More Is Not Always Better: Digital Usage Levels and Psychological Well-Being Among Students

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ABSTRACT

This study investigated the relationship between digital usage levels, gender, and psychological well-being (PWB) among students. A two-way ANOVA was conducted on data from 294 participants. Results revealed a significant main effect of digital usage on psychological well-being, $F(2, 294) = 3.50$, $p = .031$, with students reporting lower well-being at high levels of digital use compared to low levels. However, neither the main effect of gender, $F(1, 294) = 2.55$, $p = .111$, nor the interaction effect between gender and usage level, $F(2, 294) = 0.05$, $p = .953$, were significant. Post-hoc analysis confirmed significant differences only between high and low digital users. These findings suggest that while gender does not significantly shape well-being outcomes, the intensity of digital engagement plays a crucial role. Moderate and mindful technology use supports psychological health, whereas excessive use undermines it. The study highlights the importance of balanced digital engagement and recommends that educational institutions integrate digital wellness and self-regulation strategies into their student support systems.

Keywords: Digital usage; psychological well-being; gender differences; technology.

Introduction

In recent years, digital technology has become an integral component of students' academic and social lives. The rapid growth in the use of smartphones, internet platforms, and digital media has dramatically changed how students learn and communicate, as well as spend their free time (Twenge & Farley, 2021; Valkenburg & Piotrowski, 2017). While digital technology certainly provides many valuable educational and social benefits, excessive use has raised concerns regarding its psychological impact on students (Elhai et al., 2017; Boer et al., 2020).

Psychological well-being is defined by an individual's positive psychological functioning and considers self-acceptance, autonomy, purpose in life, personal growth, and positive relationships with others (Ryff, 1989; Keyes, 2006). For students to become successful in their studies and to be emotionally stable, high levels of psychological well-being are a necessity for their overall development (Huppert, 2009). Past research

indicated that the intensity at which one engages in digital use, rather than mere access, itself forms the basis on which psychological well-being is influenced (Kushlev & Leitao, 2020; Sha et al., 2019). High levels of digital engagement have more often been associated with stress, emotional difficulties, and lower well-being, while moderate use appears less harmful (Przybylski & Weinstein, 2017; Orben & Przybylski, 2019).

The studies on gender differences in psychological well-being are indeed many; yet, findings have remained inconsistent, with the inclusion of digital usage patterns. A number of these studies show that gender might not significantly influence overall psychological well-being when the intensity of use is included (Boer et al., 2020; Twenge & Martin, 2020), and therefore require examination alongside each other.

Despite the growing interest in this area, few studies have taken a factorial approach to examine the combined effects of gender and levels of digital usage on psychological well-being. The purpose of the present study, therefore, was to use a two-way ANOVA design in examining the impact of gender and digital usage levels (low, moderate, and high) on psychological well-being among students.

Literature Review

The integration of digital technology into the everyday life of students has dramatically shifted the educational landscape and ways of social interactions. Students engage with smartphones, social media, and online platforms for learning, communication, and entertainment continuously in their daily lives (Valkenburg & Piotrowski, 2017). Research denotes that digital media supports access to information, collaboration, and engagement in academic work (Kushlev & Leitao, 2020). Yet, these positive features exist alongside possible negative sides such as distraction, sleep loss, and rising levels of stress linked to heavy consumption (Twenge & Farley, 2021). Thus, the balance between productive and harmful use of digital media becomes an increasingly significant issue in educational and psychological research.

Psychological well-being was characterised by Ryff (1989) as a state of optimal functioning encompassing autonomy, personal growth, self-acceptance, and positive interpersonal relationships. A curvilinear relationship between digital usage and well-being has been suggested by scholars, with moderate engagement associated with connectedness and excessive use undermining psychological health (Przybylski & Weinstein, 2017; Orben & Przybylski, 2019). A high amount of screen time is associated with more symptoms of depression, anxiety, and emotional exhaustion, especially when digital interactions come at the expense of face-to-face social contact (Elhai et al., 2017; Boer et al., 2020). On the other hand, it has been shown that balanced and intentional use of digital tools may facilitate motivation, peer support, and social capital, positively contributing to students' psychological functioning (Best et al., 2014).

Two key theoretical frameworks underlie modern research on the topic of digital use and well-being: The Displacement Hypothesis of Kraut et al. (1998) posits that online engagement displaces face-to-face social interactions, which are particularly beneficial for psychological well-being. On the other side, the Goldilocks Hypothesis by Przybylski & Weinstein (2017) proposes that moderate digital use is "just right," providing sufficient connectivity without the adverse effects of extreme engagement. Together, these two alternative perspectives stress the importance of the intensity of use rather than access to technology per se in evaluating its psychological implications.

The role of gender in shaping digital engagement patterns and their psychological consequences is complex. Studies have found that females are more likely to engage in online activities that are socially oriented, like social media interaction, whereas males tend towards gaming or informational browsing (Boer et al., 2020; Sha et al., 2019). On the other hand, findings on differences related to well-being present inconclusive evidence. According to Twenge and Martin (2020), females seem to be more sensitive to negative online experiences, but other works found very minimal, if any, gender differences when digital usage intensity is controlled for (Best et al., 2014; Kushlev & Leitao, 2020). These inconsistencies indicate that digital well-being outcomes may be more determined by patterns and levels of use than solely by gender.

In sum, the literature consistently shows that digital technology is deeply embedded in students' academic and social lives, offering both opportunities and challenges. The connection between digital usage and psychological well-being seems to follow a curvilinear trend; moderate use generally supports well-being, while excessive use leads to psychological strain. Although gender differences exist in how students engage with and experience digital technology, their effects appear to be shaped by the intensity and nature of usage. Thus, examining gender alongside levels of digital use is crucial to fully understand their combined impact on students' psychological well-being.

Need and Significance of the Study

Digital technology has become integral to students' learning and social lives, influencing how they study, communicate, and form relationships (Valkenburg & Piotrowski, 2017). In the same vein, despite the academic and social benefits afforded by digital tools, excessive use is associated with anxiety, stress, and diminished psychological well-being (Elhai et al., 2017; Orben & Przybylski, 2019). Evidence suggests that it is the intensity of use, rather than mere access to digital tools, that predicts the association between digital usage and mental health (Kushlev & Leitao, 2020).

Whereas the examination of gender differences in psychological well-being has been widely conducted, findings are inconsistent when digital behaviour is considered (Boer et al., 2020; Twenge & Martin, 2020). This emphasises the importance of analysing both gender and digital usage levels simultaneously to understand how their combined effects take shape in students' psychological well-being.

The present study is important because it fills the research gap by using two-way ANOVA to examine interaction effects between gender and digital usage; provides insights of value to educators and policymakers in promoting balanced digital habits; and contributes to the growing body of research into mental health in the digital age.

Research Methodology

Research Design: The present study embarked on a quantitative cross-sectional research design with the aim of ascertaining the effect of gender and levels of digital usage on the psychological well-being of students. A 2 × 3 two-way factorial design was used, in which gender (boys and girls) and level of digital usage (low, moderate, high) served as independent variables.

Variables of the Study

1. **Independent Variables:** Gender (Boys, Girls) and Levels of Digital Usage (Low, Moderate, High)

2. **Dependent Variable:** Psychological Well-Being (PWB)

Sample: The sample consisted of 300 students, selected using a stratified random sampling technique. The participants included boys and girls enrolled in class IX in government schools of Delhi.

Research Tool: Data were collected using a self-constructed rating scale on "Digital Usage Scale" and "Psychological Well-being Scale" for Secondary School Students. The Digital Usage Scale contained 27 items while the Psychological Well-being Scale contained 33 items. Each item was rated on a 3-point Likert scale that is Always, Sometimes and Never.

This tool was verified by psychological and pedagogical experts; Cronbach's Alpha for "Digital Usage Scale" is 0.77, and "Psychological Well-being Scale" is 0.88, indicating good internal consistency and strong reliability.

Statistical Analysis: The collected data were analysed using SPSS. Descriptive statistics were computed to describe the basic characteristics of the sample. Two-way ANOVA was used to test the main effects of gender and levels of digital usage and their interaction effect on psychological well-being. Since there was a significant main effect of levels, Tukey's HSD post-hoc test was used to determine specific group differences. The hypothesis was tested at a significance level of 0.05.

Although the total sample size was 300, the error degrees of freedom were reduced to 294 because six group means (2×3 design) were estimated in the two-way ANOVA model.

Error df=N-number of groups (cells)

In this design, Gender is categorised as boy and girl (2 levels), and digital usage level is categorised into three levels (high, moderate and low). So, the total cells are 2 X 3 = 6. Therefore, df=300-6, which is equal to 294.

Objectives

1. To compare the psychological well-being of boys and girls.

2. To examine differences in psychological well-being across different levels of digital usage (low, moderate, and high).

3. To examine the combined effect of gender and digital usage levels on psychological well-being.

4. To find out which level of digital usage differs significantly in psychological well-being.

Null Hypotheses

H01: There is no significant difference in psychological well-being between boys and girls.

H02: There is no significant difference in psychological well-being across different levels of digital usage (low, moderate, high).

H03: There is no interaction effect between gender and levels of digital usage on psychological well-being.

H04: There is no significant difference in psychological well-being between:

> H04(a): High vs Low digital usage

> H04(b): High vs Moderate digital usage

H04(c): Low vs Moderate digital usage

Analysis and Interpretation:

Level of Internet Usage: It is calculated by using a z-score on 27 items, and based on the values of the z-score, the researcher finds out the level of digital usage, which is as follows:

Level	No. of Respondents
High Usage	57
Moderate Usage	193
Low Usage	50

Table 1 below indicates the following results related to the above objectives:

Objective 1: The two-way ANOVA showed that the main effect of gender on psychological well-being was not significant, $F(1, 294) = 2.55$, $p = .111$. This means that the male and female participants did not show a significant difference in their overall level of psychological well-being. Thus, Null Hypothesis H01 is retained.

Objective 2: The result of the analysis indicated a statistically significant main effect of levels on psychological well-being: $F(2, 294) = 3.50$; $p = .031$. This is an indication that across the three levels, psychological well-being varies significantly. Therefore, Null Hypothesis H02 is rejected.

Objective 3: The interaction between gender and levels was not significant, $F(2, 294) = 0.05$, $p = .953$. This reflects that the pattern of variation in psychological well-being across levels was similar for both males and females. Thus, Null Hypothesis H03 was retained.

Overall Model: The overall ANOVA model was statistically significant, $F(5, 294) = 2.284$, $p = .046$, and explained 3.7% of the variance in psychological well-being ($R^2 = .037$).

Table 1: Tests of Between-Subjects Effects					
Dependent Variable: Psychological Well-being					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	1477.066[a]	5	295.413	2.284	.046
Intercept	1003639.868	1	1003639.868	7760.567	.000
Gender	330.275	1	330.275	2.554	.111
levels	905.134	2	452.567	3.499	.031
Gender * levels	12.570	2	6.285	.049	.953
Error	38021.721	294	129.326		
Total	1517630.000	300			
Corrected Total	39498.787	299			
a. R Squared = .037 (Adjusted R Squared = .021)					

Post-Hoc Test

Objective 4:

Table 2 below shows the results of the Post-Hoc Test

a) Tukey HSD post-hoc test showed that there was a significant difference between high and low digital usage students on the psychological well-being variable: −6.17, p = .015. Low digital usage students had higher psychological well-being compared to high digital usage students. The null hypothesis H04(a) is rejected.

b) There is no significant difference between the group with high and the group with moderate digital usage concerning psychological well-being (Mean Difference = −3.07, p = .175). The null hypothesis H04(b) was accepted.

c) No statistically significant difference was observed in psychological well-being between the low and moderate digital usage groups, with a Mean Difference of 3.10 at p = .200. Thus, the null hypothesis H04(c) was accepted.

Overall Interpretation: The findings show that high and low digital users are indeed significantly different in psychological well-being, with lower digital usage indicating higher well-being. However, a moderate digital user is not significantly different from either a high or a low digital user in terms of psychological well-being.

Table 2: Post Hoc Test for Levels						
Multiple Comparisons						
Dependent Variables: Psychological Well-being						
Tukey HSD						
(I) Levels	(J) Levels	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
High	Moderate	-3.0661	1.71434	.175	-7.1045	.9723
	Low	-6.1670*	2.20349	.015	-11.3577	-.9764
Moderate	High	3.0661	1.71434	.175	-.9723	7.1045
	Low	-3.1009	1.80460	.200	-7.3519	1.1501
Low	High	6.1670*	2.20349	.015	.9764	11.3577
	Moderate	3.1009	1.80460	.200	-1.1501	7.3519
Based on observed means.						
The error term is Mean Square (Error) = 129.326.						
*. The mean difference is significant at the .05 level.						

Homogeneous Subsets Interpretation: The homogeneous subsets table 3 further clarifies group differences:

- The moderate group also overlaps with both subsets, meaning that it is not greatly different from the high or low levels.

- High and low levels do not show up in the same subset, indicating that there is a significant difference between these two groups.
- Psychological well-being scores show a gradual increase from high to low levels, ranging from a mean of 67.19 to 73.36. The largest and only significant difference is between high and low levels.

Table 3: Homogeneous Subsets			
Psychological Well-being			
Tukey HSD			
Levels	N	Subset	
		1	2
High	57	67.1930	
Moderate	193	70.2591	70.2591
Low	50		73.3600
Sig.		.248	.241

Analysis and Interpretation of the Profile Plot

Profile Plot of Estimated Marginal Means: Psychological Well-being (PWB). This profile plot is for the estimated marginal means of psychological well-being across three levels (high, moderate, low) for gender (boys and girls).

1. **Effect of Levels on Psychological Well-being:** In both boys and girls, psychological well-being increases steadily from high → moderate → low levels. This reflects a strong main effect of levels, indicating that the variable represented by these levels (for example, intensity/type of digital usage or some other categorical factor) has a serious impact on psychological well-being.

2. **Gender Differences**: Boys are consistent in obtaining higher psychological well-being scores than girls at all three levels. That suggests the main effect of gender, with boys reporting better psychological well-being compared with girls.

3. **Interaction Pattern: Gender × Levels**: The lines for boys and girls are essentially parallel. Parallel lines mean no strong interaction effect between gender and levels. This means that whereas boys have higher psychological well-being than girls, the pattern of change across levels is similar for both genders.

Estimated Marginal Means of PWB
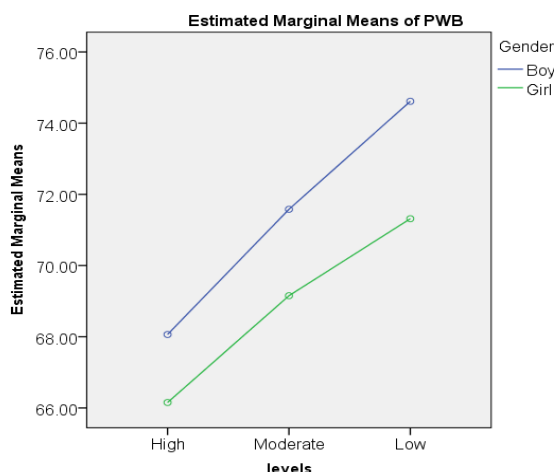
Discussion

The present study aimed to investigate the relationship between levels of digital usage and Psychological Well-being among students, considering the moderating role of gender. In tune with the emerging literature, the findings confirm that the digital engagement-psychological well-being relationship is significant yet complex. The results of two-way ANOVA indicated that gender alone failed to produce significant effects on psychological well-being; however, the level of digital usage did. Specifically, students with high digital usage reported significantly lower psychological well-being compared to those with low digital usage, while no significant differences emerged between moderate users and the other two groups. These outcomes bring into focus the importance of intensity of digital engagement rather than gender in shaping well-being outcomes.

The significant main effect of digital usage is in line with the Goldilocks Hypothesis suggested by Przybylski and Weinstein (2017) that moderate use of digital media can be beneficial, whereas excessive use tends to be detrimental. The finding that low users reported higher psychological well-being compared to heavy users is also consistent with the idea that too much digital engagement may result in negative psychological outcomes such as stress, distraction, and emotional fatigue (Twenge & Farley, 2021; Elhai et al., 2017). This finding is further consistent with the Displacement Hypothesis (Kraut et al., 1998), suggesting that excessive online interaction displaces face-to-face social contact that is important for maintaining psychological health.

This non-significant difference between moderate and both low or high users indicates a curvilinear trend in which psychological well-being predominantly deteriorates at the higher end of digital engagement. This pattern further confirms previous empirical studies showing that a moderate level of engagement facilitates connectedness and social support without the negative effects evident in overuse (Orben & Przybylski, 2019; Best et al., 2014). Kushlev and Leitao (2020) also found that intentional, moderate digital use can contribute to improved academic collaboration and increased motivation, thus positively influencing students' psychological functioning. These results taken together reinforce the assessment that the effects of digital media on well-being are based more on the intensity of use than on simple access or exposure.

Contrary to earlier studies indicating that females may be more sensitive to adverse online experiences, Twenge & Martin (2020) found no significant gender differences in overall psychological well-being. This finding also agrees with those of Best et al. (2014) and Kushlev and Leitao (2020), who suggested minimal gender differences once digital usage intensity is controlled for. Additionally, this nonsignificant interaction between gender and levels of digital usage suggests similar patterns in psychological outcomes across levels of usage for both males and females. This supports the argument even further that, when it comes to digital engagement, it is not gender, but rather usage patterns, which act as a primary factor affecting well-being outcomes.

However, it is important to notice that gender differences in engagement patterns may persist. Earlier studies have documented that females tend to be more engaged in socially oriented online activities such as social media interaction, and, on the other hand, males are more likely to use digital media for either gaming or

seeking information (Boer et al., 2020; Sha et al., 2019). Such differences in preference may underline divergent patterns of emotional or cognitive experiences from digital activities and, though not emerging as significant differences in general well-being scores, could be explored further in research into qualitative distinctions in the specific type of digital engagement. For example, social versus recreational, which may differentially predict psychological well-being across genders.

The findings contribute to the growing evidence base that supports a nuanced understanding of digital technology's psychological effects. Rather than viewing digital use as uniformly harmful or beneficial, the results underscore the importance of the intensity and purpose of use, consistent with contemporary theories of digital well-being (Przybylski & Weinstein, 2017; Orben & Przybylski, 2019). The significant differences between high and low users highlight the threshold beyond which digital engagement begins to impair well-being, possibly through mechanisms such as reduced sleep, social comparison, and emotional overload (Twenge & Farley, 2021; Elhai et al., 2017). In light of Ryff's (1989) conceptualisation of psychological well-being—which includes autonomy, personal growth, and positive relationships—the findings suggest that excessive digital engagement may undermine these domains by fostering dependency, distraction, and diminished real-life social interactions. Conversely, balanced use may support autonomy and connectedness by enabling efficient communication, collaboration, and access to learning resources (Best et al., 2014).

Conclusion

This study explored how gender and digital usage levels relate to students' psychological well-being (PWB). The findings indicate that digital usage intensity significantly affects psychological well-being, while gender and its interaction with usage levels are not significant factors. Students with high digital usage reported lower well-being than those with low usage, whereas moderate users showed no significant differences. These results reinforce the Goldilocks Hypothesis (Przybylski & Weinstein, 2017), suggesting that moderate digital engagement supports psychological health, while excessive use can be detrimental. The absence of gender differences further implies that the impact of digital technology depends more on how and how much it is used than on who uses it.

Overall, the study concludes that balanced and mindful digital engagement promotes psychological well-being, while overuse may contribute to stress and reduced functioning. Educational institutions should therefore emphasise digital balance and self-regulation strategies among students to help them maximise the benefits of technology while minimising its psychological costs. Future studies could use longitudinal designs to explore causal pathways and the role of specific online activities in shaping well-being.

Suggestions

Since high levels of digital use were associated with lower psychological well-being, students need to practice mindful and balanced technology use. Schools can introduce digital wellness programs that teach time management, self-regulation, and awareness of digital fatigue. Encouraging offline social interactions and setting healthy boundaries around screen time can help students maintain better emotional balance. Educators and policymakers should recognise that digital tools, while beneficial for learning, can become

counterproductive when overused. Integrating digital literacy with mental health education can help students develop healthier online habits. Institutions could also consider policies that promote balanced technology integration in academic environments to protect students' psychological health.

Limitations

- The study was conducted with 300 secondary school students from a specific region of Delhi, which restricts the generalizability of the findings. The results may not accurately represent students from other regions, educational levels, where patterns of digital engagement and access to technology may differ.

- The research was conducted exclusively on Class IX students from government schools in a specific region of Delhi, which limits the generalizability of the findings. Students from private schools or other regions may differ in their access to digital resources, usage patterns, and socio-economic contexts, which could influence psychological well-being differently.

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