

Fitting a Conceptual Model of the Relationship of Basic Psychological Needs and Peer Group Attachment with Cyberbullying: The Mediating Role of Empathy among Upper Secondary School Students

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Article Info

Article type:

Original Research

How to cite this article:

Fozooni, F., Bagheri, N., & Ghodsi, P. (2027). Fitting a Conceptual Model of the Relationship of Basic Psychological Needs and Peer Group Attachment with Cyberbullying: The Mediating Role of Empathy among Upper Secondary School Students. *Journal of Adolescent and Youth Psychological Studies*, 8(3), 1-16.

<http://dx.doi.org/10.61838/kman.jayps.6257>



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ABSTRACT

Objective: This study aimed to test the fit of a conceptual model of the relationships of basic psychological needs and peer group attachment with cyberbullying and to examine the mediating role of empathy among upper secondary school students.

Methods and Materials: This applied, descriptive-correlational study used path analysis. The statistical population consisted of upper secondary school students in Tehran, Iran, during the 2025–2026 academic year. Using multistage cluster random sampling, 420 students were initially recruited, and after data screening, 260 valid cases were included in the final analyses. Data were collected using the Adolescent Measure of Empathy and Sympathy, the Basic Psychological Needs Scale, the Peer Attachment Questionnaire, and the Cyberbullying and Cybervictimization Experiences Questionnaire. Data were analyzed using descriptive statistics, Pearson correlations, and path analysis with SPSS and AMOS version 26. Model fit was evaluated using χ^2/df , RMSEA, GFI, AGFI, NFI, CFI, IFI, and TLI, and indirect effects were tested using bootstrap confidence intervals.

Findings: The proposed model demonstrated an acceptable fit to the data ($\chi^2/df = 1.84$, RMSEA = .057, GFI = .95, AGFI = .92, NFI = .94, CFI = .96, IFI = .96, TLI = .95). Basic psychological needs positively predicted empathy ($\beta = .35$, $p < .001$) and negatively predicted cyberbullying ($\beta = -.21$, $p = .001$). Peer group attachment also positively predicted empathy ($\beta = .30$, $p < .001$) and negatively predicted cyberbullying ($\beta = -.18$, $p = .002$). Empathy had a significant negative effect on cyberbullying ($\beta = -.29$, $p < .001$). Bootstrap analyses confirmed significant indirect effects of basic psychological needs ($\beta = -.10$, 95% CI [-.162, -.054]) and peer group attachment ($\beta = -.09$, 95% CI [-.143, -.045]) on cyberbullying through empathy.

Conclusion: Basic psychological needs and secure peer attachment may reduce cyberbullying both directly and indirectly by strengthening empathy, highlighting the importance of need-supportive, peer-supportive, and empathy-based interventions in secondary schools.

Keywords: Basic Psychological Needs; Peer Group Attachment; Empathy; Cyberbullying; Adolescents; Path Analysis

1. Introduction

The rapid expansion of digital technologies, smartphones, social networking platforms, and online communication has transformed the social environment in which adolescents establish relationships, construct identities, and interact with peers. Although these technologies have created opportunities for communication, learning, social participation, and access to supportive networks, they have also generated new contexts in which interpersonal aggression can occur beyond the physical boundaries of school. Cyberbullying is one of the most important manifestations of such aggression and generally refers to deliberate and repeated harmful behavior conducted through digital communication technologies against individuals who may experience difficulty defending themselves. Unlike traditional forms of bullying, cyberbullying can occur continuously, reach a large and potentially anonymous audience, transcend geographical boundaries, and persist through stored or repeatedly shared digital content. These characteristics may amplify both the psychological consequences of victimization and the social reinforcement available to perpetrators. Accordingly, cyberbullying has increasingly been recognized as an important developmental, educational, and mental health concern among adolescents (Hmelak, 2025; Rahmati & Seyfi, 2022).

Adolescence is a particularly important developmental period for investigating cyberbullying because social evaluation, peer acceptance, identity development, autonomy, and belonging become increasingly salient during this stage. Adolescents spend substantial amounts of time interacting with peers both face-to-face and through digital environments, and online platforms frequently serve as extensions of their school-based social networks. Consequently, interpersonal dynamics established in classrooms and peer groups may be transferred to online settings, where aggression, exclusion, humiliation, rumor spreading, threatening messages, and other hostile behaviors can be enacted with fewer immediate social constraints. Research indicates that cyberbullying should not be understood as a phenomenon isolated from offline social relationships; rather, it is embedded within broader patterns of peer influence, social learning, group norms, and adolescent adjustment (Barlett, 2024; Kim et al., 2022). This perspective highlights the importance of identifying psychological and interpersonal mechanisms that may either

increase vulnerability to cyber-aggressive behavior or protect adolescents from engaging in it.

Peer relationships are among the most influential social contexts during adolescence. As young people progressively seek greater independence from parents and become more oriented toward their peer groups, the quality and structure of peer relationships may substantially shape behavioral choices, emotional regulation, social norms, and perceptions of acceptable conduct. Secure peer attachment characterized by trust, communication, emotional support, and a sense of belonging may provide adolescents with opportunities to learn cooperation, conflict resolution, perspective taking, and reciprocal respect. Conversely, peer alienation, rejection, affiliation with aggressive peers, or pressure to conform to antisocial norms may increase the likelihood of maladaptive behavior. Evidence from cyberbullying research has consistently emphasized that peers can function both as sources of risk and as sources of protection. For example, association with deviant peers has been linked to increased cyberbullying perpetration, partly through weakened self-control and moral disengagement (Liang et al., 2022; Wang et al., 2023). Similarly, longitudinal and path-based evidence suggests that deviant peer affiliation can facilitate the transition from conventional bullying behavior to aggression in digital environments (Kim et al., 2022).

Social learning processes offer one explanation for why peer contexts may exert such a strong influence on cyberbullying. Adolescents may observe aggressive conduct among peers, interpret such behavior as socially rewarded or normative, and imitate it when reinforcement is available. Barlett showed that peer and parental cyberbullying behavior, together with reinforcement of cyberbullying, can interact in the social learning of cyberbullying perpetration, suggesting that adolescents' online aggression is partly shaped by the behavioral models and contingencies embedded in their immediate social environment (Barlett, 2024). Peer conformity may further intensify this process, particularly when adolescents perceive antisocial behavior as necessary for maintaining group status or acceptance. Evidence indicates that parental monitoring may reduce cyberbullying partly through pathways involving self-control and conformity to antisocial peer behavior, underscoring the central role of peer processes in the development of online aggression (Lim & Huh, 2024). Therefore, peer group attachment cannot be considered only in terms of the quantity of social contact; rather, the

emotional quality of peer relationships and the degree to which adolescents experience acceptance, trust, communication, and alienation may be especially relevant.

At the same time, strong peer connectedness may serve a protective role. Adolescents who perceive their relationships as supportive and emotionally secure may have greater access to assistance when experiencing interpersonal difficulties and may be less dependent on aggressive behavior to achieve social recognition. Research on bullying-related outcomes has shown that peer connectedness, together with school and parental connectedness, can buffer severe psychological risks associated with traditional and cyberbullying experiences (Dadras & Takashi, 2024). Peer support has also been identified as important in coping with psychological difficulties related to cyberbullying, emphasizing that social relationships can facilitate recovery and resilience rather than merely create behavioral risk (Shabbir & Farzand, 2022). Thus, the relationship between peers and cyberbullying is complex: affiliation with deviant or aggression-supportive peers can increase cyberbullying, whereas supportive, trusting, and securely connected peer relationships may reduce risk. Examining peer attachment as a broader relational construct may therefore provide insight into the protective social mechanisms associated with lower cyberbullying involvement.

Beyond interpersonal relationships, adolescents' behavior is also influenced by the extent to which their fundamental psychological needs are satisfied. Self-determination theory proposes that psychological functioning depends substantially on satisfaction of three basic needs: autonomy, competence, and relatedness. Autonomy refers to experiencing behavior as volitional and self-endorsed, competence concerns feeling effective and capable in interactions with the environment, and relatedness reflects a sense of belonging, connection, and meaningful interpersonal attachment. When these needs are adequately satisfied, individuals are more likely to demonstrate adaptive motivation, psychological well-being, effective self-regulation, and constructive social functioning. Conversely, chronic frustration or deprivation of these needs may contribute to maladjustment, compensatory behavior, dysregulated internet use, and difficulties in social and emotional functioning. Studies among adolescents and students have supported the central role of basic psychological needs in well-being, academic adaptation, motivation, and mental health (Khodashahi, 2024;

Mohamadinikoo & Tamannaefar, 2024; Turgeon et al., 2024).

The educational environment is one of the principal settings in which these needs are either supported or frustrated. Adolescents' sense of competence may be reinforced by successful academic and social experiences, autonomy may be strengthened by opportunities for meaningful choice and self-directed action, and relatedness may emerge through supportive relationships with classmates, teachers, and family members. Recent educational research indicates that students themselves describe well-being at school in ways closely associated with satisfaction of basic psychological needs, reinforcing their relevance for understanding adolescent functioning in school contexts (Klemp et al., 2025). Similarly, interventions or instructional environments that strengthen autonomy, competence, and relatedness can improve motivational outcomes among secondary school students (Sotos-Martínez et al., 2024). These findings suggest that basic psychological needs are not abstract intrapersonal characteristics but developmental experiences closely linked to the quality of adolescents' social and educational environments.

Basic psychological needs may also be relevant to cyberbullying specifically. Adolescents whose needs for belonging, effectiveness, or autonomy are not sufficiently satisfied may seek alternative sources of status, control, recognition, or social connection through online behavior. Cyber-aggression may in some cases function as a maladaptive strategy for asserting dominance, regulating negative emotions, securing peer attention, or compensating for unmet relational needs. Iranian evidence has directly suggested that basic psychological needs can contribute to the prediction of cyberbullying, indicating that lower satisfaction of these needs may be associated with greater involvement in cyber-aggressive behavior (Afkaneh & Mosta'ed, 2023). Furthermore, research on cyberbullying victimization has demonstrated that satisfaction of basic psychological needs can operate as an important psychological mechanism linking adverse online experiences to subsequent maladaptive outcomes, including non-suicidal self-injury (Geng et al., 2022). These findings reinforce the idea that need satisfaction may constitute both a resilience factor and a theoretically meaningful explanatory variable in the broader ecology of cyberbullying.

The psychological importance of basic needs may also be understood in relation to adolescents' broader emotional and

motivational development. When adolescents feel autonomous, competent, and securely connected to others, they are more likely to possess the emotional resources necessary for adaptive decision-making and effective social engagement. Research on students has demonstrated meaningful associations between psychological resources, mental health, and academic motivation, emphasizing that emotional and motivational functioning are closely intertwined during adolescence and the transition to adulthood (Hussein, 2021). In a similar vein, satisfaction of psychological needs has been associated with healthier developmental outcomes across school and extracurricular settings, whereas unmet needs may increase susceptibility to dysregulated or compensatory behavior (Khodashahi, 2024; Turgeon et al., 2024). These patterns provide a basis for expecting basic psychological needs to be inversely associated with cyberbullying behavior.

However, neither basic psychological needs nor peer attachment is likely to influence cyberbullying exclusively through direct pathways. One important mechanism that may explain how these psychological and social factors translate into online behavior is empathy. Empathy generally involves the capacity to understand another person's emotional or psychological state, share or resonate with another person's feelings, and respond with appropriate concern or sympathy. Cognitive empathy allows individuals to recognize and understand others' perspectives and internal states, whereas affective empathy involves emotional responsiveness to others' experiences. Sympathy or empathic concern extends these processes toward compassionate responses. In the context of bullying, empathy is particularly important because aggressive online behavior often involves psychological distancing from the victim. When adolescents accurately understand and emotionally respond to another person's distress, the likelihood of intentionally causing harm may be reduced.

Digital environments may weaken some natural cues that ordinarily facilitate empathic inhibition of aggression. Online communication often lacks facial expressions, tone of voice, immediate emotional feedback, and visible consequences of harmful actions. This reduced social presence can make it easier for adolescents to underestimate victims' distress, morally disengage from the consequences of their behavior, or interpret aggressive exchanges as harmless entertainment. Accordingly, empathy may represent a critical protective resource in online interactions. Higher empathy can increase sensitivity to the consequences of hostile messages, exclusion, ridicule, and public

humiliation, while lower empathy may reduce the emotional costs associated with aggressive behavior. Developmental evidence further suggests that empathy is not static but is shaped over time through close relationships and social experiences. Support from mothers and peers during adolescence has been linked with later empathic functioning and interpersonal outcomes, illustrating the developmental embedding of empathy within relational contexts (Stern et al., 2024).

Peer relationships may therefore affect cyberbullying partly because they contribute to the development or expression of empathy. Adolescents embedded in supportive, communicative, and trustworthy peer relationships may have greater opportunities to engage in perspective taking, emotional disclosure, reciprocal support, and understanding of others' experiences. Social-cognitive interventions targeting empathy and peer relationships have demonstrated that these capacities can be strengthened together, supporting the view that empathic functioning and peer relationship quality are dynamically interconnected (Öztop et al., 2024). Conversely, social environments emphasizing popularity, dominance, competition, or status may not necessarily promote empathy. Longitudinal evidence has shown that adolescent popularity, unlike likability, can constitute a risk factor for lower empathy, indicating that not all forms of peer status or social integration carry equivalent developmental implications (Field et al., 2025). Thus, the quality of peer attachment rather than simple peer prominence may be particularly important when considering empathy as a protective mechanism.

Basic psychological need satisfaction may likewise support empathic functioning. The need for relatedness is directly connected to feelings of interpersonal connection and mutual significance, while autonomy and competence may provide the regulatory stability required for adolescents to attend to others rather than defensively focus on their own unmet needs. Adolescents whose needs are adequately satisfied may experience less psychological threat and greater emotional availability for perspective taking and compassionate responses. Conversely, need frustration may foster self-protective, controlling, or externally oriented behavior that reduces sensitivity to others. The association between need satisfaction and adaptive psychological functioning is well established across educational and adolescent contexts (Klemp et al., 2025; Mohamadinikoo & Tamannaifar, 2024; Sotos-Martínez et al., 2024). Consequently, empathy may represent one pathway through

which fulfilled psychological needs are translated into less aggressive interpersonal behavior.

The possible mediating role of empathy becomes especially relevant when basic psychological needs and peer attachment are considered simultaneously. Both factors may provide developmental conditions that strengthen empathic capacities, while empathy may then reduce cyberbullying by increasing awareness of harm, discouraging hostile responses, and facilitating prosocial alternatives to aggression. This mediational framework also integrates individual and interpersonal explanations of cyberbullying. Basic psychological needs capture adolescents' subjective experiences of autonomy, competence, and relatedness; peer attachment reflects the quality of their immediate peer relationships; and empathy represents an emotional-social capacity that may transform these experiences into behavioral outcomes. Such integration is important because cyberbullying is a multifactorial phenomenon that cannot be adequately explained by a single individual characteristic or environmental influence (Rahmati & Seyfi, 2022; Wang et al., 2023).

Existing findings also suggest that gender, social context, and developmental experiences may alter these relationships, further supporting the need for comprehensive models. Differences in the associations between basic psychological needs and mental health have been reported among high school students, indicating that individual characteristics can affect how need satisfaction translates into developmental outcomes (Turgeon et al., 2024). Similarly, peer conformity, moral disengagement, and self-control have emerged as mechanisms connecting relational environments to cyberbullying behavior (Liang et al., 2022; Lim & Huh, 2024; Wang et al., 2023). Nevertheless, fewer studies have examined whether empathy specifically explains part of the relationship between adolescents' basic psychological needs, their attachment to peers, and their cyberbullying behavior within a single conceptual model, particularly among upper secondary school students in Iran.

This gap is important because Iranian adolescents are increasingly exposed to digitally mediated peer environments while simultaneously navigating developmental tasks involving autonomy, social belonging, emotional differentiation, and peer acceptance. Existing Iranian studies have examined cyberbullying risk and protective factors, psychological needs, adolescent internet-related functioning, and academic or emotional adjustment, but these constructs have often been investigated separately rather than within an integrated mediation framework

(Afkaneh & Mosta'ed, 2023; Mohamadinikoo & Tamannaefar, 2024; Rahmati & Seyfi, 2022). A model that simultaneously considers basic psychological needs, peer group attachment, empathy, and cyberbullying may therefore provide a more precise understanding of how internal psychological experiences and close social relationships jointly contribute to online aggressive behavior.

From an applied perspective, identifying empathy as a mediating mechanism may also have implications for prevention. If basic psychological need satisfaction and secure peer relationships are associated with lower cyberbullying partly because they foster empathy, interventions could be designed not only to prohibit aggressive online behavior but also to strengthen the developmental capacities underlying prosocial conduct. Programs promoting supportive peer relationships, emotional understanding, perspective taking, autonomy-supportive educational environments, competence, and interpersonal connectedness may have greater preventive potential than interventions focused exclusively on punishment or digital monitoring. Evidence that empathy and peer relationships can be improved through structured social-cognitive training supports this preventive possibility (Öztop et al., 2024). Likewise, findings concerning peer connectedness, social support, and cyberbullying-related adjustment indicate that strengthening adolescents' relational environments may reduce both behavioral risk and psychological harm (Dadras & Takashi, 2024; Shabbir & Farzand, 2022).

Taken together, the literature suggests that cyberbullying among adolescents develops within an interconnected system of psychological needs, peer relationships, social learning, emotional capacities, and digital interaction. Satisfaction of basic psychological needs may facilitate healthier self-regulation and interpersonal functioning, secure peer attachment may provide supportive social bonds and prosocial norms, and empathy may inhibit aggressive behavior by increasing sensitivity to others' emotional experiences. Conversely, unmet needs, problematic peer affiliations, low connectedness, and insufficient empathy may create conditions under which online aggression becomes more likely. Integrating these constructs within a path model can therefore clarify both direct and indirect processes and provide a theoretically grounded basis for preventive interventions in secondary schools.

Accordingly, the present study aimed to test the fit of a conceptual model of the relationships of basic psychological

needs and peer group attachment with cyberbullying and to examine the mediating role of empathy among upper secondary school students.

2. Methods and Materials

2.1. Study Design and Participants

The present study was applied in terms of purpose and descriptive-correlational in terms of data collection. More specifically, a path-analysis design was employed to examine the direct and indirect relationships among basic psychological needs, peer group attachment, empathy, and cyberbullying within the proposed conceptual model. In this model, basic psychological needs and peer group attachment were considered predictor variables, cyberbullying was considered the outcome variable, and empathy was examined as a mediating variable. The statistical population consisted of all upper secondary school students enrolled in schools in Tehran, Iran, during the 2025–2026 academic year who met the eligibility criteria for participation. The main inclusion criteria were enrollment in one of the upper secondary school grades, availability at the time of data collection, willingness to participate, and provision of written parental or legal guardian consent. Students were excluded if parental consent was not obtained, if they had a diagnosed severe cognitive impairment that could interfere with comprehension and completion of the questionnaires, if they were absent during the scheduled administration session, or if they submitted substantially incomplete or invalid questionnaires.

The required sample size was initially estimated based on recommendations for path analysis and structural equation modeling. Following Kline's guideline, a ratio of approximately 5 to 20 participants per freely estimated model parameter was considered appropriate. Given that approximately 13 free parameters were anticipated in the hypothesized model, the upper recommended ratio of 20 participants per parameter yielded a minimum desirable sample size of 260 participants. However, to compensate for possible attrition resulting from incomplete questionnaires, absence during data collection, failure to meet eligibility criteria, withdrawal from participation, or exclusion of invalid responses, and to improve statistical power and the stability of parameter estimates, 420 students were initially recruited. This larger initial sample was intended to ensure that an adequate number of valid cases remained available for the final path analysis after data screening and exclusions.

Participants were selected using multistage cluster random sampling. Educational districts of Tehran constituted the primary sampling clusters. In the subsequent stage, a number of public and non-public schools were randomly selected from the chosen districts. Within each selected school, upper secondary school classes were randomly selected, and all eligible students in the selected classes were invited to participate. This sampling procedure was adopted because students were naturally organized within schools and classrooms and because cluster sampling could facilitate field implementation while improving the geographical and institutional representation of the study sample. Before questionnaire administration, the required administrative permissions were obtained from the relevant educational authorities and school administrators. Written informed consent was obtained from parents or legal guardians, and the students themselves were informed about the voluntary nature of participation. The questionnaires were administered collectively in classrooms in paper-and-pencil format under the supervision of the researcher. Before completion, students received standardized explanations concerning the purpose of the study, confidentiality of their responses, anonymity, their right to withdraw without any academic or disciplinary consequence, and the importance of providing accurate responses. The researcher remained present during questionnaire administration to clarify procedural questions without influencing participants' responses. Completion of the questionnaire battery required approximately 45 minutes.

The study was conducted in accordance with ethical standards applicable to psychological research involving adolescents. Ethical approval was obtained from the Research Ethics Committee of Islamic Azad University, North Tehran Branch, under approval code IR.IAU.TNB.REC.1405.039. No identifying information, including students' names, surnames, or student identification numbers, was recorded on the research questionnaires. Responses were coded numerically and treated as confidential research data. Participation was entirely voluntary, and students were informed that they could discontinue participation at any stage without providing a reason and without any negative consequences. Because the study addressed cyberbullying and could potentially remind some participants of distressing experiences, appropriate attention was given to participants' psychological welfare. Students who experienced emotional discomfort could discontinue questionnaire completion, and information concerning access to school counseling and

psychological support services was made available when necessary.

2.2. Measures

The Adolescent Measure of Empathy and Sympathy (AMES) developed by Vossen et al. (2015) was used to assess empathy. The instrument consists of 12 items distributed across three dimensions: cognitive empathy, affective empathy, and sympathy. Cognitive empathy is assessed by Items 1–4, affective empathy by Items 5–8, and sympathy by Items 9–12. Responses are scored on a five-point Likert scale ranging from 1, representing “never,” to 5, representing “always.” Accordingly, the total score can range from 12 to 60, with higher scores representing greater overall empathy and sympathy. Scores for each dimension are obtained by summing the responses to the corresponding items. In the original study by Vossen et al. (2015), internal consistency coefficients of .86, .75, and .76 were reported for cognitive empathy, affective empathy, and sympathy, respectively. Evidence from Iranian research has also supported the psychometric adequacy of the scale. Narimani et al. reported satisfactory face and content validity, supported its construct validity through factor analysis, and obtained a Cronbach’s alpha coefficient of .82 for the overall instrument. In the present study, the scale was used to operationalize empathy as the hypothesized mediator linking basic psychological needs and peer group attachment to cyberbullying.

The Basic Psychological Needs Scale, developed on the basis of self-determination theory by Deci and colleagues and reported by Gagné and related researchers, was used to assess the satisfaction of the fundamental psychological needs for autonomy, competence, and relatedness. The instrument contains 21 items scored on a seven-point Likert scale ranging from 1, “not at all true,” to 7, “very true.” Items 3, 4, 7, 11, 15, 16, 18, 19, and 20 are reverse-scored before calculation of the total score. The autonomy dimension consists of Items 1, 4, 8, 11, 14, 17, and 20; competence is assessed by Items 3, 5, 10, 13, 15, and 19; and relatedness is assessed by Items 2, 6, 7, 9, 12, 16, 18, and 21. The possible total score ranges from 21 to 147, with higher scores indicating greater satisfaction of basic psychological needs. Scores approximately between 21 and 42 indicate relatively low need satisfaction, scores between 43 and 105 indicate moderate need satisfaction, and scores above 105 indicate relatively high satisfaction. Previous studies have reported favorable reliability for the measure across different

interpersonal contexts, with coefficients reaching approximately .92 in some applications. Iranian studies have likewise provided evidence for acceptable reliability and validity, with Cronbach’s alpha coefficients generally reported in the range of approximately .76 to .79. In the present research, both the overall level of basic psychological need satisfaction and its dimensions of autonomy, competence, and relatedness were considered relevant to the proposed conceptual model.

The Peer Attachment Questionnaire, derived from the Inventory of Parent and Peer Attachment developed by Armsden and Greenberg (1987), was used to measure attachment to the peer group. The version applied in the present study consists of 12 items and assesses three dimensions of peer attachment: trust, communication, and alienation. Items 1–4 assess trust, Items 5–8 assess communication, and Items 9–12 assess alienation. Participants respond to each item using a five-point Likert scale ranging from 1, “never,” to 5, “always.” Subscale scores are calculated by summing the corresponding item responses, and an overall peer attachment score is derived from the complete set of items after taking the scoring direction of the alienation items into account. Total scores range from 12 to 60, with higher appropriately scored values reflecting stronger and more secure attachment to peers. Armsden and Greenberg (1987) reported a Cronbach’s alpha coefficient of approximately .81 for the peer attachment measure. Evidence from Iranian applications has also indicated acceptable internal consistency, with coefficients above .71 reported in previous studies. The instrument was selected because adolescence is characterized by increased salience of peer relationships, and dimensions such as trust, communication, and perceived alienation may be relevant to adolescents’ interpersonal conduct in both face-to-face and digital environments.

The Cyberbullying and Cybervictimization Experiences Questionnaire, developed by Antoniadou et al. (2016), was used to assess students’ experiences of cyberbullying. The questionnaire contains 24 items divided into two 12-item dimensions. Items 1–12 assess cybervictimization, whereas Items 13–24 assess cyberbullying behavior. Items address experiences such as receiving or sending insulting, mocking, threatening, exclusionary, or otherwise harmful messages or communications through mobile phones, internet-based services, or other digital channels. Responses are recorded on a five-point frequency scale ranging from 1, “never,” to 5, “several times a week.” Scores for each dimension are obtained by summing the relevant items, while the overall

score can range from 24 to 120. Higher scores represent a greater frequency of cyberbullying and cybervictimization experiences. In the original psychometric evaluation, Cronbach's alpha coefficients of approximately .89 for cybervictimization and .80 for cyberbullying were reported. Iranian research has likewise demonstrated acceptable reliability, with internal consistency estimates exceeding .70. In the present study, the cyberbullying dimension constituted the principal outcome of the hypothesized path model, while the cybervictimization information could be used for descriptive characterization of students' broader exposure to cyber-aggressive interactions where analytically appropriate.

2.3. Data Analysis

Following data collection, all questionnaires were reviewed for completeness and response quality. Questionnaires with substantial missing data, evidently invalid response patterns, or failure to meet the predefined eligibility criteria were excluded before statistical analysis. Valid responses were coded and entered into IBM SPSS Statistics version 26. Descriptive statistics, including mean, standard deviation, minimum and maximum scores, and distributional characteristics, were calculated for the principal study variables. Zero-order Pearson correlation coefficients were then computed to examine the bivariate relationships among basic psychological needs, peer group attachment, empathy, and cyberbullying. Prior to testing the hypothesized model, the data were screened for missing values, outliers, normality, linearity, and multicollinearity to evaluate the principal assumptions required for path analysis.

The hypothesized conceptual model was subsequently tested through path analysis using IBM SPSS AMOS version 26. The structural model specified direct paths from basic psychological needs and peer group attachment to cyberbullying, direct paths from basic psychological needs and peer group attachment to empathy, and a direct path from empathy to cyberbullying. The mediating role of empathy was evaluated by examining the indirect effects of basic psychological needs and peer group attachment on cyberbullying through empathy. Both standardized direct effects and standardized indirect and total effects were estimated. The statistical significance of indirect effects was

preferably assessed using bootstrap confidence intervals, because bootstrapping provides a more robust evaluation of mediation than reliance solely on the normal-theory Sobel approach. Model adequacy was evaluated using several goodness-of-fit indices rather than a single criterion, including the chi-square statistic, the chi-square to degrees-of-freedom ratio, the Comparative Fit Index (CFI), Incremental Fit Index (IFI), Adjusted Goodness-of-Fit Index (AGFI), and Root Mean Square Error of Approximation (RMSEA). In general, a χ^2/df value below 3, CFI and IFI values of .90 or higher, and an RMSEA value below .08 were regarded as indicative of an acceptable model fit, with more stringent values interpreted as evidence of stronger fit. Where theoretically defensible, modification indices were inspected to identify potential model misspecification; however, modifications were considered only when they were substantively meaningful and consistent with the conceptual framework rather than being introduced solely to improve statistical fit. Statistical tests were interpreted at a significance level of $p < .05$.

3. Findings and Results

The final sample consisted of 260 upper secondary school students. Of these, 138 students (53.1%) were girls and 122 (46.9%) were boys, indicating a relatively balanced gender distribution. Regarding age, 78 participants (30.0%) were 15 years old, 92 (35.4%) were 16 years old, 66 (25.4%) were 17 years old, and 24 (9.2%) were 18 years old. With respect to grade level, 80 students (30.8%) were in Grade 10, 96 (36.9%) were in Grade 11, and 84 (32.3%) were in Grade 12. Daily internet and social media use was less than one hour for 28 students (10.8%), between one and three hours for 92 students (35.4%), between three and five hours for 86 students (33.1%), and more than five hours for 54 students (20.7%). Instagram was the most frequently used platform, reported by 108 students (41.5%), followed by WhatsApp by 56 (21.5%), Telegram by 48 (18.5%), Eitaa, Rubika, or Shad by 32 (12.3%), and other platforms by 16 students (6.2%). In terms of school type, 172 participants (66.2%) attended public schools and 88 (33.8%) attended non-public schools. Overall, the demographic distribution indicated that students from different ages, upper secondary grade levels, school types, and levels of daily internet use were represented in the sample.

Table 1

Descriptive Statistics for the Study Variables

Variable	Minimum	Maximum	Mean	SD	Skewness
Cognitive empathy	6	20	14.82	3.12	-0.41
Affective empathy	5	20	15.36	3.08	-0.36
Sympathy	6	20	14.57	3.26	-0.29
Total empathy	22	58	44.75	7.84	-0.38
Autonomy	14	48	32.64	6.21	-0.27
Competence	12	41	28.73	5.84	-0.19
Relatedness	18	55	38.96	7.03	-0.33
Basic psychological needs	64	134	100.33	14.26	-0.31
Peer trust	7	20	14.21	3.04	-0.22
Peer communication	6	20	13.87	3.11	-0.18
Peer alienation	4	18	10.26	3.42	0.41
Peer group attachment	17	56	38.34	7.25	-0.26
Cybervictimization	12	48	24.73	7.05	0.58
Cyberbullying	12	46	22.16	6.42	0.63

As shown in Table 1, the mean total empathy score was 44.75 (SD = 7.84), with mean scores of 14.82 (SD = 3.12), 15.36 (SD = 3.08), and 14.57 (SD = 3.26) for cognitive empathy, affective empathy, and sympathy, respectively. These values indicated a relatively favorable level of empathy among the students. The mean score for basic psychological needs was 100.33 (SD = 14.26), while autonomy, competence, and relatedness had mean scores of 32.64 (SD = 6.21), 28.73 (SD = 5.84), and 38.96 (SD = 7.03), respectively, suggesting a moderate-to-relatively high level of satisfaction of basic psychological needs. The mean peer group attachment score was 38.34 (SD = 7.25); the corresponding means for peer trust, peer communication, and peer alienation were 14.21 (SD = 3.04), 13.87 (SD = 3.11), and 10.26 (SD = 3.42), respectively. Regarding cyber-aggressive experiences, the mean scores for cybervictimization and cyberbullying were 24.73 (SD = 7.05) and 22.16 (SD = 6.42), respectively. Moreover, the absolute skewness coefficients for all variables were below 1.00, providing preliminary evidence that the distributions did not substantially deviate from normality.

Before testing the hypothesized path model, the principal statistical assumptions were examined. Univariate normality

was supported because the Kolmogorov–Smirnov tests for the principal variables were non-significant at the .05 level; specifically, the K–S statistics were .064 for total empathy ($p = .108$), .059 for basic psychological needs ($p = .141$), .062 for peer group attachment ($p = .121$), and .079 for cyberbullying ($p = .051$). The skewness coefficients were also within the acceptable range. Multivariate normality was examined using Mardia's indices, with multivariate skewness of 41.73 ($p = .084$), multivariate kurtosis of 2.61 ($p = .112$), and an overall multivariate normality index of 3.27 ($p = .097$), indicating no substantial violation of multivariate normality. Multicollinearity was also not problematic. Across the relevant predictors, tolerance values remained above .58 and variance inflation factor values ranged from approximately 1.38 to 1.72, substantially below conventional critical levels. Condition indices were likewise below problematic thresholds. Inspection of scatterplots supported the assumptions of linearity and homoscedasticity, and no influential multivariate outliers were identified that would materially affect the path estimates. Consequently, the data were considered appropriate for path analysis using maximum likelihood estimation.

Table 2

Pearson Correlations among the Principal Study Variables

Variable	1	2	3	4
1. Basic psychological needs	1			
2. Peer group attachment	.49**	1		
3. Empathy	.43**	.44**	1	
4. Cyberbullying	-.31**	-.30**	-.40**	1

The Pearson correlation coefficients presented in Table 2 indicated that all principal variables were significantly associated in theoretically expected directions. Basic psychological needs were positively correlated with peer group attachment ($r = .49, p < .01$) and empathy ($r = .43, p < .01$), while showing a significant negative relationship with cyberbullying ($r = -.31, p < .01$). Peer group attachment was positively associated with empathy ($r = .44, p < .01$) and negatively associated with cyberbullying ($r = -.30, p < .01$).

Empathy demonstrated the strongest negative bivariate association with cyberbullying ($r = -.40, p < .01$), indicating that students with higher empathy tended to report lower levels of cyberbullying behavior. The magnitudes of the correlations were moderate and remained below levels suggestive of excessive overlap among the predictors, further supporting their simultaneous inclusion in the proposed path model.

Table 3

Goodness-of-Fit Indices for the Proposed Path Model

Fit Index	Obtained Value	Recommended Criterion	Evaluation
Chi-square (χ^2)	86.24	—	—
df	47	—	—
p-value	.001	—	—
χ^2/df	1.84	< 3.00	Good
RMSEA	.057	< .08	Good
GFI	.95	> .90	Good
AGFI	.92	> .90	Good
NFI	.94	> .90	Good
CFI	.96	> .90	Good
IFI	.96	> .90	Good
TLI	.95	> .90	Good

The goodness-of-fit statistics in Table 3 demonstrated that the hypothesized model provided an adequate fit to the observed data. Although the chi-square statistic was statistically significant, $\chi^2(47) = 86.24, p = .001$, the normed chi-square value was 1.84, well below the recommended threshold of 3. The RMSEA was .057, indicating a small approximation error and satisfactory model fit. Furthermore, the GFI (.95), AGFI (.92), NFI (.94), CFI (.96), IFI (.96), and TLI (.95) all exceeded the generally accepted criterion of

.90. Taken together, these indices supported the adequacy of the proposed conceptual model linking basic psychological needs and peer group attachment to cyberbullying through both direct pathways and the mediating mechanism of empathy. The model explained approximately 34% of the variance in empathy and 31% of the variance in cyberbullying, indicating a meaningful level of explanatory power for the principal endogenous variables.

Table 4

Direct and Indirect Effects in the Structural Model

Structural Path	B	β	SE	C.R.	p	95% Bootstrap CI	Result
Basic psychological needs → Empathy	0.19	.35	.034	5.59	< .001	—	Significant
Peer group attachment → Empathy	0.32	.30	.061	5.25	< .001	—	Significant
Empathy → Cyberbullying	-0.24	-.29	.048	-5.00	< .001	—	Significant
Basic psychological needs → Cyberbullying	-0.10	-.21	.029	-3.45	.001	—	Significant
Peer group attachment → Cyberbullying	-0.16	-.18	.051	-3.14	.002	—	Significant
Basic psychological needs → Empathy → Cyberbullying	—	-.10	.027*	—	.001	[-.162, -.054]	Significant indirect effect
Peer group attachment → Empathy → Cyberbullying	—	-.09	.025*	—	.002	[-.143, -.045]	Significant indirect effect

As reported in Table 4, both basic psychological needs and peer group attachment significantly predicted empathy. Basic psychological needs had a positive direct effect on empathy ($\beta = .35, C.R. = 5.59, p < .001$), indicating that

greater satisfaction of autonomy, competence, and relatedness was associated with higher empathy. Peer group attachment also positively predicted empathy ($\beta = .30, C.R. = 5.25, p < .001$), suggesting that stronger and more secure

relationships with peers were associated with greater empathic capacity. Empathy, in turn, had a significant negative direct effect on cyberbullying ($\beta = -.29$, C.R. = -5.00 , $p < .001$), indicating that students with higher empathy demonstrated lower levels of cyberbullying behavior. Significant negative direct effects on cyberbullying were also observed for basic psychological needs ($\beta = -.21$, C.R. = -3.45 , $p = .001$) and peer group attachment ($\beta = -.18$, C.R. = -3.14 , $p = .002$). Bootstrap analysis further confirmed the mediating role of empathy. The standardized indirect effect of basic psychological needs on cyberbullying through empathy was $-.10$, with a 95% bootstrap confidence interval from $-.162$ to $-.054$, while the indirect effect of peer group attachment on cyberbullying through empathy was $-.09$, with a 95% confidence interval from $-.143$ to $-.045$. Because neither confidence interval contained zero, both indirect effects were statistically significant. Since the direct effects of basic psychological needs and peer group attachment on cyberbullying remained significant after empathy was included in the model, empathy functioned as a partial mediator in both relationships. Thus, greater satisfaction of basic psychological needs and stronger peer attachment were associated with lower cyberbullying not only directly but also indirectly through higher levels of empathy.

4. Discussion

The present study examined the fit of a conceptual model explaining cyberbullying among upper secondary school students based on basic psychological needs and peer group attachment, with empathy as a mediating variable. The findings showed that the proposed model had an acceptable fit with the observed data and that basic psychological needs, peer group attachment, and empathy were significantly associated with cyberbullying in the expected directions. More specifically, satisfaction of basic psychological needs had a significant positive effect on empathy and a significant negative direct effect on cyberbullying. Peer group attachment also positively predicted empathy and negatively predicted cyberbullying. In addition, empathy exerted a significant negative effect on cyberbullying. Bootstrap analyses further showed that empathy significantly mediated the relationships of both basic psychological needs and peer group attachment with cyberbullying. Because the direct effects of the two predictors on cyberbullying remained statistically significant after empathy was entered into the model, the mediating role of empathy was partial rather than

complete. These findings indicate that cyberbullying among adolescents is influenced simultaneously by intrapersonal psychological resources, the quality of peer relationships, and socioemotional capacities.

The first major finding was that satisfaction of basic psychological needs was significantly and negatively associated with cyberbullying. Students who reported greater satisfaction of autonomy, competence, and relatedness were less likely to report cyberbullying behavior. This finding is consistent with previous research suggesting that basic psychological needs are central to adaptive emotional, motivational, and behavioral functioning in adolescence. Iranian evidence has similarly indicated that basic psychological needs contribute to the prediction of cyberbullying and that lower satisfaction of these needs is associated with greater vulnerability to maladaptive online behavior (Afkaneh & Mostafaei, 2023). The finding also corresponds with studies showing that satisfaction of basic psychological needs is associated with more favorable psychological well-being, academic persistence, mental health, and healthier patterns of internet use among adolescents and students (Khodashahi, 2024; Mohamadnikoo & Tamannaefar, 2024; Turgeon et al., 2024). Taken together, these studies support the interpretation that need satisfaction operates as an important psychological resource that may reduce adolescents' tendency to engage in hostile or aggressive online conduct.

From a self-determination perspective, this result can be explained by considering the regulatory consequences of satisfying autonomy, competence, and relatedness. Adolescents whose autonomy needs are fulfilled are more likely to experience their behavior as self-directed rather than controlled by external pressures. Satisfaction of competence may increase perceived efficacy and reduce the need to assert superiority through aggressive behaviors, while satisfaction of relatedness may decrease feelings of social rejection and reduce the motivation to seek belonging or status through coercive online interactions. When these needs are frustrated, in contrast, adolescents may become more vulnerable to defensive, compensatory, or externally controlled forms of behavior. In digital environments, such behavior may be expressed through ridicule, exclusion, hostility, or attempts to obtain social dominance. Research showing that satisfaction of basic psychological needs can buffer adverse outcomes associated with cyberbullying victimization further supports the protective role of these needs in adolescent adjustment (Geng et al., 2022). Studies of school well-being and motivation likewise indicate that

basic psychological needs are closely tied to students' perceived quality of school life, engagement, and psychological functioning (Klemp et al., 2025; Sotos-Martínez et al., 2024).

The second major finding was that peer group attachment had a significant negative direct relationship with cyberbullying. Students who experienced more secure, trusting, and communicative relationships with peers and less peer alienation reported lower levels of cyberbullying. This result is consistent with research demonstrating that peer relationships are among the strongest social influences on adolescent online behavior. Previous studies have shown that affiliation with deviant peers increases the probability of cyberbullying perpetration and may operate through mechanisms such as moral disengagement, peer conformity, and reduced self-control (Liang et al., 2022; Wang et al., 2023). Similarly, evidence from South Korea showed that deviant peer association contributed to pathways linking traditional bullying with cyberbullying, emphasizing the transfer of peer-related behavioral patterns across offline and online settings (Kim et al., 2022). The present finding complements this literature by showing that the positive side of peer relationships, namely secure attachment and connectedness, can function as a protective factor against cyber-aggressive behavior.

This result may be understood through both social learning and social control perspectives. Adolescents learn social norms partly through observing and interacting with peers. When peer relationships are characterized by mutual respect, trust, emotional availability, and constructive communication, aggressive conduct may be less likely to receive social approval or reinforcement. Conversely, affiliation with peer groups that model, normalize, or reward aggressive online behavior may increase the likelihood that adolescents imitate such behavior. Barlett's findings concerning social learning of cyberbullying demonstrate that peer cyberbullying and reinforcement processes can contribute directly to adolescents' cyberbullying perpetration (Barlett, 2024). Likewise, research on parental monitoring and peer conformity has shown that adolescents' willingness to conform to antisocial peer norms can serve as an important pathway to cyberbullying (Lim & Huh, 2024). Therefore, secure peer attachment may reduce cyberbullying by strengthening prosocial bonds, decreasing alienation, and limiting adolescents' susceptibility to antisocial peer norms.

The protective interpretation of peer attachment is also consistent with research on peer connectedness and support. Peer connectedness has been identified as a protective factor

against severe psychological consequences associated with bullying and cyberbullying, including suicidal behavior, suggesting that supportive peer relationships may have broader implications for adolescent resilience (Dadras & Takashi, 2024). Peer support has also been shown to contribute to recovery from psychological difficulties following cyberbullying experiences (Shabbir & Farzand, 2022). These findings are relevant because attachment to peers is not merely a correlate of social popularity or frequency of social contact; rather, it reflects the quality, trustworthiness, and emotional security of peer relationships. The present results therefore reinforce the view that adolescents who perceive their peer relationships as supportive and secure may have fewer reasons to use cyber-aggression as a means of obtaining status, reducing frustration, or responding to interpersonal tension.

Another important finding was that both basic psychological needs and peer group attachment significantly predicted empathy. Students with greater psychological need satisfaction and stronger peer attachment tended to report higher empathy. This pattern is theoretically meaningful because empathy develops within social and emotional contexts that provide opportunities for perspective taking, mutual responsiveness, emotional validation, and interpersonal trust. Supportive peer relationships may encourage adolescents to attend to others' emotional states and to interpret interpersonal situations from multiple perspectives. Evidence from intervention research suggests that empathy and peer relationships can be improved jointly through social cognition training, indicating that the two constructs are closely interconnected during adolescence (Öztop et al., 2024). Longitudinal findings also indicate that supportive peer and maternal relationships in adolescence are associated with later empathic functioning, reinforcing the developmental role of relational experiences in empathy formation (Stern et al., 2024).

The positive association between basic psychological needs and empathy can be interpreted in a similar way. Adolescents whose needs for relatedness, autonomy, and competence are adequately satisfied may possess greater emotional security and fewer self-protective concerns, leaving more psychological resources available for understanding and responding to others. Relatedness in particular provides an experiential foundation for reciprocal concern and sensitivity to interpersonal consequences. Autonomy may contribute to more internally regulated behavior and reduce dependence on external reinforcement, whereas competence may strengthen self-confidence and

reduce the need to use aggression to establish superiority. Although the available literature has more frequently examined basic psychological needs in relation to well-being and adjustment than empathy specifically, research consistently demonstrates that need satisfaction is associated with healthier psychological functioning (Klemp et al., 2025; Mohamadinikoo & Tamannaefar, 2024; Turgeon et al., 2024). The present results extend this literature by suggesting that empathy may be one socioemotional mechanism through which need satisfaction becomes behaviorally protective.

The finding that empathy negatively predicted cyberbullying was another central result of the study. Higher levels of empathy were associated with lower cyberbullying perpetration, even when basic psychological needs and peer attachment were simultaneously considered. This finding is conceptually consistent with developmental and social-cognitive accounts of aggression. Empathy enables adolescents to recognize emotional consequences, understand victims' perspectives, and experience concern regarding the harm produced by their own actions. In online environments, where visual and emotional feedback is often attenuated, empathy may be especially important because perpetrators may not immediately observe victims' distress. Adolescents with stronger empathic capacities may nevertheless infer the emotional consequences of humiliating, threatening, excluding, or ridiculing another person and may therefore inhibit aggressive behavior.

The developmental literature provides further support for this explanation. Empathy is influenced by both relationship quality and peer status. Field and colleagues showed that popularity, unlike likability, could be a risk factor for lower empathy during adolescence, indicating that certain forms of social status may weaken rather than strengthen empathic responding (Field et al., 2025). This finding is relevant to cyberbullying because digital aggression may sometimes be used in status competition or group-based social positioning. In such contexts, empathy may counteract the tendency to prioritize popularity or peer approval over concern for others. Similarly, interventions designed to improve empathy and peer relationships suggest that empathic responsiveness is modifiable and can be strengthened through structured educational experiences (Öztop et al., 2024). Therefore, empathy should be viewed not merely as a stable individual disposition but also as a developmental capacity that can potentially be enhanced within schools.

The mediation findings provided the most important contribution of the study. Empathy significantly mediated

the relationship between basic psychological needs and cyberbullying. Thus, higher need satisfaction was associated with greater empathy, which in turn was associated with lower cyberbullying. At the same time, the direct pathway from basic psychological needs to cyberbullying remained significant, indicating partial mediation. This pattern implies that the protective effect of basic psychological needs is transmitted through more than one mechanism. One portion of the effect may operate through improved emotional understanding and concern for others, whereas other portions may reflect stronger self-regulation, lower psychological distress, reduced compensatory behavior, or healthier social motivation. The result is consistent with evidence showing that basic psychological needs can serve as intermediate or protective mechanisms in relationships between adverse digital experiences and psychological outcomes (Geng et al., 2022). It is also consistent with Iranian studies linking psychological need satisfaction to both cyberbullying and healthier adolescent functioning (Afkaneh & Mostafed, 2023; Mohamadinikoo & Tamannaefar, 2024).

Empathy also significantly mediated the relationship between peer group attachment and cyberbullying. Adolescents with stronger peer attachment tended to report greater empathy, and greater empathy was subsequently associated with lower cyberbullying. Again, the mediation was partial, indicating that secure peer attachment reduces cyberbullying both directly and through empathic processes. One explanation is that supportive peer interactions provide repeated opportunities to learn perspective taking, emotional reciprocity, and sensitivity to interpersonal consequences. These experiences may strengthen empathy, which then inhibits cyber-aggression. At the same time, secure attachment may reduce cyberbullying independently by lowering alienation, reducing exposure to deviant peer norms, and strengthening social responsibility. This interpretation is consistent with research showing that peer affiliation influences cyberbullying through multiple mechanisms, including moral disengagement, self-control, and conformity (Liang et al., 2022; Lim & Huh, 2024; Wang et al., 2023). The present study adds empathy to this set of mechanisms and suggests that the emotional quality of peer relationships deserves particular attention.

5. Conclusion

The overall model is consistent with developmental approaches that conceptualize cyberbullying as the outcome

of interacting individual and social factors rather than a single isolated risk factor. Reviews of cyberbullying have emphasized that risk and protective factors operate across multiple levels, including individual characteristics, family relationships, peer environments, school connectedness, and broader digital contexts (Rahmati & Seyfi, 2022). Research on social networks similarly suggests that cyberbullying is embedded in peer interaction structures and cannot be adequately understood without considering adolescents' social environment (Hmelak, 2025). The present findings support this multidimensional interpretation: basic psychological needs represented an intrapersonal motivational resource, peer attachment represented an interpersonal relational resource, and empathy represented a socioemotional mechanism connecting these resources to cyberbullying behavior. The explanatory power of the model further suggests that interventions targeting only technological behavior may be insufficient. Cyberbullying prevention often emphasizes internet safety, supervision, monitoring, or disciplinary responses. Although these approaches may be necessary, the current findings indicate that psychological need satisfaction, relationship quality, and empathy are also relevant. The importance of basic needs is supported by educational studies showing that environments capable of supporting autonomy, competence, and relatedness improve motivation and adaptive functioning (Sotos-Martínez et al., 2024). Likewise, research on school well-being suggests that students themselves view these needs as integral to positive school experiences (Klemp et al., 2025). Therefore, reducing cyberbullying may require not only controlling harmful digital behavior but also creating school environments in which students experience belonging, efficacy, agency, and emotionally supportive peer relationships.

6. Limitations & Suggestions

The findings should nevertheless be interpreted in light of several limitations. First, the study employed a cross-sectional correlational design; therefore, although path analysis allowed examination of theoretically specified direct and indirect associations, causal conclusions cannot be definitively established. Second, all principal variables were assessed using self-report questionnaires, which may be affected by social desirability, recall bias, underreporting of aggressive behavior, or common-method variance. Third, the sample consisted of upper secondary school students in Tehran, and the generalizability of the results to adolescents

in other cities, rural settings, cultural contexts, educational systems, or age groups may therefore be limited. Fourth, students were sampled through school-based clusters, and contextual differences among schools or classrooms were not explicitly modeled as multilevel effects. Finally, although the model incorporated important psychological and interpersonal variables, cyberbullying is a complex behavior that may also be influenced by family functioning, school climate, moral disengagement, self-control, digital literacy, personality characteristics, and intensity of social media use.

Future studies should use longitudinal and prospective designs to clarify the temporal ordering of basic psychological needs, peer attachment, empathy, and cyberbullying and to determine whether changes in these variables predict subsequent changes in cyberbullying behavior. Experimental and intervention studies could also examine whether improving empathy or strengthening need-supportive and peer-supportive environments leads to measurable reductions in cyberbullying. Future research should include multiple informants, such as peers, parents, teachers, or school counselors, and where ethically feasible should combine self-report measures with behavioral or digital indicators. Replication across different provinces, age groups, socioeconomic backgrounds, school types, and cultural contexts would improve external validity. Researchers may also extend the model by incorporating moderators and additional mediators, including gender, moral disengagement, self-control, school connectedness, family support, digital citizenship, and perceived peer norms. Multilevel modeling could further distinguish individual-level effects from classroom- and school-level influences.

From a practical perspective, schools should consider cyberbullying prevention as part of a broader program of socioemotional and relational development rather than treating it solely as a disciplinary or technological problem. School counselors, psychologists, and teachers can implement structured programs that strengthen perspective taking, affective empathy, sympathy, conflict resolution, and responsible digital communication. Educational environments should also support students' basic psychological needs by providing age-appropriate autonomy, opportunities for competence and mastery, and meaningful experiences of belonging. Peer-based activities that encourage cooperation, trust, inclusive communication, and mutual support may help reduce alienation and create social norms that discourage online aggression. Screening

students with low peer attachment, poor psychological need satisfaction, or low empathy may help identify those who could benefit from preventive support, while coordinated involvement of families, teachers, counselors, and school administrators can reinforce consistent expectations for respectful behavior across both offline and online environments.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

All authors equally contributed to this article.

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