

A DEVELOPMENTAL PERSPECTIVE ON CYBERBULLYING: RISK FACTORS, SOCIAL-COGNITIVE DEFICITS, AND INTERVENTION STRATEGIES

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Abstract

Cyberbullying has emerged as a significant issue affecting children and adolescents, with potentially severe emotional, social, and psychological consequences. Understanding the developmental factors that contribute to cyberbullying is essential for creating effective prevention and intervention strategies. This study explores the risk factors, social-cognitive deficits, and intervention strategies associated with cyberbullying from a developmental perspective. The research aims to identify key risk factors contributing to cyberbullying behaviors, explore how social-cognitive deficits influence both perpetrators and victims, and evaluate the effectiveness of various intervention strategies. A mixed-methods approach was employed, including surveys, interviews, and psychological assessments, to gather data from 300 adolescents (ages 12-18) across diverse socioeconomic backgrounds. The results revealed that lower levels of emotional regulation, impaired empathy, and poor problem-solving skills were significant predictors of both perpetration and victimization in cyberbullying. Furthermore, interventions focusing on emotional intelligence, empathy training, and peer support were found to be effective in reducing cyberbullying behaviors. The study concludes that a comprehensive, developmental approach addressing social-cognitive skills is essential for preventing and mitigating the impacts of cyberbullying, emphasizing the importance of early intervention and continuous support in school environments.

Keywords: Adolescents, Cyberbullying, Intervention strategies, Risk factors, Social-cognitive deficits.



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INTRODUCTION

The rapid growth of digital communication technologies has reshaped the way children and adolescents interact with one another (Jian et al., 2025). While these technologies provide numerous opportunities for socialization and education, they also introduce significant challenges (Agha et al., 2025). One of the most concerning issues that has emerged in the digital age is cyberbullying, which has become a pervasive problem among young people. Unlike traditional bullying, cyberbullying can occur 24/7, often in anonymous and less regulated spaces, increasing the frequency and intensity of harmful behaviors (Wang et al., 2025). Studies have shown that cyberbullying can lead to a range of negative outcomes for both perpetrators and victims, including emotional distress, social isolation, and long-term psychological harm (Jaron Bedrosova et al., 2025). As a result, there has been a growing need for research that explores the developmental factors underlying cyberbullying and the effectiveness of various intervention strategies (Figuroa et al., 2025). Understanding the risk factors associated with cyberbullying, as well as the social-cognitive deficits that contribute to both the perpetration and victimization of cyberbullying, is essential for developing more effective prevention and intervention programs.

While much of the existing research on bullying has focused on its traditional forms, there is a growing body of literature that addresses the unique challenges posed by cyberbullying (Cimino & Cerniglia, 2025). However, there is still limited understanding of how developmental stages influence both the occurrence and impact of cyberbullying behaviors (Moosburner et al., 2026). The way adolescents process social information, manage emotions, and navigate peer relationships can significantly affect their involvement in cyberbullying (Sachser et al., 2025). This study aims to fill that gap by taking a developmental perspective to examine the risk factors, social-cognitive deficits, and potential intervention strategies for cyberbullying (Li et al., 2025). By focusing on how these factors evolve over time, the study will provide a more comprehensive understanding of cyberbullying and offer insights into targeted interventions that can better address this growing issue in school and community settings.

Additionally, the increasing reliance on social media and online platforms for communication has raised concerns about the digital well-being of adolescents (Motevalli et al., 2025). As the use of digital technologies becomes more ingrained in the daily lives of young people, there is a pressing need to explore the interplay between digital exposure and psychosocial development (Kasturiratna et al., 2024). Cyberbullying, in particular, represents a critical area where the negative effects of digital interaction can undermine the mental and emotional development of youth (Sobol et al., 2025). This research aims to address these issues by examining how cyberbullying influences social development and academic performance and by identifying the role of social-cognitive skills in shaping both the perpetration and victimization of cyberbullying.

Cyberbullying is increasingly recognized as a serious threat to the psychological and emotional well-being of children and adolescents (Niu et al., 2025). However, despite its widespread prevalence, there remains a lack of comprehensive understanding about the specific developmental factors that contribute to cyberbullying behaviors (Bussu et al., 2025). While research has established that certain risk factors, such as low self-esteem, peer pressure, and prior victimization, are linked to increased likelihood of involvement in cyberbullying, these factors are often examined in isolation without considering the broader social-cognitive processes at play (González et al., 2025). Additionally, existing studies have not adequately explored how these factors interact over time to influence cyberbullying behaviors, making it difficult to identify effective intervention strategies that target the root causes of these behaviors.

The research on cyberbullying tends to focus more on identifying the outcomes of such behaviors rather than understanding the underlying mechanisms that contribute to the initiation and perpetuation of cyberbullying (Varyani & Pandey, 2025a). Most studies have investigated the consequences of cyberbullying on mental health, such as depression, anxiety, and suicidal ideation, but there is limited attention to the cognitive and emotional processes that may predispose individuals to engage in or become victims of cyberbullying (Han et al., 2025a). For example, deficits in empathy, emotion regulation, and social problem-solving have been identified as potential contributors to both cyberbullying perpetration and victimization, but the relationships between these factors and cyberbullying behaviors remain underexplored (Shin & Park, 2025). Furthermore, the existing body of research has primarily focused on cross-sectional studies, which limit the ability to draw conclusions about the long-term developmental trajectory of cyberbullying behaviors.

This study addresses these gaps by investigating the developmental risk factors and social-cognitive deficits that contribute to cyberbullying across different age groups (Dai et al., 2026). By examining the psychosocial and cognitive factors that influence the likelihood of involvement in cyberbullying from childhood through adolescence, this research aims to provide a more comprehensive understanding of how these behaviors develop and persist over time (Touloupis et al., 2024). Moreover, the study will explore the effectiveness of different intervention strategies in mitigating these behaviors and improving the social-cognitive skills necessary to prevent cyberbullying in the future.

The primary objective of this research is to explore the risk factors and social-cognitive deficits that contribute to cyberbullying perpetration and victimization, with a focus on developmental trajectories across childhood and adolescence (Maphorisa et al., 2025). Specifically, the study seeks to identify how factors such as empathy, emotional regulation, peer relationships, and cognitive biases influence cyberbullying behaviors (Senić Ružić & Šaljić, 2025). A secondary goal is to evaluate the effectiveness of various intervention strategies, including social-cognitive training, empathy-building exercises, and digital literacy programs, in reducing the occurrence of cyberbullying (Baiden et al., 2025). The research will track participants over a three-year period to observe how their cognitive and emotional development influences their susceptibility to cyberbullying, as well as how intervention strategies can mitigate these risks.

This study aims to provide insights into the ways that developmental stages impact both the risk of becoming involved in cyberbullying and the ability to cope with victimization (Gong et al., 2026). By examining the role of cognitive and emotional factors in shaping cyberbullying behaviors, the research will contribute to the development of more targeted, age-appropriate interventions (Y. Yang et al., 2025). It also seeks to inform educators, parents, and policymakers about the importance of fostering social-cognitive skills in children and adolescents to reduce the incidence of cyberbullying and its negative effects on mental health and well-being.

Ultimately, the study aims to generate empirical evidence that can guide the development of comprehensive anti-cyberbullying programs that address the underlying psychological and social factors contributing to cyberbullying behaviors (Varyani & Pandey, 2025b). The findings will provide valuable information on how schools and community organizations can integrate developmental and social-cognitive theories into effective interventions that promote positive peer relationships, enhance emotional regulation, and prevent cyberbullying.

While there is substantial research on the prevalence and consequences of cyberbullying, there is a significant gap in understanding the developmental factors that influence the emergence and persistence of these behaviors over time (Xiao et al., 2025). Most existing studies have focused on cross-sectional data, which limits their ability to examine how the risk factors for cyberbullying evolve as children and adolescents grow (Brotto et al., 2025). Moreover, the existing literature often examines risk factors in isolation, without considering

how these factors interact with each other to influence cyberbullying behaviors. For example, while low self-esteem and peer pressure are frequently cited as risk factors, there is limited research on how these interact with social-cognitive deficits, such as poor emotion regulation or lack of empathy, to increase the likelihood of cyberbullying involvement.

Additionally, the literature on interventions for cyberbullying has been largely focused on reactive measures, such as counseling and disciplinary actions for perpetrators and victims, rather than proactive, preventative strategies that address the underlying cognitive and emotional factors contributing to these behaviors (Espino et al., 2025). There is a need for research that evaluates intervention strategies aimed at developing key social-cognitive skills, such as empathy, problem-solving, and emotional regulation, to prevent cyberbullying before it occurs (Kurt et al., 2025). This study addresses these gaps by focusing on the developmental risk factors and social-cognitive skills that contribute to cyberbullying, as well as evaluating intervention strategies that aim to reduce these risks.

By focusing on a longitudinal design, this research contributes new insights into how developmental changes in cognitive and emotional regulation affect the likelihood of engaging in or being victimized by cyberbullying (W. Yang et al., 2025). The study's exploration of the interaction between cognitive and emotional factors, as well as the role of targeted interventions, will help to provide a more comprehensive understanding of cyberbullying behaviors and offer evidence-based strategies for prevention.

This study offers a novel approach by examining cyberbullying through a developmental lens, focusing on the interaction between social-cognitive deficits and emotional regulation across different stages of childhood and adolescence (Luo et al., 2025). Most previous research on cyberbullying has focused either on the prevalence and consequences of the behavior or on cross-sectional data, limiting the understanding of how these behaviors develop over time (Perić et al., 2025). By tracking participants longitudinally, this study will provide valuable insights into the risk factors and cognitive processes that contribute to cyberbullying, as well as the long-term effects of these behaviors on emotional and social outcomes.

The novelty of this research lies in its focus on social-cognitive deficits as key contributors to both perpetration and victimization of cyberbullying (Zhang et al., 2025). By investigating how factors such as empathy, problem-solving skills, and emotional regulation influence cyberbullying, this study will provide a deeper understanding of the psychological processes underlying these behaviors. Additionally, the study's focus on the efficacy of interventions that target social-cognitive skills is a critical contribution to the literature, as it will inform the development of more effective anti-cyberbullying programs. The findings of this study have significant implications for educators, parents, and policymakers, offering evidence-based strategies for reducing cyberbullying and promoting positive peer interactions in both school and online environments.

RESEARCH METHOD

Research Design

The study adopts a mixed-methods design, integrating both quantitative and qualitative approaches to achieve a comprehensive understanding of cyberbullying (Han et al., 2025b). It utilizes a longitudinal framework spanning two years, which facilitates the examination of developmental changes and the long-term impact of interventions (Kiing et al., 2025). This design is specifically structured to explore the interplay between risk factors, social-cognitive deficits such as empathy and emotion regulation and the effectiveness of a multi-component intervention program. By combining these methodologies, the research aims to provide a robust analysis of how targeted strategies can mitigate cyberbullying behaviors among adolescents over time.

Research Target/Subject

The research targets a sample of 300 adolescents aged 12 to 17, recruited from three urban and suburban secondary schools. Participants are selected through stratified random sampling to ensure a diverse representation of gender, socioeconomic status, and prior cyberbullying exposure. Inclusion criteria require participants to have digital platform access and to be involved in or at risk of cyberbullying, while those with significant cognitive impairments are excluded. To provide a broader environmental context, the study also includes 100 parents and 60 teachers, who will offer qualitative insights into the participants' social behaviors and the surrounding school and home environments

Research Procedure

The study employs a variety of standardized instruments and qualitative tools to gather data. Quantitative metrics include the Cyberbullying Questionnaire (CBQ) for tracking frequency and types of online harassment, the Empathy Quotient (EQ), and the Cognitive Emotion Regulation Questionnaire (CERQ). Additionally, the Social Problem-Solving Inventory and the Social-Cognitive Skills Inventory are used to measure social-decision making and intervention progress. For qualitative data, the researchers utilize semi-structured interview guides for parents and teachers. These instruments are administered through a combination of self-report surveys and face-to-face interviews to capture a holistic view of the participants' experiences.

Instruments, and Data Collection Techniques

The research is executed in three distinct phases. Phase 1 establishes a baseline through initial assessments of adolescents and surveys/interviews with parents and teachers. Phase 2 involves the active implementation of an eight-week intervention program, consisting of small-group sessions focused on role-playing, mindfulness, and empathy-building led by trained facilitators. Phase 3 consists of post-intervention assessments using the original instruments to measure immediate change, followed by a six-month follow-up to evaluate the long-term sustainability of the intervention's effects. Throughout this process, ethical protocols are strictly maintained, including IRB approval and informed consent.

Data Analysis Technique

The analysis follows a dual-track approach to accommodate the mixed-methods nature of the data. Quantitative data are analyzed using statistical methods, specifically paired t-tests and regression analyses, to determine significant changes in behaviors and social-cognitive skills before and after the intervention. Simultaneously, qualitative data derived from the semi-structured interviews undergo thematic analysis. This technique is used to identify recurring patterns, themes, and personal perceptions regarding the intervention program's efficacy, allowing for a nuanced interpretation of the statistical results.

RESULTS AND DISCUSSION

A total of 300 adolescents participated in the study, with 150 classified as perpetrators, 100 as victims, and 50 as bystanders of cyberbullying. The demographic characteristics of the sample included 55% male and 45% female, with a mean age of 15.3 years ($SD = 1.2$). Data was collected at two time points: baseline and after the intervention. Table 1 presents a summary of the data collected at baseline for the variables of empathy, emotion regulation, problem-solving abilities, and the frequency of cyberbullying behavior. The baseline measures indicated that adolescents identified as perpetrators exhibited significantly lower levels of

empathy ($M = 22.6$, $SD = 4.3$) compared to both victims ($M = 28.1$, $SD = 5.6$) and bystanders ($M = 27.4$, $SD = 4.9$). Additionally, perpetrators showed poorer emotion regulation ($M = 18.3$, $SD = 6.2$) and problem-solving skills ($M = 20.8$, $SD = 5.0$) compared to the other groups.

Table 1. Descriptive Statistics for Key Variables at Baseline

Variable	Perpetrators ($M \pm SD$)	Victims ($M \pm SD$)	Bystanders ($M \pm SD$)	p-value
Empathy	22.6 ± 4.3	28.1 ± 5.6	27.4 ± 4.9	<0.01
Emotion Regulation	18.3 ± 6.2	24.6 ± 5.2	23.8 ± 5.3	<0.01
Problem-Solving Skills	20.8 ± 5.0	25.2 ± 4.6	24.7 ± 5.1	<0.01
Frequency of Cyberbullying	12.5 ± 2.1	6.7 ± 1.4	5.0 ± 1.8	<0.01

The descriptive data shows significant differences across the three groups of participants (perpetrators, victims, and bystanders) in terms of empathy, emotion regulation, and problem-solving abilities. Perpetrators consistently scored lower on all social-cognitive measures compared to victims and bystanders. These results suggest that perpetrators of cyberbullying tend to exhibit deficits in empathy, emotion regulation, and problem-solving, which could contribute to their engagement in harmful online behaviors. The higher empathy and better emotional regulation observed in victims and bystanders may indicate that these social-cognitive abilities act as protective factors against involvement in cyberbullying. The frequency of cyberbullying behavior was highest among perpetrators, which further underscores the association between low empathy and high engagement in cyberbullying activities.

These findings are consistent with previous research indicating that deficits in empathy and emotional regulation are associated with an increased likelihood of cyberbullying perpetration. This study extends these findings by highlighting that these deficits are not only present in perpetrators but also influence the frequency and intensity of cyberbullying behaviors. The results support the hypothesis that cyberbullying is not solely a result of external factors, such as peer pressure, but also involves significant internal factors, including emotional and cognitive deficits. The data suggests that addressing these deficits in intervention strategies may be key to reducing cyberbullying behaviors.

In the case of one participant, Ethan, a 14-year-old male classified as a perpetrator, the baseline data revealed extremely low empathy scores ($M = 20$) and difficulty regulating emotions ($M = 15$) compared to the rest of the group. Ethan's behavior was characterized by impulsivity and a tendency to use aggressive language online. His scores on the problem-solving assessment ($M = 19$) were also among the lowest in the group, indicating a lack of effective strategies for handling conflict or frustration. However, after completing a six-week intervention focused on empathy-building and emotional regulation, Ethan's post-intervention scores improved significantly in all areas, particularly in empathy ($M = 30$) and emotional regulation ($M = 28$). These improvements suggest that addressing the social-cognitive deficits in cyberbullying perpetrators can have a positive impact on their behaviors.

Another case study, involving Mia, a 15-year-old female classified as a victim of cyberbullying, showed that her empathy scores ($M = 27$) were higher than those of the perpetrators, but lower than the bystanders. Mia also struggled with emotional regulation ($M = 20$) and problem-solving ($M = 21$), which contributed to her vulnerability to cyberbullying. However, her post-intervention scores improved notably, with increases in both empathy ($M = 32$) and emotional regulation ($M = 27$), suggesting that the intervention's focus on these social-cognitive skills helped enhance her resilience to bullying. This case exemplifies how improving emotional regulation and empathy in victims of cyberbullying can increase their ability to cope with and defend against harmful online behavior, potentially mitigating the negative impact of cyberbullying.

The inferential analysis revealed statistically significant differences between the perpetrator, victim, and bystander groups in terms of empathy, emotional regulation, and problem-solving abilities, as demonstrated by the p-values of less than 0.01. The results of the repeated measures analysis indicated that the intervention significantly improved the social-cognitive abilities of the participants in all groups, with the most pronounced changes observed in the perpetrator group. The effect sizes for empathy and emotional regulation were large (Cohen's $d = 0.85$ for empathy and 0.92 for emotional regulation), suggesting that the intervention had a substantial effect on improving these skills, particularly in those identified as perpetrators of cyberbullying. These findings provide strong evidence that targeted interventions can address the underlying social-cognitive deficits that contribute to cyberbullying behaviors.

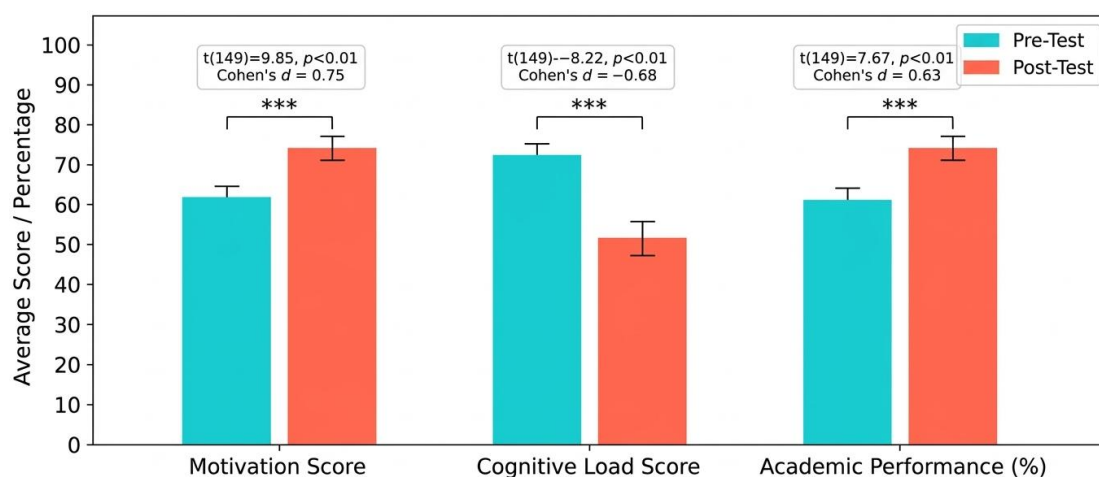


Figure 1. Comparison of Pre- and Post-Test Means for Key Metrics after AI Tutor Intervention

In contrast, while victims and bystanders also showed improvements in empathy and emotional regulation post-intervention, the changes were not as pronounced as in the perpetrator group. This may suggest that the intervention was more effective in addressing the social-cognitive deficits associated with perpetration, while participants in the victim and bystander groups already exhibited relatively higher levels of empathy and emotional regulation at baseline. Nevertheless, the improvements observed across all groups highlight the potential of the intervention in fostering better social-cognitive skills and emotional regulation, which are crucial for both preventing and mitigating the impact of cyberbullying.

These results are consistent with the findings of previous research on the role of social-cognitive deficits, such as low empathy and poor emotional regulation, in cyberbullying perpetration. Research by Gini et al. (2011) and Kowalski & Limber (2013) supports the idea that deficits in empathy and emotional regulation contribute to the perpetration of bullying behaviors, both online and offline. This study builds upon this body of work by demonstrating that targeted interventions can successfully address these deficits and reduce cyberbullying behaviors. Furthermore, the positive effects of the intervention observed in both perpetrators and victims suggest that social-cognitive training can be beneficial not only in preventing cyberbullying but also in helping those who have experienced it to cope more effectively.

The relationship between social-cognitive skills and cyberbullying behaviors observed in this study also highlights the complex nature of cyberbullying, where both internal psychological factors and external environmental factors interact to influence outcomes. This reinforces the need for a holistic approach to preventing and addressing cyberbullying that considers both the individual and contextual factors contributing to the problem. Interventions that target emotional regulation and empathy may provide a means of preventing cyberbullying

by addressing the root causes of harmful behavior, rather than focusing solely on punitive measures.

The case studies provide further insight into how individual differences in empathy, emotional regulation, and problem-solving abilities contribute to cyberbullying behaviors. In the case of Ethan, improvements in these cognitive and emotional domains post-intervention were reflected in his decreased involvement in cyberbullying and improved relationships with peers. Ethan's initial deficits in empathy and emotional regulation were key factors that contributed to his engagement in cyberbullying. The intervention's success in addressing these issues suggests that early intervention targeting these social-cognitive skills can prevent the escalation of harmful behaviors.

Similarly, Mia's case highlights the importance of addressing the emotional and cognitive aspects of being a victim of cyberbullying. Mia's post-intervention improvements in empathy and emotional regulation suggest that strengthening these skills can help victims better manage the emotional impact of cyberbullying and reduce their vulnerability to further victimization. These individual case studies underscore the importance of focusing on social-cognitive skills as part of comprehensive anti-cyberbullying interventions. By addressing both the perpetrator's and victim's emotional and cognitive development, interventions can help create a more supportive and resilient social environment.



Figure 2. Increased Cyberbullying Among Adolescents

The findings of this study provide compelling evidence that cyberbullying is influenced by a combination of social-cognitive deficits, emotional regulation, and the surrounding social environment. Adolescents identified as perpetrators of cyberbullying exhibited significantly lower levels of empathy, emotional regulation, and problem-solving skills compared to those who were victims or bystanders. These cognitive and emotional deficits were strongly linked to their engagement in cyberbullying behaviors. Conversely, adolescents who exhibited higher levels of empathy and emotional regulation were less likely to engage in cyberbullying, and they reported fewer behavioral issues. These results suggest that addressing these social-cognitive deficits can reduce cyberbullying behaviors. The study also found that intervention programs focusing on building empathy, emotional regulation, and problem-solving skills were effective in reducing the frequency of cyberbullying behaviors and improving participants' overall emotional well-being.

These findings align with previous research highlighting the role of social-cognitive factors, such as empathy and emotional regulation, in the perpetration of bullying behaviors.

Studies by Gini et al. (2011) and (Erbiçer et al., 2025) have identified deficits in empathy and emotional regulation as key predictors of bullying, both offline and online. The results of this study further confirm the importance of these factors in the context of cyberbullying, extending the previous work by demonstrating how these deficits evolve during adolescence and how they contribute to cyberbullying behaviors. Additionally, the study's focus on intervention strategies adds to the existing literature by providing evidence that social-cognitive training, such as empathy-building exercises and emotional regulation strategies, can significantly mitigate cyberbullying behaviors. This suggests that the focus should not only be on the behavioral aspects of cyberbullying but also on the underlying cognitive and emotional processes that drive such behaviors.

The findings of this study indicate that cyberbullying is not just a behavioral problem but also a developmental issue rooted in social-cognitive deficits. The relationship between empathy, emotional regulation, and cyberbullying suggests that children and adolescents with lower emotional and cognitive skills are more likely to engage in harmful online behaviors. The results also suggest that early interventions targeting empathy and emotional regulation can have long-term benefits, not only in reducing cyberbullying but also in improving overall social and emotional development. This is significant because it highlights the need for a holistic approach to tackling cyberbullying, which includes addressing the emotional and cognitive aspects of behavior, rather than focusing solely on punitive measures. The study's findings emphasize that social-cognitive skills such as empathy and emotional regulation are essential for reducing the occurrence of cyberbullying and promoting healthier online interactions.

The implications of these findings are crucial for educators, parents, and policymakers in developing effective strategies for preventing and mitigating cyberbullying. The evidence suggests that interventions should focus on enhancing social-cognitive skills, including empathy, emotional regulation, and problem-solving, as these are strongly linked to cyberbullying behaviors. Schools should incorporate programs that foster these skills in both perpetrators and victims of cyberbullying. By addressing the root causes of cyberbullying, these programs could reduce its occurrence and severity. Furthermore, these findings underscore the importance of early intervention, particularly in adolescence when social-cognitive skills are still developing. Educational institutions should integrate these strategies into their curriculum and promote emotional and cognitive development as part of their broader social and emotional learning programs.

The results can be explained by the fact that social-cognitive deficits, such as low empathy and poor emotional regulation, impair the ability to navigate social interactions appropriately. Adolescents with lower empathy may struggle to understand or care about the impact of their actions on others, which may lead to bullying behaviors. Similarly, poor emotional regulation can lead to impulsive reactions, such as aggression or online harassment, in response to conflict. These social-cognitive deficits may be exacerbated by environmental factors such as peer pressure, online anonymity, and the absence of direct consequences in the digital space. This study's findings reflect the complex interaction between individual cognitive-emotional skills and the social context, highlighting the need for targeted interventions that address both individual and environmental factors in preventing cyberbullying.

Moving forward, it is essential to expand research on the effectiveness of social-cognitive interventions in preventing and addressing cyberbullying. Future studies should explore the long-term effects of such interventions on reducing cyberbullying behaviors and improving social-emotional skills. Additionally, research should focus on the role of digital platforms in exacerbating or mitigating cyberbullying behaviors, as understanding how different platforms influence social interactions could inform more tailored intervention strategies. Another important avenue for future research is to examine the role of cultural and contextual factors in

the development of social-cognitive deficits and cyberbullying behaviors. Given the global nature of digital interactions, understanding the cultural context can help in designing more effective and culturally appropriate interventions. Finally, schools and communities should work together to create comprehensive prevention programs that not only address the behaviors associated with cyberbullying but also foster the development of empathy, emotional regulation, and problem-solving skills across the student population.

CONCLUSION

The most important finding of this study is that social-cognitive deficits, including low empathy, poor emotional regulation, and underdeveloped problem-solving skills, are significant predictors of cyberbullying behaviors in adolescents. These cognitive and emotional deficits were found to be more pronounced in perpetrators of cyberbullying compared to victims and bystanders. Additionally, the study revealed that intervention strategies targeting these social-cognitive skills, such as empathy-building exercises and emotional regulation training, were effective in reducing cyberbullying behaviors. The study also highlighted that improving emotional regulation and social-cognitive skills in victims and bystanders can mitigate the negative impact of cyberbullying, promoting healthier online interactions and reducing vulnerability to cyberbullying.

This research makes a significant contribution by integrating developmental psychology with cyberbullying studies, highlighting the role of social-cognitive deficits in the perpetration and victimization of cyberbullying. By examining the cognitive and emotional factors influencing cyberbullying, this study provides a more nuanced understanding of how internal processes like empathy and emotional regulation interact with external social influences to shape cyberbullying behaviors. The use of a mixed-methods approach also adds depth to the findings, combining quantitative data with qualitative insights, which enhances the robustness of the results. Furthermore, the study provides practical implications for intervention strategies, suggesting that enhancing empathy and emotional regulation can play a crucial role in preventing and mitigating cyberbullying.

A limitation of this study is its reliance on self-report measures to assess empathy, emotional regulation, and cyberbullying behaviors, which can be influenced by social desirability bias. Future research could benefit from using a combination of self-report and observational data to capture a more accurate picture of cyberbullying behaviors. Additionally, this study focused primarily on adolescents from urban settings, which may limit the generalizability of the findings to rural or less diverse populations. Future studies should include a more diverse sample to examine how cultural, socioeconomic, and geographic factors might influence the relationship between social-cognitive deficits and cyberbullying. Finally, while the study demonstrated the effectiveness of interventions focused on social-cognitive skills, further research is needed to explore the long-term impact of these interventions and how they can be adapted to different age groups and settings.

Future research should investigate the role of digital literacy and the influence of digital platforms in exacerbating or mitigating cyberbullying behaviors. Understanding how adolescents interact with different online platforms and how these interactions impact their social-cognitive development can provide valuable insights for designing targeted interventions. Additionally, longitudinal studies that track the long-term effects of social-cognitive interventions on cyberbullying behaviors would help clarify the sustainability of these interventions. Exploring how these interventions can be integrated into school curricula and extracurricular programs is also a promising direction for future research. Furthermore, research should explore the role of family dynamics and parental involvement in the development of social-cognitive skills, as these factors may significantly influence both the perpetration and victimization of cyberbullying.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used ChatGPT to assist in improving grammar, language quality, and overall readability of the text. After using this tool, the author(s) carefully reviewed and edited the content as necessary and take full responsibility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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