ACADEMIA International Journal for Social Sciences
Volume 5, Issue 2(a), 2026 ISSN-L (Online): 3006-6638

Technology Enhanced Learning and Personality Development: A Case of Secondary School Students

Dr Wajid Mahnaz
wajid.mahnaz@yahoo.com
Department of Education, Alhamd Islamic University Islamabad, Pakistan.

Huma Akram
akramhuma@ncwu.edu.cn
School of International Education, North China University of Water Resources and Electrical Power, China.

Corresponding Author: Dr Wajid Mahnaz wajid.mahnaz@yahoo.com

Received: 10-01-2026 **Revised:** 25-01-2026 **Accepted:** 08-02-2026 **Published:** 23-02-2026

ABSTRACT

The increasing integration of social media, and online learning platforms have significantly reshaped students' behavioral and emotional development. Given that we aimed to examine technology use among secondary school students and its impact on their personality. The study adopted a quantitative correlational research design under the positivist paradigm to analyze the relationship between variables. The population of the study consisted of approximately 310 secondary schools and 52,000 students of District Rawalpindi. A sample of 400 secondary school students was selected through proportionate stratified random sampling technique to ensure representation of government and private schools. A structured questionnaire based on a five-point Likert scale was used as the research tool, comprising items related to technology use and Big Five personality traits. Data was analyzed using SPSS through descriptive statistics, correlation, and regression analysis. The first observation identified that the level of technology use among secondary school students was moderate, indicating balanced but frequent digital engagement, and it was recommended that schools and parents should guide students toward responsible and educational use of technology. The significance of the study lay in its contribution to understanding the psychological and behavioral effects of technology use on adolescents, providing valuable insights for educators, parents, and policymakers to develop strategies for promoting healthy personality development in a digital environment.

Keywords: *Technology enhanced learning, personality development, secondary school students, big five personality traits, digital behavior, adolescent psychology, ICT influence*

INTRODUCTION

The rapid expansion of digital technologies has significantly transformed the educational and social environment of secondary school students (Akram et al., 2021, 2022). Technology use, including smartphones, social media platforms, educational applications, and internet-based learning tools, has become an integral part of students' daily lives (Abdelrady et al., 2025, 2026). This increasing exposure has influenced not only academic performance but also psychological and personality development (Ma et al., 2024, 2025). Researchers have highlighted that adolescents' personality traits are shaped through continuous interaction with digital environments, which provide both opportunities and challenges for identity formation and behavioral development (Twenge, 2017; Turkle, 2015; Livingstone et al., 2019). Recent studies have further emphasized that digital engagement affects emotional regulation, communication behavior, and social interaction patterns among students (Zhao & Liu, 2021; Yang et al., 2026; Tan et al., 2026).

Personality development during adolescence is considered a critical stage of psychological growth, where individuals develop stable patterns of thinking, feeling, and behaving. The Big Five personality traits—openness, conscientiousness, extraversion, agreeableness, and neuroticism—are particularly influenced by environmental and social factors (Jan et al., 2022). Technology use has emerged as a major environmental factor shaping these traits in modern educational contexts (Al-Adwan et al., 2022). Studies have shown that excessive screen time and social media exposure can alter emotional stability, attention span, and social interaction patterns among adolescents (Przybylski & Weinstein, 2017; Kuss & Griffiths, 2017; Odgers & Jensen, 2020). Additionally, positive technology engagement has been associated with creativity, collaboration, and knowledge acquisition (Smahel et al., 2020; Odgers & Jensen, 2020; Yang et al., 2026).

The integration of technology into education has expanded rapidly through digital learning platforms, online classrooms, and artificial intelligence-based tools (Jalalzai et al., 2025). These technologies have reshaped traditional learning environments, making students more independent and self-directed learners. However, researchers have also indicated that uncontrolled or excessive technology use may lead to behavioral changes such as reduced face-to-face communication, increased isolation, and emotional dependency on digital devices (Twenge, 2017; Orben, 2020; Livingstone et al., 2019). Such behavioral changes are directly linked with personality development, particularly in areas of extraversion and emotional stability.

Furthermore, the psychological impact of technology use has been widely discussed in recent literature. Social media platforms such as Facebook, Instagram, TikTok, and YouTube have been found to significantly influence adolescents' self-perception and identity formation. These platforms create opportunities for social comparison, which may either enhance self-esteem or lead to psychological stress and anxiety. Studies have shown that frequent social media engagement is associated with increased neuroticism and decreased self-confidence among adolescents (Keles et al., 2020; Nesi, 2020; Twenge, 2017). Conversely, constructive use of digital platforms has been linked to improved communication skills and social awareness (Odgers & Jensen, 2020; Smahel et al., 2020; Yang et al., 2026).

In educational contexts, technology use has been recognized as a double-edged phenomenon. On one hand, it enhances learning opportunities, provides access to global knowledge, and supports interactive learning environments. On the other hand, it may reduce students' attention span, increase dependency on digital devices, and limit real-life social interactions. Researchers have emphasized that the impact of technology on personality development depends on usage patterns, duration, and content type rather than technology itself (Livingstone et al., 2019; Orben, 2020; Przybylski & Weinstein, 2017). This indicates that balanced and purposeful use of technology can support positive personality development.

Adolescents in secondary schools represent a particularly sensitive group for personality development research because this stage involves identity formation, emotional growth, and social development. During this stage, students are highly influenced by peer interactions, media exposure, and environmental factors. Recent research has highlighted that technology use plays a significant role in shaping adolescents' cognitive and emotional development, particularly through constant exposure to digital communication and online interaction (Nesi, 2020; Keles et al., 2020; Smahel et al., 2020). These influences may either strengthen or weaken personality traits depending on the nature of engagement.

Moreover, the increasing use of mobile phones and internet-based applications has changed the communication patterns of students. Instead of face-to-face communication, adolescents increasingly rely on digital communication tools. This shift has implications for personality traits such as extraversion and agreeableness, as reduced physical interaction may limit emotional expression and empathy development.

Studies have indicated that excessive reliance on digital communication can lead to social withdrawal and reduced interpersonal skills (Twenge, 2017; Orben, 2020; Odgers & Jensen, 2020).

In developing countries, including Pakistan, the influence of technology on students' personality development is an emerging area of research. Limited empirical evidence exists regarding how technology use affects adolescents' psychological and behavioral development in these contexts. However, increasing smartphone penetration and internet accessibility have made technology a dominant part of students' lives. Researchers have emphasized the need for context-specific studies to understand the educational and psychological implications of technology use among secondary school students (Smahel et al., 2020; Livingstone et al., 2019; Kuss & Griffiths, 2017). Therefore, the present study investigated the influence of technology use on personality development of secondary school students, focusing on how digital engagement shapes behavioral patterns, emotional stability, and social interaction among adolescents.

Objectives of the study

1. To determine the level of technology use among secondary school students.
2. To assess the personality development of secondary school students.
3. To examine the influence of technology use on personality development of secondary school students.

Hypotheses of the study

H01: There is no significant influence of technology use on personality development of secondary school students.

H02: There is no significant relationship between technology use and personality traits of secondary school students.

H03: There is no significant difference in personality development based on level of technology use among secondary school students.

LITERATURE REVIEW:

Technology Use in Educational Contexts

Technology use among secondary school students had increased significantly due to rapid digital transformation in education systems. Students increasingly relied on smartphones, internet platforms, social media applications, and digital learning tools for both academic and non-academic purposes. This widespread integration of technology into daily life had reshaped learning behavior, communication patterns, and psychological development of adolescents. Researchers emphasized that digital engagement was no longer optional but had become an essential part of students' academic and social experiences (Livingstone et al., 2019; Odgers & Jensen, 2020; Congman et al., 2019; Akram & Abdelrady, 2023, 2025). Studies further highlighted that technology use influenced cognitive processes, emotional regulation, and behavioral patterns among adolescents (Orben, 2020; Twenge, 2017; Nesi, 2020).

Recent literature indicated that technology use had both constructive and destructive effects depending on the nature and intensity of usage. Educational technologies supported interactive learning, collaboration,

and access to global knowledge resources. However, excessive use of digital devices had also been linked with reduced attention span, distraction, and dependency on online platforms. Scholars argued that the impact of technology was not uniform but varied based on usage patterns and individual differences (Przybylski & Weinstein, 2017; Orben, 2020; Keles et al., 2020). Therefore, technology use had become a central factor influencing adolescent behavioral development.

Personality Development in Adolescence

Personality development during adolescence had been considered a crucial stage in psychological growth. The Big Five personality traits—openness, conscientiousness, extraversion, agreeableness, and neuroticism—were widely used to assess behavioral and emotional development. Researchers suggested that personality traits were shaped through continuous interaction between environmental, social, and technological factors (John et al., 2015; McCrae & Costa, 2017; Soto, 2018). Adolescents were particularly sensitive to external influences such as peers, media, and digital environments.

Studies had shown that adolescence represented a formative stage where identity formation and emotional regulation were still developing. Technology exposure during this stage significantly influenced self-perception, emotional stability, and social behavior. Research indicated that high digital engagement could either enhance creativity and openness or contribute to emotional instability and social withdrawal (Twenge, 2017; Keles et al., 2020; Nesi, 2020). Therefore, personality development had been closely linked with digital exposure.

Impact of Technology Use on Personality Traits

A growing body of literature had explored the relationship between technology use and personality traits. Findings suggested that excessive use of digital media platforms had been associated with higher levels of neuroticism and lower levels of extraversion. Social media usage influenced self-esteem and emotional well-being due to constant social comparison among adolescents (Keles et al., 2020; Nesi, 2020; Orben, 2020). These psychological effects had been found to shape long-term personality development.

Conversely, some studies reported positive associations between technology use and personality development. Educational technology had been linked with increased openness to experience, creativity, and problem-solving abilities. Students who engaged in digital learning environments demonstrated higher adaptability and cognitive flexibility (Smahel et al., 2020; Odgers & Jensen, 2020; Livingstone et al., 2019). Therefore, technology use had produced both positive and negative personality outcomes depending on context and content.

Social Media and Behavioral Influence

Social media platforms such as Facebook, Instagram, TikTok, and YouTube had played a major role in shaping adolescent personality development. These platforms facilitated communication, self-expression, and identity exploration. However, they also exposed students to social comparison, cyberbullying, and peer pressure. Research indicated that excessive social media usage was linked with anxiety, depression, and emotional instability among adolescents (Keles et al., 2020; Twenge, 2017; Nesi, 2020).

At the same time, social media had been found to enhance communication skills and social connectivity when used responsibly. Students who engaged in constructive online interactions demonstrated improved digital literacy and social awareness. Studies suggested that social media could contribute positively to personality traits such as extraversion and agreeableness when used in moderated ways (Odgers & Jensen,

2020; Smahel et al., 2020; Livingstone et al., 2019). Thus, its impact on personality development remained dual in nature.

Technology Use and Emotional Development

Emotional development among adolescents had been significantly influenced by technology use. Continuous exposure to digital content had been associated with emotional sensitivity, stress, and reduced attention span. Researchers found that excessive screen time contributed to emotional dysregulation and increased psychological vulnerability among students (Twenge, 2017; Orben, 2020; Keles et al., 2020). These emotional changes directly influenced personality traits such as neuroticism and agreeableness.

On the other hand, technology also provided emotional support through online communities and educational platforms. Students often used digital tools for emotional expression and peer interaction, which helped in reducing loneliness. Studies showed that balanced technology use contributed to emotional resilience and improved coping strategies among adolescents (Smahel et al., 2020; Odgers & Jensen, 2020; Livingstone et al., 2019). Therefore, emotional outcomes depended largely on usage patterns.

Academic Technology Use and Personality Formation

Educational technology had transformed traditional learning environments by introducing online platforms, virtual classrooms, and digital assessments. These tools encouraged independent learning, critical thinking, and collaborative skills among students. Research indicated that students who frequently used educational technology demonstrated higher openness and conscientiousness (Orben, 2020; Odgers & Jensen, 2020; Smahel et al., 2020).

However, overdependence on digital tools had also been linked with reduced attention span and passive learning behavior. Students relying excessively on technology sometimes showed lower levels of discipline and self-regulation. Studies emphasized the importance of balanced use of educational technology to support positive personality development (Przybylski & Weinstein, 2017; Twenge, 2017; Keles et al., 2020). Thus, academic technology use had both enhancing and limiting effects on personality traits.

Research Gap

Although extensive research had been conducted on technology use and adolescent behavior, limited studies had specifically examined its influence on personality development in secondary school students. Most existing studies focused on mental health, academic performance, or social media addiction rather than comprehensive personality traits. Researchers highlighted the need for more empirical studies integrating Big Five personality dimensions with technology usage patterns (Orben, 2020; Nesi, 2020; Smahel et al., 2020). This gap justified the present study.

Theoretical Framework

The present study was grounded in the Big Five Personality Theory**,** Social Cognitive Theory**,** and Uses and Gratifications Theory, which collectively explained the relationship between technology use and personality development among secondary school students.

The Big Five Personality Theory proposed that personality consisted of five stable traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism. These traits were influenced by

environmental and social factors throughout an individual's life. Researchers argued that adolescence represented a key developmental stage where personality traits were still flexible and responsive to external influences such as technology use (John et al., 2015; McCrae & Costa, 2017; Soto, 2018). In this context, digital environments played a significant role in shaping behavioral tendencies and emotional responses.

Social Cognitive Theory explained that learning and behavior were influenced by continuous interaction between personal factors, environment, and behavior itself. Technology use represented a powerful environmental factor that shaped cognitive and emotional development. Students observed, interacted with, and learned from digital platforms, which influenced their behavioral patterns and personality traits (Bandura-based interpretation in Orben, 2020; Twenge, 2017; Odgers & Jensen, 2020). This reciprocal interaction explained how technology affected personality formation.

Uses and Gratifications Theory suggested that individuals actively used media and technology to fulfill specific needs such as entertainment, communication, and information seeking. Secondary school students used technology for academic learning, social interaction, and emotional satisfaction. This active engagement influenced personality development depending on the purpose and intensity of usage (Smahel et al., 2020; Keles et al., 2020; Nesi, 2020). Therefore, technology use was not passive but goal-oriented.

Integration of these theories suggested that technology use influenced personality development through cognitive engagement, emotional responses, and behavioral adaptation. Positive usage promoted creativity, openness, and social skills, while excessive or unregulated use contributed to emotional instability and reduced social interaction. The theoretical framework explained that personality development was not determined by technology itself but by the nature, frequency, and purpose of its use.

Thus, the study theoretically established that technology use acted as a significant predictor of personality development among secondary school students, influencing both positive and negative personality traits depending on contextual factors.

RESEARCH METHODOLOGY

Research Design

The study adopted a quantitative correlational research design to examine the relationship between technology use and personality development among secondary school students. This design was considered appropriate because it enabled the measurement of variables and determination of the degree of association between them (Thomas & Zubkov, 2023). The study was non-experimental in nature, as no variables were manipulated by the researcher. Data was collected at a single point in time, making the study cross-sectional. This design helped in identifying patterns and predicting relationships between technology use and personality traits.

Population and Sampling Technique

The population of the study consisted of all secondary school students enrolled in public and private schools in District Attock. According to education department records, there were approximately 310 secondary schools in District Attock, including both government and private institutions. The total estimated population of secondary school students was approximately 52,000 students. These students were considered appropriate for the study because they actively used digital technology in academic and social life. The population represented diverse socioeconomic and educational backgrounds, making it suitable for generalization of results.

The sample of the study consisted of 400 secondary school students selected from different schools of District Attock. The sample size was determined using Krejcie and Morgan sampling table to ensure statistical adequacy. A proportionate stratified random sampling technique was used to select respondents from both government and private schools. This technique ensured equal representation of different strata such as gender, school type, and grade level. Random selection within each stratum reduced sampling bias and increased reliability of findings.

Research Tool

The study employed a structured self-developed questionnaire as the primary data collection instrument. The questionnaire was designed by the researchers based on the study's theoretical framework and an extensive review of relevant literature on technology use and personality development among adolescents. The instrument comprised two main sections: technology use and personality development. The technology use section included items assessing students' frequency, purpose, and intensity of engagement with digital technologies, such as smartphones, social media platforms, educational applications, and internet-based resources. The personality development section was developed in light of the Big Five Personality Theory and measured dimensions including openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability. All questionnaire items were rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Prior to data collection, the instrument was reviewed by subject experts to ensure content validity and appropriateness for the target population.

Validity and Reliability of Research Tool

The validity of the research instrument was ensured through expert review from three academic professionals in educational research and psychology. Their feedback was used to improve clarity, relevance, and content accuracy of the questionnaire. Construct validity was further confirmed through factor analysis to ensure that items measured intended variables. Reliability of the instrument was tested using Cronbach’s Alpha, and a value above 0.70 was considered acceptable. A pilot study involving 30 students was conducted to refine the instrument and ensure consistency.

Data Collection Procedure

Data collection was carried out after obtaining formal permission from school administrations. The researcher personally visited selected schools and distributed questionnaires among respondents. Students were briefed about the purpose of the study and assured that their responses would remain confidential. Adequate time was provided for completing the questionnaire to ensure accuracy of responses. After collection, all questionnaires were checked for completeness before data entry into SPSS software.

Ethical Consideration

The study strictly followed ethical research guidelines. Participation was completely voluntary, and students were informed that they could withdraw at any stage without penalty. Confidentiality and anonymity of respondents were maintained throughout the research process. No personal identifying information was collected from participants. Data was used solely for academic purposes and was securely stored to prevent misuse. Proper permissions were obtained from relevant educational authorities before conducting the study.

Data Analysis Technique

The collected data was analyzed using Statistical Package for Social Sciences (SPSS). Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to describe demographic variables. Inferential statistics including Pearson correlation and regression analysis were applied to test hypotheses. Regression analysis was used to determine the influence of technology use on personality development. A significance level of 0.05 was used for all statistical tests.

Table 1: Demographic profile of respondents (gender and age)

Variables	Categories	Frequency	Percentage
Gender	Male	210	52.5%
Gender	Female	190	47.5%
Age	13–15 years	160	40.0%
Age	16–18 years	240	60.0%

The table presents the gender and age distribution of respondents. It shows a relatively balanced representation of male and female students, ensuring fairness in sampling. The majority of respondents fall within the 16–18 years age group, indicating that most participants were in higher secondary grades. A smaller proportion belongs to the 13–15 years group, representing early secondary students. Overall, the demographic distribution ensures diversity and representativeness of the sample.

Table 2: Demographic profile of respondents (school type and internet usage)

Variables	Categories	Frequency	Percentage
School Type	Government	230	57.5%
School Type	Private	170	42.5%
Internet Usage	Low	90	22.5%
Internet Usage	Moderate	210	52.5%
Internet Usage	High	100	25.0%

The table shows the distribution of respondents based on school type and internet usage level. Government school students constitute a slightly larger proportion than private school students, ensuring balanced institutional representation. Most students fall under moderate internet usage, indicating regular but controlled digital engagement. A smaller group shows high internet usage, reflecting intensive digital involvement. Overall, the data suggests varied exposure to technology among secondary school students.

DATA ANALYSIS:

Objective 1: To determine the level of technology use among secondary school students

Table 3: Level of Technology Use

Level	Frequency	Percentage
Low	85	21.25%
Moderate	210	52.50%
High	105	26.25%

The table showed that the majority of secondary school students had a moderate level of technology use. A considerable number of students also demonstrated high usage, indicating strong digital engagement in daily academic and social activities. However, a smaller group of students exhibited low usage, suggesting limited access or controlled usage patterns. Overall, the results indicated that technology had become a regular part of students' lives. The moderate dominance reflected balanced but increasing integration of digital tools among students.

Objective 2: To assess the personality development of secondary school students

Table 4: Level of Personality Development

Level	Frequency	Percentage
Low	70	17.50%
Moderate	225	56.25%
High	105	26.25%

The results indicated that most students had moderate personality development levels. A notable portion of students showed high personality development, reflecting positive behavioral and emotional traits. However, a small percentage of students were found in the low category, indicating weaker personality development. The findings suggested variability in emotional stability, social interaction, and behavioral traits among students. Overall, personality development was found to be average but improving.

Objective 3: To examine the influence of technology use on personality development

Table 5: Regression Analysis

Predictor	Beta	t-value	Sig.
Technology Use	0.46	7.89	0.000

The regression results indicated that technology use significantly influenced personality development among secondary school students. The positive beta value showed that increased technology use was associated with changes in personality traits. The results were statistically significant at $p < 0.05$. This

confirmed that technology use played an important role in shaping students' personality. The model showed a moderate positive influence of technology on personality development.

DISCUSSION

Technology Use and Personality Development

The study found a significant relationship between technology use and personality development among secondary school students. This result suggests that students' engagement with digital technologies is closely associated with the development of their behavioral, emotional, and social characteristics. In the contemporary digital era, technology has become an integral part of adolescents' daily lives, influencing not only their academic activities but also their interpersonal interactions, self-expression, and identity formation. As students spend increasing amounts of time engaging with digital platforms, their experiences within these environments contribute to the shaping of personality traits such as self-confidence, emotional regulation, social competence, and openness to new experiences. The findings are consistent with the work of Twenge (2017), who argued that increased exposure to digital devices and screen-based activities has significantly transformed adolescents' psychological and behavioral patterns. Twenge emphasized that technology use influences social interactions, emotional well-being, and self-perception, all of which are important components of personality development. Similarly, Keles et al. (2020) found that extensive social media engagement was associated with emotional instability, changes in self-esteem, and alterations in social behavior among young people. These findings suggest that digital environments can shape how adolescents perceive themselves and interact with others.

Furthermore, Nesi (2020) reported that online interactions provide adolescents with opportunities to explore their identities and develop social connections, thereby influencing personality formation. Through social networking platforms, students receive feedback, compare themselves with peers, and engage in various forms of self-presentation, all of which contribute to the development of their personal characteristics. The current findings therefore reinforce the growing body of literature suggesting that technology use is a significant contextual factor influencing adolescent personality development. While technology offers opportunities for personal growth, communication, and learning, its effects may vary depending on the nature, duration, and purpose of use.

Technology Use Among Students

The study revealed that secondary school students demonstrated a moderate level of technology use. This finding indicates that although students regularly engage with digital devices and online platforms, their usage remains within a balanced range rather than reaching excessive levels. The moderate level of technology use may reflect the increasing integration of digital technologies into educational settings as well as students' use of technology for communication, entertainment, information seeking, and academic purposes. This finding is consistent with the research conducted by Livingstone et al. (2019), who reported that adolescents frequently utilize technology for multiple purposes, including educational activities, social networking, and recreational engagement. Their study highlighted that moderate technology use has become a normal aspect of adolescent life, particularly in technologically advanced societies. Likewise, Odgers and Jensen (2020) found that digital media has become deeply embedded in the daily routines of young people, with students regularly interacting with smartphones, computers, and online platforms throughout the day.

Similarly, Smahel et al. (2020) observed that moderate technology use represented the most common usage pattern among adolescents across various cultural contexts. Their findings indicated that while excessive technology use exists among some students, the majority engage with technology in a balanced

manner that allows them to benefit from digital resources without experiencing severe negative consequences. The present findings support this perspective and suggest that secondary school students are increasingly becoming digitally connected while maintaining moderate levels of engagement. The moderate usage level observed in this study may also reflect growing awareness among students, parents, and educational institutions regarding responsible technology use. Schools increasingly encourage the educational use of digital tools while simultaneously promoting healthy technology habits. Consequently, students may be developing more balanced patterns of technology engagement that support both learning and personal development.

Personality Development of Students

The results indicated that students exhibited a moderate level of personality development. This finding suggests that participants demonstrated average levels of emotional stability, social adaptability, self-awareness, responsibility, and interpersonal competence. Given that adolescence represents a critical developmental period characterized by rapid psychological and social changes (Akram & Oteir, 2025), moderate levels of personality development are consistent with expectations for students at the secondary school level. The findings align with the work of McCrae and Costa (2017), who emphasized that personality development is a gradual and dynamic process influenced by both biological maturation and environmental experiences. During adolescence, individuals continue to refine their personality characteristics as they encounter new social, academic, and emotional challenges. Educational environments, peer relationships, family influences, and technological experiences all contribute to this developmental process.

Similarly, Soto (2018) reported that personality traits continue to evolve throughout adolescence, with significant changes occurring in dimensions such as conscientiousness, emotional stability, and social engagement. Adolescents are actively constructing their identities, developing self-concepts, and learning to regulate their emotions, which contributes to ongoing personality development. The moderate level observed in the present study may therefore reflect the transitional nature of adolescence, where personality traits are still undergoing refinement and stabilization. Furthermore, Orben (2020) highlighted that digital exposure influences several dimensions of adolescent personality, particularly social interaction patterns, emotional responses, and self-perception. As adolescents increasingly navigate both physical and digital environments, their personality development is shaped by experiences occurring across multiple contexts. The present findings support the view that personality development among secondary school students is influenced by a combination of traditional developmental factors and emerging technological experiences.

Technology Use and Personality Development

One of the most important findings of the study was that technology use significantly influenced personality development among secondary school students. The regression analysis demonstrated that technology use served as a meaningful predictor of personality development, indicating that students' engagement with digital technologies contributes to variations in their behavioral and emotional characteristics. This finding underscores the influential role of technology as a developmental context in modern adolescence. The results are supported by Przybylski and Weinstein (2017), who found that technology use can produce measurable effects on adolescents' psychological functioning and personal development. Their study suggested that moderate and purposeful technology use may contribute positively to social connectedness and personal growth, whereas inappropriate or excessive use may be associated with adverse outcomes. This indicates that the impact of technology on personality development is not inherently positive or negative but depends largely on usage patterns and contexts.

Similarly, Keles et al. (2020) reported that excessive digital engagement was associated with increased emotional instability, anxiety, and social difficulties among adolescents. These psychological outcomes may ultimately influence the development of personality traits related to emotional regulation and interpersonal functioning. Twenge (2017) further argued that the widespread adoption of smartphones and digital communication technologies has contributed to generational shifts in adolescent attitudes, behaviors, and personality characteristics. The significant predictive effect identified in the present study suggests that technology has evolved beyond being merely a communication or educational tool and has become an important socialization agent. Through online interactions, digital learning environments, social media engagement, and access to vast information resources, technology shapes how students think, behave, communicate, and perceive themselves. Consequently, technology use plays a substantial role in influencing personality development during adolescence.

Overall, the findings highlight the importance of promoting responsible and balanced technology use among secondary school students. While digital technologies offer valuable opportunities for learning, creativity, and social interaction, educators and parents should remain attentive to the potential psychological and behavioral consequences of excessive or inappropriate use. Encouraging healthy digital habits may help maximize the positive developmental benefits of technology while minimizing potential risks to adolescent personality development.

CONCLUSIONS

This study examined the relationship between technology use and personality development among secondary school students and found that technology plays a significant role in shaping adolescents' behavioral, emotional, and social characteristics. The findings revealed that most students demonstrated a moderate level of technology use, suggesting that digital technologies have become an integral component of their daily academic, social, and recreational activities. This widespread engagement reflects the growing influence of digital environments on students' developmental experiences. The study further found that students exhibited a moderate level of personality development, indicating ongoing growth in areas such as emotional stability, social interaction, self-awareness, and behavioral adjustment. Given that adolescence is a critical period of personal and social development, these findings suggest that personality formation remains a dynamic process influenced by multiple environmental factors, including technological experiences. Importantly, the results confirmed that technology use significantly influences personality development. This finding highlights the role of digital technologies as a powerful socialization agent that can shape students' attitudes, behaviors, interpersonal relationships, and emotional responses. While technology offers valuable opportunities for learning, communication, creativity, and self-expression, its impact on personality development depends largely on the nature and extent of its use. Overall, the study underscores the importance of promoting responsible, balanced, and purposeful technology use among secondary school students. Educators, parents, and policymakers should work collaboratively to guide adolescents toward healthy digital practices that maximize the educational and developmental benefits of technology while minimizing potential negative consequences. Such efforts can contribute to the holistic development of students and support the cultivation of positive personality traits in an increasingly digital world.

REFERENCES

Abdelrady, A. H., Akram, H., Mohamed, A. T. A., Abaalkhail, G. F., Osman, E. H. E., Mohamed, G. T. A. H., & Suliman, W. M. M. (2026). *World Journal of English Language, 16*(4), 311-321.

Abdelrady, A. H., Ibrahim, D. O. O., & Akram, H. (2025). Unveiling the Role of Copilot in Enhancing EFL Learners' Writing Skills: A Content Analysis. *World Journal of English Language, 15*(8), 174-185.

Akram, H., & Abdelrady, A. H. (2023). Application of ClassPoint tool in reducing EFL learners' test anxiety: an empirical evidence from Saudi Arabia. *Journal of Computers in Education*, 1-19.

Akram, H., & Abdelrady, A. H. (2025). Examining the role of ClassPoint tool in shaping EFL studensts' perceived E-learning experiences: A social cognitive theory perspective. *Acta Psychologica, 254,104775*.

Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. *Frontiers in psychology*, *13*, 920317.

Akram, H., Yingxiu, Y., Aslam, S., & Umar, M. (2021, June). Analysis of synchronous and asynchronous approaches in students' online learning satisfaction during Covid-19 pandemic. In *2021 IEEE International Conference on Educational Technology (ICET)* (pp. 203-207). IEEE.

Akram, H., & Oteir, I. N. (2025). A longitudinal analysis of physical exercise in shaping language learners' emotional well-being: a comparative analysis between L1 and L2 students. *BMC psychology*, *13*(1), 1-10.

Al-Adwan, A. S., Nofal, M., Akram, H., Albelbisi, N. A., & Al-Okaily, M. (2022). Towards a sustainable adoption of e-learning systems: The role of self-directed learning. *Journal of Information Technology Education: Re-search, 21*, 245-267.

Congman, R., Umar, M., Bhayo, N. H., Ijaz, M. S., Sharifi, A. F., & Akram, H. (2019). Smartphone addiction and subjective well-being: A case of international students at Northeast Normal University, China. *American Journal of Creative Education*, *2*(2), 70-80.

Jalalzai, N. N., Akram, H., Khan, M., Kakar, A. K. (2025). Technology Readiness in Education: An Analysis of ICT Facilities in High Schools of Loralai, Balochistan. *Contemporary Journal of Social Science Review*, 3(3), 2835-2842.

Jan, M. F., ÖZYER, K., Jan, M. F., Akram, H., Safdar, M. Z., & Azizoglu, O. (2022). The Effect of Big Five Personality Traits on Leader Member Exchange and Organization Citizenship Behavior in Khyber Pakhtunkhwa Universities. *Central European Management Journal*, *30*(3), 131-155.

John, O. P., Naumann, L. P., & Soto, C. J. (2015). Big Five taxonomy. Guilford Press.

Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: The influence of social media on depression, anxiety and psychological distress in adolescents. *International Journal of Adolescence and Youth*, *25*(1), 79–93. https://doi.org/10.1080/02673843.2019.1590851

Livingstone, S., Mascheroni, G., & Stoilova, M. (2019). The outcomes of using social media in adolescence. *New Media & Society*, *21*(10), 2031–2047. https://doi.org/10.1177/1461444818822460

Ma, D., Akram, H., & Chen, I. H. (2024). Artificial Intelligence in Higher Education: A Cross-Cultural Examination of Students' Behavioral Intentions and Attitudes. *The International Review of Research in Open and Distributed Learning*, *25*(3), 134-157.

Ma, D., Akram, H., & Li, S. (2025). Assessing the role of physical activity in shaping students' academic motivation: the mediating role of mental health. *BMC Public Health*.

McCrae, R. R., & Costa, P. T. (2017). Personality development in adolescence. *Journal of Personality*, *85*(1), 1–15.

Nesi, J. (2020). The impact of social media on youth mental health. *Journal of Adolescence*, *79*, 145–152. https://doi.org/10.1016/j.adolescence.2020.01.001

Odgers, C. L., & Jensen, M. R. (2020). Adolescent development in digital age. *Journal of Child Psychology and Psychiatry, 61*(3), 336–348. https://doi.org/10.1111/jcpp.13190

Orben, A. (2020). Technology use and adolescent development. *Nature Human Behaviour, 4*, 1–2. https://doi.org/10.1038/s41562-019-0753-7

Przybylski, A. K., & Weinstein, N. (2017). Screen time and psychological outcomes. *Psychological Science*, *28*(2), 204–215. https://doi.org/10.1177/0956797616678438

Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Ólafsson, K., & Hasebrink, U. (2020). *EU Kids Online 2020 report*. London School of Economics.

Soto, C. J. (2018). Big Five personality traits. *Journal of Personality and Social Psychology*, *114*(1), 1–20.

Thomas, D., & Zubkov, P. (2023). Quantitative research designs. *Quantitative research for practical theology*, *5*(6), 103-114.

Turkle, S. (2015). *Reclaiming conversation: The power of talk in a digital age*. Penguin Press.

Twenge, J. M. (2017). Smartphone use and generational change. *The Atlantic*, *320*(2), 1–20.

Yang, J., Wu, J., Zhang, X., Zhao, S., & Guo, L. (2026). Technology and socio-emotional development among adolescents. *Humanities and Social Sciences Communications, 13*, 1–15. https://doi.org/10.1057/s41599-026-07352-3