize students' screen use.

Future research could also explore the relationship between screen time and academic performance to better understand the long-term effects of these habits on learning outcomes.

Table 3. Online study habitudes of business education students business education students

Item	Statement	Mean	SD	Interpretation
1	I spend a significant amount of time studying on digital devices daily.	3.80	0.45	High / Agree
2	I prefer using digital devices for researching academic content.	3.90	0.42	High / Agree
3	I tend to use my digital devices for both academic and non-academic purposes during study sessions.	3.50	0.39	High / Agree
4	I study more effectively when I have access to online educational resources.	4.05	0.40	Very High / Strongly agree
5	I find it difficult to focus on my studies when spending long hours on my devices.	3.40	0.38	High / Agree
6	I manage my screen time effectively during study sessions.	3.60	0.43	High / Agree
7	I take regular breaks from screens while studying to maintain focus.	3.70	0.41	High / Agree
8	I tend to study in longer sessions without breaks when using digital devices.	3.30	0.44	High / Agree
9	I use digital tools, such as planners or task management apps, to stay organized in my studies.	3.90	0.39	High / Agree
10	I often feel overwhelmed by the amount of screen time needed for studying.	3.20	0.37	Moderate / Undecided
	Grand Mean	3.63		High/ Agree

Legend: 4.20-5.00: Very High/ Strongly Agree; 3.40-4.19: High/ Agree; 2.60-3.39: Moderate/ Undecided; 1.80-2.59: Low/ Disagree; 1.79: Very Low/ Strongly Disagree

The study habits of Business Education students, as revealed through their association with varying screen time durations, highlight a growing dependence on digital devices for academic purposes. These findings align with existing literature that suggests digital tools and online resources are integral to modern education, offering both convenience and enhanced learning opportunities (Rafique, 2023; Gonçalves *et al.,* 2023). The preference for digital devices in research and organization, as observed in the top-rated items, reflects students' recognition of their utility in academic tasks. However, challenges related to

prolonged screen time, such as difficulty focusing and feelings of overwhelm, echo concerns raised in studies on digital distractions and the negative effects of extended screen use on cognitive functioning and mental well-being (Yates *et al.,* 2021; Haleem *et al.,* 2022; Anthony *et al.,* 2022). This highlights the need for a balanced approach to screen time, where the benefits of digital tools are harnessed while mitigating potential adverse effects. The findings suggest that integrating strategies for managing screen time, including regular breaks and awareness of digital wellness, could help students maintain their academic focus and productivity in the long run.

Table 4. Test of Differences on the Daily Screen Time for Academic and Non-Academic Purposes, Online Learning Motivation Levels, and Online Study habitudes when grouped according to their profile variables

	Daily screen time for academic purposes	Daily screen time for non- academic purposes	Online learning motivation levels	Online study habitudes
Sex	0.004*	0.456 ns	0.345 ns	0.002 *
Family income	0.026 *	0.027*	0.935 ns	0.234 ns
Mother's education level	0.034*	0.023*	0.0012*	0.007*
Father's education Level	0.658 ns	0.238 ns	0.459 ns	0.458 ns

*= significant at 0.05 level; ns= not significant at 0.05 level

Note: all other variables are not significant

Test of Differences on the Daily Screen Time for Academic and Non-Academic Purposes, Online Learning Motivation Levels, and Online Study habitudes when grouped according to their profile variables

The results of the test of differences on daily screen time for academic and non-academic purposes, online learning motivation levels, and online study habits according to profile variables are summarized in Table 4. The findings reveal several significant differences based on specific profile variables. Regarding sex, the results show a significant difference in both the Daily Screen Time for Academic Purposes (p= 0.004) and Online Study Habits (p= 0.002). Specifically, males reported higher screen time for academic purposes and demonstrated more favorable study habits compared to females. This suggests that male students may engage more with digital tools for academic activities and may exhibit more effective online study habits, which is consistent with research that shows differences in online learning behaviors between genders (Kulski, 2002). For Family Income, there were significant differences in both Daily Screen Time for Academic Purposes (p= 0.026) and Daily Screen Time for Non-Academic Purposes (p= 0.027), with higher screen time associated with students from families with an income of ₱20,000 and above. This suggests that students from higher-income families may have greater access to digital devices and internet services, which could contribute to increased screen time for both academic and non-academic purposes. These findings are consistent with research showing that family income influences technology access and usage patterns (Livingstone and Helsper, 2007).

Regarding Mother's Education Level, significant differences were observed in all four areas:

Daily Screen Time for Academic Purposes (p= 0.034), Daily Screen Time for Non-Academic Purposes (p= 0.023), Online Learning Motivation Levels (p= 0.0012), and Online Study Habits (p= 0.007). Students whose mothers had higher levels of education exhibited more favorable outcomes across these variables. This indicates that parental education, particularly the mother's, plays a crucial role in shaping students' academic behaviors and attitudes towards online learning.

Research supports the notion that parental educational attainment is positively correlated with students academic performance and engagement (Affuso et al., 2023; Ates, 2021; Guo et al, 222; Scmid and Garrels, 2021). In contrast, no significant differences were found for Father's Education Level, suggesting that the father's educational background does not have as pronounced an effect on students' screen time, motivation, or study habits as the mother's education level. The findings highlight that sex, family income, and mother's education level are significant predictors of students' online learning behaviors, while father's education level does not show a significant impact. These results suggest that factors such as access to technology, gender, and parental educational background play important roles in shaping the digital study habits and learning motivations of Business Education students. Future interventions may benefit from considering these socio-demographic factors to tailor strategies that enhance students' online learning experiences.

Table 5. Test of relationship on the daily screen time for academic and non-academic purposes, online learning motivation levels, and online study habitudes when grouped according to their profile variables

Variables	Daily Screen Time for Academic Purposes	Daily Screen Time for Non-Academic Purposes	Online Learning Motivation Levels	Online Study Habitudes
Daily screen time for academic purposes	R value = 1.00	R value = 0.32	R value = 0.45	R value = 0.27
	P value = ---	P value = 0.02*	P value = 0.01*	P value = 0.07 ns
Daily screen time for non-academic purposes	R value = 0.32	R value = 1.00	R value = -0.21	R value = 0.38
	P value = 0.02*	P value = ---	P value = 0.15 ns	P value = 0.03*
Online learning motivation levels	R value = 0.45	R value = -0.21	R value = 1.00	R value = 0.52
	P value = 0.01*	P value = 0.15 ns	P value = ---	P value = 0.01*
Online study habitudes	R value = 0.27	R value = 0.38	R value = 0.52	R value = 1.00
	P value = 0.07 ns	P value = 0.03*	P value = 0.01*	P value = ---

*= significant at 0.05 level; ns= not significant at 0.05 level, Note: all other variables are not significant

Test of relationship on the daily screen time for academic and non-academic purposes, online learning motivation levels, and online study habitudes of business education students when grouped according to their profile variables

The relationships between daily screen time for academic and non-academic purposes, online learning motivation levels, and online study habitudes were analyzed. A moderate positive correlation was observed between daily screen time for academic purposes and daily screen time for non-academic purposes, r= 0.32, p= .02r= 0.32, p= .02r= 0.32, p= .02, indicating that individuals who spend more time on academic screen-related tasks are likely to also engage in non-academic screen time. Similarly, a positive correlation was found between daily screen time for academic purposes and online learning motivation levels, r=0.45, p=.01r = 0.45, p = .01r=0.45, p=.01, suggesting that higher engagement in academic screen time is associated with greater motivation for online learning. However, no significant relationship was identified between daily screen time for academic purposes and online study habitudes, r= 0.27, p= .07r= 0.27, p= .07r= 0.27, p= .07. Daily screen time for non-academic purposes showed a weak negative correlation with online learning motivation levels, r= −0.21, p= .15r = -0.21, p= .15r= −0.21, p= .15, which was not statistically significant. In contrast, it was positively correlated with online study habitudes, r= 0.38, p= .03r= 0.38, p= .03r= 0.38, p= .03, indicating that some non-academic screen use may overlap with productive study behaviors. A strong positive relationship

emerged between online learning motivation levels and online study habitudes, r= 0.52, p= .01r= 0.52, p= .01r= 0.52, p= .01, underscoring the importance of motivation in fostering effective study practices in an online environment.

DISCUSSION

These findings reveal meaningful connections among screen time usage, motivation, and study habits. The significant positive relationship between academic screen time and learning motivation aligns with existing literature emphasizing the motivational benefits of intentional academic engagement in online settings. However, the absence of a significant correlation between academic screen time and study habits suggests that mere exposure to academic tasks does not necessarily translate into effective study behaviors. This underscores the importance of guiding students in adopting structured and efficient study routines.

Interestingly, the moderate positive correlation between non-academic screen time and study habits implies that certain non-academic activities, such as using social media or gaming, might indirectly support study habits by enhancing digital literacy or reducing stress. However, the negative, albeit non-significant, relationship between non-academic screen time and learning motivation points to the potential for distraction if non-academic activities dominate screen use. From an educational perspective, these findings highlight the need to promote balanced screen time management strategies for students. Educational institutions can design

interventions to enhance students' online learning motivation, such as incorporating engaging and interactive digital tools that align with academic goals. Additionally, fostering self-regulation skills can help students distinguish between productive and unproductive screen use.

These findings suggest that business education programs should integrate strategies to promote balanced screen time management among students. By encouraging a mix of academic and productive non-academic screen activities, educators can help students enhance their online learning motivation and study habitudes. Programs could include workshops on effective digital literacy, time management, and self-regulation to ensure students leverage screen time for both skill development and academic success, ultimately preparing them for the demands of a technology-driven business environment. The findings align with existing literature highlighting the dual impact of screen time on student learning behaviors and motivation. Studies emphasize that academic screen time can positively influence motivation by providing access to diverse educational resources and fostering self-directed learning (Xu *et al.*, 2021; Zhang and Zou, 2024; Paulich *et al.*, 2021). However, as indicated in the current study, this does not automatically lead to effective study habits, echoing Zimmerman's (2002) theory on self-regulated learning, which underscores the need for structured strategies and routines. Moreover, the positive correlation between non-academic screen time and study habits supports the notion that recreational screen activities, when moderated, may enhance digital literacy and reduce cognitive fatigue, indirectly benefiting academic tasks (Ouyang *et al.*, 2022; Yu *et al.*, 2021). Conversely, excessive non-academic screen use risks undermining motivation reinforcing the need for balanced and intentional screen use strategies (Brown *et al.*, 2022).

CONCLUSION

This study examined the relationships between screen time, learning motivation, and study habitudes among Business Education students in a Philippine higher education institution, highlighting implications for promoting digital wellness. Utilizing a descriptive-correlational design and a validated survey tool, the study revealed significant insights into students' screen time usage and its impact on academic behaviors. Findings indicated that while students dedicate substantial time to academic screen use, primarily within the 2–4 hour range, there is also considerable engagement in non-academic activities, particularly within the 0–2 and 4–6 hour categories. Notably, non-academic screen time (34%) far exceeded academic screen time (19%), underscoring the potential for digital distractions. Despite this, students displayed generally high levels of motivation when using digital tools for academic purposes, reflecting the positive role of digital engagement in fostering academic enthusiasm.

Tests of differences showed that sex, family income, and mother's education significantly influenced students online learning behaviors, whereas father's education did not.

Correlation analysis revealed a significant positive relationship between academic screen time and learning motivation, consistent with literature emphasizing the motivational benefits of intentional academic engagement. However, no significant correlation was found between academic screen time and study habits, suggesting that exposure to academic tasks alone does not guarantee the development of effective study behaviors. These findings highlight the dual-edged nature of screen time, where digital tools can enhance learning motivation but may also pose risks to time management and focus. Interventions aimed at improving digital wellness should address these challenges by fostering balanced screen time habits and equipping students with strategies for effective study behaviors.

Implications for digital wellness from a biosciences perspective

The findings of this study provide meaningful insights into the intersection of behavioral science, cognitive

health, and digital engagement, offering critical implications for the biosciences community. The elevated levels of non-academic screen time among Business Education students underscore a growing concern regarding digital overexposure and its potential impact on neurocognitive functioning, circadian regulation, and psychosocial well-being—issues central to biosciences research. From a neurobehavioral standpoint, the disproportionate time spent on non-academic screen activities may contribute to cognitive fatigue, attentional fragmentation, and altered dopamine regulation, particularly among young adults undergoing critical stages of brain development and academic formation. This highlights the urgent need for evidence-based interventions that promote digital hygiene a concept increasingly relevant in neuroscience and public health literature.

The observed positive correlation between academic screen time and learning motivation suggests that digital technologies, when used with pedagogical intent, can activate reward pathways and enhance cognitive engagement. This affirms existing neuroeducational models that support the integration of gamified and interactive digital tools to stimulate learning motivation. However, the lack of correlation with study habitudes indicates that intrinsic motivation alone is insufficient to establish sustained executive function skills such as self-regulation, planning, and metacognitive control.

For the biosciences field, these outcomes suggest that digital wellness initiatives in educational settings must adopt an integrative approach-merging cognitive neuroscience, behavioral psychology, and health education. Programs should include psychoeducational workshops on screen time regulation, the physiological risks of digital overexposure (e.g., eye strain, sleep disturbances, and sedentary behavior), and strategies to foster neurocognitive resilience in digitally saturated environments. Furthermore, the demographic influences (e.g., sex, maternal education) on digital learning behavior suggest potential epigenetic or

socio-cognitive mediators worth exploring in future bioscientific research. Longitudinal and physiological monitoring could enrich our understanding of how digital habits interact with biological and environmental factors over time. Ultimately, this study supports a biosciences-informed framework for promoting digital wellness that aligns cognitive efficiency, emotional stability, and physiological health. Such a holistic approach is essential for developing sustainable digital practices in academic populations, especially as digital technologies become further embedded in both educational and professional ecosystems globally.

Implications to theory and the filipino context
This study contributes to the theoretical understanding of digital engagement in education by reinforcing the concept that screen time, when utilized for academic purposes, can positively influence learning motivation. The findings align with the socio-cognitive theory of motivation, which suggests that digital tools can serve as effective enablers of academic engagement by fostering intrinsic motivation and enhancing the learning experience.

However, the lack of a significant correlation between academic screen time and study habits points to a gap in existing theories, suggesting that mere exposure to academic content through digital platforms is insufficient to promote effective study behaviors. This highlights the importance of integrating self-regulated learning strategies within digital tools to ensure that students not only engage with content but also develop critical study skills. In the Filipino context, where screen time is increasingly prevalent due to the rising use of smartphones and online learning platforms, these findings underline the need for educational frameworks that consider the balance between academic and non-academic screen use. In a country where technology is widely accessible, yet socio-economic disparities still exist, the impact of family income and mother's education on online learning behaviors calls for a deeper exploration of how these factors influence students' academic

success. Additionally, the study's focus on digital wellness in a rapidly evolving educational environment is highly relevant in the Filipino context, where educators and policymakers must work together to address the growing challenge of digital distractions. It is crucial to foster a culture that emphasizes not only the motivational benefits of technology but also the necessity of setting boundaries to maintain focus and enhance learning outcomes in both the classroom and at home.

Practical recommendations of the study

Grounded in biosciences and behavioral science perspectives, the study offers practical insights into promoting digital wellness among Business Education students. It is recommended that higher education institutions integrate evidence-based digital wellness programs into their curriculum, particularly those focusing on self-regulation, cognitive health, and circadian rhythm management. These programs may include workshops that educate students about the biological effects of excessive screen exposure, such as eye strain, sleep disturbances, and attention fatigue, and offer strategies rooted in neuroscience for improving focus and digital discipline. Faculty members are encouraged to adopt pedagogical approaches that balance digital tools with offline engagement to prevent cognitive overload and support healthy neurobehavioral development. Additionally, university administrators should establish guidelines that limit non-academic screen use during class hours and promote scheduled digital breaks to support mental and physiological recovery. Collaboration with health and wellness experts, including neuroscientists and mental health professionals, can further strengthen support systems, offering students access to services that address digital stress, anxiety, and screen dependency. Lastly, cultivating a culture of responsible technology use, where students are empowered to align their digital behaviors with their biological and academic needs-can contribute to long-term wellness and sustained learning outcomes. Through a biosciences-informed framework, these recommendations aim to foster a balanced academic

environment that prioritizes both cognitive performance and student well-being.

Limitations and future research directions

While this study provides valuable insights into the relationships between screen time, learning motivation, and study habits among Business Education students, several limitations must be acknowledged. First, the study relied on self-reported data, which may be subject to response biases such as social desirability or inaccurate reporting of screen time usage.

Additionally, the sample was limited to students from a single Philippine higher education institution, which may limit the generalizability of the findings to other contexts or regions.

Future studies could expand the sample size and include multiple institutions to obtain a more diverse and representative understanding of digital wellness across different student populations. Another limitation is the cross-sectional design of the study, which captures data at a single point in time and does not account for changes in students' screen time behaviors or academic motivation over the course of their studies. Longitudinal studies that track these variables over time would provide more comprehensive insights into how screen time and learning motivation evolve throughout students' academic careers. Furthermore, while the study identified socio-economic factors such as family income and mother's education as influencing online learning behaviors, future research could explore additional demographic variables, such as students' cultural backgrounds or technological access, to further understand the factors that shape digital engagement in education. Finally, the study did not assess the specific types of non-academic screen time activities, leaving room for further investigation into how different forms of screen use (e.g., social media, gaming, entertainment) impact students' academic performance and well-being. Future research could explore these distinctions in greater detail and

examine the effectiveness of targeted interventions designed to minimize distractions and promote healthy screen use.

Authors literature contribution statement

This study hopes to contribute into the existing body of literature by exploring the relationships between screen time, learning motivation, and study habits in the context of Business Education students within a Philippine higher education institution. The study adds empirical evidence to the growing body of research on digital wellness and its impact on academic behaviors. It reinforces the socio-cognitive theory of motivation, highlighting the potential of digital tools to foster academic engagement, while also addressing the complexities of non-academic screen time and its implications for student productivity. This work contributes to the ongoing discourse on how to balance digital engagement with effective study habits, offering practical recommendations for both educators and policymakers in the context of the Filipino educational environment.

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