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# The Structural Model of Cyberbullying–Victimization Experience Based on Body Image Satisfaction with the Mediating Role of Self-Esteem in Adolescents

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### ABSTRACT

**Purpose:** This study aimed to investigate the structural relationship between body image satisfaction and cyberbullying–victimization experience in adolescents, with self-esteem functioning as a mediating variable.

**Methods and Materials:** The research employed a descriptive-correlational design using structural equation modeling (SEM). The statistical population consisted of all second-level secondary school students in Tehran during the 2023–2024 academic year. A multistage cluster sampling method was used to select 400 participants, of which 374 completed all study components. Data were collected using three validated instruments: the Cyberbullying and Victimization Experience Questionnaire (CBVEQ), the Body Image Satisfaction Scale (SWBIS), and the Rosenberg Self-Esteem Scale (RSES). Data analysis was conducted using SPSS-26 for descriptive statistics and AMOS-24 for confirmatory factor analysis and SEM to test the hypothesized mediation model.

**Findings:** Results showed that body image satisfaction positively and significantly predicted self-esteem ( $\beta = 0.200$ ,  $CR = 4.085$ ,  $p < 0.001$ ), while self-esteem negatively predicted cyberbullying–victimization experience ( $\beta = -0.317$ ,  $CR = -5.236$ ,  $p < 0.001$ ). Additionally, body image satisfaction had a significant direct negative effect on cyberbullying–victimization ( $\beta = -0.531$ ,  $CR = -8.789$ ,  $p < 0.001$ ). The Sobel test confirmed the mediating role of self-esteem in the relationship between body image satisfaction and cyberbullying–victimization ( $z = -7.784$ ,  $p < 0.001$ ), indicating a significant indirect effect ( $\beta = -0.064$ ).

**Conclusion:** The findings highlight the central role of self-esteem in mediating the negative association between body image satisfaction and involvement in cyberbullying. Adolescents with higher body satisfaction tend to experience greater self-esteem, which in turn reduces their vulnerability to both cyberbullying perpetration and victimization.

**Keywords:** Cyberbullying, Body Image Satisfaction, Self-Esteem, Adolescents, Structural Equation Modeling, Victimization



## 1. Introduction

The rise of digital technology and the omnipresence of social media have transformed the nature of interpersonal relationships among adolescents, ushering in new forms of aggression such as cyberbullying. Unlike traditional bullying, cyberbullying penetrates private spaces and often occurs anonymously, which increases its psychological impact and reduces the likelihood of detection or intervention (Ismail et al., 2023; Platts et al., 2023). Adolescents are particularly vulnerable to cyberbullying due to their developmental stage, marked by heightened sensitivity to peer evaluations and identity exploration. This vulnerability is intensified by increased exposure to online environments where self-worth is often constructed through body image ideals and social comparisons (Ariana, Almuhtadi, Natania, Handayani, Bressan, et al., 2024; Webber, 2022).

Cyberbullying is defined as intentional and repeated harm inflicted through electronic devices and digital platforms, encompassing behaviors such as threats, humiliation, spreading rumors, and exclusion (Chamizo-Nieto & Rey, 2023; Koteswaramma et al., 2024). Its consequences are profound, with research linking cyberbullying victimization to a range of adverse outcomes, including depression, anxiety, low academic performance, and suicidal ideation (Chai, 2021; Ragusa et al., 2024; Santos et al., 2021). Moreover, empirical evidence suggests that adolescents who experience cyberbullying often grapple with diminished self-esteem and body dissatisfaction, both of which mediate psychological distress (Geng et al., 2022; Wachs et al., 2020).

Self-esteem, defined as an individual's overall sense of self-worth, plays a crucial mediating role in adolescents' response to cyberbullying. Lower levels of self-esteem have been consistently associated with greater susceptibility to both victimization and perpetration in cyber contexts (Geng et al., 2021; Quintana-Orts et al., 2021). Adolescents with low self-esteem may perceive themselves as deserving of mistreatment or may lack the assertiveness to resist harassment. Conversely, they may also engage in bullying behaviors as a misguided strategy to gain control or social dominance. In either case, self-esteem emerges as a central variable in understanding the dynamics of cyberbullying and its psychological sequelae (Santos et al., 2021).

An increasingly studied determinant of adolescent self-esteem is body image satisfaction. Body image refers to one's subjective evaluation of physical appearance, and

satisfaction with body image has been shown to influence emotional well-being and social functioning (Malinowska-Cieřlik et al., 2022; Wei et al., 2022). In contemporary digital culture, adolescents are routinely exposed to idealized body standards that are often unattainable, leading to increased body dissatisfaction, especially among females (Ariana, Almuhtadi, Natania, Handayani, Larasati, et al., 2024; Prince et al., 2025). This dissatisfaction not only contributes to diminished self-esteem but also increases vulnerability to cyberbullying, particularly when appearance becomes a target for online aggression (Geng et al., 2021; Pratiti et al., 2022).

Digital platforms like TikTok, Instagram, and Snapchat reinforce body comparison behaviors through their algorithmic emphasis on physical appearance and popularity metrics. Studies have demonstrated that body-related content on such platforms contributes significantly to body dissatisfaction, particularly among female adolescents who are more likely to internalize appearance-based evaluations (Ariana, Almuhtadi, Natania, Handayani, Bressan, et al., 2024; Webber, 2022). This dissatisfaction can result in both psychological distress and increased involvement in cyberbullying dynamics—either as victims of appearance-based harassment or as perpetrators seeking to deflect insecurities through aggression (Platts et al., 2023; Prince et al., 2025).

The relationship between body image satisfaction and cyberbullying has also been theorized within the framework of social comparison and digital identity construction. Adolescents with negative body perceptions may engage more frequently in social comparison, making them more sensitive to peer feedback and social exclusion online (Geng et al., 2021; Mangintir et al., 2020). Such dynamics may intensify feelings of inadequacy, social isolation, and lead to increased risk for involvement in both sides of cyberbullying—perpetration and victimization. Meanwhile, positive body image has been associated with resilience and psychological well-being, reducing the likelihood of adverse reactions to online harassment (Santos et al., 2021; Siregar, 2023).

The mediating role of self-esteem between body image satisfaction and cyberbullying outcomes has been explored in various cultural contexts, yet findings often highlight the need for culturally specific investigations. For example, while Western studies often emphasize appearance-driven peer cultures, recent research in Asian populations has underscored the influence of collective values and filial norms on adolescents' cyber behavior and self-perception

(Wei et al., 2022; Zhong et al., 2021). These findings support the necessity of conducting localized studies that reflect the socio-cultural nuances influencing adolescent behavior in digital spaces.

In addition to self-perception and internal states, broader environmental and institutional contexts also affect adolescents' experiences of cyberbullying. The school environment, in particular, plays a dual role: it can either buffer the psychological impact of cyberbullying through support systems or exacerbate it through neglect and lack of preventive programs (Kanan et al., 2024; Ruda & Kuzmina, 2020). Schools with comprehensive digital literacy and emotional regulation curricula report lower rates of cyberbullying and higher student well-being. However, many institutions lack formal mechanisms for addressing appearance-based harassment online, making it imperative to develop empirically grounded frameworks that incorporate psychological, social, and institutional variables.

The literature also highlights gender differences in cyberbullying involvement and psychological impact. Female adolescents are more frequently targeted with body-shaming and appearance-related cyberbullying, which is directly tied to increased body dissatisfaction and depressive symptoms (Ariana, Almuhtadi, Natania, Handayani, Bressan, et al., 2024; Prince et al., 2025). Males, on the other hand, may experience bullying focused on masculinity, strength, or dominance, often responding with counter-aggression. These patterns underscore the importance of developing gender-sensitive interventions that address the unique challenges faced by different groups of adolescents in cyber contexts (Chamizo-Nieto & Rey, 2023; Lee et al., 2023).

From a methodological perspective, the complexity of relationships among body image satisfaction, self-esteem, and cyberbullying experiences necessitates robust statistical modeling. Structural equation modeling (SEM) offers a sophisticated analytical approach to test both direct and indirect effects among these variables, allowing researchers to assess mediation pathways and latent constructs simultaneously (Chai, 2021; Шейнов et al., 2020). Such models enable a comprehensive understanding of the causal mechanisms underlying cyberbullying dynamics and provide evidence-based directions for preventive measures.

Given the multifaceted nature of cyberbullying and its psychological underpinnings, this study aims to explore the structural relationship between body image satisfaction and cyberbullying-victimization experience among adolescents, with self-esteem as a mediating variable. Specifically, the

study seeks to examine whether adolescents who are more satisfied with their body image exhibit higher levels of self-esteem, which in turn reduces their likelihood of being involved in cyberbullying, either as perpetrators or victims.

## 2. Methods and Materials

### 2.1. Study Design and Participants

This study employed a descriptive-correlational research design using the structural equation modeling (SEM) approach. The statistical population included all adolescents enrolled in the second stage of secondary schools in Tehran during the academic year 2023–2024, which comprised approximately 252,000 students. Given the use of SEM, Kline (2015) recommends a minimum ratio of 5 participants per estimated parameter, while a 10:1 ratio is deemed appropriate and a 20:1 ratio ideal. In the proposed model of the current study, 10 parameters were considered, and thus a suitable sample size would be 200 students. To increase the precision of model estimation and account for potential participant attrition, a total of 400 students were selected. Given the large population and the impracticality of accessing all individuals, a multi-stage cluster sampling method was utilized. The city of Tehran was divided into five geographical areas: north, south, east, west, and center. From each zone, one district was randomly selected. Following the official administrative procedures of the Ministry of Education, an official introduction letter was obtained from the university, submitted to the education departments of the selected districts, and necessary approvals were obtained from the research and security departments. The selected districts included districts 2, 3, 5, 13, and 16. From each district, one boys' school and one girls' school were randomly chosen. Then, from each selected school, two classes were randomly selected to participate in the study. Written informed consent was obtained from school principals, who also confirmed that parental consent was not required. Anonymous written consent was obtained from all participating students after providing them with informed consent forms.

### 2.2. Measures

#### 2.2.1. Cyberbullying - Victimization Experience Questionnaire (CBVEQ)

The CBVEQ, developed by Antoniadou, Kokkinos, and Markos (2016), was used to assess adolescents' experiences with cyberbullying and cyber victimization. The instrument

consists of two subscales—cyber victimization and cyberbullying—each with 12 items, capturing both direct and indirect dimensions. Direct experiences include behaviors such as property destruction (e.g., sending virus-infected files), verbal abuse (e.g., sending derogatory messages), and threats (e.g., sending threatening messages). Indirect experiences are assessed through items related to social exclusion (e.g., spreading harmful rumors), defamation (e.g., sending false or humiliating messages), and impersonation (e.g., pretending to be someone else online to mistreat a peer). Responses are scored using a 5-point Likert scale ranging from 1 (Never) to 5 (Every day). The original validation study reported excellent psychometric properties with CFI = 0.97, TLI = 0.97, and RMSEA = 0.031, and Cronbach's alpha coefficients of 0.89 and 0.80 for the bullying and victimization subscales, respectively. In the Persian adaptation by Basharpour and Zardi (2019), Cronbach's alpha values were 0.75, 0.78, and 0.79 for the respective subscales and overall score, with CFA indices confirming good model fit (CFI = 0.92, NFI = 0.91, RMSEA = 0.071) (Abdollahnejad et al., 2022; Fariba et al., 2022).

#### 2.2.2. Satisfaction With Body Image Scale (SWBIS)

The SWBIS, originally developed by Suhoto and Garcia (2002), was used to assess individuals' satisfaction with their body image. Initially composed of 81 items, the scale was refined through content validation and factor analyses to a final version of 22 items. The scale uses a 5-point Likert format ranging from 1 (Strongly disagree) to 5 (Strongly agree), with sample items like "I am satisfied with my body as it is." Psychometric evaluation of the original scale reported a test-retest reliability of 0.71 and a Cronbach's alpha of 0.91. Factor analysis using varimax rotation supported a unidimensional structure with KMO = 0.89. The Persian version, validated by Taheri Torbati et al. (2013), also demonstrated strong psychometric properties with KMO = 0.89, a significant Bartlett's test ( $\chi^2 = 2293.3$ ,  $p < 0.001$ ), Cronbach's alpha = 0.91, and test-retest reliability = 0.75. One culturally irrelevant item was removed during content validation, resulting in the final 22-item version used in the present study (Kiani Rad, 2024).

#### 2.2.3. Rosenberg Self-Esteem Scale (RSES)

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES), developed by Rosenberg (1965),

which is among the most widely used instruments for assessing global self-worth. It contains 10 items, five positively worded (items 1–5) and five negatively worded (items 6–10). Items are rated on a 4-point Likert scale, where positively phrased items are scored from 0 (Strongly disagree) to 3 (Strongly agree), and negatively phrased items are reverse scored. The original validation reported a Cronbach's alpha of 0.93 and a test-retest reliability of 0.85. In Iranian studies, internal consistency has ranged from 0.69 to 0.89 using various reliability indices. For example, Mohammadi (2005) reported reliability coefficients of 0.69 (Cronbach's alpha), 0.78 (test-retest), and 0.68 (split-half), while Rajabi and Bahloul (2007) found values of 0.84 for the overall sample, 0.87 for male students, and 0.80 for female students. In another study, Cronbach's alpha reached 0.89, and yet another study confirmed a reliability of 0.77 (Parsakia & Darbani, 2022).

#### 2.3. Data Analysis

Data analysis was conducted at both descriptive and inferential levels. At the descriptive level, the frequency distributions, central tendency measures, and dispersion indices were calculated for each variable. For inferential analysis, the structural equation modeling (SEM) approach was employed to evaluate the hypothesized relationships. SPSS version 26 was used for descriptive statistics, while AMOS version 24 was used for confirmatory factor analysis (CFA) and path analysis within the structural model. The measurement model was first validated using CFA to assess the adequacy of latent constructs, followed by evaluation of the structural model using path coefficients and fit indices. This dual-stage procedure ensured both construct validity and the robustness of the hypothesized mediating effects within the proposed model.

### 3. Findings and Results

The final sample consisted of 374 high school students, of whom 179 individuals (47.9%) were in the tenth grade, 184 individuals (49.2%) were in the eleventh grade, and 11 individuals (2.9%) were in the twelfth grade. In terms of gender distribution, 51.1% of the participants were female, while the remaining 48.9% were male.

**Table 1***Descriptive Statistics of Study Variables*

Variable	N	Mean	SD	Min	Max
Positive Self-Esteem	374	15.03	3.95	5	20
Negative Self-Esteem	374	11.39	3.26	4	16
Overall Self-Esteem	374	26.41	6.21	9	36
Cyberbullying Victimization Factor	374	28.14	9.24	12	58
Cyberbullying Perpetration Factor	374	23.45	8.40	12	53
Cyberbullying–Victimization Experience	374	51.59	15.13	24	108
Body Image Satisfaction	374	80.24	20.39	23	110

As shown in Table 1, the mean score for overall self-esteem was 26.41 with a standard deviation of 6.21, ranging from 9 to 36. Positive and negative self-esteem subscales had means of 15.03 and 11.39, respectively. The cyberbullying–victimization experience had a mean of 51.59 (SD = 15.13), with victimization and perpetration components averaging 28.14 and 23.45, respectively. Body image satisfaction had the highest mean score among the variables (M = 80.24, SD = 20.39), with a wide range of 23 to 110, indicating considerable variability in participants' perceptions of their body image.

Before conducting structural equation modeling, the assumptions required for analysis were examined and confirmed. The normality of data distribution was assessed

using skewness and kurtosis indices, with all values falling within the acceptable range of  $\pm 2$ , indicating no significant deviation from normality. Linearity and homoscedasticity were evaluated through scatterplot inspections, revealing linear relationships and constant variance among variables. Multicollinearity was checked by calculating tolerance and variance inflation factor (VIF) values, which were within standard thresholds (tolerance > 0.1, VIF < 10), confirming the absence of multicollinearity. Additionally, Mahalanobis distance was used to detect multivariate outliers, and no extreme cases were found. These results collectively confirmed that the data met the statistical assumptions necessary for valid structural equation modeling.

**Table 2***Pearson Correlation Coefficients Between Main Research Variables*

Variables	1	2	3	4	5	6	7
1. Positive Self-Esteem	—						
2. Negative Self-Esteem	.478**	—					
3. Overall Self-Esteem	.829**	.887**	—				
4. Cyberbullying Victimization	-.512**	-.527**	-.603**	—			
5. Cyberbullying Perpetration	-.453**	-.423**	-.511**	.468**	—		
6. Cyberbullying–Victimization Exp.	-.565**	-.557**	-.652**	.871**	.842**	—	
7. Body Image Satisfaction	.447**	.364**	.476**	-.564**	-.465**	-.603**	—

\*\*p &lt; .01



The Pearson correlation analysis revealed significant relationships among the main variables. Positive self-esteem showed significant negative correlations with cyberbullying victimization ( $r = -.512, p < .01$ ), cyberbullying perpetration ( $r = -.453, p < .01$ ), and the overall cyberbullying–victimization experience ( $r = -.565, p < .01$ ), while it was positively associated with body image satisfaction ( $r = .447, p < .01$ ). Negative self-esteem also had strong negative associations with body image satisfaction ( $r = .364, p < .01$ ) and was positively correlated with cyberbullying–

victimization components. Overall self-esteem exhibited the highest inverse correlation with cyberbullying–victimization experience ( $r = -.652, p < .01$ ). Additionally, body image satisfaction was negatively related to all components of cyberbullying–victimization and positively associated with both positive self-esteem ( $r = .447, p < .01$ ) and overall self-esteem ( $r = .476, p < .01$ ). These results support the expected theoretical relationships between adolescents' self-concept, body image satisfaction, and their experiences with cyberbullying (Table 2).

**Table 3***Structural Equation Model Path Coefficients and Sobel Test Results*

Pathway	Standardized Coefficient ( $\beta$ )	Critical Ratio (CR)	p-value	Result
Body Image Satisfaction $\rightarrow$ Self-Esteem	0.200	4.085	0.00	Confirmed
Self-Esteem $\rightarrow$ Cyberbullying–Victimization	–0.317	–5.236	0.00	Confirmed
Body Image Satisfaction $\rightarrow$ Cyberbullying–Victimization	–0.531	–8.789	0.00	Confirmed

The results of the structural equation model confirm all hypothesized relationships in the study. Body image satisfaction had a significant positive effect on self-esteem ( $\beta = 0.200, CR = 4.085, p < .001$ ), indicating that higher satisfaction with one's body image is associated with higher self-esteem. Furthermore, self-esteem significantly and negatively predicted cyberbullying–victimization experience ( $\beta = -0.317, CR = -5.236, p < .001$ ), suggesting

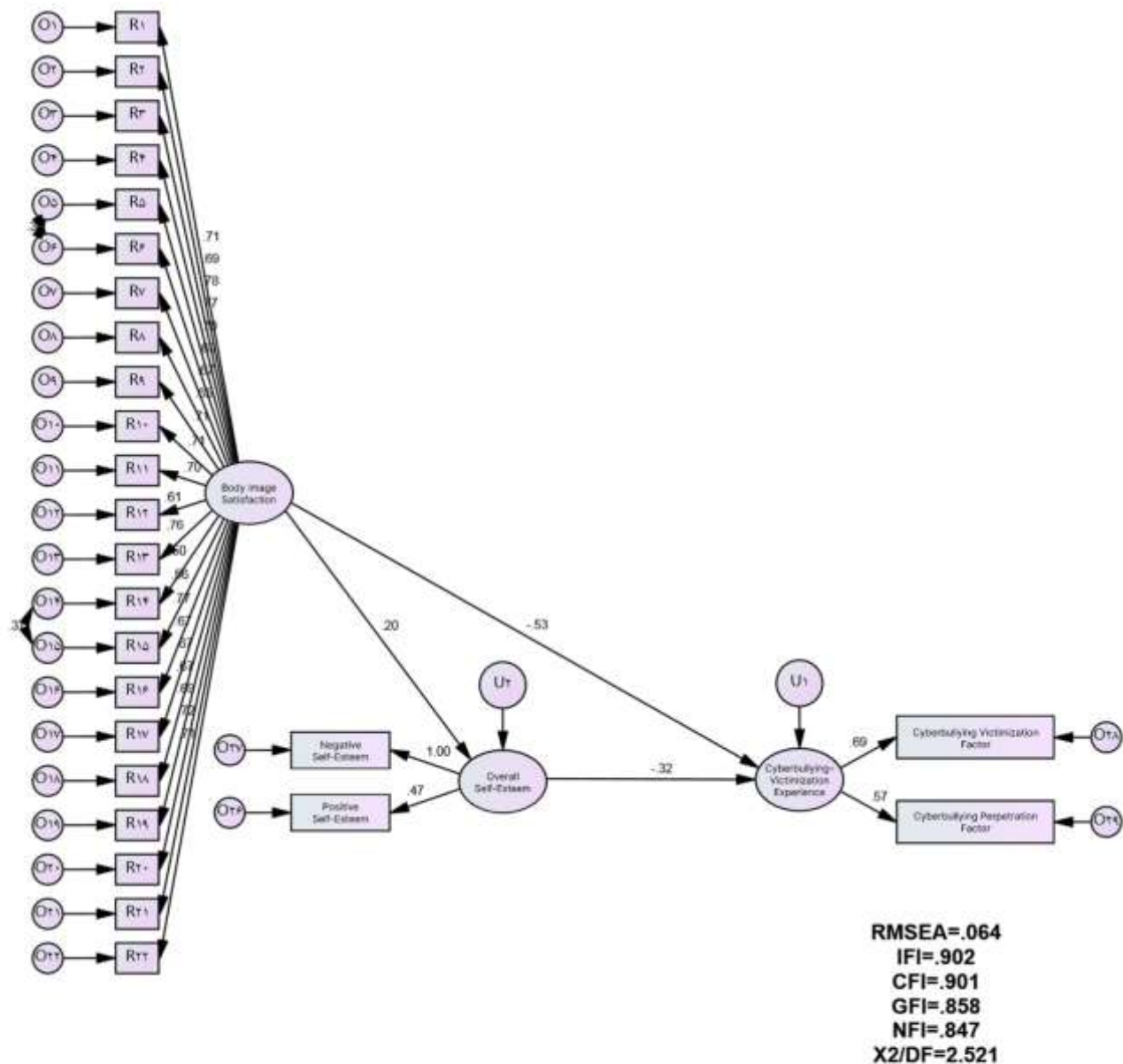
that adolescents with higher self-esteem are less likely to experience or engage in cyberbullying-related behaviors. Additionally, body image satisfaction had a strong direct negative effect on cyberbullying–victimization ( $\beta = -0.531, CR = -8.789, p < .001$ ), indicating that those with greater body image satisfaction are significantly less likely to be involved in such experiences (Table 3).

**Table 4***Sobel Test of Mediation*

Direct Effect	Indirect Effect	Total Effect	Sobel z-score	p-value
–0.531	–0.064	–0.595	–7.784	0.00

The Sobel test further confirmed the mediating role of self-esteem in the relationship between body image satisfaction and cyberbullying–victimization. With a z-score of –7.784 and a p-value less than .001, the indirect effect of self-esteem was statistically significant, validating its role as

a mediator. Overall, these findings underscore a meaningful path through which adolescents' body image perceptions influence their exposure to cyberbullying via the mechanism of self-esteem (Table 4).

**Figure 1**
*Model with Standard Coefficients*


#### 4. Discussion and Conclusion

The present study investigated the structural relationship between body image satisfaction and the experience of

cyberbullying-victimization among adolescents, with self-esteem modeled as a mediating variable. The results revealed three significant paths: (1) body image satisfaction positively predicted self-esteem, (2) self-esteem negatively

predicted the experience of cyberbullying–victimization, and (3) body image satisfaction negatively predicted the experience of cyberbullying–victimization. Moreover, the Sobel test confirmed that self-esteem significantly mediated the relationship between body image satisfaction and cyberbullying–victimization, suggesting that self-esteem plays a crucial buffering role against the negative psychological impacts of body dissatisfaction.

The first finding—body image satisfaction as a positive predictor of self-esteem—resonates strongly with the existing literature. Adolescents who hold a more positive perception of their physical appearance tend to evaluate themselves more favorably in general, which elevates their overall self-worth (Malinowska-Cieřlik et al., 2022; Webber, 2022). These findings align with those of (Ariana, Almuhtadi, Natania, Handayani, Larasati, et al., 2024), who reported that adolescents with greater body satisfaction demonstrated higher levels of self-confidence and emotional stability. Similarly, (Prince et al., 2025) identified that exposure to idealized body content online significantly affects adolescents' self-perception, but those with higher initial body satisfaction were more resilient to such exposure. In this study, the strong positive path coefficient from body image satisfaction to self-esteem reinforces the theoretical assertion that body image is a foundational component of self-concept during adolescence—a developmental stage during which identity and appearance are intricately intertwined (Webber, 2022).

The second major finding—the negative relationship between self-esteem and cyberbullying–victimization—also supports a well-established empirical trend. Numerous studies have shown that adolescents with lower self-esteem are more likely to be both targets and perpetrators of cyberbullying (Geng et al., 2021; Quintana-Orts et al., 2021; Wachs et al., 2020). The present study's findings are in concordance with those of (Santos et al., 2021), who found that adolescents with higher self-esteem demonstrated greater resilience to online harassment and were less likely to engage in retaliatory behaviors. (Chamizo-Nieto & Rey, 2023) similarly highlighted that emotional protective factors such as gratitude and life satisfaction buffer against the risk of suicidal ideation in cybervictimised adolescents—a buffering effect likely underpinned by self-esteem. In our analysis, the mediating role of self-esteem implies that adolescents with more favorable body image are protected from cyberbullying not only directly but also indirectly through enhanced self-worth. These findings substantiate prior research suggesting that self-esteem serves as a central

psychological shield against online aggression (Chai, 2021; Siregar, 2023).

The third path—direct negative influence of body image satisfaction on cyberbullying–victimization—demonstrates that even in the absence of high self-esteem, adolescents who feel good about their bodies are less likely to be drawn into cyber-aggressive dynamics. This finding echoes the results of (Pratiti et al., 2022), who found that students with body dissatisfaction were more vulnerable to both negative feedback during videoconferencing and social exclusion. Likewise, (Lee et al., 2023) documented that appearance-based cyberbullying was particularly impactful among sexual minority students, whose body image and self-worth were already under societal strain. Our study confirms that body image dissatisfaction is not only a predictor of internalized psychological distress but also increases adolescents' involvement in externalized social conflict, especially in virtual settings. Adolescents with low body satisfaction may experience heightened social anxiety, peer rejection sensitivity, or adopt maladaptive online personas in search of validation—all of which increase their vulnerability to online victimization (Geng et al., 2022; Ragusa et al., 2024).

The mediation analysis further underscored the psychological mechanism by which body image affects experiences with cyberbullying. The Sobel test confirmed that self-esteem significantly mediated the relationship between body image satisfaction and cyberbullying–victimization. This is consistent with the conceptual model proposed by (Geng et al., 2021), who argued that body satisfaction impacts online social comparison, which in turn affects both emotional well-being and cyberbullying outcomes. Additionally, (Mangintir et al., 2020) emphasized the role of social support and emotional competence in mitigating the adverse effects of body dissatisfaction on adolescents' online experiences. In light of these findings, it becomes apparent that the pathway from body image to cyberbullying is complex, with self-esteem functioning as a psychological filter through which appearance-related self-perception translates into behavioral vulnerability or resilience.

It is also worth noting that the relationship between body image and cyberbullying may be bidirectional. While body dissatisfaction can predispose individuals to become targets or perpetrators of cyber aggression, the experience of cyberbullying itself can reinforce negative body perceptions (Ariana, Almuhtadi, Natania, Handayani, Bressan, et al., 2024; Platts et al., 2023). Adolescents exposed to repeated





appearance-based attacks may internalize derogatory comments, thereby developing body dissatisfaction, eating concerns, or even disordered body surveillance. This feedback loop was observed in the study by (Prince et al., 2025), who documented how online exposure to negative body commentary increases self-objectification and leads to long-term disturbances in body image. The reciprocal nature of this relationship warrants longitudinal research to further disentangle cause and effect over time.

Furthermore, gender may moderate the observed relationships. Although not the primary focus of the present study, previous research has shown that female adolescents are disproportionately affected by body-related cyberbullying (Ariana, Almuhtadi, Natania, Handayani, Larasati, et al., 2024; Malinowska-Cieřlik et al., 2022). This is consistent with cultural patterns in which societal and media-driven appearance standards place greater evaluative pressure on girls. Conversely, male adolescents may experience cyberbullying in relation to strength, dominance, or athleticism, which also ties back to body image but may manifest differently in terms of psychological impact and behavioral response (Geng et al., 2021; Zhong et al., 2021). The implications of these gendered dynamics are critical for designing prevention and intervention programs that are sensitive to the unique vulnerabilities of different adolescent populations.

In sum, the findings of the present study contribute to a growing body of evidence underscoring the intersection of digital behavior, body image, and adolescent psychological well-being. They affirm that cyberbullying is not simply a product of online disinhibition or peer conflict but is intimately connected to how young people view themselves and their bodies. Self-esteem and body satisfaction serve as psychological resources that protect adolescents from digital victimization, while their absence amplifies risk. By elucidating the mediating role of self-esteem, this study provides an explanatory framework that can inform both theoretical models and practical interventions aimed at reducing cyber aggression and promoting youth mental health.

Despite the strengths of this study, several limitations should be acknowledged. First, the cross-sectional design restricts the ability to make causal inferences. Although structural equation modeling reveals significant associations, the directionality of these effects remains tentative and would benefit from longitudinal validation. Second, data were collected through self-report questionnaires, which may be subject to social desirability

bias or inaccurate recall. Third, while the sample was relatively large and diverse in terms of school districts, it was geographically limited to adolescents in Tehran, which may constrain the generalizability of findings to other cultural or national contexts. Additionally, the study did not control for potentially confounding variables such as parental monitoring, peer support, or previous mental health history, all of which could influence the relationships under investigation.

Future studies should employ longitudinal or experimental designs to examine how body image satisfaction and self-esteem develop over time and how they interact with digital behaviors. Incorporating qualitative data could also enrich our understanding of the subjective experiences underlying cyberbullying incidents and appearance-related insecurity. Moreover, future research should explore moderating variables such as gender, socioeconomic status, and digital literacy, which may alter the strength or direction of the observed pathways. Expanding the sample to include adolescents from different cultural settings would also allow for cross-cultural comparisons, thereby enhancing the global applicability of the findings.

Practitioners and educators should prioritize programs that enhance adolescents' body image and self-esteem as part of broader cyberbullying prevention strategies. School curricula should include psychoeducation on digital resilience, media literacy, and emotional regulation. Interventions should be tailored to address the specific vulnerabilities of both male and female students, especially regarding appearance-related pressures perpetuated by social media. Parents, teachers, and counselors should be trained to recognize the signs of cyberbullying and low body satisfaction, and foster environments that encourage open communication, peer support, and positive identity development in both physical and digital spaces.

### Authors' Contributions

All authors significantly contributed to this study.

### Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

### Transparency Statement



Data are available for research purposes upon reasonable request to the corresponding author.

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## Declaration of Interest

The authors report no conflict of interest.

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## Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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