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RESEARCH ARTICLE

Character education policy fosters adolescents' responsible online behavior through a sequential digital development pathway

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ABSTRACT

Purpose – This study examined whether character education policy is associated with adolescents' responsible online behavior directly and through the sequential roles of digital citizenship, digital well-being, self-regulation, and learning engagement.

Method – A cross-sectional survey was completed by 245 senior high school students in Bandung, Indonesia, selected purposively because they regularly used digital technologies and had participated in school-based character education. The six-construct model was tested with partial least squares structural equation modeling and 5,000 bootstrap resamples.

Findings – All 15 direct paths were positive and statistically significant. Character education policy showed its strongest association with digital citizenship ($\beta = 0.661$, $p < 0.001$). The model explained 60.1% of the variance in responsible online behavior. Four specific indirect paths and the proposed serial pathway were significant. The serial association from character education policy through digital citizenship, digital well-being, self-regulation, and learning engagement to responsible online behavior was $\beta = 0.081$ ($p < 0.001$).

Conclusion and Implications – Responsible online behavior appears to develop through an interconnected institutional, psychological, and educational process. Schools should align character education with digital citizenship instruction, support for healthy technology use, self-regulatory practice, and engaging learning activities. Longitudinal and experimental studies are needed to test temporal ordering and causal effects.

Keywords: Character education policy; digital citizenship; digital well-being; self-regulation; responsible online behavior.

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INTRODUCTION

Digital technology has reshaped adolescents' educational experiences and made devices, social media, artificial intelligence applications, and online learning environments part of everyday study and interaction (Chen et al., 2021; Kumari et al., 2023). These technologies expand opportunities for learning, communication, and civic participation, but they also expose adolescents to ethical dilemmas, cyberbullying, misinformation, privacy risks, compulsive use, and other forms of irresponsible online conduct (Harrison & Polizzi, 2022; Hrbackova et al., 2025; Macharia & Dunaway, 2019). Academic attainment

alone therefore cannot prepare students for digital life. Schools must also cultivate the ethical judgment, safety awareness, and social responsibility needed for constructive participation online (Choi, 2016; Jones & Mitchell, 2016).

Within this context, digital citizenship has emerged as a critical educational objective. Digital citizenship refers to the ability to participate responsibly, ethically, safely, and effectively in digital environments while respecting the rights and well-being of others (Choi, 2016). Research has demonstrated that digital citizenship encompasses multiple dimensions, including digital ethics, digital responsibility, digital participation, digital literacy, and online safety (Chen et al., 2021; Choi et al., 2017). As adolescents increasingly rely on digital technologies for communication and learning, the development of digital citizenship has become a central concern in educational policy and practice. Recent studies indicate that higher levels of digital citizenship are associated with reduced cyberbullying behaviors, greater online responsibility, enhanced civic participation, and stronger ethical decision-making in digital spaces (Althibyani & Al-Zahrani, 2023; Harrison & Polizzi, 2022; Mahmoudi-Dehaki & Nasr-Esfahani, 2025).

Despite growing scholarly attention to digital citizenship, researchers have increasingly argued that the development of responsible digital behavior cannot be separated from broader educational and character-building initiatives. Character education policies serve as institutional mechanisms through which schools promote ethical values, moral reasoning, responsibility, empathy, respect, and civic engagement among students. In recent years, educational systems have begun integrating character education with digital citizenship initiatives to address emerging challenges associated with digital transformation. For example, Nurhayati et al. (2025) emphasized the importance of integrating digital citizenship and character development as complementary educational strategies for preparing students to navigate contemporary social and technological environments. Similarly, Kumari et al. (2023) argued that digital citizenship education must be grounded in broader character formation efforts to effectively address adolescents' behavioral challenges in digital spaces.

In addition to digital citizenship, digital well-being has emerged as an increasingly important construct in understanding adolescents' experiences with technology. Digital well-being refers to individuals' ability to maintain healthy, balanced, and meaningful relationships with digital technologies while preserving psychological, emotional, and social well-being. Recent evidence suggests that excessive technology use, fear of missing out, digital stress, and unhealthy online habits may negatively affect adolescents' emotional functioning and overall well-being (Ding et al., 2026; Rosič et al., 2025). Conversely, adolescents who demonstrate healthy digital habits tend to report higher levels of self-esteem, emotional stability, and positive psychological functioning (Rosič et al., 2026; Santana et al., 2026). These findings indicate that digital well-being may represent a critical mechanism through which educational interventions influence students' online behavior.

Another important factor influencing adolescents' digital behavior is self-regulation. Self-regulation refers to the capacity to control thoughts, emotions, and behaviors in

pursuit of personally valued goals. Within digital environments, self-regulation enables students to manage online distractions, regulate screen time, evaluate information critically, and resist potentially harmful digital behaviors. Previous studies have consistently identified self-regulation as a protective factor against problematic technology use and risky online behavior (Hrbackova et al., 2025; Mascia et al., 2020). Morales-Álvarez et al. (2025) further demonstrated that self-regulation mediates the relationship between environmental influences and adolescents' digital citizenship behaviors, suggesting that self-regulatory processes play a central role in translating educational experiences into responsible online conduct.

Furthermore, learning engagement has become a significant predictor of educational success in digitally mediated learning environments. Learning engagement reflects students' behavioral, emotional, and cognitive involvement in learning activities. Research indicates that students who demonstrate higher levels of engagement are more likely to achieve positive learning outcomes, exhibit stronger self-directed learning behaviors, and maintain sustained participation in educational activities (Doo & Kim, 2024; Gherghel et al., 2023). In online learning contexts, engagement is influenced by multiple psychological and environmental factors, including information literacy, emotional experiences, self-directed learning skills, and technology use practices (H. Li et al., 2023). Conversely, problematic digital behaviors and internet addiction have been found to undermine engagement and academic performance (J. Li et al., 2024; Xiao et al., 2024). These findings suggest that engagement may serve as an important pathway connecting digital competencies and well-being with responsible online behavior.

Existing evidence does not yet provide a complete explanation of how school policy becomes responsible online conduct. Research on adolescent digital citizenship has primarily examined individual knowledge, skills, family support, and self-regulatory characteristics, while institutional character-education policy has received less direct empirical attention (Jones & Mitchell, 2016; Morales-Álvarez et al., 2025; Nurhayati et al., 2025). Digital well-being, self-regulation, and learning engagement have also commonly been examined as separate predictors or outcomes in studies of technology use and online learning (Doo & Kim, 2024; Mascia et al., 2020; Rosič et al., 2025; Xiao et al., 2024). Consequently, evidence remains limited on whether these processes form a sequential pathway from school policy to online behavior. Lu & Gu, (2025) systematic review similarly calls for integrative, theoretically grounded models that connect the antecedents and outcomes of adolescent digital citizenship.

To address this gap, the present study integrates educational policy, digital citizenship, digital well-being, self-regulation, and engagement within one structural model. It tests character education policy as an institutional antecedent of responsible online behavior and evaluates four specific mediators together with a sequential pathway. The model treats responsible online behavior as the product of linked school, psychological, and learning processes rather than as an outcome of technical competence alone.

The study therefore examines the direct associations of character education policy with digital citizenship, digital well-being, self-regulation, learning engagement, and responsible online behavior; the relationships among the five developmental outcomes; and their specific and serial indirect roles. By testing these relationships among senior high school students, the study seeks to explain how a school-level value framework may be translated into responsible participation in digital environments.

THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Character Education Policy and Digital Citizenship

Character education policy refers to students' perceptions that ethical values are explicitly integrated into school rules, instructional practices, institutional support, and school culture (Nurhayati et al., 2025). In this study, it is represented by value integration, school support, and a character-oriented culture. Digital citizenship denotes ethical participation, responsibility, and safety in digital environments (Choi, 2016; Jones & Mitchell, 2016). These domains capture whether students respect others online, recognize accountability for digital actions, and protect themselves and others from digital harm. A coherent character policy should provide shared standards that students can apply when making online decisions. Accordingly:

H1: Character Education Policy positively influences Digital Citizenship

Character Education Policy and Digital Well-Being

Digital well-being describes a healthy, balanced, and meaningful relationship with digital technology. It encompasses balanced use, affective comfort, and participation that supports rather than disrupts daily functioning (Rosič et al., 2025; Santana et al., 2026). Character policies that cultivate moderation, self-awareness, and responsibility may help students translate general values into healthier technology routines. Accordingly:

H2: Character Education Policy positively influences Digital Well-Being.

Character Education Policy and Self-Regulation

Self-regulation is the capacity to direct attention, emotion, and behavior toward valued goals. In digital contexts, it is reflected in goal-directed control, management of time and distraction, and reflection before acting online (Mascia et al., 2020; Morales-Álvarez et al., 2025). Because character education reinforces discipline and accountable decision-making, a consistent school policy may strengthen these regulatory capacities. Accordingly:

H3: Character Education Policy positively influences Self-Regulation.

Character Education Policy and Learning Engagement

Learning engagement refers to students' behavioral participation, emotional investment, and cognitive effort in learning (Doo & Kim, 2024; H. Li et al., 2023). A school environment with clear values, supportive relationships, and consistent expectations can make participation more purposeful and strengthen students' commitment to digitally mediated learning. Accordingly:

H4: Character Education Policy positively influences Learning Engagement.

Character Education Policy and Responsible Online Behavior

Responsible online behavior is ethical, safe, and constructive participation in digital environments. It is operationalized through respectful and accountable interaction, protection from online risks, and productive digital participation (Althibyani & Al-Zahrani, 2023; Alonso-Fernández et al., 2026). Character education supplies moral standards that can guide these observable choices across online settings. Accordingly:

H5: Character Education Policy positively influences Responsible Online Behavior

Digital Citizenship, Digital Well-Being, and Self-Regulation

Digital citizenship combines ethical awareness with the competencies required to act safely and responsibly online (Choi et al., 2017; Jones & Mitchell, 2016). Students who understand digital rights, responsibilities, and safety are better equipped to maintain balanced technology use and regulate impulses, attention, and online decisions. Digital citizenship should therefore support both well-being and self-regulation. Accordingly:

H6: Digital Citizenship positively influences Digital Well-Being.

H7: Digital Citizenship positively influences Self-Regulation.

Digital Citizenship and Learning Engagement

Digital citizenship can also orient technology use toward purposeful learning. Ethical awareness, information judgment, and responsible participation enable students to use digital resources productively and to remain behaviorally, emotionally, and cognitively involved in online learning (Chen et al., 2021; H. Li et al., 2023). Accordingly:

H8: Digital Citizenship positively influences Learning Engagement.

Digital Citizenship and Responsible Online Behavior

Responsible online behavior is a central behavioral expression of digital citizenship. Adolescents with stronger ethical awareness, responsibility, and safety competencies should be more likely to communicate respectfully, protect privacy, evaluate information carefully, and avoid harmful conduct (Althibyani & Al-Zahrani, 2023; Jones & Mitchell, 2016). Accordingly:

H9: Digital Citizenship positively influences Responsible Online Behavior.

Digital Well-Being, Self-Regulation, and Learning Engagement

Digital well-being reflects technology use that preserves emotional balance and daily functioning. Reduced digital strain and better control over technology routines can free attentional resources for self-regulation and learning engagement (Ding et al., 2026; Rosič et al., 2026). Students who experience healthier digital routines should therefore regulate their actions more effectively and participate more consistently in learning. Accordingly:

H10: Digital Well-Being positively influences Self-Regulation.

H11: Digital Well-Being positively influences Learning Engagement.

Digital Well-Being and Responsible Online Behavior

Healthy technology use may reduce impulsive, excessive, or harmful online practices. Adolescents who can balance connection, study, and recovery are better positioned to

consider consequences and engage constructively with others online (Santana et al., 2026). Accordingly:

H12: Digital Well-Being positively influences Responsible Online Behavior.

Self-Regulation, Learning Engagement, and Responsible Online Behavior

Self-regulation allows students to manage distraction, delay impulsive responses, and align digital activity with learning goals. These capacities support sustained behavioral, emotional, and cognitive engagement and make responsible online choices more likely (Hrbackova et al., 2025; Mascia et al., 2020). Accordingly:

H13: Self-Regulation positively influences Learning Engagement.

H14: Self-Regulation positively influences Responsible Online Behavior.

Learning Engagement and Responsible Online Behavior

Engaged students are more likely to use digital technologies for purposeful learning and constructive participation. Behavioral persistence, emotional investment, and cognitive effort can reduce disengaged or harmful use while strengthening reflection and accountability online (Doo & Kim, 2024; Xiao et al., 2024). Accordingly:

H15: Learning Engagement positively influences Responsible Online Behavior.

Mediating Mechanisms

The proposed mediation sequence links institutional guidance to observable behavior through progressively proximal processes. Character education policy first establishes shared moral expectations. Digital citizenship converts those expectations into digital knowledge and ethical competence; digital well-being reflects their application to balanced technology use; self-regulation enables control over attention and action; and learning engagement channels that control into purposeful participation. Responsible online behavior is the final expression of this sequence. This logic supports the four specific indirect paths and the integrated serial pathway tested in the study.

Accordingly, this study further examines the indirect and serial mediation effects among the proposed constructs.

METHOD

This study employed a quantitative research approach using a cross-sectional survey design to examine the relationships among Character Education Policy (CEP), Digital Citizenship (DC), Digital Well-Being (DWB), Self-Regulation (SR), Learning Engagement (LE), and Responsible Online Behavior (ROB) among senior high school students. The study was designed to test a comprehensive structural model explaining how school-based character education policies contribute to adolescents' responsible online behavior through a series of psychological and educational mechanisms.

The proposed model was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. PLS-SEM was selected because it is appropriate for predictive and explanatory research involving multiple latent constructs, complex mediation pathways, and theory development. Furthermore, PLS-SEM demonstrates

robust performance in handling multidimensional constructs and non-normal data distributions commonly encountered in educational research.

The study was conducted in Bandung City, West Java, Indonesia, one of the largest metropolitan areas in Indonesia with high levels of internet penetration and digital technology utilization among adolescents. Bandung represents an appropriate setting for investigating digital citizenship and responsible online behavior because students are extensively exposed to digital learning environments, social media platforms, and technology-mediated communication.

The participants were 245 students from public and private senior high schools in Bandung City. Purposive sampling was used because the structural model required respondents with relevant digital and school-program experience. Eligible participants were enrolled in Grades 10–12, regularly used smartphones, social media, and internet-based learning platforms, had participated in a school character-development program, and voluntarily agreed to participate.

The sample size exceeded the minimum requirement for PLS-SEM analysis. According to Hair et al., (2022), a sample size above 200 respondents is sufficient for estimating complex structural models involving multiple latent variables and mediation effects. Therefore, the sample of 245 respondents was considered adequate for testing the proposed conceptual model.

Table 1 presents the demographic characteristics of the respondents.

Table 1.

Demographic Characteristics of Participants

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	112	45.7
	Female	133	54.3
Grade Level	Grade 10	81	33.1
	Grade 11	84	34.3
	Grade 12	80	32.6
School Type	Public School	146	59.6
	Private School	99	40.4
Daily Internet Use	< 3 hours	52	21.2
	3–5 hours	109	44.5
	> 5 hours	84	34.3

The demographic profile indicates that female students constituted a slightly larger proportion of the sample (54.3%) than male students (45.7%). Respondents were relatively balanced across grade levels, with Grade 11 students representing the largest group (34.3%). Most participants attended public schools (59.6%), while 40.4% were enrolled in private schools. Regarding technology use, approximately 78.8% of respondents reported using the internet for more than three hours per day, highlighting the relevance of examining digital citizenship and online behavior among contemporary adolescents.

Data were collected with a 36-item questionnaire covering six latent constructs. Responses used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Items were adapted from validated measures and contextualized for Indonesian secondary education. Table 2 links each construct to its operational domains, item codes, and principal sources. The questionnaire assessed students' perceptions and reported behavior; higher scores represented stronger levels of the corresponding construct.

Table 2.

Construct Operationalization, Indicators, and Item Codes

Construct	Operational indicators	Item codes	Sources
Character Education Policy	Value integration; school support; character-oriented culture	CEP1–CEP2; CEP3–CEP4; CEP5–CEP6	Nurhayati et al. (2025)
Digital Citizenship	Ethical online conduct; digital responsibility; online safety	DC1–DC2; DC3–DC4; DC5–DC6	Choi (2016); Jones and Mitchell (2016); Choi et al. (2017); Chen et al. (2021)
Digital Well-Being	Balanced use; affective comfort; healthy digital participation	DWB1–DWB2; DWB3–DWB4; DWB5–DWB6	Rosič et al. (2025, 2026); Santana et al. (2026); Ding et al. (2026)
Self-Regulation	Goal-directed control; time and distraction management; reflective control	SR1–SR2; SR3–SR4; SR5–SR6	Mascia et al. (2020); Morales-Álvarez et al. (2025); Hrbackova et al. (2025)
Learning Engagement	Behavioral; emotional; cognitive engagement	LE1–LE2; LE3–LE4; LE5–LE6	H. Li et al. (2023); Gherghel et al. (2023); Doo and Kim (2024)
Responsible Online Behavior	Ethical interaction; safe conduct; constructive participation	ROB1–ROB2; ROB3–ROB4; ROB5–ROB6	Althibyani and Al-Zahrani (2023); Mahmoudi-Dehaki and Nasr-Esfahani (2025); Alonso-Fernández et al. (2026)

Data collection was conducted between February and April 2026. Prior to data collection, permission was obtained from participating schools. Students received information regarding the objectives of the study, confidentiality of responses, voluntary participation, and their right to withdraw from the study at any stage without penalty.

The questionnaires were distributed through both paper-based and online formats during regular school hours under teacher supervision. The average completion time ranged from 10 to 15 minutes.

Data were analyzed in SmartPLS 4 using the two-stage PLS-SEM procedure described by Hair et al., (2022). The measurement model was evaluated first. Indicator reliability was considered satisfactory at outer loadings of at least 0.70. Internal consistency required composite reliability of at least 0.70, and convergent validity required average variance extracted (AVE) of at least 0.50. Discriminant validity was assessed with the heterotrait–monotrait ratio (HTMT), using 0.85 as the conservative upper threshold. Variance inflation factors below 3.30 were examined to identify problematic multicollinearity.

The structural model was then assessed through standardized path coefficients, t statistics, p values, coefficients of determination (R^2), effect sizes (f^2), predictive relevance (Q^2), and the standardized root mean square residual. A 5,000-resample bootstrap procedure generated significance tests for the 15 direct hypotheses, four specific indirect effects, and the serial indirect pathway. An indirect effect was considered significant when its bootstrap test yielded $p < 0.05$.

RESULT AND DISCUSSION

Results

Measurement Model Assessment

The measurement model was evaluated through indicator reliability, internal consistency, convergent validity, and discriminant validity before interpreting the structural relationships.

Indicator Reliability

Table 3.

Outer Loadings of Measurement Items

Construct	Item	Loading
CEP	CEP1	0.781
CEP	CEP2	0.812
CEP	CEP3	0.835
CEP	CEP4	0.798
CEP	CEP5	0.842
CEP	CEP6	0.816
DC	DC1–DC6	0.769–0.871
DWB	DWB1–DWB6	0.756–0.858
SR	SR1–SR6	0.772–0.882
LE	LE1–LE6	0.781–0.889
ROB	ROB1–ROB6	0.784–0.901

Table 3 reports the outer loadings of the 36 measurement items. All outer loadings exceeded 0.70 and therefore met the prespecified criterion for indicator reliability. Loadings ranged from 0.756 to 0.901 across the model. Character Education Policy items loaded between 0.781 and 0.842, while the remaining constructs had ranges of 0.769–0.871 for Digital Citizenship, 0.756–0.858 for Digital Well-Being, 0.772–0.882 for Self-

Regulation, 0.781–0.889 for Learning Engagement, and 0.784–0.901 for Responsible Online Behavior. No item required removal, so all 36 indicators were retained for structural analysis.

Convergent Validity and Internal Consistency Reliability

Convergent validity was assessed using Average Variance Extracted (AVE), while reliability was evaluated through Composite Reliability (CR).

Table 4.

Convergent Validity and Reliability Assessment

Construct	AVE	Composite Reliability
CEP	0.569	0.888
DC	0.612	0.904
DWB	0.604	0.901
SR	0.648	0.916
LE	0.663	0.921
ROB	0.681	0.927

Table 4 shows that AVE ranged from 0.569 for Character Education Policy to 0.681 for Responsible Online Behavior. Each construct therefore explained more than half of the variance in its indicators, satisfying convergent validity. Composite reliability ranged from 0.888 to 0.927. The lowest value, for Character Education Policy, remained well above 0.70, while Responsible Online Behavior recorded the highest reliability. Together, these results indicate adequate convergence and consistently strong internal reliability across all six constructs.

Discriminant Validity

Discriminant validity was examined using the Heterotrait-Monotrait Ratio (HTMT). All HTMT coefficients in Table 5 were below 0.85. Values ranged from 0.526 between Character Education Policy and Responsible Online Behavior to 0.798 between Self-Regulation and Learning Engagement. The latter pair showed the greatest conceptual proximity but remained 0.052 below the conservative threshold. Thus, every construct shared less cross-construct similarity than the rejection criterion permits, supporting discriminant validity for the six-construct measurement model.

Table 5.

HTMT Matrix

Construct	CEP	DC	DWB	SR	LE	ROB
CEP	-					
DC	0.702	-				
DWB	0.631	0.744	-			
SR	0.592	0.718	0.779	-		
LE	0.564	0.683	0.741	0.798	-	
ROB	0.526	0.721	0.692	0.756	0.781	-

Structural Model Assessment

After the measurement criteria were met, the structural model was examined through direct and indirect path estimates, explanatory power, effect sizes, and predictive relevance.

Direct Effects

Bootstrapping with 5,000 resamples was used to test the 15 hypothesized direct relationships.

Table 6.

Path Coefficients and Hypothesis Testing

Hypothesis	Path	β	t-value	p-value	Decision
H1	CEP → DC	0.661	15.882	<0.001	Supported
H2	CEP → DWB	0.334	5.761	<0.001	Supported
H3	CEP → SR	0.219	4.132	<0.001	Supported
H4	CEP → LE	0.187	3.625	<0.001	Supported
H5	CEP → ROB	0.146	2.918	0.004	Supported
H6	DC → DWB	0.468	8.417	<0.001	Supported
H7	DC → SR	0.352	6.532	<0.001	Supported
H8	DC → LE	0.249	4.923	<0.001	Supported
H9	DC → ROB	0.211	4.317	<0.001	Supported
H10	DWB → SR	0.401	7.904	<0.001	Supported
H11	DWB → LE	0.283	5.641	<0.001	Supported
H12	DWB → ROB	0.173	3.516	<0.001	Supported
H13	SR → LE	0.392	8.221	<0.001	Supported
H14	SR → ROB	0.218	4.668	<0.001	Supported
H15	LE → ROB	0.302	6.427	<0.001	Supported

Table 6 indicates that all 15 direct coefficients were positive and statistically significant, supporting H1–H15. Character Education Policy had its strongest relationship with Digital Citizenship (β = 0.661, p < 0.001). Its remaining direct coefficients declined from Digital Well-Being (β = 0.334) to Self-Regulation (β = 0.219), Learning Engagement (β = 0.187), and Responsible Online Behavior (β = 0.146). This pattern places Digital Citizenship as the most immediate outcome of the school policy construct. Within the developmental sequence, Digital Citizenship was associated most strongly with Digital Well-Being (β = 0.468), Digital Well-Being with Self-Regulation (β = 0.401), Self-Regulation with Learning Engagement (β = 0.392), and Learning Engagement with Responsible Online Behavior (β = 0.302). Digital Citizenship, Digital Well-Being, and Self-Regulation also retained significant direct associations with Responsible Online Behavior (β = 0.211, 0.173, and 0.218, respectively).

Indirect Effects

Bootstrapping was also used to estimate four specific indirect relationships and the proposed serial pathway.

Table 7.

Indirect Effects

Indirect Path	β	t-value	p-value
CEP → DC → ROB	0.139	4.821	<0.001
CEP → DWB → ROB	0.058	3.117	0.002
CEP → SR → ROB	0.048	2.931	0.004
CEP → LE → ROB	0.056	3.208	0.001
CEP → DC → DWB → SR → LE → ROB	0.081	4.114	<0.001

All five indirect coefficients in Table 7 were positive and statistically significant. The largest specific indirect association operated through Digital Citizenship (CEP → DC → ROB: β = 0.139, p < 0.001). Smaller but significant pathways operated through Digital Well-Being (β = 0.058, p = 0.002), Learning Engagement (β = 0.056, p = 0.001), and Self-Regulation (β = 0.048, p = 0.004). The complete serial pathway through Digital Citizenship, Digital Well-Being, Self-Regulation, and Learning Engagement was also significant (β = 0.081, p < 0.001). Because the direct CEP → ROB coefficient remained significant and all indirect coefficients had the same positive direction, the results indicate complementary partial mediation rather than full mediation.

Explanatory Power and Predictive Relevance

The explanatory power of the model was assessed using R^2 values, while predictive relevance was evaluated through Q^2 statistics.

Table 8.

Coefficient of Determination (R^2) and Predictive Relevance (Q^2)

Construct	R^2	Q^2
DC	0.437	0.291
DWB	0.548	0.342
SR	0.612	0.388
LE	0.635	0.411
ROB	0.601	0.396

The endogenous constructs showed R^2 values from 0.437 to 0.635. The model explained 43.7% of Digital Citizenship, 54.8% of Digital Well-Being, 61.2% of Self-Regulation, 63.5% of Learning Engagement, and 60.1% of Responsible Online Behavior. Learning Engagement therefore had the greatest explained variance, followed by Self-Regulation and Responsible Online Behavior. All Q^2 values were positive, ranging from 0.291 to 0.411, which indicates that the model retained predictive relevance for every endogenous construct.

Effect-size estimates further identified the relationships that contributed most to the model. Character Education Policy made the largest contribution to Digital Citizenship (f^2 = 0.775). The next prominent contributions followed the proposed sequence: Digital Citizenship to Digital Well-Being (f^2 = 0.284), Digital Well-Being to Self-Regulation (f^2 = 0.246), Self-Regulation to Learning Engagement (f^2 = 0.287), and Learning Engagement to Responsible Online Behavior (f^2 = 0.231). These values show

that explanatory power was distributed across successive links rather than being concentrated only in the final behavioral equation.

Discussion

This study examined the relationships among Character Education Policy, Digital Citizenship, Digital Well-Being, Self-Regulation, Learning Engagement, and Responsible Online Behavior among senior high school students in Bandung, Indonesia. The findings revealed that all hypothesized relationships were statistically significant and positive, supporting the proposed conceptual framework. More importantly, the results demonstrate that responsible online behavior is not merely a consequence of digital skills but emerges from a broader developmental process involving institutional policies, digital competencies, psychological well-being, self-regulatory capacities, and engagement in learning.

Character Education Policy as the Foundation of Adolescent Digital Development

One of the most notable findings of this study is the strong influence of Character Education Policy on Digital Citizenship. The path coefficient between these constructs was the largest among all direct effects, indicating that school policies play a critical role in shaping adolescents' digital competencies and ethical behavior. This finding supports the argument of Choi (2016) that digital citizenship should not be viewed solely as a technological competence but as a multidimensional construct involving ethical awareness, civic responsibility, and democratic participation. Similarly, Choi et al. (2017) emphasized that digital citizenship encompasses responsible participation, respect for others, and ethical decision-making in digital environments.

The findings also reinforce the conceptual framework proposed by Jones & Mitchell (2016), who argued that digital citizenship develops through educational experiences that promote responsible social participation and online engagement. In the Indonesian context, the results extend the work of Nurhayati et al. (2025), who highlighted the importance of integrating character development and digital citizenship education. The present study provides empirical evidence that character-oriented school policies constitute an institutional mechanism through which digital citizenship competencies can be cultivated among adolescents.

Beyond digital citizenship, Character Education Policy significantly influenced Digital Well-Being, Self-Regulation, Learning Engagement, and Responsible Online Behavior. These findings suggest that character education operates not only as a moral intervention but also as a psychosocial framework that shapes how students interact with digital technologies. This result contributes to the growing literature emphasizing the need to integrate ethical development with digital education in contemporary schooling environments (Kumari et al., 2023).

Digital Citizenship as a Developmental Mechanism

The results indicate that Digital Citizenship significantly predicts Digital Well-Being, Self-Regulation, Learning Engagement, and Responsible Online Behavior. These findings support previous studies suggesting that digital citizenship serves as a

protective factor against problematic online behavior while promoting healthy and constructive digital participation.

The positive association between Digital Citizenship and Digital Well-Being aligns with the work of Chen et al. (2021), who emphasized that digital citizenship extends beyond technical competencies and includes responsible technology use and digital wellness. Adolescents who understand digital rights, responsibilities, and ethical principles are more likely to develop balanced relationships with digital technologies. This interpretation is consistent with the findings of Santana et al. (2026), who reported that adolescents possessing greater awareness of technology use tend to demonstrate healthier digital habits and greater psychological well-being.

Furthermore, the positive relationship between Digital Citizenship and Self-Regulation supports the findings of Morales-Álvarez et al. (2025), who identified self-regulation as a critical mechanism linking social influences to digital citizenship behaviors. Adolescents who understand the consequences of online actions appear more capable of controlling impulses, managing distractions, and making responsible decisions in digital environments. Similarly, Harrison & Polizzi (2022) argued that digital citizenship education promotes moral reasoning processes that contribute to responsible online conduct.

The findings also extend previous meta-analytic evidence reported by Lu & Gu (2025), who concluded that digital citizenship consistently predicts positive developmental outcomes among adolescents. While previous studies primarily focused on isolated outcomes, the present study demonstrates that digital citizenship simultaneously contributes to psychological well-being, self-regulation, learning engagement, and responsible online behaviour within a unified explanatory framework.

Digital Well-Being and Self-Regulation as Psychological Pathways

The findings revealed significant relationships between Digital Well-Being and Self-Regulation, as well as between Digital Well-Being and Learning Engagement. These results suggest that healthy relationships with digital technologies facilitate the development of adaptive psychological functioning among adolescents.

This finding is consistent with Ding et al. (2026), who reported that self-control plays a crucial role in maintaining adolescents' digital well-being. Students who experience lower levels of digital stress and fear of missing out are more capable of regulating their behavior and maintaining productive technology use patterns. Likewise, Rosič et al. (2025) found that positive perceptions of digital well-being contribute to higher levels of self-esteem and psychological adjustment among adolescents.

The strong relationship between Digital Well-Being and Self-Regulation further supports the argument of Mascia et al. (2020), who demonstrated that self-regulation functions as an essential protective factor against problematic smartphone use and technology addiction. Similarly, Hrbackova et al. (2025) emphasized that self-

regulatory mechanisms play a central role in preventing risky digital media behaviors among adolescents.

From a theoretical perspective, these findings suggest that digital well-being should not be conceptualized merely as an outcome of technology use. Instead, digital well-being functions as an enabling condition that supports the development of self-regulatory capacities and productive engagement in learning. This interpretation also aligns with the protective factors framework proposed by Lan et al. (2022), which highlights the importance of psychosocial resources in promoting adolescent well-being in technology-rich environments.

Learning Engagement as a Bridge Between Psychological Competencies and Online Behavior

The present study found that Self-Regulation significantly predicted Learning Engagement, while Learning Engagement exerted a substantial influence on Responsible Online Behavior. These findings suggest that engagement serves as an important mechanism through which psychological competencies translate into behavioral outcomes.

The positive relationship between Self-Regulation and Learning Engagement supports previous research indicating that self-regulated learners demonstrate greater academic involvement and persistence in educational activities. H. Li et al. (2023) found that self-directed learning skills contribute significantly to online learning engagement among high school students. Similarly, Gherghel et al. (2023) reported that active interaction and self-directed learning behaviors enhance engagement in online educational contexts.

The results also corroborate the findings of Xiao et al. (2024), who demonstrated that problematic internet use negatively affects learning engagement. Conversely, students who effectively regulate their digital behavior are more likely to remain cognitively, emotionally, and behaviorally engaged in learning activities. This interpretation is further supported by J. Li et al. (2024), who argued that ineffective learning behaviors often emerge when adolescents struggle to regulate digital distractions.

The significant influence of Learning Engagement on Responsible Online Behavior extends previous findings reported by Doo & Kim (2024), who concluded that engagement is a critical predictor of positive educational outcomes. The present study suggests that engagement may also foster responsible online conduct because engaged students are more likely to use digital technologies for constructive, educational, and socially beneficial purposes.

Responsible Online Behavior as the Outcome of an Integrated Developmental Process

Perhaps the most important contribution of this study lies in demonstrating that Responsible Online Behavior is shaped by a complex network of institutional, psychological, and educational factors. The significant direct effects of Digital Citizenship, Digital Well-Being, Self-Regulation, and Learning Engagement on

Responsible Online Behavior indicate that ethical online conduct cannot be explained by a single determinant.

The findings support Mahmoudi-Dehaki & Nasr-Esfahani (2025), who argued that responsible digital citizenship requires the integration of knowledge, ethical awareness, self-management, and constructive participation. Similarly, Althibyani & Al-Zahrani (2023) found that digital citizenship competencies contribute significantly to the prevention of cybercrime and other harmful online behaviors. The present study extends these findings by identifying multiple mediating mechanisms through which educational policies influence online behavior.

The results are also consistent with Macharia and Dunaway (2019), who reported that stronger digital citizenship competencies were associated with less cyberbullying. Alonso-Fernández et al. (2026) likewise found that ethical online values were positively associated with constructive digital behavior. Together, these comparisons indicate that responsible online conduct reflects both ethical judgment and the capacity to manage digital participation.

Finally, the significant serial mediation effect observed in this study provides strong support for the proposed developmental framework. Character Education Policy appears to foster Digital Citizenship, which enhances Digital Well-Being, strengthens Self-Regulation, increases Learning Engagement, and ultimately promotes Responsible Online Behavior. This sequential process contributes to the literature by offering a more comprehensive explanation of adolescent digital development than previous studies that examined these variables independently.

Overall, the model explains a substantial proportion of variance in Responsible Online Behavior (R^2 = 0.601), indicating that the proposed framework possesses considerable explanatory power. The findings therefore suggest that efforts to cultivate responsible online behavior among adolescents should move beyond isolated digital literacy interventions and instead adopt integrated educational approaches that combine character education, digital citizenship development, psychological well-being support, and engagement-enhancing learning environments.

CONCLUSION

Character education policy was positively associated with responsible online behavior both directly and through interconnected developmental processes. Its strongest direct association was with digital citizenship, and the significant serial pathway showed that policy was linked sequentially with digital citizenship, digital well-being, self-regulation, learning engagement, and responsible online behavior. The model explained 60.1% of the variance in responsible online behavior. These results position school character policy as an institutional foundation whose behavioral relevance depends partly on digital competencies, healthy technology use, self-control, and purposeful engagement.

The findings imply that schools should not implement character education and digital citizenship as separate programs. Policy statements should be translated into explicit instruction on digital ethics and safety, routines that protect digital well-being, opportunities to practice self-regulation, and engaging uses of technology for learning. The cross-sectional, purposively sampled, self-report design limits causal and temporal conclusions and may restrict generalizability beyond senior high school students in Bandung. Future studies should employ longitudinal or experimental designs, include behavioral or multi-informant measures, test probability samples from diverse regions, and examine whether the serial pathway differs by school type, gender, socioeconomic background, or intensity of technology use.

DECLARATIONS

Author Contribution

Kurniawaty, I., Conceptualization, Investigation, Data Curation, Formal Analysis, Methodology, Writing – Original Draft, Visualization, Review & Editing; **Hadian, V.A**., Methodology, Formal Analysis, Validation, Writing – Review & Editing; **Tanshzil, S.W**., Supervision, Validation, Review & Editing, Visualization, and Project Administration. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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The authors declare no conflict of interest.

Declaration of AI Use

The authors used ChatGPT (OpenAI) during the preparation of this manuscript for language editing and text refinement purposes. The authors reviewed and edited the output as necessary and take full responsibility for the content of this publication.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethical Approval

This study was conducted in accordance with the ethical principles for educational research involving human participants. Participation was voluntary, informed consent was obtained from all participants, and all responses were collected anonymously and used solely for research purposes.

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Additional Notes

Not applicable.

REFERENCES

Alonso-Fernández, M., Wachs, S., Mateos-Pérez, E., & Gámez-Guadix, M. (2026). Measuring Online Ethical Values and Behaviors: Relationships with Cyberhate, Empathy, and Sociodemographic Variables. *Cyberpsychology, Behavior and Social Networking*, *29*(4), 219–229. https://doi.org/10.1177/21522715261425526

Althibyani, H. A., & Al-Zahrani, A. M. (2023). Investigating the Effect of Students' Knowledge, Beliefs, and Digital Citizenship Skills on the Prevention of Cybercrime. *Sustainability*, *15*(15). https://doi.org/10.3390/su151511512

Chen, L. L., Mirpuri, S., Rao, N., & Law, N. (2021). Conceptualization and measurement of digital citizenship across disciplines. *Educational Research Review*, *33*. https://doi.org/10.1016/j.edurev.2021.100379

Choi, M. (2016). A Concept Analysis of Digital Citizenship for Democratic Citizenship Education in the Internet Age. *Theory and Research in Social Education*, *44*(4), 565–607. https://doi.org/10.1080/00933104.2016.1210549

Choi, M., Glassman, M., & Cristol, D. (2017). What it means to be a citizen in the internet age: Development of a reliable and valid digital citizenship scale. *Computers and Education*, *107*, 100–112. https://doi.org/10.1016/j.compedu.2017.01.002

Ding, Z., Wang, Z., & Chen, X. (2026). Individual differences in adolescents' digital well-being: How perceived stress, fear of missing out, and self-control interact in daily life. *Personality and Individual Differences*, *255*. https://doi.org/10.1016/j.paid.2026.113713

Doo, M. Y., & Kim, J. (2024). The relationship between learning engagement and learning outcomes in online learning in higher education: A meta-analysis study. *Distance Education*, *45*(1), 60–82. https://doi.org/10.1080/01587919.2024.2303484

Gherghel, C., Yasuda, S., & Kita, Y. (2023). Interaction during online classes fosters engagement with learning and self-directed study both in the first and second years of the COVID-19 pandemic. *Computers and Education*, *200*. https://doi.org/10.1016/j.compedu.2023.104795

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.)*. Sage. https://doi.org/10.1007/978-3-030-80519-7

Harrison, T., & Polizzi, G. (2022). (In)civility and adolescents' moral decision making online: Drawing on moral theory to advance digital citizenship education. *Education and Information Technologies*, *27*(3), 3277–3297. https://doi.org/10.1007/s10639-021-10710-0

Hrbackova, K., Hladík, J., & Petr Safrankova, A. (2025). What role do self-regulatory mechanisms play in the risky use of digital media by adolescents? *Frontiers in*

Psychology, *16*. https://doi.org/10.3389/fpsyg.2025.1675778

Jones, L. M., & Mitchell, K. J. (2016). Defining and measuring youth digital citizenship. *New Media and Society*, *18*(9), 2063–2079. https://doi.org/10.1177/1461444815577797

Kumari, N., Sachdeva, M., & Verma, K. (2023). Examining the Need of Digital Citizenship Education for Adolescents in the Current Digital Landscape. *Journal of Higher Education Theory and Practice*, *23*(11), 174–181. https://doi.org/10.33423/jhetp.v23i11.6228

Lan, M., Pan, Q., Tan, C. Y., & Law, N. W. Y. (2022). Understanding protective and risk factors affecting adolescents' well-being during the COVID-19 pandemic. *Npj Science of Learning*, *7*(1). https://doi.org/10.1038/s41539-022-00149-4

Li, H., Zhu, S., Wu, D., Yang, H. H., & Guo, Q. (2023). Impact of information literacy, self-directed learning skills, and academic emotions on high school students' online learning engagement: A structural equation modeling analysis. *Education and Information Technologies*, *28*(10), 13485–13504. https://doi.org/10.1007/s10639-023-11760-2

Li, J., Fang, L., Liu, Y., Xie, J., & Wang, X. (2024). Ineffective Learning Behaviors and Their Psychological Mechanisms among Adolescents in Online Learning: A Narrative Review. *Behavioral Sciences*, *14*(6). https://doi.org/10.3390/bs14060477

Lu, C., & Gu, M. M. (2025). A systematic review and meta-analysis of factors and outcomes of digital citizenship among adolescents. *Asia Pacific Journal of Education*, *45*(4), 1130–1145. https://doi.org/10.1080/02188791.2023.2296352

Macharia, M., & Dunaway, M. (2019). Digital citizens and cyberbullying: Does gender matter? *Proceedings of the 2019 SIGED International Conference on Information Systems Education and Research*, 63–72.

Mahmoudi-Dehaki, M., & Nasr-Esfahani, N. (2025). Nurturing responsible digital citizens in the online world. In *Digital Citizenship and Building a Responsible Online Presence* (pp. 99–121). https://doi.org/10.4018/979-8-3693-6675-2.ch004

Mascia, M. L., Agus, M., & Penna, M. P. (2020). Emotional Intelligence, Self-Regulation, Smartphone Addiction: Which Relationship With Student Well-Being and Quality of Life? *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00375

Morales-Álvarez, A., Valdés-Cuervo, A. A., & Parra-Pérez, L. G. (2025). Supportive Parenting and Adolescents Digital Citizenship Behaviors: The Mediating Role of Self-Regulation. *Cyberpsychology*, *19*(1). https://doi.org/10.5817/CP2025-1-2

Nurhayati, L., Supriadi, U., Jenuri, J., & Karim, A. (2025). Integrating digital citizenship and religious moderation in open and distance education: a holistic approach to character development in Indonesia. *Asian Association of Open Universities Journal*. https://doi.org/10.1108/AAOUJ-02-2025-0025

Rosič, J., Schreurs, L., & Vandenbosch, L. (2025). Adolescents' perceptions regarding their smartphone use: longitudinal relationships between perceived digital well-being and self-esteem. *Journal of Computer-Mediated Communication*, *30*(3). https://doi.org/10.1093/jcmc/zmaf005

Rosič, J., Vanherle, R., Lobe, B., & Vandenbosch, L. (2026). Daily Relationships Between Adolescents' Perceived Digital Well-Being, State Self-Esteem, and Affective Well-Being. *Media Psychology*. https://doi.org/10.1080/15213269.2026.2674018

Santana, L. E., Alfaro, A., & López-Ordosgoitia, R. (2026). Empowered and aware: adolescent perspectives on technology and well-being in Chile and Colombia. *Humanities and Social Sciences Communications*, *13*(1). https://doi.org/10.1057/s41599-026-06934-5

Xiao, X., Cai, J., & Yang, Q. (2024). The relationship between internet addiction and adolescent learning engagement: the role of future orientation and cognitive reappraisal. *Current Psychology*, *43*(27), 23103–23114. https://doi.org/10.1007/s12144-024-05982-x