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Digital Dependency and Stress Levels among Adolescents: An Empirical Investigation

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Abstract

The increasing use of smartphones and internet-based platforms has made digital technology an important part of adolescent education, communication, entertainment, and social life. At the same time, difficulty regulating digital engagement may be associated with distraction, sleep disruption, emotional strain, and stress. The present study examined the association between digital dependency, measured through a mobile-addiction score, and stress among 200 adolescents. The sample included 100 Standard 10 students and 100 Standard 12 students, with 102 males and 98 females aged 14–18 years. Digital dependency was assessed using the Smartphone Addiction Scale–VAM scoring framework, while stress was assessed using the Stress Scale (SS-LVNS), covering pressure, physical stress, anxiety, and frustration. Descriptive statistics, Pearson's correlation, and independent-samples comparisons were used. The mean stress score was 16.64 (SD = 8.06), and the mean mobile-addiction score was 61.77 (SD = 18.37). A significant positive relationship was found between mobile-addiction and stress scores, $r = .337$, $p < .001$. Standard 10 students reported higher mean stress ($M = 19.54$) than Standard 12 students ($M = 13.73$), and the difference was statistically significant, $t = 5.45$, $p < .001$. The mobile-addiction difference between standards was also statistically significant, $t = 2.06$, $p = .041$, although the result should be interpreted cautiously. Female students had higher mean stress than males, whereas the gender difference in mobile-addiction scores was not statistically significant. A data-quality review identified several mobile-addiction scores above 100; these should be checked against the original questionnaires before final publication. The findings indicate that digital dependency and adolescent stress are related in this sample, while the cross-sectional design does not establish causation.

Keywords: adolescents, digital dependency, mobile addiction, smartphone use, stress, academic pressure, anxiety, frustration

1. Introduction

Digital technology has become embedded in the everyday lives of adolescents. Smartphones provide access to educational resources, social networking, messaging, entertainment, video content, games, and information. Because one device can perform many functions, young people may move between academic and recreational activities without a clear boundary. Digital technology can therefore support learning and social connection while also creating opportunities for distraction and continuous engagement.

Adolescence is a period of rapid psychological and social development. Young people are becoming more independent, forming peer relationships, developing academic and occupational goals, and becoming increasingly sensitive to social evaluation. Digital platforms can support these developmental tasks by enabling communication and self-expression, but they may also introduce social comparison, fear of missing out, constant notifications, and pressure to remain available. Research on problematic smartphone use has identified links with psychological factors such as anxiety, depression, reassurance seeking, and difficulties with emotional regulation (Elhai et al., 2017).

In the present study, digital dependency is used as an operational research term rather than as a clinical diagnosis. It refers to a pattern of excessive or difficult-to-control engagement reflected in the mobile-addiction scale score. A high score should not be interpreted simply as evidence that a student owns a smartphone or spends many hours online. The more relevant issue is whether digital activity becomes difficult to regulate or interferes with sleep, concentration, academic work, relationships, or emotional balance.

Stress is another important aspect of adolescent well-being. Academic examinations, parental expectations, peer relationships, future uncertainty, competition, and changing responsibilities may create psychological demands. The SS-LVNS framework used in this study conceptualizes stress through four dimensions: pressure, physical stress, anxiety, and frustration (Lakshmi & Narain, 2014). This multidimensional approach allows stress to be considered as more than a single emotional state.

The relationship between digital dependency and stress may operate in more than one direction. Excessive digital engagement may be associated with stress through reduced sleep, interruption of concentration, social comparison, or information overload. Conversely, students who are already

stressed may use smartphones for distraction, entertainment, or temporary emotional relief. Other factors, including family environment, academic workload, personality, sleep patterns, and peer relationships, may influence both variables. Therefore, a correlational study can establish statistical association but cannot determine causal direction.

2. Review of Related Literature

Research on digital behavior has moved from a primary focus on internet addiction toward more specific examination of smartphone use, social-media engagement, gaming, and problematic digital behavior. Gao et al. (2016) reported relationships between smartphone use, social anxiety, and loneliness, illustrating that smartphone behavior can have complex social and emotional correlates. Elhai et al. (2017) reviewed problematic smartphone use and described associations with anxiety and depression-related psychopathology. These findings suggest that the psychological meaning of smartphone use depends not only on the amount of use but also on the reasons for use and the degree of behavioral control.

Adolescent stress is also shaped by educational and interpersonal circumstances. Academic pressure can affect concentration, sleep, motivation, and perceived performance. Alam (2010) examined emotional intelligence and academic stress among adolescents, highlighting the importance of psychological factors in understanding students' academic experiences. Digital devices can interact with these demands in opposing ways: they may provide educational support and communication, but they may also make distraction immediately available during periods of study.

Twenge (2017) discussed the broader relationship between intensive digital engagement and indicators of adolescent psychological well-being. Such evidence should be interpreted cautiously because population-level associations do not demonstrate that technology alone causes psychological difficulties. Family relationships, school climate, peer networks, socioeconomic conditions, and individual differences can influence both digital behavior and well-being.

An important distinction in this literature is the difference between high digital engagement and problematic digital use. A student may spend considerable time online for classes, research, communication, or creative work without showing dependency. Another student may spend a similar amount of time online in a way that is difficult to control and interferes with sleep or responsibilities. For this reason, scale-based assessment can provide information that simple screen-

time estimates cannot capture. The present study follows this approach by examining measured digital dependency alongside measured stress.

3. Rationale of the Study

The increasing role of smartphones in adolescent life creates a need to understand how patterns of digital engagement relate to psychological well-being. Schools and families may observe distraction, late-night device use, reduced concentration, and academic pressure, but evidence-based assessment is preferable to assumptions about technology. The present study is relevant because it examines digital dependency and stress within the same adolescent sample and includes students from two academically important standards.

The study also has methodological relevance because it applies the scoring frameworks supplied with the instruments. A quality-control review of the dataset identified unusually high mobile-addiction values. Rather than silently deleting these observations, the revised paper reports the issue transparently and recommends verification against the original response sheets before publication.

4. Objectives

• To examine the level of stress among adolescents studying in Standard 10 and Standard 12.

• To examine the level of mobile addiction/digital dependency among adolescents.

• To determine the relationship between mobile addiction/digital dependency and stress.

• To compare stress scores between Standard 10 and Standard 12 students.

• To compare mobile-addiction scores between Standard 10 and Standard 12 students.

• To describe gender-wise differences in stress and mobile-addiction scores.

• To classify adolescents according to the qualitative norms supplied with the instruments.

5. Hypotheses

H1: There will be a significant relationship between mobile addiction/digital dependency and stress among adolescents.

H2: There will be a significant difference in stress scores between Standard 10 and Standard 12 students.

H3: There will be a significant difference in mobile-addiction scores between Standard 10 and Standard 12 students.

6. Method

6.1 Research Design

The study employed a quantitative, cross-sectional, correlational design. This design was selected to examine the statistical relationship between digital dependency and stress at one point in time. No variable was experimentally manipulated; therefore, the design does not permit causal conclusions.

6.2 Participants

The dataset contained 200 adolescents aged 14–18 years, with a mean age of 16.23 years (SD = 1.34). The sample included 102 males and 98 females. There were 100 students from Standard 10 and 100 students from Standard 12.

6.3 Instruments

Digital dependency was assessed using the Smartphone Addiction Scale–VAM framework (Vijayshri & Ansari, 2019). The supplied scoring norms classify scores as Very Low (28 and below), Low (29–39), Below Average (40–50), Average (51–65), Above Average (66–80), High (81–87), and Very High (88 and above).

Stress was assessed using the Stress Scale (SS-LVNS) developed by Lakshmi and Narain (2014). The scale contains 40 items across four dimensions: Pressure, Physical Stress, Anxiety, and Frustration. The supplied manual provides gender-specific overall stress norms. For boys, scores of 0–11 are Low, 12–21 Moderate, and 22 or above High. For girls, scores of 0–13 are Low, 14–24 Moderate, and 25 or above High.

6.4 Procedure and Analysis

The analysis used the values contained in the supplied dataset. Descriptive statistics were calculated for age, stress, and mobile-addiction scores. Pearson’s product-moment correlation was used to examine the association between digital dependency and stress. Independent-samples tests were used for comparisons by academic standard and gender. Statistical significance was evaluated at the .05 level.

A data-quality review was conducted because several mobile-addiction scores were above 100, although the supplied interpretation table identifies 88 and above as Very High. One previously reported value of 493 had already been corrected to 49. The remaining values above 100 were retained in the primary analysis because they were present in the supplied dataset, but they are

flagged for verification against the original questionnaires. A sensitivity analysis excluding scores above 100 was also reported as a robustness check.

7. Results

7.1 Descriptive Statistics

The overall mean stress score was 16.64 (SD = 8.06), with scores ranging from 1 to 35. The overall mean mobile-addiction score was 61.77 (SD = 18.37). Standard 10 students had a mean stress score of 19.54 (SD = 8.18), whereas Standard 12 students had a mean of 13.73 (SD = 6.83). Mean mobile-addiction scores were 64.43 (SD = 20.94) for Standard 10 and 59.12 (SD = 15.03) for Standard 12.

Female students had a mean stress score of 18.62 (SD = 7.57), compared with 14.73 (SD = 8.10) among males. Mean mobile-addiction scores were 60.30 (SD = 19.12) for females and 63.20 (SD = 17.60) for males.

Table 1. Descriptive Statistics by Academic Standard

Group	N	Stress M	Stress SD	Mobile M	Mobile SD
Standard 10	100	19.54	8.18	64.43	20.94
Standard 12	100	13.73	6.83	59.12	15.03
Overall	200	16.64	8.06	61.77	18.37

7.2 Relationship Between Digital Dependency and Stress

Pearson's correlation showed a statistically significant positive association between mobile-addiction score and stress score, $r = .337$, $p < .001$. The relationship is small in magnitude. The coefficient of determination (r^2) is approximately .114, meaning that about 11.4% of the variance in stress scores is statistically associated with variation in mobile-addiction scores in this sample. This value must not be interpreted as evidence that digital dependency causes 11.4% of adolescent stress.

7.3 Standard-Wise Comparisons

Standard 10 students reported significantly higher stress than Standard 12 students, $t = 5.45$, $p < .001$. The comparison of mobile-addiction scores between the two standards was also statistically significant, $t = 2.06$, $p = .041$. Because the mobile scores show considerable variability and include unusually high observations, the latter finding should be interpreted cautiously.

7.4 Gender-Wise Comparisons

Female adolescents had significantly higher stress scores than male adolescents, $t = 3.52$, $p < .001$. The difference in mobile-addiction scores between males and females was not statistically significant, $t = -1.11$, $p = .266$. These findings describe the present sample and should not be generalized to all adolescents.

7.5 Stress-Level Distribution

Using the gender-specific stress norms, 65 adolescents were classified as Low, 91 as Moderate, and 44 as High. In Standard 10, 25 were Low, 41 Moderate, and 34 High. In Standard 12, 40 were Low, 50 Moderate, and 10 High. Thus, the Standard 10 group contained a larger proportion of participants in the High-stress category.

7.6 Data-Quality Check

After the confirmed correction of Participant 12 from 493 to 49, eight mobile-addiction scores remained above 100: 101, 101, 103, 103, 103, 106, 106, and 112. These values are outside the central range suggested by the supplied norms and should be checked against the original questionnaires. The primary correlation retained the supplied values and was $r = .337$, $p < .001$. When scores above 100 were excluded for sensitivity analysis, the correlation was $r = .263$, $p = .0002$. The positive association therefore remained present after excluding the unusual observations.

8. Discussion

The principal finding is a statistically significant positive association between digital dependency and stress. Adolescents with higher mobile-addiction scores tended, on average, to have higher stress scores. This finding is compatible with previous literature describing relationships between problematic smartphone use and psychological difficulties (Elhai et al., 2017). However, the size of the association is modest, and the cross-sectional design prevents a conclusion that smartphone dependence causes stress.

Several explanations are possible. Frequent digital engagement may interfere with sleep or sustained attention, particularly when devices are used late at night. Social-media environments can also increase exposure to social comparison, peer evaluation, and a continuous flow of information. At the same time, adolescents experiencing academic or interpersonal stress may turn to smartphones as a convenient source of distraction or emotional regulation. Thus, the association may be reciprocal, and unmeasured factors may contribute to both variables.

The higher stress level observed among Standard 10 students is another notable result. The mean stress score for Standard 10 was substantially higher than that for Standard 12, and the distribution showed more High-stress cases in Standard 10. This pattern should not be treated as evidence that one academic standard universally produces more stress. Examination timing, school context, family expectations, age, academic workload, and other contextual factors may influence the difference.

Gender findings showed higher mean stress among females, while males had a somewhat higher mean mobile-addiction score. The stress difference was statistically significant, but the mobile-addiction difference was not. These results should be interpreted as sample-specific rather than as universal gender patterns. Differences in reporting style, social context, coping, and sample composition may affect observed group differences.

The data-quality issue is important for interpretation. The supplied mobile-addiction norms classify 88 and above as Very High, yet several observations exceed 100. One extreme value had already been verified and corrected from 493 to 49. The remaining values should be verified before publication. The sensitivity analysis is useful because the positive correlation remains significant after excluding scores above 100, but the sensitivity result should not replace the primary analysis unless the data-cleaning rule is formally justified.

9. Implications

The findings have practical implications for adolescents, parents, schools, and counselors. Digital-well-being programs can focus on self-regulation rather than simply demanding complete avoidance of smartphones. Adolescents may benefit from scheduled study periods, reduced notifications, regular sleep routines, planned breaks, and keeping devices away during focused academic work.

Parents can establish predictable expectations around sleep and study while maintaining open communication about why adolescents use digital platforms. Schools may combine stress-management education with digital-use education, particularly for students experiencing academic pressure. Counselors can explore whether smartphone use is functioning as a source of stress, a coping strategy, a source of sleep disruption, or a form of social support. The objective should be balanced and intentional technology use.

10. Limitations

• The cross-sectional design does not establish temporal order or causality.

• The sample contains 200 adolescents from the supplied dataset and may not represent adolescents from other schools or regions.

• Self-report scale scores may be affected by recall, interpretation, social desirability, and response style.

• Detailed information on sleep, academic workload, family environment, socioeconomic status, gaming, and specific digital activities was not available.

• Several mobile-addiction observations above 100 require verification against the original response sheets.

• Only bivariate correlations and group comparisons were conducted; potential confounding variables were not controlled through a multivariable model.

11. Suggestions for Future Research

Future studies should use longitudinal designs to examine whether changes in digital behavior precede changes in stress or vice versa. Researchers should distinguish educational use, social media, gaming, entertainment, messaging, and short-form video rather than treating all screen use as equivalent. Sleep, academic pressure, family relationships, peer relationships, and coping style could be examined as potential explanatory variables. Larger samples drawn from multiple schools and geographic areas would improve generalizability. Future analyses should also preserve raw item responses and document scoring, reverse scoring, missing-data handling, and category assignment so that unusual observations can be identified before statistical testing.

12. Conclusion

This study examined digital dependency and stress among 200 adolescents from Standard 10 and Standard 12. A statistically significant positive association was found between mobile-addiction and stress scores, $r = .337$, $p < .001$. Standard 10 students reported higher average stress than Standard 12 students, while female participants reported higher mean stress than males. The gender difference in mobile-addiction scores was not statistically significant. These findings suggest that digital dependency and stress are related in the present sample, but they do not demonstrate that digital dependency causes stress.

The study also highlights the importance of careful data validation. The confirmed correction of one extreme mobile-addiction value improved the consistency of the dataset, while several remaining

high values require verification from the original questionnaires. Overall, the findings support balanced digital-well-being efforts that encourage self-regulation, healthy sleep, focused study habits, and stress-management skills without assuming that digital technology is inherently harmful.

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