Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Digital Literacy and E-motions as Predictors of Cyberbullying Coping Strategies Among High School Students: A Cross-Sectional Study by Witnessing Status

Furkan Aydın

furkanaydin@ankara.edu.tr

Ankara University

Sema Sulak Güzey

Bartin University

Seyfullah Gökoğlu

Bartin University

Research Article

Keywords: Cyberbullying, coping strategies, digital literacy, e-motions, witnessing cyberbullying

Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11197322/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Coping with cyberbullying is a multidimensional process that requires digital competencies and online emotional processes to be considered together. This study examined the predictive roles of digital literacy and e-motions in cyberbullying coping strategies among high school students and the pattern of these roles across students who had and had not witnessed cyberbullying.

Methods

This cross-sectional correlational study included 445 students in grades 9–12. Data were collected using the Digital Literacy Scale, the E-motions Questionnaire, and the Cyberbullying Coping Strategies Scale. Descriptive statistics, Pearson correlation analysis, and covariance-based structural equation modeling with maximum likelihood estimation were used. The model was evaluated through multigroup analyses involving 248 students who had witnessed cyberbullying and 197 who had not.

Results

Digital literacy (β = 0.15) and e-motions (β = 0.24) were positive and significant predictors of cyberbullying coping strategies in the overall model. The structural model yielded fit indices of CFI = 0.949, TLI = 0.927, RMSEA = 0.080, and SRMR = 0.062. Analyses by witnessing status indicated that the predictive role of digital literacy was significant among students who had witnessed cyberbullying (β = 0.24) but nonsignificant among those who had not (β = 0.09). E-motions were positively associated with coping strategies in both groups.

Conclusions

Overall, the findings indicate that digital literacy and e-motions are positively associated with cyberbullying coping strategies among high school students. Digital literacy was a significant predictor among students who had witnessed cyberbullying, whereas a positive association between e-motions and coping was observed in both groups. The findings provide a basis for addressing digital competencies and online emotional processes together in educational initiatives designed to support students' coping strategies.

Background

The consequences of cyberbullying for psychological well-being and social relationships highlight the need to understand how individuals cope with online adversity. Coping is a multifaceted process that involves evaluating digital safety options, accessing information and support, and managing emotional

difficulties [1, 2]. Within this process, digital literacy is relevant to evaluating online information and using safety options, whereas e-motions concern the expression, perception, and management of emotions in digital interactions [3, 4]. Considering these two variables together may therefore contribute to understanding how coping with cyberbullying relates to digital competencies and online emotional processes.

Research has examined the relationships of digital literacy with digital resilience and cyberbullying experiences, as well as those of online emotional content use with cybervictimization and cyberbullying perpetration [4, 5, 6]. However, these findings are insufficient to explain the joint predictive contribution of digital literacy and e-motions to cyberbullying coping strategies or how these relationships vary according to witnessing experience. The association of witnessing with coping patterns and psychological distress also provides a rationale for comparing these relationships between individuals who have and have not previously witnessed cyberbullying [7]. Examining digital literacy, e-motions, and coping strategies within the same research model and investigating their relationships by witnessing status may thus provide a more comprehensive understanding of the individual characteristics and experiences associated with coping. The findings may inform educational initiatives aimed at supporting coping skills by identifying relevant competencies and differences in experience.

This study aimed to examine the predictive roles of digital literacy and e-motions in cyberbullying coping strategies among high school students. In the research model, digital literacy and e-motions were specified as predictor variables, and cyberbullying coping strategies as the outcome variable. These predictive roles were also evaluated separately among students who had and had not witnessed cyberbullying. Accordingly, the study addressed the following research questions:

1. Do digital literacy and e-motions significantly predict cyberbullying coping strategies?
2. Do digital literacy and e-motions significantly predict cyberbullying coping strategies among high school students who have and have not witnessed cyberbullying?

Theoretical framework

Cyberbullying and cybervictimization

As digital communication has become an integral part of everyday life, cyberbullying has emerged as an increasingly prevalent psychosocial problem [8]. Cyberbullying refers to aggressive behaviors intended to harm others through information and communication technologies, whereas cybervictimization can be defined as being targeted by and exposed to these behaviors [9, 10]. Such behaviors may take the form of insults, threats, humiliation, impersonation, and exclusion from groups on social media and other online platforms, threatening individuals' safety and well-being in digital environments [11, 12]. Perpetrators' ability to conceal their identities, the potential for aggressive content to reach a broad audience, and the possibility of cyberbullying occurring at any time make it difficult to confine victimization to a particular time or place [13, 14, 15]. Furthermore, the persistence and repeated sharing

of content may expose victims repeatedly to the effects of aggressive behaviors, while barriers to disclosing these experiences can hinder support seeking [10, 16].

Cybervictimization is a widespread problem across countries and educational levels, affecting a substantial proportion of children and adolescents in particular [8, 17, 18]. Although prevalence varies with sample characteristics and assessment methods, its associations with psychological and educational difficulties across social contexts indicate that its significance extends beyond the number of individuals affected [17, 19]. Exposure to online attacks may undermine well-being through its associations with depressive symptoms, anxiety, loneliness, and psychological distress; these difficulties may co-occur with poorer academic performance and school disengagement [11, 17, 19]. The emotional and social dimensions of victimization are also interrelated. When difficulties in regulating negative emotions are considered alongside peer relationships and responses to conflict, a more complex process emerges in which some individuals occupy both victim and perpetrator roles [18, 20, 21]. These difficulties associated with cybervictimization underscore the need to examine the coping strategies individuals use in response to online attacks.

Cyberbullying coping strategies

Coping with cyberbullying encompasses the cognitive, emotional, and behavioral efforts individuals make to manage the stress of online attacks, prevent continued victimization, and protect their psychological well-being [2, 22]. This process includes complementary responses ranging from taking digital safety measures and accessing social support to disengaging from aggressive interactions and obtaining information about possible solutions [1, 23]. Because the functionality of strategies may vary according to the nature of the cyberbullying, individuals' appraisals of the situation, and the support available to them, no single approach can be assumed to be equally effective across all victimization experiences [22, 24]. Within this framework, cyberbullying coping strategies can be considered in terms of cognitive security, help seeking, avoidance, and information seeking [1, 25].

Cognitive security

In this classification, cognitive security refers to protective choices and technological measures intended to enhance online safety and privacy [25, 26]. Blocking or unfriending a perpetrator, changing account information, and restricting access to personal content can be considered examples of this dimension [1, 26]. These strategies aim to reduce perpetrators' access to individuals and strengthen individuals' control over digital interactions. Cognitive security therefore involves translating awareness of online risks into practices that protect safety and privacy.

Help seeking

Help seeking involves sharing a cyberbullying experience with trusted individuals to request emotional support, guidance, or practical assistance in resolving the problem [2, 23]. Turning to family members, friends, teachers, and relevant professionals enables victims to address their difficulties with the assistance of social support resources. However, help seeking depends not only on the availability of support but also on whether individuals perceive it as accessible and useful [2, 24]. It is therefore a coping process in which the ability to disclose experiences and request support operates together with an understanding and supportive social environment [27].

Avoidance

Avoidance encompasses responses such as not replying to bullying messages, ignoring aggressive interactions, or withdrawing from the online environment in which cyberbullying occurs [1, 2]. This approach may serve to reduce interaction with the perpetrator and provide distance from the associated emotional burden. However, when avoidance is combined with perceiving the problem as irresolvable and abandoning help seeking, victims may find it more difficult to access support [2, 24]. The functionality of avoidance should therefore be evaluated in relation to the circumstances of withdrawal and whether it is used alongside other coping strategies [22].

Information seeking

Information seeking refers to efforts to obtain relevant information and possible solutions in order to understand cyberbullying and learn how to cope with a particular situation [1, 25]. Learning about online safety practices, reporting options, and available sources of support expands the options individuals can consider. Whereas help seeking involves directly requesting support from a person or institution, information seeking prioritizes learning what can be done. Information seeking can thus be viewed as a preparatory process that supports the selection of safety measures and access to appropriate sources of help when necessary [1, 23].

Digital literacy

Understanding cyberbullying coping strategies requires consideration of individuals' knowledge and competencies in digital environments. Digital literacy encompasses competencies in using digital technologies, adapting to new technologies, accessing and evaluating online information, communicating, and developing solutions to problems [28]. In the context of cyberbullying, these competencies are particularly relevant to cognitive and safety-related processes, such as critically evaluating digital content and protecting personal information [6, 29]. Digital resilience, which encompasses coping with, recovering from, and learning from adverse online experiences, is also associated with digital literacy and is considered alongside positive parent–child relationships and school-based digital literacy opportunities [4]. These relationships indicate that coping with online difficulties is linked to family and school contexts as well as individual competencies. Nevertheless, the

potential protective role of digital literacy against cyberbullying should not be assumed to be equivalent across individuals and circumstances; differences in competency levels and their development over time should be considered [6, 29]. Digital literacy thus provides a theoretical basis for discussing the information evaluation, safety, and problem-solving aspects of coping with cyberbullying.

E-motions

Alongside the information- and safety-related aspects of coping with difficulties in digital environments, the expression and interpretation of emotions in online interactions are also relevant. The concept of e-motions describes emotional processes in these environments, encompassing the online expression, perception, facilitative use, understanding, and management of emotions [3]. However, the intensity of online emotional expression should be distinguished from the functional management of emotions. The associations of online emotional content use with cybervictimization and cyberbullying perpetration, and of the facilitative use of emotions with emotion regulation difficulties and problematic social media use, suggest that digital emotional processes do not necessarily serve a protective function [5, 30]. Understanding the emotional aspects of coping with cyberbullying therefore requires consideration of both individuals' online emotional expressions and the functions of those expressions in communication.

Witnessing cyberbullying

Witnessing cyberbullying refers to encountering online aggressive behaviors directed at others and represents a dimension of the cyberbullying experience that extends into the social environment [31]. Witnessing can be considered in relation to coping processes because witnesses encounter responses to cyberbullying and must also manage the emotions that the event evokes in them. Responses such as supporting the victim, seeking help, and remaining passive demonstrate the range of behavioral options available to witnesses, while emotional experiences such as worry, sadness, and anxiety suggest that witnesses may themselves need to cope [7, 32, 33]. The association between emotional difficulties related to witnessing and coping patterns suggests that this experience should not be understood merely as awareness of an event [7]. Expectations that adults will understand the problem and intervene helpfully are also relevant to students' evaluations of support options [34]. Accordingly, previous experience of witnessing cyberbullying may be associated with how individuals evaluate safety measures, help seeking, avoidance, and information seeking in similar situations. This potential relationship does not imply that witnessing automatically develops effective coping skills; rather, it provides a theoretical rationale for examining whether coping strategies differ between individuals who have and have not previously witnessed cyberbullying.

Methods

Study design

This study used a cross-sectional correlational design to examine the relationships between high school students' digital literacy, e-motions, and cyberbullying coping strategies. The variables were assessed at a single point in time without an intervention. Covariance-based structural equation modeling was used to examine the relationships of digital literacy and e-motions with coping strategies within the same model [35]. These relationships were also evaluated through multigroup analyses among students who had and had not previously witnessed cyberbullying. The study aimed to identify associations and statistical prediction rather than establish causality.

Participants and procedures

The study included 445 high school students in grades 9–12. Table 1 presents the demographic characteristics of the participants.

Table 1
Demographic characteristics of the participants

Characteristic	Category	n	%
Grade level	9th Grade	199	44.7
	10th Grade	203	45.6
	11th Grade	30	6.7
	12th Grade	13	2.9
Gender	Male	217	48.8
	Female	228	51.2
Computer ownership	Yes	299	67.2
	No	146	32.8
Smartphone ownership	Yes	425	95.5
	No	20	4.5
Social media use pattern	Passive user	201	45.2
	Moderately active user	201	45.2
	Active user	43	9.7
Daily internet use	0–1 hour	11	2.5
	1–2 hours	76	17.1
	3–4 hours	223	50.1
	5–6 hours	89	20.0
	7 hours or more	37	8.3
	No internet use	9	2.0
Self-reported technology proficiency	Low	16	3.6
	Moderate	254	57.1
	High	175	39.3
Previous exposure to cyberbullying as a witness	Yes	248	55.7
	No	197	44.3
Previous experience of cybervictimization	Yes	86	19.3
	No	359	80.7
Previous digital safety/cyberbullying training	Yes	259	58.2

Characteristic	Category	n	%
	No	186	41.8

[Insert Table 1 here]

Participants represented different grade levels and genders, and data were collected face to face by the researchers.

Measures

E-motions Questionnaire

The 21-item E-motions Questionnaire [3, 36] was used to assess emotions in online communication. The items (e.g., “I express my emotions through social networking sites such as Facebook, Twitter, or Instagram” and “I know how to distinguish one emotion from another when expressed on Facebook, Twitter, or Instagram”) are rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The scale consists of four dimensions: e-emotional expression, e-emotional perception, use of e-emotions, and understanding and management of e-emotions.

Digital Literacy Scale

The 10-item Digital Literacy Scale [28, 37] was used to assess students’ digital literacy levels. The items (e.g., “I know how to solve my own technical problems when using technology” and “I am confident with my search and evaluation skills in regard to obtaining information from the Web”) are rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The scale has a unidimensional structure, factor loadings ranged from .46 to .74, and the single-factor structure explained 40% of the total variance.

Cyberbullying Coping Strategies Scale

The 19-item Cyberbullying Coping Strategies Scale [25] was used to assess students’ strategies for coping with cyberbullying. The items (e.g., “I ask my family for help,” “I remove those who cyberbully me from my friends list,” and “I search the Internet for information about cyberbullying”) are rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The scale consists of four dimensions: enhancing cognitive security and privacy (cognitive security), seeking help (help seeking), avoidance and ignoring (avoidance), and seeking information (information seeking). Exploratory and confirmatory factor analyses conducted during scale development supported its four-factor structure and indicated acceptable psychometric properties.

Data analysis

Descriptive statistics were computed to summarize the variables. Maximum likelihood estimation was used to assess the fit of the measures within the structural equation modeling framework. Model fit was evaluated using the chi-square statistic, CFI, GFI, AGFI, IFI, TLI, SRMR, and RMSEA.

Use of generative AI in manuscript preparation

OpenAI ChatGPT was used to assist with language editing, text revision, and formatting this manuscript in accordance with the journal's requirements.

Results

Table 2 presents the descriptive statistics and internal consistency estimates for the measures.

Table 2
Descriptive statistics and internal consistency of the measures

Measure	M	SD	Min	Max	Cronbach's α
Digital Literacy Scale	38.07	6.28	13	50	0.832
E-motions Questionnaire	2.96	0.81	1	5	0.929
Expression	2.69	1.02	1	5	
Perception	3.15	0.94	1	5	
Use of e-motions	2.72	0.98	1	5	
Understanding and management	3.20	0.89	1	5	
Cyberbullying Coping Strategies Scale	58.58	11.36	19	95	0.798
Cognitive security	23.76	4.57	7	35	
Help seeking	15.81	4.15	5	25	
Avoidance	13.23	3.72	5	25	
Information seeking	5.78	2.09	2	10	

M = mean; SD = standard deviation; Min = minimum; Max = maximum. The E-motions Questionnaire dimensions are e-emotional expression, e-emotional perception, use of e-motions, and understanding and management of e-motions.

[Insert Table 2 here]

The mean scores were 38.07 ± 6.28 for the Digital Literacy Scale, 2.96 ± 0.81 for the E-motions Questionnaire, and 58.58 ± 11.36 for the Cyberbullying Coping Strategies Scale. Cronbach's alpha coefficients indicated acceptable internal consistency for the measures [38]. The relationships between the measures were examined, and the results are presented in Table 3.

Table 3
Correlations between the study variables

Measure		DL	E-motions	Coping
Digital Literacy Scale	r	1	0.132	0.138
	p		0.005	0.004
E-motions Questionnaire	r		1	0.245
	p			< 0.001
Cyberbullying Coping Strategies Scale	r			1
	p			

DL = Digital Literacy Scale; E-motions = E-motions Questionnaire; Coping = Cyberbullying Coping Strategies Scale; r = Pearson correlation coefficient; p = significance level.

[Insert Table 3 here]

Statistically significant positive correlations were found between the Digital Literacy Scale and the E-motions Questionnaire ($r = 0.132$, $p = 0.005$), between the Digital Literacy Scale and the Cyberbullying Coping Strategies Scale ($r = 0.138$, $p = 0.004$), and between the E-motions Questionnaire and the Cyberbullying Coping Strategies Scale ($r = 0.245$, $p < 0.001$).

The assumptions of confirmatory factor analysis were assessed by examining multicollinearity and univariate and multivariate normality [39]. Multicollinearity was evaluated using the variance inflation factor (VIF) and tolerance (T). VIF indicates the extent to which multicollinearity increases the variance of an estimated regression coefficient; values below 10 are generally considered acceptable. Tolerance indicates the proportion of variance in a predictor that is not explained by the other predictors; a nonzero value indicates the absence of perfect multicollinearity. In this study, VIF was below 10 and tolerance was nonzero, suggesting no evidence of substantial multicollinearity [40]. Univariate normality was assessed using skewness and kurtosis values and their critical ratios. According to Schumacker and Lomax [41], skewness and kurtosis values within ± 2 are consistent with a normal distribution. The values in this study fell within this range.

Maximum likelihood estimation assumes multivariate normality [42, 43]. Multivariate normality was therefore assessed, and the data were found to satisfy this assumption.

Path analysis

Fit indices were examined for a path model in which e-motions and cyberbullying coping strategies were specified as two latent variables, their respective dimensions served as observed indicators, and the Digital Literacy Scale score was included as an observed variable. Table 4 presents the model fit indices, which indicate acceptable to good fit [44, 45, 46, 47].

Table 4
Model fit indices

Fit index	Value
χ^2/df	3.946
GFI	0.954
NFI	0.933
IFI	0.949
TLI	0.927
CFI	0.949
RMSEA	0.080
SRMR	0.062

[Insert Table 4 here]

Table 4 summarizes model fit using χ^2/df, GFI, IFI, TLI, CFI, RMSEA, and SRMR. The path model is presented in Fig. 1. E-motions ($\beta = 0.24$, $p < 0.001$) and digital literacy ($\beta = 0.15$, $p < 0.001$) were positive predictors of cyberbullying coping strategies.

Multigroup analysis by witnessing status

The model was examined according to whether students had witnessed cyberbullying, and the results are presented in Table 5.

Table 5
Multigroup model comparisons by cyberbullying witnessing status

Model	df	CMIN	p	NFI Δ1	IFI Δ2	RFI ρ1	TLI ρ2
Measurement weights	6	16.791	0.010*	0.011	0.011	0.001	0.001
Structural weights	8	22.892	0.004*	0.015	0.015	0.001	0.001
Structural covariances	10	28.550	0.001*	0.019	0.019	0.002	0.002
Structural residuals	11	29.565	0.002*	0.019	0.020	0.000	0.000
Measurement residuals	20	49.134	< 0.001*	0.032	0.033	-0.003	-0.003

df = degrees of freedom; CMIN = chi-square statistic; p = significance level; NFI = normed fit index; IFI = incremental fit index; RFI = relative fit index; TLI = Tucker–Lewis index. *p < 0.05.

[Insert Table 5 here]

The model comparisons indicated differences by cyberbullying witnessing status in measurement weights, structural weights, structural covariances, structural residuals, and measurement residuals. Digital literacy was a positive predictor of cyberbullying coping strategies among students who had witnessed cyberbullying (β = 0.24, p < 0.001), whereas this predictive relationship was not statistically significant among those who had not (β = 0.09, p = 0.206). A path being significant in only one group does not, by itself, demonstrate a significant difference between the group-specific paths. The structural models for students who had and had not witnessed cyberbullying are presented in Fig. 2 (panels a and b, respectively).

Discussion

This study found that high school students' digital literacy and e-motions were positively associated with their cyberbullying coping strategies. The predictive role of digital literacy in coping strategies was significant among students who had witnessed cyberbullying but nonsignificant among those who had not. E-motions were positively associated with coping strategies in both groups. These findings contribute to an understanding of coping with cyberbullying that considers digital competencies, online emotional processes, and witnessing experience together.

Theoretical implications

The positive predictive role of digital literacy in cyberbullying coping strategies indicates that students' knowledge and competencies in digital environments are associated with the responses available to them when encountering online adversity. This finding is supported by the positive associations of digital literacy with protective problem-solving strategies in response to online risks and with the productive

coping dimension of digital resilience [48, 49]. This relationship may reflect digitally competent students' greater familiarity with safety options, access to relevant information, and awareness of potential solutions to the situations they encounter.

However, the positive relationship between digital literacy and the overall coping construct in this study does not imply that all forms of coping are associated with digital competencies in the same way. The finding that digital literacy is positively associated with both productive and nonproductive coping responses, but not significantly associated with the strategy of turning to others, highlights this distinction [49]. The relationship between digital literacy and problem-solving strategies in response to online risks supports the relevance of digital competencies, particularly to individual solutions [48]. By contrast, the finding that adolescents' help seeking from parents is associated more with active parental mediation than with parents' digital competencies highlights the relational dimension of seeking social support [50]. Knowing a technical solution and sharing an experience with another person may therefore involve different requirements; help seeking may require openness to communication and supportive relationships in addition to digital knowledge.

Because coping was represented by cognitive security, help seeking, avoidance, and information seeking in this study, the finding should be interpreted in terms of a common construct encompassing different responses. The range of suggested responses to cyberbullying scenarios—including talking face to face, turning to family or friends, contacting law enforcement, and taking technical measures—indicates that coping preferences can vary with the nature of the event [23]. Moreover, the differing associations of preventive digital awareness, cognitive reappraisal, emotion regulation, and social support with well-being, compared with reactive and risky coping, suggest that strategies cannot be assumed to function equally well [51]. The positive relationship observed here may therefore reflect students' use of a wider range of coping options; however, greater reported use does not imply that these strategies are equally effective in real-life situations.

The positive predictive role of e-motions in cyberbullying coping strategies indicates that online emotional processes should be considered when seeking to understand coping. The inclusion of emotion regulation, cognitive reappraisal, and social support as components of coping supports the relevance of emotional processes to this construct [51]. Research among female students has also identified responsible decision-making and perceived parental support as mediators of the relationship between cybervictimization and coping [2]. This finding suggests that coping is linked to both students' decision-making skills and the support they perceive from their parents.

Nevertheless, the observed relationship between e-motions and coping should not be interpreted as evidence that all online emotional processes are protective. The positive associations of online emotional content use with cybervictimization and cyberbullying perpetration, alongside the negative associations of social and emotional competencies with these experiences, indicate a need to distinguish emotional engagement from emotional competence [5]. The inclusion of expression, perception, facilitative use, understanding, and management within e-motions further supports this

distinction [36]. Because these dimensions were considered under a common construct in this study, the observed relationship may reflect emotional engagement online as well as the capacity to manage emotions.

The significant relationship between digital literacy and coping strategies among students who had witnessed cyberbullying, but not among those who had not, suggests that witnessing experience may provide a relevant context for understanding this relationship. Witnessing cyberbullying is associated with anxiety and depressive symptoms, suggesting that witnesses may also need support to cope with emotional difficulties [7]. The association of empathic distress during witnessing with intentions to remain passive, and of compassion with intentions to help, supports the view that responses to witnessing can vary according to their emotional nature [52]. Observing cyberbullying directed at others may therefore help students connect their digital knowledge with concrete risks and possible responses. However, this explanation was not directly tested in this study, and statistical significance in one group but not the other does not, by itself, establish a significant difference between the group-specific paths.

Practical implications

The associations of both digital literacy and e-motions with coping strategies provide a rationale for addressing digital safety skills and online emotional processes together in school-based education. Evidence that educational programs contribute to recognizing cyberbullying and developing awareness, together with the potential to support coping skills through education, highlights the value of structured school activities [26, 53]. The inclusion of preventive digital awareness, cognitive reappraisal, emotion regulation, and social support within coping also supports the development of multifaceted educational content [51]. Accordingly, programs may address recognizing emotions, evaluating responses, and accessing appropriate support alongside privacy settings, blocking, and reporting options.

The inclusion of help seeking as a dimension of coping also requires educational initiatives to address students' knowledge of and ability to access support. The recommendation of different sources of help, such as family, friends, and law enforcement, across cyberbullying scenarios indicates that students can consider different support options according to the nature of the event [23]. However, the lower use of support seeking relative to other coping strategies and the association of parental help seeking with active parental mediation suggest that knowing about a support resource may not be sufficient to use it [50, 54]. School counseling services may therefore benefit from making explicit whom students can approach, under what circumstances, and how, while work with families may emphasize nonjudgmental listening and supportive communication.

The pattern observed by witnessing status supports the inclusion of witnesses alongside students directly exposed to cyberbullying in educational initiatives. The different associations between witnesses' emotional responses and their intentions to help, act aggressively, or remain passive indicate that witnessing is not a uniform experience [52]. Variation in suggested coping options across cyberbullying scenarios also supports the inclusion of diverse situations in educational activities [23]. Examples involving humiliating posts, threats, fake accounts, and online exclusion may therefore be

used to help students discuss safe responses, consider ways to support victims, and practice seeking adult support when necessary.

Limitations and directions for future research

This study has several limitations. First, its cross-sectional correlational design precludes conclusions about the direction and causality of the relationships between digital literacy, e-motions, and coping strategies. Future longitudinal studies could trace the development of these relationships over time, while intervention studies could test the effects of education targeting digital and emotional skills on coping.

The use of self-report data means that responses may have been influenced by students' self-perceptions and tendencies to provide socially desirable answers. Assessing all variables using the same method also introduces the possibility of common method effects. Future studies could supplement self-reports with performance-based digital literacy tasks, scenario-based assessments, and interviews to examine these relationships using multiple data sources.

Modeling e-motions and coping strategies as common constructs represented by their subdimensions limited the separate assessment of dimension-specific relationships. The findings therefore do not indicate that all emotional processes or forms of coping are associated in the same direction or to the same degree. Furthermore, coping scores do not directly demonstrate the effectiveness of strategies in reducing victimization or protecting psychological well-being. Future studies could examine the relationships of the different dimensions of e-motions with cognitive security, help seeking, avoidance, and information seeking separately and track the outcomes of these strategies.

Assessing witnessing solely in terms of whether students had previously witnessed cyberbullying does not capture differences in the frequency, timing, nature of the event, or witnesses' responses. Uncertainties regarding measurement invariance also limit the interpretation of comparisons between witnessing groups. Because a relationship being significant in only one group does not demonstrate a significant between-group difference, no firm conclusion can be drawn about the moderating role of witnessing. Future research could establish the comparability of measurements across groups, directly compare the relevant path coefficients, and consider different features of witnessing experience.

Finally, the predominance of ninth- and tenth-grade students limits the generalizability of the findings across all stages of high school education. Previous victimization and cyberbullying education experiences were also not controlled for in the structural model. Examining these experiences together with family support and the school environment in samples with more balanced representation across grade levels may provide a more comprehensive understanding of the individual and environmental conditions associated with coping.

Conclusions

This study showed that digital literacy and e-motions were positive and significant predictors of cyberbullying coping strategies among high school students. The predictive role of digital literacy was significant among students who had witnessed cyberbullying but nonsignificant among those who had not. Although this pattern provides a rationale for examining witnessing experience in greater detail, it does not, by itself, establish that the relationship differs between the groups.

The main contribution of this study is to demonstrate the associations of coping with cyberbullying with digital competencies and online emotional processes within the same model. The findings support addressing these two areas together in initiatives aimed at expanding students' coping options. The success of such initiatives should be evaluated through students' responses to actual incidents and the outcomes of those responses, alongside their reported strategies.

Abbreviations

AGFI: Adjusted goodness-of-fit index; CFA: Confirmatory factor analysis; CFI: Comparative fit index; CMIN: Chi-square statistic; df/DF: Degrees of freedom; GFI: Goodness-of-fit index; IFI: Incremental fit index; M: Mean; ML: Maximum likelihood; NFI: Normed fit index; RFI: Relative fit index; RMSEA: Root mean square error of approximation; SD: Standard deviation; SEM: Structural equation modeling; SRMR: Standardized root mean square residual; TLI: Tucker–Lewis index; VIF: Variance inflation factor.

Declarations

Ethics approval and consent to participate

All procedures involving human participants were performed in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments. The study was approved by the Social and Human Sciences Ethics Committee of Bartın University, Türkiye, on 11 February 2026 (Protocol No. 2026-SBB-0010; Meeting No. 2; Decision No. 1). Informed consent to participate was obtained from the parents or legal guardians of all students aged 18 years or younger.

Consent for publication

Not applicable.

Availability of data and materials

The dataset supporting the findings of this study is deposited in Zenodo (https://doi.org/10.5281/zenodo.23017135) under restricted access. Access may be granted upon request, subject to approval by the authors.

Competing interests

The authors declare that they have no competing interests.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Authors' contributions

Author 1: Conceptualization; Methodology; Investigation; Writing – original draft; Writing – review and editing.

Author 2: Formal analysis; Writing – review and editing.

Author 3: Investigation; Data curation; Writing – review and editing.

All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

References

1. Aydın F, Topal M, Yaşar H. Investigation of high school students' coping strategies with cyberbullying. Journal of Interdisciplinary Education: Theory and Practice. 2024;6(2):130–141. https://doi.org/10.47157/jietp.1494605
2. Espino E, Guarini A, Del Rey R. Effective coping with cyberbullying in boys and girls: The mediating role of self-awareness, responsible decision-making, and social support. Current Psychology. 2023;42(36):32134–32146. https://doi.org/10.1007/s12144-022-04213-5
3. Alemdar M, Yiğiter MS. Assessing cyber-emotional skills in the digital age: The Turkish adaptation and measure invariance of the e-motions scale. HAYEF: Journal of Education. 2025;22:0036. https://doi.org/10.5152/hayef.2025.24036
4. Pan Q, Lan M, Tan CY, Tao S, Liang Q, Law N. Protective factors contributing to adolescents' multifaceted digital resilience for their wellbeing: A socio-ecological perspective. Computers in Human Behavior. 2024;155:108164. https://doi.org/10.1016/j.chb.2024.108164
5. Marín-López I, Zych I, Ortega-Ruiz R, Hunter SC, Llorent VJ. Relations among online emotional content use, social and emotional competencies and cyberbullying. Children and Youth Services Review. 2020;108:104647. https://doi.org/10.1016/j.childyouth.2019.104647
6. Vo DV, Nguyen PNT, Huynh VT, Nguyen GMT. Cyberbullying among high school students: Digital literacy as a protective factor? Social Psychology of Education. 2026;29:7. https://doi.org/10.1007/s11218-026-10174-5

7. Tang B, Ouyang W, Deng J, Huang X. Prevalence of mental stress and its association with witnessing cyberbullying and coping strategies among undergraduates in Hunan, China in 2021. Technology and Health Care. 2024;32(2):915–924. https://doi.org/10.3233/THC-230305
8. Zhu C, Huang S, Evans R, Zhang W. Cyberbullying among adolescents and children: A comprehensive review of the global situation, risk factors, and preventive measures. Frontiers in Public Health. 2021;9:634909. https://doi.org/10.3389/fpubh.2021.634909
9. Li Q. Bullying in the new playground: Research into cyberbullying and cyber victimisation. Australasian Journal of Educational Technology. 2007;23(4):435-454. https://doi.org/10.14742/ajet.1245
10. Vismara M, Girone N, Conti D, Nicolini G, Dell'Osso B. The current status of cyberbullying research: A short review of the literature. Current Opinion in Behavioral Sciences. 2022;46:101152. https://doi.org/10.1016/j.cobeha.2022.101152
11. Giumetti GW, Kowalski RM. Cyberbullying via social media and well-being. Current Opinion in Psychology. 2022;45:101314. https://doi.org/10.1016/j.copsyc.2022.101314
12. Ray G, McDermott CD, Nicho M. Cyberbullying on social media: Definitions, prevalence, and impact challenges. Journal of Cybersecurity. 2024;10(1):tyae026. https://doi.org/10.1093/cybsec/tyae026
13. Arató N, Zsidó AN, Rivnyák A, Péley B, Lábadi B. Risk and protective factors in cyberbullying: The role of family, social support and emotion regulation. International Journal of Bullying Prevention. 2022;4(2):160–173. https://doi.org/10.1007/s42380-021-00097-4
14. Camerini AL, Marciano L, Carrara A, Schulz PJ. Cyberbullying perpetration and victimization among children and adolescents: A systematic review of longitudinal studies. Journal of Computer-Mediated Communication. 2020;25(2):163–181. https://doi.org/10.1093/jcmc/zmz031
15. Kasturiratna KS, Hartanto A, Chen CH, Tong EM, Majeed NM. Umbrella review of meta-analyses on the risk factors, protective factors, consequences and interventions of cyberbullying victimization. Nature Human Behaviour. 2025;9(1):101-132. https://doi.org/10.1038/s41562-024-02011-6
16. Dennehy R, Meaney S, Walsh KA, Sinnott C, Cronin M, Arensman E. Young people's conceptualizations of the nature of cyberbullying: A systematic review and synthesis of qualitative research. Aggression and Violent Behavior. 2020;51:101379. https://doi.org/10.1016/j.avb.2020.101379
17. Gohal G, Alqassim A, Eltyeb E, Rayyani A, Hakami B, Al Faqih A, et al. Prevalence and related risks of cyberbullying and its effects on adolescent. BMC Psychiatry. 2023;23:39. https://doi.org/10.1186/s12888-023-04542-0
18. Güllü H, Karahan E, Akçay AO. A comprehensive investigation of cyberbullying and cyber victimization among secondary school students. Education and Information Technologies. 2023;28(10):12633–12650. https://doi.org/10.1007/s10639-023-11687-8
19. Tran HGN, Thai TT, Dang NTT, Vo DK, Duong MHT. Cyber-victimization and its effect on depression in adolescents: A systematic review and meta-analysis. Trauma, Violence, & Abuse. 2023;24(2):1124–1139. https://doi.org/10.1177/15248380211050597

20. Arató N, Zsidó AN, Lénárd K, Lábadi B. Cybervictimization and cyberbullying: The role of socio-emotional skills. Frontiers in Psychiatry. 2020;11:248. https://doi.org/10.3389/fpsyt.2020.00248
21. Quintana-Orts C, Mora-Merchán JA, Muñoz-Fernández N, Del Rey R. Bully-victims in bullying and cyberbullying: An analysis of school-level risk factors. Social Psychology of Education. 2024;27(2):587–609. https://doi.org/10.1007/s11218-023-09846-3
22. Chamizo-Nieto MT, Arrivillaga C, Gómez-Hombrados J, Rey L. Preventing cyberbullying in victims: What role do cognitive coping strategies play in boys and girls? Children and Youth Services Review. 2024;163:107751. https://doi.org/10.1016/j.childyouth.2024.107751
23. Aydın F, Seferoğlu SS. An investigation of university students' cyberbullying coping strategies. İnönü Üniversitesi Eğitim Fakültesi Dergisi. 2020;21(2):579–594. https://doi.org/10.17679/inuefd.554675
24. Chen Q, Zhu Y. Cyberbullying victimisation among adolescents in China: Coping strategies and the role of self-compassion. Health & Social Care in the Community. 2022;30(3):e677–e686. https://doi.org/10.1111/hsc.13438
25. Koç M, Horzum MB, Ayas T, Aydın F, Özbay A, Uğur E, et al. Coping with cyberbullying scale: A validity and reliability study. Sakarya University Journal of Education. 2016;6(3):116–128. https://doi.org/10.19126/suje.281376
26. Yurdakul Y, Bütün Ayhan A. The effect of the cyberbullying awareness program on adolescents' awareness of cyberbullying and their coping skills. Current Psychology. 2023;42(28):24208–24222. https://doi.org/10.1007/s12144-022-03483-3
27. Felk J, Liesegang J, Schmidt F, Donat M, Wolgast A. Verbal patterns and effective strategies in cyberbullying prevention and intervention: A systematic review. Child Psychiatry & Human Development. 2025. Advance online publication. https://doi.org/10.1007/s10578-025-01910-7
28. Üstündağ MT, Güneş E, Bahçivan E. Turkish adaptation of digital literacy scale and investigating pre-service science teachers' digital literacy. Journal of Education and Future. 2017;(12):19–29.
29. Tao S, Reichert F, Law N. Longitudinal bidirectional relations between digital literacy and cyberbullying experiences in adolescence. Humanities and Social Sciences Communications. 2026;13:425. https://doi.org/10.1057/s41599-026-06788-x
30. Marino C, Gini G, Angelini F, Vieno A, Spada MM. Social norms and e-motions in problematic social media use among adolescents. Addictive Behaviors Reports. 2020;11:100250. https://doi.org/10.1016/j.abrep.2020.100250
31. Polanco-Levicán K, Salvo-Garrido S. Bystander roles in cyberbullying: A mini-review of who, how many, and why. Frontiers in Psychology. 2021;12:676787. https://doi.org/10.3389/fpsyg.2021.676787
32. Gomes SDS, Ferreira PDC, Pereira N, Simão AMV. A comparative analysis of adolescents' emotions and emotion regulation strategies when witnessing different cyberbullying scenarios. Heliyon. 2024;10(9):e29705. https://doi.org/10.1016/j.heliyon.2024.e29705
33. Palomera R, Fernández-Rouco N, Briones E, González-Yubero S. Adolescent bystanders' responses and the influence of social values on applying bullying and cyberbullying strategies. Journal of

School Violence. 2021;20(4):523–535. https://doi.org/10.1080/15388220.2021.1979017

34. Bell M, Øverland K. Students' perspectives on stakeholders' cooperative efforts to overcome cyberbullying in Norwegian primary schools. Social Psychology of Education. 2026;29:90. https://doi.org/10.1007/s11218-026-10260-8
35. Kline RB. Principles and practice of structural equation modeling. 5th ed. New York: Guilford Press; 2023.
36. Zych I, Ortega-Ruiz R, Marín-López I. Emotional content in cyberspace: Development and validation of E-motions Questionnaire in adolescents and young people. Psicothema. 2017;29(4):563–569. https://doi.org/10.7334/psicothema2016.340
37. Ng W. Can we teach digital natives digital literacy? Computers & Education. 2012;59(3):1065–1078. https://doi.org/10.1016/j.compedu.2012.04.016
38. Nunnally JC. Psychometric theory. 2nd ed. New York: McGraw-Hill; 1978.
39. Ullman JB, Bentler PM. Structural equation modeling. In: Weiner IB, Schinka JA, Velicer WF, editors. Handbook of psychology. 2nd ed. Wiley; 2012. https://doi.org/10.1002/9781118133880.hop202023
40. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis. 7th ed. Harlow: Pearson Education Limited; 2014.
41. Schumacker RE, Lomax RG. A beginner's guide to structural equation modeling. 2nd ed. Mahwah, NJ: Lawrence Erlbaum Associates; 2004.
42. Byrne BM. Structural equation modeling with AMOS: basic concepts, applications, and programming. 2nd ed. New York: Routledge; 2010.
43. Brown TA, Moore MT. Confirmatory factor analysis. In: Hoyle RH, editor. Handbook of structural equation modeling. New York: Guilford Press; 2012. p. 361–379.
44. Hooper D, Coughlan J, Mullen MR. Structural equation modelling: guidelines for determining model fit. Electronic Journal of Business Research Methods. 2008;6(1):53–60. https://doi.org/10.21427/D7CF7R
45. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal. 1999;6(1):1–55. https://doi.org/10.1080/10705519909540118
46. Kline RB. Principles and practice of structural equation modeling. 2nd ed. New York: Guilford Press; 2005.
47. Tabachnick BG, Fidell LS. Using multivariate statistics. 4th ed. Boston: Allyn and Bacon; 2001.
48. Vandoninck S, d'Haenens L, Roe K. Online risks: Coping strategies of less resilient children and teenagers across Europe. Journal of Children and Media. 2013;7(1):60–78. https://doi.org/10.1080/17482798.2012.739780
49. Pan Q, Lan M, Tan CY, Tao S, Liang Q, Law N. Development and validation of digital resilience scale for primary and secondary school students. BMC Psychology. 2025;13:1412. https://doi.org/10.1186/s40359-025-03739-0

50. Soldatova GU, Rasskazova EI, Chigarkova SV. Digital socialization of adolescents in the Russian Federation: Parental mediation, online risks, and digital competence. Psychology in Russia: State of the Art. 2020;13(4):191–206. https://doi.org/10.11621/pir.2020.0413
51. Tokgöz EÖ, Kocatürk M, Serin H. Constructing the cyberbullying coping scale for adolescents and young adults: Psychometric properties and well-being correlates. BMC Psychology. 2026;14:447. https://doi.org/10.1186/s40359-026-04212-2
52. Steinvik HR, Duffy AL, Zimmer-Gembeck MJ. Bystanders' responses to witnessing cyberbullying: The role of empathic distress, empathic anger, and compassion. International Journal of Bullying Prevention. 2024;6:399–410. https://doi.org/10.1007/s42380-023-00164-y
53. Aydın F. The effect of cyberbullying education on sixth-grade students' cyberbullying awareness [master's thesis]. Sakarya: Sakarya University; 2016.
54. Chen Q, Lu Z, Liu B, Xiao Q, Zhu Y, Chan KL. Validation of Chinese version of coping strategies for victims of cyberbullying scale. BMC Psychology. 2024;12:259. https://doi.org/10.1186/s40359-024-01766-x

Figures

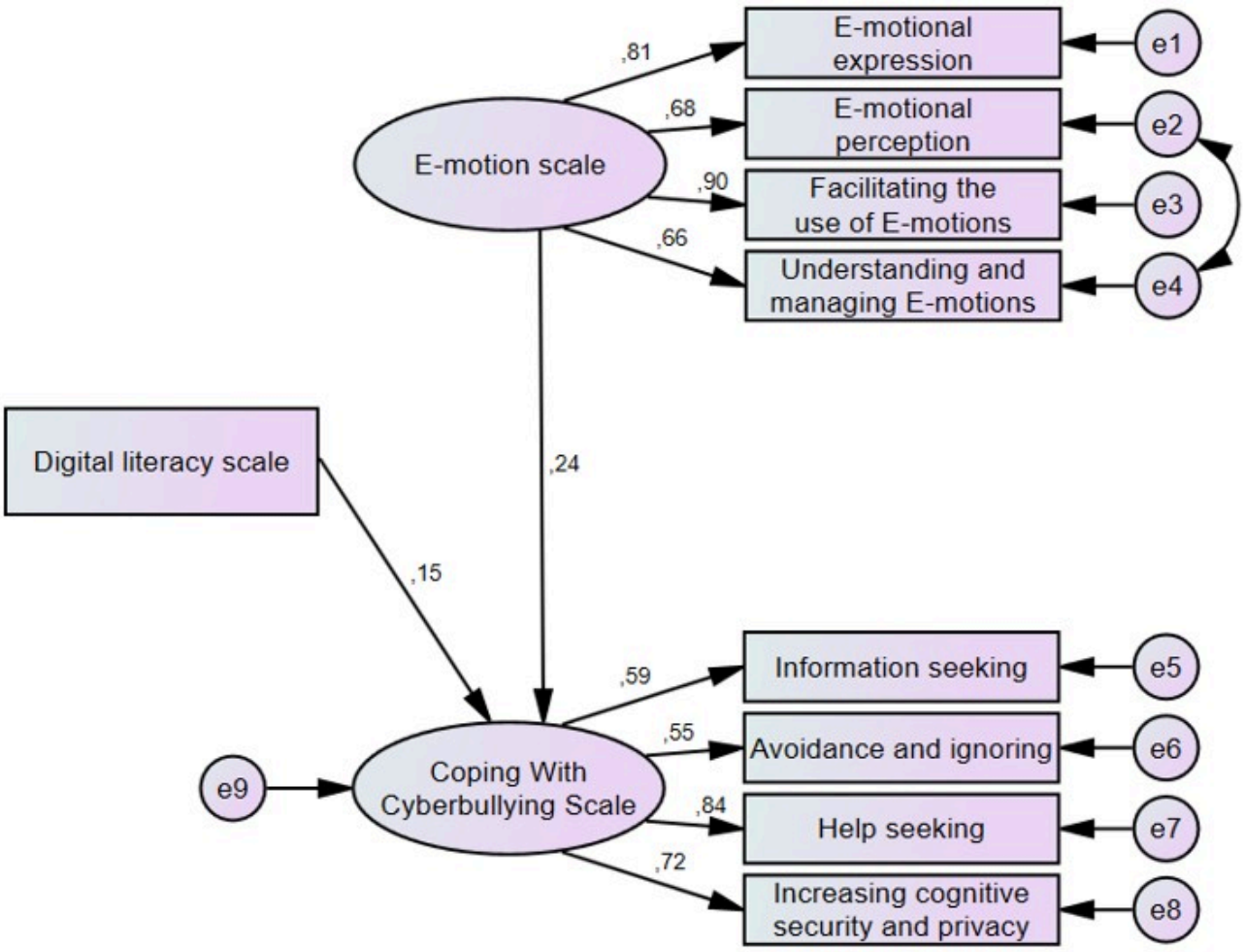


Figure 1

Structural model of digital literacy, e-motions and cyberbullying coping strategies

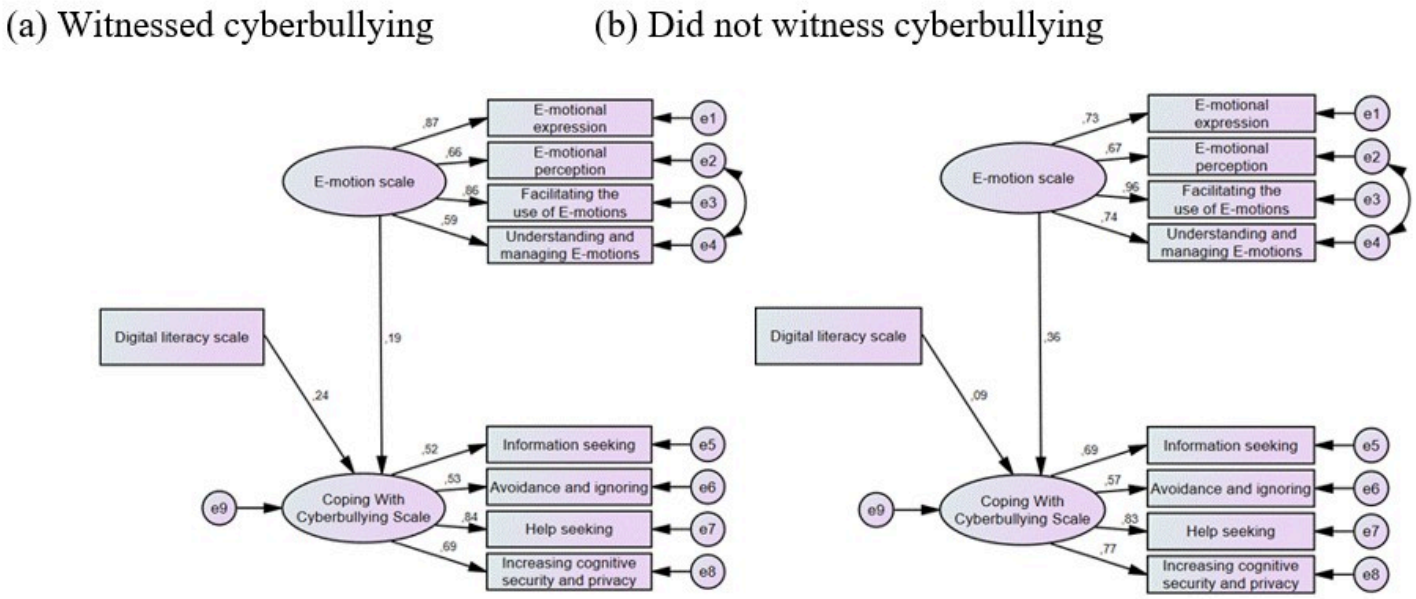


Figure 2

Structural models by cyberbullying witnessing status

Note. (a) Students who had witnessed cyberbullying; (b) students who had not witnessed cyberbullying. β = standardized path coefficient. Coefficients were estimated separately for each group.