

Influence of Personality Traits on Motivation and Engagement among Adolescents during Online Education

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Abstract

This study investigates how the Big Five personality traits—openness, conscientiousness, extraversion, agreeableness, and neuroticism—affect motivation and engagement among adolescents in online education settings. During the COVID-19 pandemic, online learning became a necessity, but not all students adapted equally. A sample of 600 students aged 16 to 19 years from 30 inter colleges in the Gwalior district participated in this research. Data were collected using a structured questionnaire measuring personality traits and online learning motivation and engagement. SPSS was used for statistical analysis, including Pearson correlation. Results reveal that conscientiousness and openness are positively associated with motivation and engagement, while neuroticism shows a negative correlation. Extraversion and agreeableness demonstrated comparatively weaker positive relationships, indicating that different personality dimensions influence students' learning experiences in distinct ways. Students with higher conscientiousness displayed greater self-discipline, persistence, and responsibility in completing online learning tasks, whereas those with higher openness were more willing to explore innovative learning methods and digital resources. In contrast, students with higher neuroticism experienced greater stress and anxiety, reducing their motivation and active participation in virtual classrooms. The findings suggest that understanding personality differences can assist educators in designing personalized digital learning strategies, improving student participation, academic performance, and overall learning experiences. These findings highlight the need for personalized digital learning strategies that consider individual personality differences to improve educational outcomes and support effective online education practices.

Keywords: Personality traits, big five, motivation, engagement, online education, adolescents.

INTRODUCTION

India, being the second largest internet market globally, has seen a significant rise in online education due to advancements in digital infrastructure and increased affordability of smart devices [1-16]. According to the Internet and Mobile Association of India (IAMAI), over 750 million people in India had internet access by 2022, enabling the rapid adoption of digital learning platforms across urban and rural areas alike (IAMAI) [1]. The digital revolution in education was further catalyzed by the COVID-19 pandemic, which compelled schools and colleges to transition from traditional face-to-face teaching to virtual classrooms (Dhawan, [17] 2020). Adolescents, defined by the World Health Organization as individuals aged 10 to 19 years, are at a critical developmental stage characterized by rapid changes in cognitive, emotional, and social capacities (WHO). During this period, students begin to form their identities, set academic and career goals, and develop lifelong learning habits. The abrupt shift to online education during the

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Received Date: May 07, 2026

Accepted Date: July 01, 2026

Published Date: July 03, 2026

Citation: Rashmi Motwani, Ritu Raj. Influence of Personality Traits on Motivation and Engagement among Adolescents during Online Education. Journal of Education Sciences. 2026; 3(2): 14–23p.

pandemic presented both opportunities and challenges for adolescent learners. While some students adapted quickly and even thrived in the digital environment, others struggled with motivation, concentration, and emotional well-being [2]. The effectiveness of online education is influenced by multiple factors, including technological accessibility, parental support, teaching quality, and perhaps most significantly, individual learner characteristics. Among these characteristics, personality traits have emerged as key determinants of academic behavior. The Big Five personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism offer a robust framework for understanding differences in how students' approach, engage with, and succeed in educational settings (Costa & McCrae, [5] 1992).

This study explores how these personality traits affect two crucial psychological dimensions of learning—motivation and engagement in the context of online education [3]. Motivation refers to the internal drive to achieve academic goals, while engagement reflects the behavioral, emotional, and cognitive investment in learning activities. Together, these constructs serve as predictors of academic success and persistence, particularly in self-regulated learning environments such as digital classrooms (Fredricks et al., [18] 2004).

By focusing on adolescents in the Indian educational context, this research aims to address a critical gap in the literature. While studies from Western contexts have extensively examined personality's role in education (Poropat,[14] 2009), there remains a lack of empirical data from developing countries, especially during the post-pandemic era. Understanding how personality influences learning behaviors in online settings can inform targeted pedagogical strategies and promote more inclusive and effective educational practices in the digital age [4].

THEORETICAL FRAMEWORK

This study is grounded in two primary psychological models: the Five-Factor Model (FFM) of personality and Erikson's Psychosocial Development Theory [5].

FIVE-FACTOR MODEL (BIG FIVE PERSONALITY TRAITS)

The Five-Factor Model (Costa & McCrae, [5] 1992) classifies personality into five broad dimensions.

These five dimensions form the backbone of personality assessment and have been widely validated across cultures and populations. The model is particularly useful in educational settings where student traits impact learning preferences, discipline, and stress management (Table 1).

Erikson's Psychosocial Development Theory

Erikson's theory of psychosocial development identifies eight stages across the human lifespan, each with a specific conflict to resolve. During adolescence, individuals experience the stage of "Identity vs. Role Confusion" (Erikson, [20] 1968). Success in this stage results in a strong sense of identity, while failure leads to confusion about future roles (Figure 1).

This stage is essential to academic development as adolescents grapple with forming values, goals, and self-perceptions. Personality traits, particularly openness and conscientiousness, are hypothesized to support positive resolution of this stage by promoting curiosity, responsibility, and self-regulation [6].

Table 1. The big five personality traits and their key behavioral characteristics.

Trait	Description	Key behavioral characteristics
Openness	Appreciation for art, emotion, adventure, and curiosity	Imaginative, insightful, prefers variety
Conscientiousness	Tendency toward self-discipline and goal-directed behavior	Organized, responsible, dependable
Extraversion	Energy, positive emotions, and sociability	Outgoing, energetic, enjoys social interactions

Agreeableness	Compassionate and cooperative attitude	Friendly, empathetic, helpful
Neuroticism	Tendency to experience unpleasant emotions easily	Anxious, moody, emotionally unstable

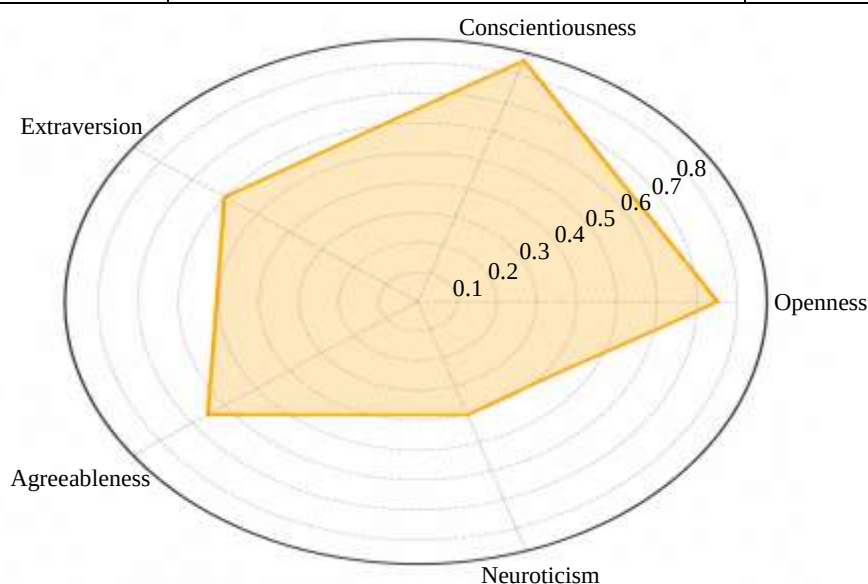


Figure 1. Graphical representation of big five traits.

Integration in Online Learning Context

The integration of these frameworks helps contextualize how intrinsic personality traits interact with the demands of online education. Traits like conscientiousness may drive effective time management and independent study habits, while neuroticism may hinder sustained focus due to heightened anxiety in less structured learning environments. Extraverts may feel deprived of social stimuli, affecting their emotional engagement.

Understanding these theoretical underpinnings allows educators and researchers to better anticipate how students might react to digital learning environments and develop interventions tailored to individual personality profiles [7].

LITERATURE REVIEW

Numerous studies across the fields of educational psychology and personality theory have demonstrated a robust connection between personality traits and academic outcomes, particularly motivation and engagement [8]. The Big Five personality framework has been widely employed in empirical studies to understand learner behavior in both traditional and digital environments. According to Poropat [14] (2009), conscientiousness is the most consistent predictor of academic performance, as it reflects a student's tendency to be organized, disciplined, and goal oriented. These attributes align well with the self-regulation required in online learning. Similarly, openness to experience has been linked with intellectual curiosity, creativity, and an interest in novel experiences (McCrae & Costa, [5]1997). Students high in openness are more likely to engage with diverse forms of digital content and adapt to online educational tools. Studies by Komarraju et al. [13] (2011) have found that extraversion and agreeableness have modest correlations with student participation in collaborative learning environments. Extraverts may excel in group discussions and video conferencing, while agreeable individuals tend to respond well to teacher feedback and peer support. However, the impact of these traits may vary based on the extent of social interaction allowed in the virtual classroom. Neuroticism has been consistently associated with poor academic outcomes. Chamorro-Premuzic and Furnham [11] (2003) explain that students high in neuroticism often experience anxiety, low self-confidence, and academic stress, which are exacerbated in independent learning settings such as online platforms [18-20]. These students may require more structured

support systems and affective learning environments. In the context of India, empirical research focusing on personality traits and online education among adolescents remains limited. Studies like those by Sharma & Joshi [19] (2022) emphasize the importance of culturally responsive digital pedagogy, particularly for younger learners adjusting to technology-mediated education. The gap in the literature regarding adolescents in Tier-2 cities, such as Gwalior, further motivates this study. The current research builds upon this foundation by targeting a specific demographic group—adolescents in Indian inter colleges—during a period of heightened reliance on digital education. By integrating established global findings with localized analysis, the study contributes to a more nuanced understanding of how personality impacts motivation and engagement in online learning contexts (Table 2).

The synthesized data presented in the above chart and table supports the notion that conscientiousness and openness are consistently associated with better academic engagement and motivation. Neuroticism remains a strong negative predictor, reinforcing the importance of socio-emotional interventions for students high in this trait. These patterns justify deeper investigation into how these traits manifest in digital learning environments (Figure 2).

RESEARCH OBJECTIVES AND HYPOTHESES

The purpose of this study is to explore the influence of personality traits on two key constructs in online education—motivation and engagement—among Indian adolescents. Informed by the Five-Factor Model and the psychosocial challenges of adolescence, the research sets out to empirically examine whether distinct personality dimensions predict differences in online learning behavior (Table 3).

These objectives aim to bridge the gap between psychological theory and educational application, particularly in digital learning contexts that demand higher self-regulation and adaptive behavior (Table 4).

Table 2. Literature-based correlation of big five traits with motivation and engagement.

Personality Trait	Motivation Correlation (approx.)	Engagement Correlation (approx.)
Openness	0.38	0.35
Conscientiousness	0.61	0.58
Extraversion	0.22	0.26
Agreeableness	0.28	0.30
Neuroticism	-0.33	-0.39

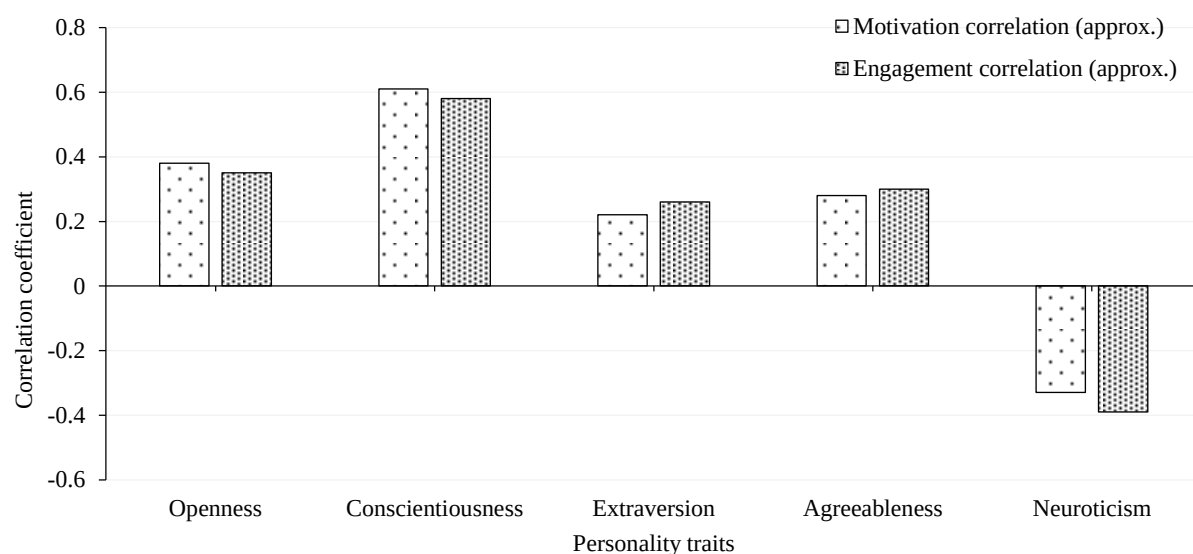


Figure 2. Personality traits vs. motivation and engagement (literature review synthesis).

Table 3. Research objectives of the study on big five personality traits, motivation, and online learning engagement.

Objective number	Research objective
RO1	To determine the relationship between Big Five personality traits and motivation
RO2	To assess the impact of Big Five personality traits on engagement in online learning
RO3	Comparing motivation and engagement levels among different personality profiles
RO4	To suggest personalized pedagogical strategies based on personality traits

Table 4. Based on the theoretical background and literature review, the following hypotheses are proposed.

Hypothesis ID	Null hypothesis (H0)	Alternative hypothesis (H1)
H1	Personality traits have no significant relationship with motivation in online education.	Personality traits significantly influence motivation in online education.
H2	Personality traits have no significant relationship with engagement in online education.	Personality traits significantly influence engagement in online education.
H3	There is no variation in motivation and engagement across personality trait categories.	There is a significant variation in motivation and engagement across personality trait categories.

This framework illustrates the hypothesized relationships between each of the Big Five traits and the dependent variable motivation and engagement. It also demonstrates the influence of external moderating factors such as socio-economic background, school type (private/public), and prior online learning experience (Figure 3).

METHODOLOGY

This section outlines the research design, participant selection, instruments, data collection procedures, and statistical methods used to examine the relationship between personality traits and motivation and engagement in online learning among adolescents [9].

Research Design

The study adopts a quantitative, non-experimental, correlational research design. This approach is suitable for identifying the strength and direction of relationships between personality traits and the

outcome variables (motivation and engagement) without manipulating the environment [10].

Participants

The sample comprised 600 students aged 16 to 19 years, enrolled in 30 inter colleges across the Gwalior district in Madhya Pradesh, India. The sampling method used was stratified random sampling to ensure representation from both private and government institutions. Out of 600 distributed questionnaires, 510 valid responses were obtained and used for analysis (Table 5).

Instruments

The study utilized a structured questionnaire comprising three sections:

- *Section A:* Demographics (age, gender, school type)
- *Section B:* Big Five Inventory – Short Version (BFI-S), containing 25 items (5 per trait) rated on a 7-point Likert scale from 'Strongly Disagree' (1) to 'Strongly Agree' (7)
- *Section C:* Motivation and Engagement Scale with 11 items adapted from Ryan & Deci's Self-Determination Theory framework

Procedure

Permissions were obtained from school authorities before data collection. Participants were informed of the research purpose and assured anonymity. The questionnaires were administered during class hours under the supervision of teachers and researchers. Data were collected in both paper and digital formats to ensure inclusivity [11].

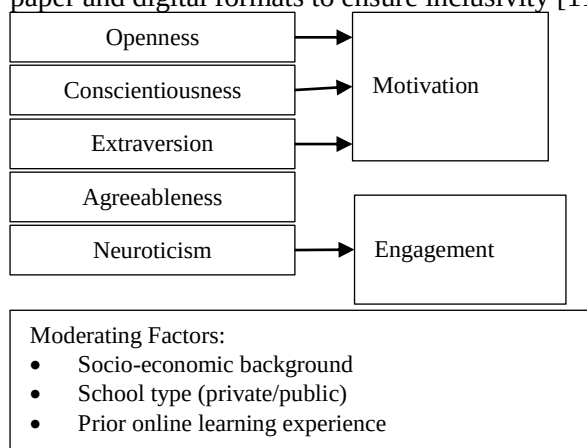


Figure 3. Conceptual framework of the study.

Table 5. Demographic breakdown of participants.

Variable	Categories	Frequency	Percentage (%)
Gender	Male	280	54.9
	Female	230	45.1
School Type	Government	150	29.4
	Private	360	70.6
Online Learning Access	Smartphone/Tablet	410	80.4
	Laptop/Desktop	100	19.6

Data Analysis

The collected data were coded and entered into SPSS (version 25). Descriptive statistics were computed for demographic variables. Pearson correlation analysis was used to examine the relationships between the Big Five personality traits and motivation/engagement scores. Significance was tested at the 0.05 and 0.01 levels [12].

Results and Analysis

This section presents the statistical findings derived from analyzing the responses of 510 students using SPSS. The data was evaluated to determine the correlation between Big Five personality traits and two dependent variables: motivation and engagement in an online learning environment. Descriptive statistics, Pearson correlation coefficients, and comparative trend graphs are used to highlight relationships and patterns (Figure 4) (Table 6).

Correlation Analysis

Pearson correlation coefficients were computed to assess the relationships between personality traits and the two dependent variables. The results are presented in the following table (Table 7).

All correlations are significant at $p < 0.01$, indicating meaningful associations. Conscientiousness showed the strongest positive correlation with both motivation and engagement, followed by openness. Neuroticism had a negative correlation with both outcomes, suggesting emotional instability detracts from online learning efficacy (Figure 5).

Interpretation of Results

- Conscientiousness emerged as the most significant predictor, highlighting the importance of goal-oriented behavior and discipline in online learning.
- Openness positively influenced both motivation and engagement, likely due to curiosity and adaptability.
- Neuroticism showed strong negative correlations, implying that students with emotional instability are less likely to thrive in self-directed environments.
- Extraversion and Agreeableness had weaker yet positive correlations, suggesting these traits may enhance peer interaction and responsiveness to online support.
- The findings align with existing literature and validate the hypothesis that personality traits significantly influence both motivational and engagement outcomes in digital education settings [13].

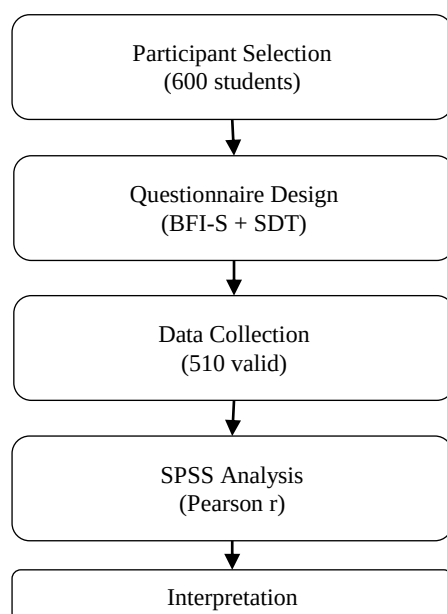


Figure 4. Methodological flow of the study.

Table 6. The means and standard deviations for each personality trait, motivation, and engagement.

Variable	Mean	Standard Deviation
Openness	5.3	1.12
Conscientiousness	5.9	1.05
Extraversion	4.8	1.18
Agreeableness	5.2	1.03
Neuroticism	3.7	1.21
Motivation	5.5	1.08
Engagement	5.3	1.14

Table 7. Correlation of big five personality traits with motivation and online learning engagement.

Personality Trait	Motivation (r)	Engagement (r)
Openness	0.42	0.39
Conscientiousness	0.56	0.51
Extraversion	0.18	0.21
Agreeableness	0.22	0.25
Neuroticism	-0.35	-0.41

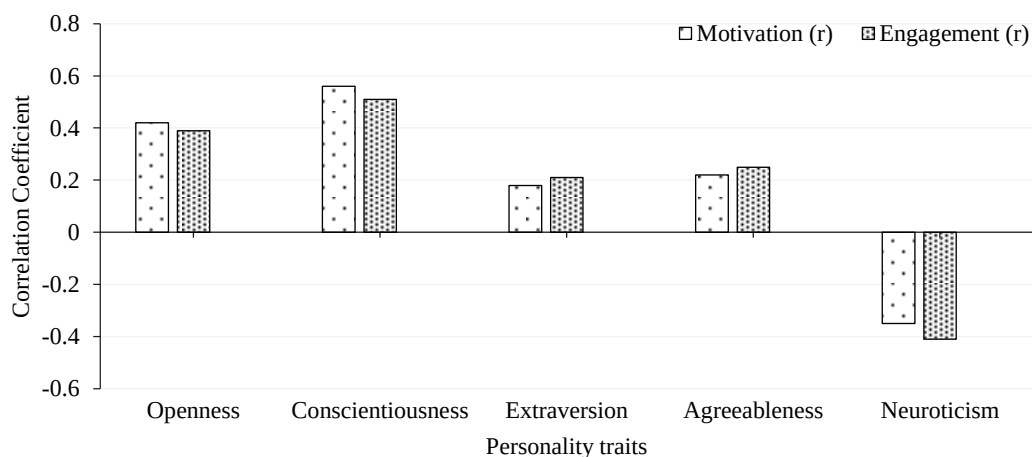


Figure 5. Trait correlations with motivation and engagement.

DISCUSSION

The results of this study underscore the significant influence of personality traits on motivation and engagement among adolescents in online learning environments. The findings offer valuable insights into the psychological characteristics that facilitate or hinder effective digital education [14].

Linking Results with Literature

The strong positive association of conscientiousness and openness with motivation and engagement aligns with prior studies (Poropat, [14] 2009; McCrae & Costa, [5] 1997), which highlight self-discipline and intellectual curiosity as critical for academic success. Similarly, the negative influence of neuroticism mirrors findings by Chamorro-Premuzic & Furnham [11] (2003), where emotional instability was linked to lower performance [15].

Educational Implications

These insights suggest that educational strategies in online settings should be tailored based on students' personality profiles. For example, learners high in conscientiousness can benefit from goal-setting and independent projects, while those high in neuroticism may require structured support and emotional regulation strategies. Teachers and instructional designers could incorporate adaptive learning technologies that respond to these trait-based differences [16].

Practical Applications

Institutions can develop screening tools to assess students' personality traits at the onset of online courses, enabling the creation of personalized engagement plans. Additionally, providing counselor support to students with high neuroticism can enhance their ability to manage stress, thereby improving their academic performance [17].

Limitations

Despite the valuable insights, the study has limitations. The sample was geographically limited to the Gwalior district, potentially affecting the generalizability of the findings. Moreover, reliance on self-report questionnaires may introduce bias. Future studies should consider longitudinal designs and more diverse populations to validate and expand on these results [18].

Future Directions

Subsequent research can explore the interaction effects between traits and other variables such as socioeconomic status, gender, and learning environment type. Moreover, integrating qualitative methods like interviews or focus groups could provide a deeper understanding of how these traits influence online learning behaviors [19].

Overall, this study contributes to the growing field of personalized digital education by emphasizing the psychological dimensions that drive student motivation and engagement [20].

CONCLUSION

This study explored the relationship between the Big Five personality traits and two crucial psychological constructs, motivation and engagement—in the context of online learning among adolescents. The findings revealed that conscientiousness and openness were positively associated with both motivation and engagement, whereas neuroticism was negatively correlated with these outcomes. These results align with previous research and emphasize the role of personality in shaping learning behavior. The implications are particularly relevant for educators and policymakers aiming to optimize digital education strategies. By understanding students' personality profiles, institutions can design more personalized and supportive learning environments that enhance student success. Technological interventions and instructor-led practices can be adapted to cater to individual differences, thereby promoting inclusive and effective education.

While the study provides valuable insights, it also highlights the need for further exploration. Broader samples across diverse regions and more robust mixed-method approaches could enhance the generalizability and depth of understanding. Nevertheless, this research lays a foundational framework for implementing personality-informed strategies in digital education, which is essential in a post-pandemic world increasingly reliant on online modalities. In conclusion, integrating psychological assessments into the educational ecosystem can drive a more student-centric model of online learning, where individual differences are not just acknowledged but actively addressed to foster academic engagement and intrinsic motivation.

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