

BODY IMAGE AND SOCIAL ANXIETY IN ADOLESCENT FEMALES WITH IDIOPATHIC SCOLIOSIS: EXPLORING SELF-ESTEEM AS MEDIATOR

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Abstract

Adolescent females diagnosed with idiopathic scoliosis frequently encounter body image-related psychological difficulties that induce social anxiety, a condition significantly influenced by their level of self-esteem. The goal of this research is to explore the role of self-esteem in the influence of body image on social anxiety in adolescent females with idiopathic scoliosis. This quantitative study involved 153 adolescent females aged 13–21 years who were diagnosed with idiopathic scoliosis. A mediation design was chosen to investigate the influence of body image on social anxiety, mediated by self-esteem. Purposive sampling was utilized as the sampling technique. The psychological constructs measured included body image, self-esteem, and social anxiety. The findings identified self-esteem as a partial mediator of the relationship between body image and social anxiety among adolescent females with idiopathic scoliosis ($\beta = -0.0996$, 95% CI [-0.20, -0.01]). Further analysis showed that negative body image significantly predicted diminished self-esteem, which subsequently predicted elevated levels of social anxiety. Clinical practitioners in the field of psychology are advised to develop psychological interventions that focus on enhancing self-esteem in order to effectively help adolescent females with idiopathic scoliosis reduce social anxiety.

Keywords: adolescent females, adolescents with idiopathic scoliosis (AIS), body image, self-esteem, social anxiety.

Citra Tubuh dan Kecemasan Sosial pada Remaja Putri Skoliosis Idiopatik: Mengeksplorasi *Self-esteem* sebagai Mediator

Abstrak

Remaja perempuan yang didiagnosis menderita skoliosis idiopatik sering mengalami kesulitan psikologis terkait citra tubuh yang dapat memicu kecemasan sosial, suatu kondisi yang sangat dipengaruhi oleh tingkat *self-esteem* mereka. Penelitian ini bertujuan untuk mengeksplorasi peran *self-esteem* dalam pengaruh citra tubuh terhadap kecemasan sosial pada remaja putri skoliosis idiopatik. Penelitian kuantitatif ini melibatkan 153 remaja putri berusia 13–21 tahun yang didiagnosis dengan skoliosis idiopatik. Desain mediasi dipilih untuk menguji pengaruh citra tubuh terhadap kecemasan sosial yang dimediasi oleh *self-esteem*. Teknik pengambilan sampel yang digunakan adalah *purposive sampling*. Skala psikologis yang digunakan mencakup citra tubuh, *self-esteem*, dan kecemasan sosial. Hasil penelitian menunjukkan bahwa *self-esteem* teridentifikasi sebagai pemediasi parsial dalam pengaruh citra tubuh terhadap kecemasan sosial pada remaja putri skoliosis idiopatik ($\beta = -0.0996$, 95% CI [-0.20, -0.01]). Analisis lebih lanjut menunjukkan bahwa citra tubuh yang negatif secara signifikan memprediksi *self-esteem* yang lebih rendah, yang pada gilirannya secara signifikan memprediksi tingkat kecemasan sosial yang lebih tinggi. Praktisi klinis di bidang psikologi disarankan untuk mengembangkan intervensi psikologis yang berfokus pada peningkatan *self-esteem* guna membantu remaja putri skoliosis idiopatik mengurangi kecemasan sosial secara efektif.

Kata kunci: citra tubuh, kecemasan sosial, remaja putri, remaja skoliosis idiopatik, *self-esteem*.

INTRODUCTION

Adolescent Idiopathic Scoliosis (AIS) involves a spinal deformity in which abnormal curvature of the spine develops during the early pubertal period (Schwieger et al., 2016). The prevalence

of AIS among adolescents ranges between 1 percent and 4 percent. AIS occurs predominantly among adolescent girls compared to boys (Cheng et al., 2015). An individual can be diagnosed with scoliosis when the spinal curvature exceeds 10° and is identified in

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children over the age of 10, with no clear cause identified for the curvature (Gallant et al., 2018). Scoliosis is not a rare condition; in fact, approximately 3 percent of adolescents worldwide have this condition, and 10 percent of them require treatment in the form of surgery or bracing to prevent further curvature, which can worsen with age (Konieczny et al., 2013).

Beyond the physical comorbidities experienced by patients, the condition has a detrimental association with mental health issues such as anxiety, social isolation, depression, eating disorders, and suicidal ideation, among others (Baird & Gardner, 2021). For adolescents with idiopathic scoliosis, the visible changes in their body shape during puberty can trigger significant negative psychological effects on their self-image and social integration. These challenges frequently manifest as social anxiety. In this context, the affected adolescents often develop intense self-consciousness and a persistent worry about how their peers perceive their physical appearance. This underlying fear makes everyday social interactions feel overwhelming, causing significant distress and a deep sense of alienation from their own bodies.

According to Li et al. (2024), adolescents with scoliosis consider their condition to be abnormal; they feel restricted in their activities and different from other children due to the externally visible changes in their body. Living with this condition entails a complex and challenging journey shaped by both physical and psychological stressors. Due to an abnormal body shape, many adolescents with scoliosis fear social interaction, which may trigger symptoms of social anxiety. This concern is largely related to how one appears in the present moment and the fear of being judged negatively by others, which are core features of social anxiety at this age. This is demonstrated by the work of Gallant et al. (2018), who documented mood disturbances including depression and anxiety among patients with AIS. Furthermore, Mitsiaki et al. (2022) reported an association between AIS and depression, anxiety, and neuroticism, particularly for anxiety. In this context, social anxiety can be considered a common problem among adolescents with idiopathic scoliosis.

Social anxiety symptoms are among those commonly experienced by adolescents with idiopathic scoliosis. The researcher's observation of the "Mental Health Awareness for Scoliosis Warriors" community, consisting of over 340 individuals with idiopathic scoliosis who gather to discuss their condition, treatment, and interventions, reveals that adolescents with

scoliosis experience anxious behavior in social settings and fear criticism from those around them. In addition, some members reported difficulty sleeping due to persistent concerns about their spinal condition. This indicates that the physical condition affects the psychological well-being of affected individuals.

Within this community, adolescents suffering from idiopathic scoliosis have expressed a tendency toward negative self-assessments, resulting in avoidance of social events, including both familiar and new social situations. Adolescents with idiopathic scoliosis have reported that many people around them struggle to accept them due to their condition. Moreover, poor body image has been associated with elevated levels of social anxiety symptoms among Indonesian adolescents, including fear of negative evaluation and social avoidance (Rahmanda et al., 2025). It is thus likely that adolescents with idiopathic scoliosis in this community experience social anxiety. This is supported by a study conducted in the United Kingdom by Baird and Gardner (2021), in which 59 percent of adolescents with scoliosis were identified as being at risk of social anxiety and 18 percent at risk of depression. These findings suggest that adolescents with idiopathic scoliosis are more likely to experience social anxiety. Other studies have similarly found that adolescents with AIS are susceptible to psychological disorders, including social anxiety (Auerbach et al., 2014). These findings imply that social anxiety among adolescents with idiopathic scoliosis is not merely a concomitant experience but a psychological reaction to their persistent concerns regarding appearance and social acceptability, and that social anxiety constitutes a critical issue in this population.

Social anxiety is defined as the fear, worry, and apprehension that arise from being around other people and from being evaluated by them (La Greca & Lopez, 1998). Social anxiety may occur because adolescents with idiopathic scoliosis often feel rejected in social environments, which causes them to fear negative evaluation from their peers. Adolescents with idiopathic scoliosis experience heightened fear in social interactions because they tend to view their body shape negatively. This negative evaluation of appearance stems from a poor perception of their body due to abnormal spinal curves. In psychology, a negative assessment of body shape is referred to as negative body image. Adolescents with idiopathic scoliosis often experience body image disturbances compared to typically developing adolescents (Gallant et al., 2018).

Body image is a personal experience that encompasses how someone thinks, feels, and behaves in relation to their body, including how they perceive, feel about, and evaluate their own body (Cash & Pruzinsky, 2002). A negative body image may cause adolescents with idiopathic scoliosis to isolate themselves from their social environment because they view their bodies more negatively and perceive their body shape as unusual and abnormal. Adolescents with a negative body image tend to exhibit increased sensitivity to rejection, making them less confident and more anxious in social situations (Blöte & Westenberg, 2007). In today's digital landscape, this vulnerability is further exacerbated by increasing exposure to appearance-focused content on social media, which has been shown to worsen body image anxiety through mechanisms of social comparison and self-objectification. Adolescents who frequently internalize idealized body standards from social media tend to evaluate their self-worth more negatively, which may heighten their vulnerability to anxiety in social situations (Lin, 2024). It can therefore be assumed that adolescent females with idiopathic scoliosis are especially vulnerable to negative self-perception, given that their condition is visibly apparent and they tend to evaluate their physical appearance more harshly than males. This situation thus has the potential to trigger social anxiety.

On the other hand, Coopersmith (1967) as cited in Ghaleh et al. (2024), Toros et al. (2023), and Yeşilyurt & Kendirkiran (2025) explains that individuals who hold a positive view of themselves and feel recognized and accepted by others tend to have higher self-esteem. Components of self-esteem include the capacity to manage and control one's own behavior (power), which reflects cognitive strength, as well as the sense that one's worth is determined by moral values (virtue). These dimensions of self-concept may serve as a protective resource for adolescent females with idiopathic scoliosis when negative body image threatens to trigger social anxiety. This reinforces the view that self-esteem can be an important factor in understanding how body image influences social anxiety.

Individual evaluations of appearance can affect self-esteem. A person with high self-esteem does not constantly engage in self-criticism. Particularly in adolescents with idiopathic scoliosis, self-esteem serves as a key regulatory factor. Emerging empirical evidence suggests that adolescents' social anxiety is greatly influenced by their self-esteem, with higher

levels of self-esteem being associated with reduced social anxiety. Adolescents with stronger self-worth tend to feel more confident in social interactions and less fearful of negative evaluation (Sakinata & Moesarofah, 2025). According to an empirical study on Indonesian adolescents, self-esteem is a significant predictor of social anxiety, with adolescents who report lower self-esteem scoring higher on fear of negative evaluation and social avoidance. These results corroborate the importance of self-esteem as a psychological factor in adolescents' social functioning (Madani & Tobing, 2024). Adolescent females with idiopathic scoliosis who possess elevated self-esteem are typically more adept at accepting their condition, despite its unusual characteristics. They remain focused on reaching their life goals because they view themselves positively and value their own uniqueness. This perspective is consistent with the findings of de Carvalho et al. (2020), who indicated that elevated self-esteem inherently fosters a sense of personal well-being. Moreover, body image and self-esteem are closely related. Research by Javaid and Ajmal (2019) affirms that a positive body image nurtures high self-esteem, while findings by Saranya et al. (2022) revealed that negative perceptions of one's body reduce it. Consequently, negative body image constitutes a psychological trigger for heightened vulnerability to social anxiety, particularly in adolescent females whose sense of self-worth is closely tied to their physical appearance.

Within this framework, self-esteem may function as a psychological mechanism through which negative body image translates into elevated social anxiety. Conversely, self-esteem may serve as a protective buffer against social anxiety. Adolescent females with idiopathic scoliosis who possess higher self-esteem can also experience less social fear, as they are able to recognize their distinctive qualities and feel capable of navigating everyday life despite living with scoliosis. Recent research supports this assertion, indicating a substantial inverse correlation between social anxiety and self-esteem (Ayed et al., 2024). High self-esteem is considered to moderate negative thoughts about body shape and to protect against body image disturbances and social anxiety. Therefore, self-esteem functions not only as an independent psychological factor but also as a mediating variable in the relationship between body image and social anxiety. This is further supported by a study by Cai et al. (2024) showing that a positive body image can be linked to higher self-esteem, which in turn may play a significant role in reducing social anxiety.

Recent evidence highlights that body image is a crucial factor in the lives of adolescents with spinal deformities such as idiopathic scoliosis. Adolescents with spinal deformities frequently have disturbed body image as a consequence of visible physiological changes, resulting in decreased psychological well-being and impaired social functioning (Misterska et al., 2024). Notably, adolescents with idiopathic scoliosis are more likely to have an altered body schema and a more negative body image, leading to increased vulnerability to psychological distress (Bertucelli et al., 2023). Furthermore, negative body image has repeatedly been associated with lower self-esteem in adolescents, particularly in the context of appearance-related social comparison (Longa et al., 2025). These results indicate that body image is a vital factor in the formation of self-esteem and psychological adjustment among adolescents, justifying the inclusion of self-esteem as an intervening construct in the relationship between body image and social anxiety.

Other research has demonstrated that self-esteem substantially mediates the relationship between body image and depression (Pehlivan et al., 2022). While this prior study highlights the importance of self-esteem, its primary focus remains on depression as the main outcome. How this mediating mechanism specifically applies to social anxiety remains an underexplored gap, establishing the novelty of the current study. To address this, the researcher specifically examines adolescent females with idiopathic scoliosis. Unlike other types of scoliosis, the unknown etiology of the idiopathic type often makes it considerably more difficult for sufferers to accept their physical condition. This specific vulnerability underscores the urgency of this research. Because adolescence is a critical period for social development, leaving this psychological mechanism unexamined could hinder the development of targeted psychological interventions, ultimately placing these adolescents at risk of long-term social isolation. Therefore, this research seeks to examine the relationship between body image and social anxiety in adolescent females diagnosed with idiopathic scoliosis, with self-esteem serving as a mediating variable. The hypothesis posits that negative body image is associated with elevated social anxiety, both directly and indirectly through lower self-esteem.

METHODS

Research Design, Location, and Time

This research employed a quantitative methodology utilizing a mediation model to investigate the contribution of body image to social anxiety, with self-esteem hypothesized to mediate this relationship in adolescent females with idiopathic scoliosis. Eligible participants who consented to take part in the study were asked to complete three assessment scales before being consolidated into a single communication group on the WhatsApp platform, titled "Mental Health Awareness for Scoliosis Warriors". This study was conducted as an online-based survey involving adolescent females with idiopathic scoliosis residing in Indonesia. This community was selected because it facilitates access to participants who are actively involved in scoliosis-related discussions and support. The study was conducted from December 2024 to July 2025.

Sampling Technique

The sampling method employed was purposive sampling, a non-probability method in which samples are selected based on specific predetermined criteria. To be eligible for this research, participants were required to be female adolescents between the ages of 10 and 21 years, have a confirmed diagnosis of idiopathic scoliosis, and provide consent to participate in the study. The research enlisted 153 females aged 13 to 21 years who satisfied the specified medical and demographic criteria. Participants aged 10 to 12 years did not meet the final inclusion criteria due to insufficient data.

Procedures for Data Collection

Prospective participants were provided with online informed consent at the outset of the research process. Screening was performed to collect biodemographic data regarding the scoliosis diagnosis (e.g., angle of curvature) after potential participants had completed the informed consent procedure. Participants subsequently completed a self-report questionnaire comprising three psychological measures: body image, social anxiety, and self-esteem. The three measures were grounded in the theoretical frameworks of Coopersmith (1967) for self-esteem, La Greca and Lopez (1998) for social anxiety, and Cash and Pruzinsky (2002b) for body image. Reliability was estimated using Cronbach's Alpha, and content validity was determined using the

Aiken's V formula assessed through expert review.

Measurement and Assessment of Variables

Body Image. According to Cash and Pruzinsky (2002), body image refers to an individual's views, thoughts, cognitions, and evaluations concerning the various parts of their body. Cash (2000) further described body image as the comprehensive mental representation of one's body, encompassing behavioral, cognitive, and attitudinal dimensions, including aspects related to physical health and fitness. In this study, body image was assessed using a measurement tool developed by the researcher based on Cash's (2000) theoretical framework, from which indicator-based items were generated. The resulting scale comprises 30 items addressing five dimensions of body image: (1) self-classified weight, (2) overweight preoccupation, (3) body area satisfaction, (4) appearance orientation, and (5) appearance evaluation. Each item was rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). A higher body image score indicates a more positive perception of one's body. Content validity was supported by the majority of items obtaining an Aiken's V score above 0.87. The Cronbach's Alpha coefficient for this scale was 0.889.

Social Anxiety. Social anxiety is defined as the experience of fear, anxiety, and worry in relation to social interactions, coupled with apprehension about being evaluated or judged negatively by others (La Greca & Lopez, 1998). The scale consists of 34 items pertaining to three dimensions of social anxiety: (1) social avoidance and distress in general situations, (2) social avoidance and distress in new situations, and (3) fear of negative evaluation. Each item was rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Content validity was supported by the majority of items obtaining an Aiken's V score of 0.87 or higher. The Cronbach's Alpha coefficient for this scale was 0.929.

Self-Esteem. Self-esteem is defined as the evaluative judgment individuals make about themselves, that is, the degree to which they agree or disagree with certain personal attributes and perceive themselves as worthy, significant, and capable (Coopersmith, 1967). The self-esteem data in this study were collected using an instrument developed by the researcher based on Coopersmith's (1967) theoretical framework, from which items were derived for measurement. The scale assesses

self-esteem across four domains using a total of 33 items: (1) self-esteem in terms of power (sense of control and authority), (2) self-esteem in terms of significance (sense of importance), (3) self-esteem in terms of virtue (moral character), and (4) self-esteem in terms of competence (sense of capability). Participants were assessed using a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Content validity was supported by the majority of items obtaining an Aiken's V score above 0.87. The Cronbach's Alpha coefficient for this scale was 0.894.

Data Analysis

The quantitative data collected via questionnaire were processed and analyzed using path analysis with the PROCESS Macro by Hayes in SPSS 27. This analytical approach was selected because it can assess the role of self-esteem in mediating the relationship between body image and social anxiety. Path analysis enables researchers to determine whether an independent variable has a direct effect on a dependent variable and whether a mediating variable accounts for an indirect effect. Specifically, this study uses path analysis to examine both the direct and indirect relationships among the variables and to clarify how self-esteem functions as an intervening variable in the relationship between body image and social anxiety in adolescent females with idiopathic scoliosis.

RESULTS

Descriptive Analysis

A total of 153 adolescent girls with idiopathic scoliosis were included in this study (n=153). The descriptive analysis reveals variability in participants' body image, social anxiety, and self-esteem scores. The majority of respondents were identified as late adolescents and reported mild to severe degrees of scoliosis curvature. Table 1 summarizes the descriptive statistics and demographic characteristics.

Body Image. Results indicate that adolescent females diagnosed with idiopathic scoliosis reported a range of body image experiences. The overall scores reflect variability in how participants perceive and evaluate their physical appearance and body-related attributes. Dimensionally, body image was assessed across five domains: appearance evaluation, appearance orientation, body area satisfaction, overweight preoccupation, and self-classified weight. These findings indicate that body image

Table 1 Descriptive statistics of body image, social anxiety, self-esteem, and demographic characteristics of adolescent females with idiopathic scoliosis (n=153)

Predictor	Mean	Standard Deviation	Frequency	%
Social Anxiety	87.08	17.405		
Body Image	67.16	11.913		
Self-Esteem	97.02	12.210		
Age				
Early Adolescence (13–14 years)			6	3.9
Middle Adolescence (15–17 years)			62	40.5
Late Adolescence (18–21 years)			85	55.6
Degree of Scoliosis Curvature				
Mild Scoliosis (10–25°)			36	23.5
Moderate Scoliosis (25°–45°)			52	34.0
Severe Scoliosis (>45°)			43	28.1
Not yet measured			22	14.4

in this sample involves multidimensional features spanning the evaluative, cognitive, and behavioral domains of physical self-perception (Lizana-Calderón et al., 2023).

Social Anxiety. The descriptive findings indicate that adolescent females with idiopathic scoliosis exhibited varying degrees of social anxiety. Overall social anxiety scores reflect concerns about being evaluated by others in social situations. A closer examination of the different dimensions reveals variability across fear of negative evaluation, social avoidance and distress in unfamiliar situations, and social avoidance and distress in everyday situations. This indicates that social anxiety in this demographic is expressed through both anticipatory apprehension and avoidance behaviors across various social contexts (Lizana-Calderón et al., 2023).

Self-Esteem. The descriptive analyses of self-esteem suggest diversity in how participants evaluate and value themselves. The overall results indicate differences in the degree to which adolescent girls with idiopathic scoliosis rate their abilities and sense of personal worth.

Dimensional analysis reveals differences across the domains of power, significance, virtue, and competence. These findings suggest that self-esteem in the participants is shaped by several internal appraisals, including perceived control, moral values, sense of importance, and sense of competence (Jalali-Farahani et al., 2022).

Mediation Analysis

The mediating role of self-esteem in the relationship between body image and social anxiety was investigated using path analysis (Table 2). Body image was found to exert a moderate direct effect on social anxiety. In addition, a significant indirect effect was identified, with body image influencing social anxiety through self-esteem. The results of the indirect effect analysis indicate that the relationship between body image and social anxiety was significantly mediated by self-esteem, with zero excluded from the bootstrap confidence interval. These results suggest that self-esteem partially mediates the association between body image and social anxiety among adolescent females with idiopathic scoliosis (Khodabandelou et al., 2019).

Table 2 Results of path analysis examining the mediating role of self-esteem in the relationship between body image and social anxiety using PROCESS Macro Model 4 (n=153)

Path	Label	Standardized Estimates	SE	Interval Estimate	p	Remarks
<i>Direct Effect</i>						
BI → SA	c'	-0.6164	0.0935	-0.8012 ~ -0.4316	0.0000	Significant
BI → SE	a	0.1710	0.0822	0.0085 ~ 0.3335	0.0392	Significant
SE → SA	b	-0.5823	0.0913	-0.7626 ~ -0.4020	0.0000	Significant
<i>Indirect Effect(s)</i>	a x b	-0.0996	0.0498	-0.2040 ~ -0.0108		Significant
<i>Total Effect</i>	c + a x b	-0.7160	0.1036	-0.9207 ~ -0.5112	0.0000	Significant

Note: BI = Body Image; SA = Social Anxiety; SE = Self-Esteem; SE = Standard Error; CI = Confidence Interval. Analysis conducted using PROCESS Macro Model 4.

DISCUSSION

The findings of the present study reveal a negative relationship between body image and social anxiety among adolescent girls with idiopathic scoliosis. That is, the more negatively individuals evaluate their physical appearance, the higher the social anxiety they report. This finding underscores the importance of body image perceptions in shaping social-emotional experiences in this sample. Adolescent girls are generally more susceptible to anxiety and stress than boys, as they tend to become more preoccupied with problems when facing difficult circumstances (Gintari et al., 2023). This is corroborated by a British study involving more than 8,000 teenagers, in which Yoon et al. (2023) observed that, although mental health challenges tend to increase during the transitional period of adolescence, females experience considerably more difficulties than males across multiple dimensions of well-being. Thus, physical insecurity and the inherent vulnerability associated with visible bodily differences may further intensify these adolescents' anxiety.

To better understand this relationship, it is useful to consider it within a developmental framework. According to Sawyer et al. (2018), adolescence constitutes a transitional stage between childhood and adulthood, characterized by physical development as well as evolving social responsibilities. This is a sensitive period for identity formation, during which individuals become acutely conscious of social approval. Qualitative interviews conducted by Papageorgiou et al. (2022) similarly highlight that physical appearance holds considerable importance for adolescent girls. Because the onset of idiopathic scoliosis typically occurs during this period, physical differences become particularly difficult to conceal or overlook. Adolescents with visible scoliosis may perceive themselves as different from their peers, which naturally gives rise to heightened self-awareness. These concerns can escalate into fear of negative evaluation and avoidance of social interaction. Overall, a negative body image functions as a psychological catalyst for social anxiety in this context.

These findings support earlier research indicating elevated social anxiety among individuals with negative body image. Prior studies have shown that people who rate their appearance poorly are more prone to sensitivity to social judgment and rejection, which may cause discomfort in social interactions. Studies by Djudiyah et al. (2024) and Thomas et al.

(2022) have similarly identified body image as an important predictor of social anxiety. Research conducted in Indonesia with adolescent samples has further demonstrated that negative self-evaluation and body image dissatisfaction can significantly contribute to elevated social anxiety and social avoidance (Prastia et al., 2023). The current study therefore contributes to this body of evidence by extending the association to adolescents with idiopathic scoliosis.

The results also indicate that body image is significantly associated with self-esteem. Adolescents who feel more positively about their bodies tend to have higher self-esteem. This suggests that evaluations of physical appearance are linked to broader attributions of self-worth and competence. In adolescents with idiopathic scoliosis, a negative physical self-concept may generalize to overall self-evaluations. Conversely, acceptance of one's physical appearance may allow individuals to maintain a more positive self-concept. Physical self-concept thus appears to be a foundational element in the development of self-esteem.

This is corroborated by prior research documenting a strong association between body image and self-esteem. Studies have found that those who perceive their body negatively tend to exhibit lower self-esteem. de Carvalho et al. (2020) and Javaid and Ajmal (2019) found that negative body image is associated with lower self-worth, while positive body image is linked to higher self-esteem. The present results are consistent with these findings and collectively underscore the significance of body image in shaping adolescents' self-assessments. This association may be particularly pronounced in individuals with identifiable physical differences.

In addition, the findings support the view that self-esteem is a significant predictor of social anxiety. Adolescents with a stronger sense of self-esteem generally experience less social anxiety. Self-esteem may serve as a psychological resource enabling individuals to cope with social stressors. A self-concept characterized by a sense of worth and capability may lead adolescents to be less concerned about being evaluated negatively by others. This may in turn result in fewer avoidance behaviors and reduced social fear. Accordingly, self-esteem acts as a buffer against social anxiety.

Existing research supports the influence of self-esteem on social anxiety. Studies have established that individuals with higher self-esteem demonstrate greater emotional

regulation and better adaptation to social challenges. Ayed et al. (2024) also found that self-esteem is inversely associated with social anxiety, indicating that self-esteem serves as a buffer against social threats. High self-esteem may moderate the impact of body-related concerns in adolescent girls with idiopathic scoliosis. Therefore, self-esteem is a fundamental component of social-emotional adaptation.

Importantly, the current findings indicate that self-esteem mediates the association between body image and social anxiety. This result demonstrates that body image influences social anxiety both directly and indirectly through self-esteem. Poor body image may contribute to social anxiety by reducing self-esteem, which in turn increases fear of negative evaluation. Conversely, a positive body image may protect against social anxiety by enhancing self-esteem. This mediating role underscores the psychological mechanism through which physical self-perceptions are linked to social-emotional outcomes. Self-esteem thus functions as a critical intervening factor in this relationship. The last paragraph of this section erroneously referred to self-esteem as a “moderator”; this is corrected here to “mediator” to be consistent with the study design and findings.

The current results are further corroborated by prior research by Cai et al. (2024) and Pehlivan et al. (2022), who found that self-esteem partially mediates the association between body image and mental health outcomes, including anxiety and depression. The present study extends this evidence by focusing specifically on adolescent females with idiopathic scoliosis. This group, especially, faces particular challenges due to the visible and often unpredictable nature of their condition. The results underscore the importance of incorporating self-esteem into an understanding of psychological adjustment in this population.

The findings of the present study are also supported by the work of Rizkillah (2023), who demonstrated that self-regulatory abilities and self-evaluation processes substantially help adolescents cope with psychosocial stressors during developmental transitions. In the case of adolescent females with idiopathic scoliosis, a negative body image can disrupt internal self-regulation, leading to increased vulnerability to social anxiety. Furthermore, Lathiifah et al. (2023) highlighted that psychological control and internal evaluation processes significantly contribute to psychosocial problems in adolescents. Against this backdrop, the findings

of the present study further support the role of self-esteem as an important psychological mechanism linking body image with social anxiety. Enhancing self-esteem may therefore serve as a protective strategy that helps adolescents manage body-related concerns and reduce social anxiety in social interactions. It is also worth noting that cognitive factors such as executive function may moderate how adolescents perceive themselves, both in terms of self-esteem and body image, given that executive function skills can shape how individuals process and respond to both external and internal information in ways that influence behavior (Rahmawati & Roebiyanto, 2025). Future research may benefit from examining cognitive factors such as executive function as potential contributors to self-perception and behavioral outcomes in this population.

Overall, the results highlight meaningful implications for psychological interventions. Interventions designed to address negative body image and strengthen self-esteem may reduce the risk of social anxiety in adolescent females with idiopathic scoliosis. Psychological support that specifically targets body image concerns can thus indirectly help lower social anxiety. By actively building self-esteem, adolescents may become less susceptible to social anxiety. For example, practical efforts to enhance self-esteem and foster more positive self-perception can be initiated through affirming feedback from family members, as well as through peer support programs in school environments. Therefore, interventions that simultaneously target body image and self-esteem may be highly beneficial in reducing social anxiety outcomes in this population.

While this study provides an initial understanding of the psychological dynamics in adolescents with idiopathic scoliosis, it has several limitations. First, the sample is exclusively limited to adolescent females with idiopathic scoliosis. As a result, the findings cannot be generalized to other demographic groups, such as male adolescents or patients with other types of spinal deformities. In addition, other potentially relevant variables were not examined in this study. Therefore, future research is encouraged to enrich the understanding of the psychological aspects of scoliosis patients more comprehensively, for example, by investigating the role of perceived social support or peer attachment, so that the field of clinical psychology can develop and apply more effective and targeted interventions to support the psychological well-being of these individuals.

CONCLUSION AND SUGGESTIONS

The findings of this study demonstrate that a negative body image can lead to diminished self-esteem, which subsequently results in elevated social anxiety among adolescent females with idiopathic scoliosis. Conversely, adolescent females with idiopathic scoliosis who hold a positive body image tend to have higher self-esteem, which in turn is associated with lower social anxiety. The results further indicate that body image has a significant direct effect on social anxiety in adolescent females with idiopathic scoliosis, and that self-esteem partially mediates this relationship, meaning that body image influences social anxiety both directly and indirectly through self-esteem.

Based on these findings, psychological interventions aimed at improving self-esteem are recommended to help reduce social anxiety in adolescent females with idiopathic scoliosis. Mental health practitioners, particularly psychologists, are encouraged to design intervention programs that promote positive body image and strengthen self-esteem. Such interventions may support adolescents in coping more effectively with the psychological challenges associated with idiopathic scoliosis. Additionally, since self-esteem only partially mediates the relationship between body image and social anxiety, further research is needed to identify other factors that influence mental health, particularly social anxiety, in adolescents with idiopathic scoliosis. Future studies are also encouraged to pursue a deeper understanding of mental health in this population.

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