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Development of Violence Prevention Education E-Module to Strengthen Harmonious Harmony of Life with the Environment in Elementary Schools

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Abstract

Violence in elementary schools in Indonesia is still a serious problem that hinders student development. This research aims to develop an E-Mode of Violence Prevention Education designed to strengthen the harmonization of harmonious life in the elementary school environment. This study uses a 4D development model which includes the Define, Design, Develop and Disseminate stages which involve the validation of experts, teachers and students in four elementary schools in Gorontalo Regency. The results of expert validation show that the E-Module meets the criteria of "very valid" with an average score above 85%. The limited trial showed that more than 85% of students rated the E-Module as practical, easy to use, and attractive. Data analysis through the Kolmogorov–Smirnov normality test showed that the pretest and posttest data were normally distributed (Sig.>0.05). The results of the paired samples t-test showed significant differences in students' knowledge, attitudes, and skills before and after the use of the E-Module (p = 0.001). The effect size calculation (Cohen's d) ranged from 1.34–1.86 with a very large category, which confirms the strong influence of the E-Module in improving the competence of violence prevention. Thus, this E-Module is valid, practical, and effective, and is able to be widely implemented as part of creating harmonious harmony of life in the elementary school environment.

INTRODUCTION

Violence and bullying in primary school settings remain persistent global concerns, not merely as isolated behavioral incidents but as complex social phenomena embedded within multilayered ecological systems of children’s development. From an epistemological perspective, bullying is increasingly understood as a product of dynamic interactions between individual dispositions, peer group norms, institutional practices, and broader socio-digital environments (Salmivalli et al., 2021; Gaffney et al., 2019). Consequently, efforts to address school violence cannot rely solely on surface-level interventions or disciplinary approaches, as these often fail to engage with the underlying psychosocial mechanisms that sustain aggressive behaviors over time (Durlak et al., 2011; Kennedy, 2020).

Furthermore, the landscape of childhood interaction has undergone a significant transformation. The boundaries between offline and online environments are no longer distinct, and experiences of aggression increasingly traverse both domains. This shift introduces new forms of vulnerability, where traditional bullying intersects with cyber-mediated behaviors, thereby amplifying both frequency and psychological impact (Chen et al., 2023; Kutok et al., 2021). Nevertheless, in many educational contexts, particularly in developing regions, preventive strategies remain largely conventional, emphasizing moral instruction without sufficiently integrating digital literacy or socio-emotional competencies (Salamah & Sarjiyem, 2025; Pappa et al., 2024).

Anchored in the theoretical framework of Social Emotional Learning (SEL), prevention efforts are expected to operate through the enhancement of core competencies such as empathy, self-regulation, and responsible decision-making. These competencies function not merely as educational outcomes but

as mediating mechanisms that reduce the likelihood of aggressive and harmful behaviors (Durlak et al., 2011; Low et al., 2015). At the same time, the Social Ecological Model suggests that effective interventions must address multiple levels of influence, including individual cognition, peer interaction, and institutional culture (Devries et al., 2015; Espelage & Swearer, 2010). When juxtaposing these frameworks, a conceptual tension emerges: while SEL focuses on internal competencies, ecological models emphasize contextual dynamics. The integration of both, therefore, becomes not only relevant but necessary.

However, despite the theoretical clarity, the translation of these frameworks into scalable and context-sensitive interventions remains uneven. Digital learning tools, particularly e-modules, offer an underexplored pathway to operationalize these theories within classroom practice. Digital interventions possess the capacity to deliver structured, interactive, and adaptive content that can simultaneously target cognitive understanding and affective engagement (Hsu & Lin, 2020; Al Mamun & Lawrie, 2023). More importantly, they allow for the embedding of scenario-based learning, reflective exercises, and behavioral simulations that align with SEL principles. And yet, the long road from technological potential to pedagogical impact is not always smooth.

In the Indonesian context, the challenge becomes even more pronounced. While national data indicate persistent rates of school-based violence among primary-aged children, intervention models are still dominated by print-based modules and sporadic counseling programs, often lacking systematic integration into daily learning processes (Ibrahim et al., 2025; Putri et al., 2024). Moreover, culturally grounded values such as harmonious social relations are frequently emphasized rhetorically but rarely operationalized within structured intervention designs. This gap suggests not only a methodological limitation but also an epistemic one, where local values are insufficiently translated into measurable educational constructs.

At this juncture, one cannot help but notice a subtle paradox. On one hand, harmony and collective balance are deeply rooted in local cultural narratives. On the other, educational interventions tend to import external models without fully embedding these cultural logics. The question, then, is not simply whether an intervention works, but whether it resonates with the lived social realities of the learners themselves.

Given the above, there remains a critical research gap at the intersection of digital learning, socio-emotional development, and culturally contextualized violence prevention. Existing studies have either focused on digital media for cognitive outcomes or on anti-bullying programs without leveraging technological affordances in a structured manner (Freeman et al., 2024; Fraguas et al., 2021). Few have attempted to integrate these domains into a coherent intervention model, particularly within underrepresented educational contexts.

Therefore, this study advances a theory-driven digital intervention framework, conceptualizing the e-module not merely as instructional material but as a mechanism-based tool designed to influence key psychosocial determinants of violence-related behavior. Specifically, the intervention is positioned to

enhance students' socio-emotional competencies while simultaneously embedding values of harmonious living within a structured digital learning environment. By doing so, the study seeks to move beyond the question of effectiveness toward a more nuanced inquiry: how and through what mechanisms can digital interventions reshape children's orientations toward violence and social coexistence?

Undeniably, answering this question contributes not only to the development of educational media but also to the broader discourse on bullying prevention, particularly in contexts where digital transformation and cultural values intersect in complex and often overlooked ways.

CONCEPTUAL MODEL

The conceptual model of this study is grounded in the integration of Social Emotional Learning (SEL) theory and the Social Ecological Model to explain how a digital violence prevention e-module may influence students' violence-related behaviors and social interaction patterns. Rather than positioning the e-module merely as a passive instructional product, the present framework conceptualizes it as an active behavioral intervention mechanism capable of shaping psychosocial processes associated with violence prevention and harmonious social interaction. This perspective reflects a shift from product-oriented educational development toward mechanism-based intervention science, where the central concern lies not only in whether behavioral change occurs, but also in understanding the psychosocial pathways through which such change is produced (Durlak et al., 2011; Salmivalli et al., 2021).

The theoretical foundation of the model assumes that violence-related behaviors, including bullying, verbal aggression, and social exclusion, are mediated by internal socio-emotional competencies and simultaneously influenced by broader social contexts. From the perspective of Social Emotional Learning (SEL), competencies such as empathy, emotional regulation, self-awareness, and responsible decision-making function as proximal determinants of prosocial behavior and social adaptation (Durlak et al., 2011; Low et al., 2015). Students who possess stronger socio-emotional competencies tend to demonstrate lower levels of aggressive behavior and higher levels of constructive interpersonal interaction. However, these competencies do not operate in isolation. Ecological theory suggests that students' behaviors are continuously shaped through interactions within peer groups, classroom environments, school culture, and institutional norms, which may either reinforce or inhibit violent tendencies (Bronfenbrenner, 1979; Espelage & Swearer, 2010; Devries et al., 2015). Accordingly, the present model conceptualizes violence prevention as the result of interactions between intrapersonal transformation and contextual behavioral alignment.

Within this framework, the digital violence prevention e-module functions as the primary intervention variable. The e-module is designed as an integrated digital learning system that incorporates scenario-based learning activities, reflective exercises, and interactive multimedia components, including videos, text-based materials, and quizzes. These instructional elements are intentionally designed to encourage active engagement and experiential learning processes, which are considered essential for facilitating

the internalization of social norms and prosocial behavioral scripts (Hsu & Lin, 2020; Al Mamun & Lawrie, 2023). Through repeated exposure to reflective and contextualized learning experiences, students are expected to develop a deeper understanding of the emotional and social consequences of violent behavior.

The model further proposes that the influence of the digital e-module on behavioral outcomes occurs through several psychosocial mediating mechanisms. The first mediator is empathy development, defined as the ability to understand and share the emotional experiences of others. Empathy has consistently been identified as a significant protective factor against aggressive behavior because it encourages compassion, perspective-taking, and prosocial responses (Jolliffe & Farrington, 2006; Durlak et al., 2011). The second mediator is self-regulation and emotional control, which refers to the capacity to manage emotional reactions and behavioral impulses, particularly in stressful or conflict-related situations. Students with stronger self-regulation skills are generally more capable of resolving interpersonal conflicts without resorting to violence or aggression (Gross, 2015; Low et al., 2015). The third mediator involves social awareness and norm internalization, namely students' recognition and acceptance of socially appropriate behaviors and anti-violence norms within peer and school contexts. This mechanism is important because bullying and violence are often influenced by group dynamics and social reinforcement processes (Salmivalli et al., 2021). Collectively, these psychosocial mechanisms represent the explanatory pathway through which the intervention is expected to influence students' behavioral orientations. Without the development of these internal competencies, behavioral change may remain temporary or superficial.

The ultimate outcomes of the model are conceptualized as reductions in violence-related tendencies and the strengthening of harmonious social interaction. Violence-related tendencies include behaviors such as bullying, verbal aggression, intimidation, and social exclusion, whereas harmonious interaction refers to cooperative behavior, mutual respect, empathy-driven communication, and constructive conflict resolution. In this study, harmonious living is not treated merely as a cultural abstraction, but rather as a measurable behavioral orientation rooted in observable prosocial interaction patterns within school environments.

In addition, the model acknowledges that the effectiveness of the intervention may vary according to several contextual moderating factors. These include the school environment, classroom climate, teacher facilitation, implementation fidelity, and cultural values emphasizing social harmony. Ecological theory emphasizes that behavior is co-constructed through interactions across multiple environmental systems; therefore, even well-designed interventions may produce different outcomes depending on contextual support and social reinforcement structures (Bronfenbrenner, 1979; Espelage & Swearer, 2010). Teachers, for instance, play a crucial role in facilitating reflective discussions and modeling non-violent communication, while supportive classroom climates may strengthen the internalization of prosocial norms.

Synthesizing these relationships, the conceptual pathway proposed in this study can be summarized as follows: the digital violence prevention e-module influences empathy development, self-regulation, and social awareness, which subsequently contribute to reduced violence-related behavior and increased harmonious social interaction, with these relationships being moderated by school and cultural contexts. The novelty of this conceptual model lies in its hybrid integration of educational technology, psychosocial theory, and cultural dimensions. Unlike conventional approaches that position Social Emotional Learning as a separate curricular component, the present model embeds SEL competencies directly within a digital learning environment. Furthermore, the model bridges culturally grounded concepts of harmonious living with measurable psychosocial constructs and positions digital modules not simply as instructional media, but as behavioral intervention mechanisms capable of influencing social interaction patterns.

Nevertheless, an important reflective consideration remains. Interventions designed to teach non-violence may risk becoming overly prescriptive if they fail to resonate with students' lived realities and social experiences. Consequently, the effectiveness of the model may depend not solely on technological sophistication or theoretical coherence, but also on whether students recognize their own experiences, conflicts, and social relationships within the learning process itself. Figure 1 illustrates the integrated conceptual framework of the study.

METHOD

Research Design and Epistemic Positioning

This study employed a design-based quasi-experimental approach, integrating Research and Development (R&D) with intervention evaluation in a real-world educational setting. While the procedural backbone follows the 4D model (Define, Design, Develop, Disseminate), the present study extends beyond product validation by embedding a theory-driven intervention framework grounded in Social Emotional Learning (SEL) and ecological perspectives on child behavior (Durlak et al., 2011; Devries et al., 2015).

From an inferential standpoint, the study adopts a one-group pretest–posttest quasi-experimental design, not as a claim of causal certainty, but as an exploratory mechanism to assess within-subject changes in psychosocial and behavioral indicators following exposure to the digital intervention (Shadish et al., 2002). This positioning is critical, as it reframes the design from a methodological limitation into a context-sensitive evaluation strategy within authentic school environments.

Participants and Sampling Strategy

The study involved elementary school students (Grade 5) drawn from four public schools in Gorontalo Regency, Indonesia. Schools were selected using purposive cluster sampling, based on criteria including:

1. documented presence of peer-related conflict or bullying incidents,
2. readiness to integrate digital learning tools, and
3. administrative willingness to participate in intervention research.

A total of N ≈ 120 students participated in the field trial phase, following an initial limited trial (n = 30). This sample size aligns with recommendations for detecting medium-to-large within-group effects in educational interventions (Cohen, 1988).

It is worth pausing here. The sample is not statistically representative in a probabilistic sense, and yet it is socially meaningful. The schools selected are not random abstractions; they are lived environments where intervention relevance arguably matters more than statistical generalizability.

Intervention Design: Digital SEL-Based E-Module

The intervention consisted of a digital violence prevention e-module, designed as an applied learning system integrating:

- scenario-based narratives reflecting real-life peer conflict situations,
- guided reflective exercises targeting emotional awareness,
- interactive multimedia elements (videos, animations, quizzes), and
- behavioral reinforcement tasks aligned with prosocial norms.

The content structure was explicitly mapped onto SEL competencies, particularly empathy, self-regulation, and social awareness (CASEL framework), thereby operationalizing theoretical constructs into measurable learning components (Durlak et al., 2011; Low et al., 2015).

The module was implemented over a 4–6 weeks period, embedded within regular classroom activities under teacher facilitation. Implementation fidelity was monitored through structured observation and teacher logs.

Measures and Instrumentation

To examine the mechanisms underlying behavioral change, this study employed several instruments designed to measure psychosocial constructs, behavioral outcomes, and product feasibility. The psychosocial constructs functioned as mediating variables within the conceptual framework and were assessed using adapted Likert-scale questionnaires. These instruments measured empathy, self-regulation, and social awareness as core dimensions of Social Emotional Learning (SEL). Empathy was evaluated through indicators such as perspective-taking ability and emotional responsiveness toward others, while self-regulation focused on students' capacity for impulse control and emotional management during interpersonal interactions. Social awareness was measured through students' recognition of social norms, sensitivity to peer relationships, and prosocial orientation within the school

environment. These psychosocial dimensions were selected because previous studies have consistently identified them as significant predictors of bullying-related behavior and prosocial interaction patterns (Jolliffe & Farrington, 2006; Durlak et al., 2011).

The behavioral outcome measures were designed to assess the effectiveness of the digital violence prevention e-module in reducing violence-related tendencies and promoting harmonious social interaction. Violence prevention outcomes were operationalized through three primary dimensions: students' knowledge of violence-related concepts, attitudinal orientation toward non-violence, and self-reported behavioral tendencies associated with aggression or prosocial behavior. The knowledge component assessed students' understanding of bullying, violence prevention, and appropriate conflict resolution strategies, whereas the attitudinal dimension examined students' acceptance of non-violent values and social harmony principles. Self-reported behavioral tendencies were used to identify perceived changes in students' interpersonal behaviors following the intervention. Although self-report instruments may contain inherent response bias, they remain widely used and appropriate for capturing internal psychological states, perceptions, and subjective behavioral changes, particularly in early-stage intervention research related to school violence prevention (Espelage & Swearer, 2010).

In addition to psychosocial and behavioral measurements, the study also evaluated the feasibility of the developed e-module as an educational product. Product feasibility assessment included measures of validity, practicality, and usability using expert validation sheets and student response questionnaires. Expert validation involved the evaluation of content relevance, instructional design quality, language clarity, and multimedia integration by specialists in education and learning media. Meanwhile, student response questionnaires were used to examine usability, accessibility, engagement, and overall learning experience during the implementation of the module. These procedures are consistent with Research and Development (R&D) methodologies that emphasize systematic product evaluation before broader implementation (Okpatrioka, 2023).

Validity and Reliability Procedures

Validity and Reliability Procedures

The validity and reliability of the research instruments were established through several systematic procedures to ensure the accuracy and consistency of the collected data. Content validity was evaluated through expert judgment involving specialists in instructional design, subject matter expertise, and educational linguistics. The experts assessed the appropriateness, clarity, relevance, and alignment of the instrument items with the objectives of the study and the conceptual dimensions being measured. Quantitative validation was conducted using percentage agreement criteria, in which validation scores exceeding 80% were interpreted as indicating a high level of validity. This process ensured that the instruments adequately represented the constructs of empathy, self-regulation, social awareness, and violence prevention outcomes addressed in the study.

Instrument reliability was examined using Cronbach's alpha coefficient to determine the internal consistency of the measurement scales. A reliability coefficient of $\alpha \geq 0.70$ was considered acceptable, following the reliability standards proposed by Hair et al. (2010). The use of Cronbach's alpha allowed the researchers to evaluate the consistency of responses across instrument items and to ensure that the scales reliably measured the intended psychosocial and behavioral constructs.

Data Collection Procedure

The data collection process was conducted in three sequential phases consisting of pretest, intervention, and posttest stages. During the pretest phase, baseline data were collected to measure students' initial psychosocial conditions and violence-related behavioral tendencies prior to the implementation of the intervention. This stage provided the reference point for evaluating changes following exposure to the digital violence prevention e-module.

The second phase involved the implementation of the intervention through guided classroom activities using the developed e-module. The module was delivered under structured instructional conditions to ensure that students engaged consistently with the learning materials, reflective activities, and interactive multimedia components embedded within the intervention. Teacher supervision was maintained throughout the implementation process to support student participation and maintain the ecological validity of the classroom environment.

Following the intervention, the posttest phase was conducted using the same instruments administered during the pretest stage. The purpose of the posttest was to capture within-subject changes in psychosocial competencies and violence-related behavioral tendencies after participation in the intervention program. Conducting the study within regular classroom settings under teacher supervision also minimized disruption to instructional activities while preserving the authenticity of the educational context.

Data Analysis Strategy

The data analysis process consisted of preliminary analysis, inferential statistical testing, and effect size estimation. Preliminary analysis was first conducted to examine the distributional characteristics of the data and provide descriptive summaries of the measured variables. Normality testing was performed using the Shapiro–Wilk test to determine whether the data met the assumptions required for parametric statistical analysis. Descriptive statistics, including means and standard deviations, were also calculated to summarize students' psychosocial and behavioral scores before and after the intervention.

To evaluate the effectiveness of the intervention, inferential analysis was conducted using paired samples t-tests to compare pretest and posttest scores. This statistical procedure was selected because it allows for the examination of within-subject differences following the intervention. The level

of statistical significance was set at $p < .05$ to determine whether observed changes were statistically meaningful.

In addition to significance testing, effect size estimation was performed using Cohen's d to assess the magnitude of the intervention effects. According to Cohen (1988), effect size values of 0.2 indicate small effects, 0.5 indicate medium effects, and 0.8 or higher indicate large effects. The inclusion of effect size analysis was intended to complement statistical significance testing by providing information regarding the practical importance and educational relevance of the intervention outcomes. This combined analytical approach is particularly important in educational intervention research because statistically significant findings do not always reflect meaningful practical change in students' behaviors or psychosocial development (Durlak et al., 2011).

Ethical Considerations

Ethical approval

was obtained from the institutional research authority. Participation was voluntary, with informed consent secured from school administrators, teachers, and parents. Student anonymity and data confidentiality were strictly maintained throughout the study.

Methodological Limitation

While the absence of a control group limits causal inference, the study is positioned as an early-stage intervention evaluation within an authentic educational context. Future research employing randomized controlled designs is necessary to strengthen causal claims and generalizability.

RESULTS

Preliminary Analysis: Distributional Assumptions

Prior to inferential testing, the distribution of pretest and posttest scores across the four participating schools was examined using the Shapiro–Wilk test. As shown in Table 1, all values exceeded the threshold of $p > .05$, indicating that the assumption of normality was satisfied and that parametric analysis was appropriate (Field, 2018).

Table 1
Normality Test Results (Shapiro–Wilk)

School	Pretest (p)	Posttest (p)	Interpretation
SDN 6 Limboto	0.148	0.168	Normal
SDN 13 Telaga Biru	0.368	0.172	Normal
SDN 7 Telaga	0.121	0.151	Normal
SDN 5 Tilango	0.133	0.108	Normal

These findings suggest that the observed score distributions do not deviate significantly from normality, thereby justifying the use of paired samples t-tests for subsequent analysis (Shadish et al., 2002).

Primary Outcome Analysis: Pre–Post Differences

To evaluate the effectiveness of the digital intervention, paired samples t-tests were conducted comparing pretest and posttest scores across all participating schools. The results consistently indicate statistically significant improvements in violence prevention-related competencies following the intervention.

Table 2
Paired Samples t-Test Results

School	Mean Difference	t-value	p-value	Interpretation
SDN 6 Limboto	-21.75	-10.53	.001	Significant
SDN 13 Telaga Biru	-22.30	-9.22	.001	Significant
SDN 7 Telaga	-22.52	-9.20	.001	Significant
SDN 5 Tilango	-18.04	-7.59	.001	Significant

Across all sites, the mean differences between pretest and posttest scores ranged from − 18.04 to -22.52, indicating substantial improvement following exposure to the intervention. The consistently significant p-values (p = .001) suggest that the observed changes are unlikely to be due to chance alone (Cohen, 1988). However, statistical significance alone does not capture the magnitude of change, and thus effect size estimation becomes essential.

Effect Size Estimation: Magnitude of Intervention Impact

To assess practical significance, Cohen's d was calculated for each school. As presented in Table 3, all effect sizes fall within the very large category, indicating a strong intervention effect across contexts.

Table 3
Effect Size (Cohen's d)

School	t-value	Cohen's d	Interpretation
SDN 6 Limboto	10.53	1.86	Very Large
SDN 13 Telaga Biru	9.22	1.63	Very Large
SDN 7 Telaga	9.20	1.63	Very Large
SDN 5 Tilango	7.59	1.34	Very Large

From an interpretive standpoint, these effect sizes exceed conventional thresholds (d ≥ 0.80), suggesting that the intervention produced substantial and meaningful improvements in students' competencies related to violence prevention (Cohen, 1988; Durlak et al., 2011).

Mechanism-Oriented Interpretation (Link to Conceptual Model)

While the statistical results confirm effectiveness, a more nuanced reading is required. The magnitude and consistency of change across multiple schools suggest that the intervention may not merely enhance surface-level knowledge, but rather influence underlying psychosocial mechanisms.

Specifically:

- The structured increase in scores reflects potential gains in social awareness and norm internalization, consistent with SEL frameworks (Durlak et al., 2011).
- The large effect sizes may indicate improvements in self-regulation and emotional processing, which are critical mediators in reducing aggressive behavior (Low et al., 2015).
- The uniformity of results across schools suggests that the intervention operates robustly across different classroom contexts, aligning with ecological perspectives (Espelage & Swearer, 2010).

In other words, the data begin to tell a deeper story. Not just that students learned more, but that they may have started to interpret social situations differently.

Although the mediating variables proposed in the conceptual framework—namely empathy, self-regulation, and social awareness—were not directly measured as independent constructs in the present analysis, the observed behavioral improvements are theoretically consistent with established Social Emotional Learning (SEL) pathways. Specifically, the magnitude and consistency of pre–post gains, coupled with very large effect sizes, suggest that the intervention likely engaged underlying psychosocial processes that are widely recognized as proximal determinants of prosocial behavior and violence reduction (Durlak et al., 2011; Low et al., 2015).

Furthermore, prior meta-analytic and experimental evidence indicates that interventions incorporating reflective, scenario-based, and interactive learning components tend to produce changes not only in

knowledge outcomes but also in affective and regulatory domains, particularly those associated with empathy development and emotional control (Salmivalli et al., 2021; Gaffney et al., 2019). In this study, the design features of the e-module—such as guided reflection, social scenario simulation, and behavioral reinforcement tasks—align closely with these mechanisms, thereby providing indirect support for the activation of the proposed mediators.

Nevertheless, from an inferential standpoint, it is important to acknowledge that the present findings do not constitute direct empirical validation of mediation effects. Rather, they provide theoretically grounded indicative evidence, suggesting that the pathway from digital intervention to behavioral outcomes is plausibly mediated by socio-emotional competencies. Future research employing explicit mediator measurement and structural modeling approaches is therefore necessary to confirm these pathways with greater analytical precision.

Cross-Site Consistency and Contextual Stability

An important observation lies in the relatively narrow range of effect sizes (1.34–1.86). This consistency suggests that the intervention maintains its effectiveness across varying school environments, which is often a challenge in educational interventions (Gaffney et al., 2019).

Nevertheless, slight variation is visible:

- Higher effects in SDN 6 Limboto (d = 1.86)
- Lower, though still large, effects in SDN 5 Tilango (d = 1.34)

This variation may reflect differences in:

- implementation fidelity
- teacher facilitation
- classroom dynamics

Such contextual sensitivity aligns with ecological models, which emphasize that intervention outcomes are co-shaped by environmental factors (Devries et al., 2015).

Integrated Analytical Statement

Taken together, the findings indicate that the digital e-module intervention is associated with:

1. Statistically significant improvements in violence prevention competencies
2. Substantively large effect sizes, indicating practical impact
3. Consistent outcomes across multiple school contexts

More importantly, when interpreted through the conceptual model, these results suggest that the intervention likely operates through psychosocial mediation pathways, particularly those related to empathy, self-regulation, and social awareness.

There is a temptation to read large effect sizes as definitive proof of success. Yet, without a control group, one must remain cautious. What we observe here is strong evidence of change, but not absolute proof of causality. Still, in real classrooms, change of this magnitude is rarely trivial. Taken together, these findings suggest the presence of a mechanism-driven change process, albeit indirectly inferred.

DISCUSSION

This study contributes to the still limited body of empirical evidence emerging from Global South contexts, where the intersection of digital transformation, educational practice, and violence prevention remains underexplored. While much of the existing literature on bullying interventions is concentrated in high-income, Western settings, the present findings highlight how theory-driven digital approaches can be meaningfully adapted within resource-constrained and culturally distinct educational environments. Importantly, the integration of locally embedded values—such as harmonious social living—into a structured Social Emotional Learning (SEL) framework suggests that effective intervention design need not rely on direct transplantation of established models, but rather on their contextual reinterpretation. In this sense, the study not only extends the geographical scope of bullying prevention research, but also underscores the importance of culturally responsive and digitally mediated strategies in addressing violence-related behaviors among children in diverse global settings.

The present findings offer more than a confirmation of intervention effectiveness; they open a window into the mechanisms through which digital learning environments may reshape children's orientations toward violence and social interaction. While the statistical results demonstrate significant pre–post improvements and large effect sizes, their interpretive value lies in how they align with, and extend, existing theoretical frameworks in bullying prevention and social-emotional development.

Interpreting Effectiveness Beyond Outcomes: A Mechanism-Based Perspective

At a surface level, the observed improvements might be read as increased knowledge or awareness. However, when situated within the Social Emotional Learning (SEL) framework, these gains are more plausibly interpreted as shifts in core psychosocial competencies, particularly empathy, emotional regulation, and social awareness (Durlak et al., 2011; Low et al., 2015).

The magnitude of the effect sizes (d = 1.34–1.86) suggests that the intervention likely influenced not only cognitive understanding but also affective and behavioral readiness to respond to social conflict. This distinction matters. Knowledge alone rarely translates into behavioral change; rather, it is the internalization of emotional and social competencies that enables individuals to reinterpret and regulate their responses to potentially aggressive situations (Salmivalli et al., 2021).

Thus, the findings tentatively support the proposition that digital interventions, when aligned with SEL principles, can act as mediating mechanisms rather than mere informational tools.

Digital Modality as a Behavioral Catalyst

Furthermore, the role of the digital e-module deserves closer scrutiny. The intervention was not simply "delivered digitally"; it was structured around interactive, scenario-based, and reflective components, which likely enhanced engagement and cognitive-emotional processing.

This aligns with emerging evidence suggesting that digital learning environments can facilitate deeper behavioral engagement when they simulate real-life social situations (Al Mamun & Lawrie, 2023; Hsu & Lin, 2020). In this study, the inclusion of narrative scenarios and reflective prompts may have enabled students to mentally rehearse alternative responses to conflict, thereby strengthening prosocial behavioral scripts.

Juxtaposing these findings with meta-analytic evidence on digital interventions (Chen et al., 2023; Gaffney et al., 2019), the present study contributes by demonstrating that digital tools are not inherently effective; their impact depends on how well they operationalize psychological mechanisms of change.

Consistency Across Contexts: Ecological Robustness

An intriguing aspect of the results lies in their consistency across four distinct school settings. Despite variations in local conditions, the intervention produced uniformly large effects.

From an ecological perspective, this suggests that the intervention may possess a degree of contextual robustness, functioning effectively across different classroom climates and institutional environments (Espelage & Swearer, 2010; Devries et al., 2015). However, the slight variation in effect sizes indicates that contextual factors—such as teacher facilitation or implementation fidelity—still play a moderating role.

In other words, the intervention appears to be adaptable but not context-neutral. Its success may depend on the alignment between instructional delivery and the social dynamics of the classroom.

Bridging a Critical Gap: Digital SEL in Underrepresented Contexts

One of the more subtle contributions of this study lies in its contextual positioning. Much of the existing literature on bullying prevention is concentrated in Western or high-resource settings, often employing structured programs such as KiVa or PATHS (Salmivalli et al., 2021; Crean & Johnson, 2013).

In contrast, the present study demonstrates that a digitally mediated SEL-based intervention can be effectively implemented in a Global South context, where resources, infrastructure, and pedagogical traditions differ significantly.

This is not merely a replication; it is an adaptation. The integration of locally relevant values, such as harmonious social living, into the intervention design suggests that culturally grounded constructs can

be operationalized within modern digital frameworks.

There is a quiet but important shift here. Rather than importing intervention models wholesale, this study hints at the possibility of reconfiguring them—embedding local meanings into global frameworks. It is not a perfect synthesis, perhaps, but it is a necessary one.

Theoretical Contribution: Toward a Hybrid Intervention Model

Given the above, the study advances a hybrid conceptual contribution:

a Digital Social-Emotional Learning (D-SEL) intervention model

This model integrates:

- SEL competencies (intrapersonal mechanisms)
- ecological sensitivity (contextual moderation)
- digital delivery (instructional medium)

Such integration addresses a recurring fragmentation in the literature, where psychological theory, educational practice, and technological implementation often operate in isolation. By bringing these elements together, the study contributes to a more holistic understanding of intervention design in bullying prevention.

Practical and Policy Implications

From a practical standpoint, the findings suggest that digital e-modules can serve as scalable tools for embedding violence prevention within everyday learning environments. Unlike standalone intervention programs, which may require extensive training and resources, e-modules offer flexibility in integration and delivery.

For policymakers, the implications are equally significant:

- the integration of digital SEL-based content into national curricula
- investment in teacher training for facilitative implementation
- expansion of digital infrastructure to support equitable access

These recommendations align with broader calls for systemic approaches to violence prevention that combine educational, technological, and policy-level interventions (Freeman et al., 2024; Fraguas et al., 2021).

Limitations and Forward Trajectory

Nevertheless, the findings must be interpreted with caution. The absence of a control group limits causal inference, and the relatively short intervention duration precludes conclusions about long-term impact.

Future research should therefore:

- employ randomized controlled designs
- incorporate longitudinal follow-up
- examine mediating variables directly (e.g., empathy scales, behavioral observation)

Such directions are essential to move from evidence of change toward evidence of mechanism and sustainability.

Integrative Closing Reflection

Ultimately, the study suggests that violence prevention in schools cannot rely on isolated strategies. It requires a convergence—of theory, technology, and context. The digital e-module, in this sense, is not the solution in itself. It is, perhaps, a vehicle through which deeper transformations can occur, if designed and implemented with sufficient theoretical and contextual sensitivity. And yet, one might still wonder: Are we observing the beginning of behavioral change, or merely its early signal? The answer, inevitably, lies in what comes next.

CONCLUSION

This study advances the understanding of violence prevention in primary education by demonstrating that a theory-driven digital intervention can meaningfully influence students' orientations toward non-violent and harmonious social behavior. While the empirical findings indicate statistically significant improvements accompanied by very large effect sizes, their contribution extends beyond effectiveness alone. Rather, they suggest that the integration of digital learning environments with Social Emotional Learning (SEL) principles provides a viable pathway for addressing the psychosocial mechanisms underlying bullying and aggression (Durlak et al., 2011; Salmivalli et al., 2021).

From a theoretical standpoint, the study contributes to the emerging discourse on mechanism-based intervention design. By positioning the e-module as an active mediator of change—targeting empathy, self-regulation, and social awareness—it bridges a critical gap between educational technology and behavioral science. Furthermore, by embedding culturally grounded constructs such as harmonious social living into a structured digital framework, the study illustrates how local values can be operationalized within global intervention models, thereby enriching the ecological validity of bullying prevention research (Espelage & Swearer, 2010; Devries et al., 2015).

Practically, the findings indicate that digital e-modules can function as scalable, flexible, and context-sensitive tools for integrating violence prevention into everyday classroom practice. This is particularly relevant in educational systems where resources for intensive intervention programs may be limited, yet digital infrastructure is gradually expanding. Consequently, the study offers actionable implications for educators and policymakers, including the integration of SEL-based digital content into curricula,

investment in teacher facilitation capacity, and the strengthening of school-level implementation systems (Freeman et al., 2024; Fraguas et al., 2021).

Nevertheless, the study remains situated within important limitations. The quasi-experimental design without a control group constrains causal inference, and the relatively short duration of implementation does not allow for assessment of long-term behavioral change. These limitations, however, also signal a clear trajectory for future research: the need for randomized controlled trials, longitudinal designs, and direct measurement of mediating variables to more precisely capture the mechanisms and sustainability of intervention effects.

Perhaps the most important insight is not that the intervention "works," but that it begins to reveal *how* educational environments can be restructured to cultivate non-violent dispositions. The process is gradual, layered, and inevitably imperfect—yet it is within this imperfection that meaningful change often takes root.

In conclusion, this study underscores that effective bullying prevention is not merely a matter of delivering content, but of designing experiences that reshape how children perceive, interpret, and respond to social interaction. The digital SEL-based e-module, in this sense, represents not an endpoint, but a step toward a more integrative and contextually grounded approach to fostering safe, inclusive, and harmonious school environments.

Declarations

Author Contribution

W.T.P. conceptualized the study, conducted the research, analyzed the data, and wrote the main manuscript text. R.H. contributed to the research design, supervision, and critical revision of the manuscript. M.A.P. assisted in data collection, data interpretation, and manuscript editing. All authors reviewed and approved the final version of the manuscript.

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Figures

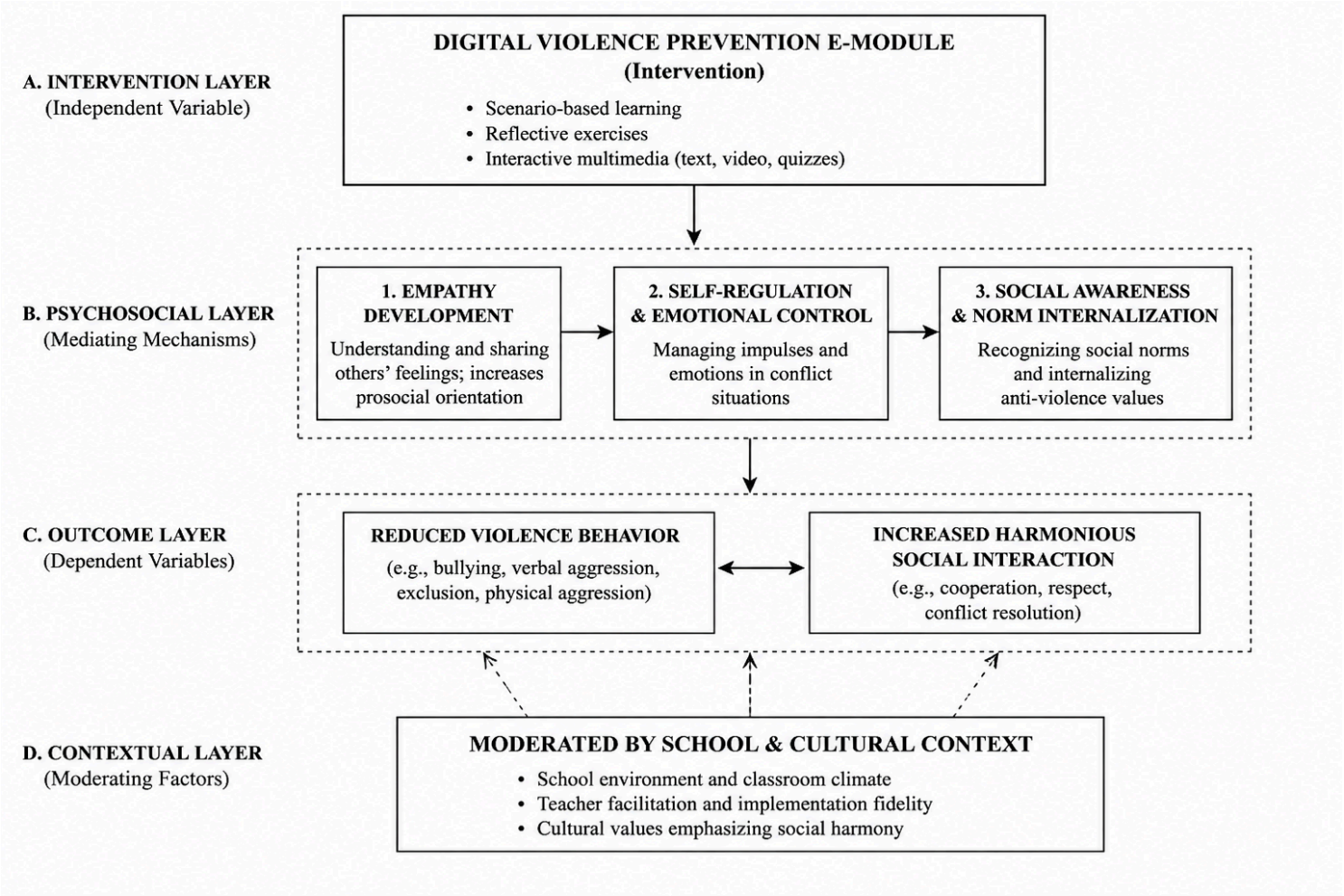


Figure 1

VISUAL SCHEMA