



Height dissatisfaction and loneliness among adolescents: the chain mediating role of social anxiety and social support

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Abstract

Previous research on body dissatisfaction has mainly focused on the dissatisfaction with weight and appearance. Limited research has examined the dissatisfaction with another major body feature that is important to our social relationships and personal well-being, namely, body height. We hypothesized that height dissatisfaction would predict more intense loneliness among adolescents, and that this relationship is mediated by greater social anxiety and reduced social support. Participants of this study were 515 Chinese high school students. The Shortness subscale of the Negative Physical Self Scale, Social Anxiety Scale for Adolescents, Perceived Social Support Scale, and ULS-8 were integrated into a paper-and-pencil survey. The results revealed that adolescents with high levels of height dissatisfaction reported higher levels of loneliness. A chain mediation model showed that the relationship between height dissatisfaction and loneliness could be both sequentially mediated by social anxiety and social support, and mediated by social anxiety. However, no mediating role of social support was found. We also found that body height did not predict social anxiety or social support, but can predict loneliness. The current findings provide novel insights into the occurrence of loneliness among adolescents, and indicate that negative self-perceptions of body height and the resulting social anxiety can lead to loneliness.

Keywords Adolescents · Height dissatisfaction · Loneliness · Social anxiety · Social support

Introduction

Since it broke out in December 2019, COVID-19 has had a swift and devastating effect in many parts of the world, including a significant impact on the health and well-being of citizens globally (Torales et al., 2020). In particular, social distancing measures adopted by governments to mitigate the spread of the virus, such as travel bans and lockdowns, have led to limited social interactions, thereby increasing the risk of social isolation and loneliness (Racine et al., 2020). Loneliness is also considered to be a modern epidemic that has been linked to various poor mental health outcomes, such as depression (Xu & Chen, 2019), anxiety (Beutel et al., 2017), and psychotic symptoms (Jaya et al., 2017).

Loneliness is defined as the negative feeling individuals experience when they perceive their social relationships as unsatisfying, either quantitatively or qualitatively (Peplau & Perlman, 1982). Previous studies in this area have predominantly focused on older people, who are particularly vulnerable to loneliness (Luhmann & Hawkley, 2016). However, recent research has suggested that loneliness also commonly occurs during adolescence, and that the experience of loneliness peaks at around the age of 20 years (Lee et al., 2019). Previous findings have shown that adolescents who experience chronic loneliness are more likely to exhibit depressive symptoms (Lapierre et al., 2019) and experience suicidal ideation (Bračič et al., 2019). Loneliness has also been associated with a wide range of maladaptive behaviors during adolescence. For example, adolescents with a high level of loneliness are more aggressive (Schinka et al., 2013; Sun et al., 2017), more addicted to the Internet and online games (Cheng, 2021; Yu et al., 2019; Zhao et al., 2016), and are more likely to engage in substance abuse (Kim et al., 2020; Stickley et al., 2014). Indeed, adolescence is a particularly challenging developmental period that is characterized by multiple physical, social, and cognitive changes (Steinberg

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& Morris, 2001), which may put adolescents at higher risk of encountering internalizing problems such as loneliness (MacEvoy et al., 2011).

Considering the detrimental consequences of loneliness on adolescents' mental health and daily functioning alongside the psychological and developmental characteristics of adolescents, it is crucial to understand the occurrence of loneliness at this sensitive period. Researchers have examined several antecedents of loneliness during adolescence, including personality traits (Zhang et al., 2015; Zhao et al., 2018), family and school environments (Li et al., 2019; Pengpid & Peltzer, 2018; Pilgrim & Blum, 2012; Yu et al., 2019), peer relationships (Carissa & Melanie, 2014; Xiao et al., 2021), and socioeconomic status (Chen & Chung, 2007; To, 2016). Physical characteristics and body image could also affect loneliness. For instance, existing empirical findings have shown that obesity (Hajek & König, 2018; Rotenberg et al., 2017) and appearance dissatisfaction (Zinovyeva et al., 2016) are associated with increased loneliness levels. However, these factors have been mainly studied in adults, and rarely in adolescents. Moreover, few studies have examined whether body height influences loneliness. Chen et al. (2006) found that Chinese adolescents of all ages are most commonly dissatisfied with their body height, among all physical characteristics. As a major physical characteristic, body height is associated with not only how others perceive individuals, but also how individuals perceive themselves (Judge & Cable, 2004). Previous research has suggested that individuals who have a below-average height tend to be more dissatisfied with their physical stature (Martel & Biller, 1987; O'Gorman et al., 2019). In addition, several studies have revealed the negative effects of height dissatisfaction on mental health (e.g., Chen, 2006; Shi et al., 2020). Given that loneliness is an important indicator of mental health (Çiçek, 2021b; Lim et al., 2016), height dissatisfaction might thus be positively associated with loneliness. In the present research, we examined whether and how height dissatisfaction influences adolescents' loneliness.

Height dissatisfaction and loneliness

Height dissatisfaction refers to the negative perceptions surrounding one's height (e.g., thinking they are too short), negative affective experiences (e.g., being shorter brings negative experiences), and behavioral changes (e.g., trying to grow taller by exercising or using drugs) (Chen, 2006). Empirical evidence has demonstrated that shorter people or those who are dissatisfied with their body height tend to develop a lower level of self-worth and confidence, and have a poorer mental health compared to their taller counterparts (Judge & Cable, 2004). While the relationship between body dissatisfaction and loneliness has been demonstrated, to our knowledge, no study has examined whether height

dissatisfaction is associated with loneliness. Studies carried out in Canada (Goldfield et al., 2010) and Portugal (Almeida et al., 2012) have found that teenagers with a high level of body dissatisfaction are at higher risk of exhibiting depressive symptoms and experiencing loneliness. Forste et al. (2017) found that body dissatisfaction in adolescent girls is an important predictor of loneliness in early adolescence. Another study also reported that adolescents who are dissatisfied with their bodies are more likely to experience loneliness (Zinovyeva et al., 2016). Similarly, as an important dimension of body dissatisfaction (Chen, 2006), we hypothesized that height dissatisfaction increases loneliness in Chinese adolescents (Hypothesis 1).

The potential mediating effect of social anxiety

To date, no research has investigated the possible mediating role of social anxiety in the relationship between height dissatisfaction and loneliness. Social anxiety is characterized by negative emotional experiences (e.g., anxiety, tension, and fear) and an avoidance of social situations due to excessive worry of being evaluated by others (Morrison & Heimberg, 2013). Previous research has established that social anxiety is significantly associated with body dissatisfaction (Cash & Fleming, 2002), and that individuals with higher levels of body dissatisfaction are more anxious in social interactions (Ping et al., 2014). As an important dimension of body dissatisfaction (Chen, 2006), we hypothesized that height dissatisfaction increases social anxiety.

Due to negative beliefs about oneself and others, socially anxious individuals tend to avoid social interactions, which makes them more likely to feel lonely (Hoffman et al., 2021). Numerous empirical studies have also shown that social anxiety is significantly correlated with loneliness (e.g., Fung et al., 2017; Teo et al., 2013). Thus, we hypothesized that social anxiety mediates the effect of height dissatisfaction on loneliness in Chinese adolescents (Hypothesis 2).

The potential mediating effect of social support

Social support refers to the psychological and material resources that individuals receive from their social networks (Kleiman & Riskind, 2013), which could help to cope with stressful life events (Thoits, 1986). Until now, the relationship between height dissatisfaction and social support has not been directly examined. However, several lines of evidence have suggested that there is an association between weight and social support. For example, students who are overweight or obese are less likely to be accepted by their peers than their counterparts of average weight (Bell & Morgan, 2000; Zeller et al., 2008). A recent study by Chinese researchers also found that teenagers of an average weight receive a higher level of social support than those who are

obese or overweight (Ren et al., 2020). This result could be explained by the obesity bias and weight stigma that exist in society. Considering that the body shape of people with obesity does not comply with the mainstream aesthetic standards, and obesity usually leads to mobility problems, people with obesity are more likely to be rejected by others, which could curb their enthusiasm for social contact. Consequently, people with obesity might reduce or avoid social interactions, which results in receiving lower levels of social support. Similarly, there are stereotypes about height in society. For example, Jackson and Ervin (1992) found that individuals tend to evaluate tall people more positively than shorter people. Based on the similarity between height stereotypes and obesity stereotypes, it can be predicted that taller individuals are more likely to be noticed and welcomed by others in social situations, and that they thus receive higher levels of social support; conversely, shorter individuals may receive lower levels of social support.

Social support is considered to be an important protective factor for mental health, and can alleviate the adverse effects of negative emotions (Çiçek, 2021a). The stress-buffering model also suggests that social support can mitigate the adverse effects of stressful events, decrease stress reactivity, and alleviate loneliness (Kawachi & Berkman, 2001). A recent study conducted with Chinese secondary school students has confirmed the predictive effect of social support on loneliness (Yu et al., 2022). Thus, we predicted that social support would mediate the effect of height dissatisfaction on loneliness in Chinese adolescents (Hypothesis 3).

The potential chain-mediating role of social anxiety and social support

Social anxiety has been found to have a negative impact on social support (Stice & Barrera, 1995). Since individuals with social anxiety symptoms usually hold negative beliefs about themselves and others, they tend to avoid social situations, which limits their opportunities to establish meaningful social relationships with others (Piccirillo et al., 2016; Sahraç et al., 2018). Furthermore, according to the social selection model, individuals who are more anxious are less able to attract and maintain supportive relationships than are less anxious individuals (Johnson, 1991). Existing evidence has shown that individuals with social anxiety are more likely to report having no close friends (Furmark et al., 1999) and are less likely to find a partner than individuals without anxiety (Davidson et al., 1994). Consequently, a lack of interpersonal relationships leads to a limited level of social support (Porter & Chambliss, 2014). Another study by Wen et al. (2020) demonstrated that high social anxiety is associated with less social support. In summary, we predicted that social anxiety and social support play a chain mediating role in the relationship between

height dissatisfaction and loneliness in Chinese adolescents (Hypothesis 4).

Methods

Participants

A total of 515 adolescents (female = 299; $M_{age} = 16.53$, $SD = 0.84$) from two high schools in Hunan Province and Henan Province, China, volunteered to participate in the present study.

Measures

Height dissatisfaction

The Shortness subscale of the Negative Physical Self Scale (Chen, 2006) was administered to measure height dissatisfaction. The subscale consists of 11 items that measure three facets of individuals' evaluations and perception of their heights, including cognition-affect (e.g., "I am shorter than most people"), projection (e.g., "My peers think I am short"), and behavior (e.g., "I have used exercises to increase my height"). Participants rated these items on 5-point Likert-style scales ranging from 0 (Not true at all) to 4 (Certainly true). Previous research has demonstrated strong construct and predictive validity of the scale using samples of Chinese adolescents and young adults (Chen et al., 2006). The ratings were averaged with higher scores indicating higher levels of height dissatisfaction. The Cronbach's alpha of the 13 items was .92.

Social anxiety

The Social Anxiety Scale for Adolescents (SASA; La Greca & Lopez, 1998) was used to measure adolescents' social anxiety. Participants rated 5 items (e.g., "I feel shy around people I don't know") on 5-point Likert scales (1 = not at all; 5 = all the time). The Chinese version of the SASA has shown to be a reliable and valid measure among Chinese adolescent samples (Wang et al., 2011). In the present study, Cronbach's alpha was .76.

Social support

The Perceived Social Support Scale (Blumenthal et al., 1987) measures an individual's perceived social support from family, friends, and others. In Chinese culture, family members are generally considered insiders (Gao, 1996) that tend to offer unconditional support and care

to each other (Yang, 2001). According to this consideration, family members will not alienate or reject an individual because of their physical defects; in other words, an individual's physical characteristics do not affect the level of family support they receive. Based on this, we assessed the level of social support using the two subscales that measure support from friends and from others. Participants rated 8 items using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). In the present study, the Cronbach's alpha for the overall scale was .90.

Loneliness

A short-form measure of loneliness (ULS-8; Hays & Dimatteo, 1987) was used to assess adolescents' loneliness. It comprises 8 items (e.g., "I feel isolated from others") rated on 4-point scales (from 1 = never to 4 = always). In the present study, Cronbach's alpha was .86.

Procedure

Participants were instructed to complete the measures in their classrooms. The demographic information, including body height, sex, and age, was also collected. The researchers informed participants that the information they provided would be kept confidential, and they were free to withdraw from the research whenever they wished.

Statistical analyses

The SPSS Version 25.0 was used for the data analyses. First, we performed analyses of descriptive statistics. Pearson's correlations were then determined to detect the initial bivariate relationships between the variables. Third, we performed chain mediation analyses (Model 6, the Process Macro; Hayes, 2009) to examine the mediating roles of social

anxiety and social support in the relationship between height dissatisfaction and loneliness. We used 5000 bootstrap samples, and biases were corrected at 95% confidence intervals to calculate the indirect effect of each variable.

Results

Initial analysis

Descriptive statistics and correlations between the measured variables are presented in Table 1. Significant correlations in the expected directions were found between height dissatisfaction, social anxiety, social support, and loneliness ($p < .05$). There was no significant correlation between height dissatisfaction and social support ($p > .10$). Body height was also correlated with height dissatisfaction and loneliness ($p < .01$).

Chain mediation analysis

A chain mediation effect model was tested, in which social anxiety and social support were mediators, height dissatisfaction was the predictor, and loneliness was the outcome. Body height, sex, and age were controlled for in the following analysis (Fig. 1). In the total effect model, height dissatisfaction had a significant predictive effect on teenagers' loneliness ($\beta = .13, p < .05$). When social anxiety and social support were included, the direct effect of height dissatisfaction on teenagers' loneliness became insignificant ($\beta = .04, p = .368$). Height dissatisfaction significantly predicted social anxiety ($\beta = .18, p < .01$), but failed to predict social support ($\beta = -.01, p = .814$). The effect of social anxiety on social support was significant ($\beta = -.22, p < .001$). As expected, both social anxiety ($\beta = .34, p < .001$) and social support ($\beta = -.43, p < .001$) predicted teenagers' loneliness.

The chain mediation model allowed us to isolate the indirect effects through social anxiety and social support (Table 2). The total indirect effect was significant

Table 1 Descriptive statistics and correlations between the key variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
1. Height dissatisfaction	1.36	.95				
2. Social anxiety	3.32	.88	.15**			
3. Social support	5.04	1.15	-.04	-.22***		
4. Loneliness	2.17	.62	.15***	.45***	-.49***	
5. Body height	1.67	.08	-.63***	-.07	.01	-.12**
6. Gender	.42	.49	.02	-.001	-.14**	-.09*
7. Age (years)	16.53	.84	-.01	.03	-.04	.04

Gender was dummy-coded as 1 for male and 0 for female; Height is measured in meter; Z-scoring body height within gender was used in the correlation analysis

*** $p < .001$; ** $p < .01$; * $p < .05$

(indirect effect = .085, SE = .04, 95% confidence interval [CI] [.012, .160]; 5000 bootstrap samples), accounting for 67.87% of the total effect of height dissatisfaction on loneliness. The indirect effect of height dissatisfaction on loneliness through social anxiety and social support was significant (indirect effect = .017, SE = .01, 95% CI [.006, .032]; 5000 bootstrap samples), accounting for 13.83% of the total effect of height dissatisfaction on loneliness. Also, height dissatisfaction had a significant indirect effect on loneliness via social anxiety (indirect effect = .062,

SE = .02, 95% CI = [.024, .102]; 5000 bootstrap samples), accounting for 49.48% of the total effect. However, the indirect effect of height dissatisfaction on loneliness through social support was not significant (indirect effect = 0.006, SE = 0.03, 95% CI = [-.044, .057]; 5000 bootstrap samples).

We further tested the potential moderating role of gender in the mediation model. However, the moderating effect of gender did not found (Table 3).

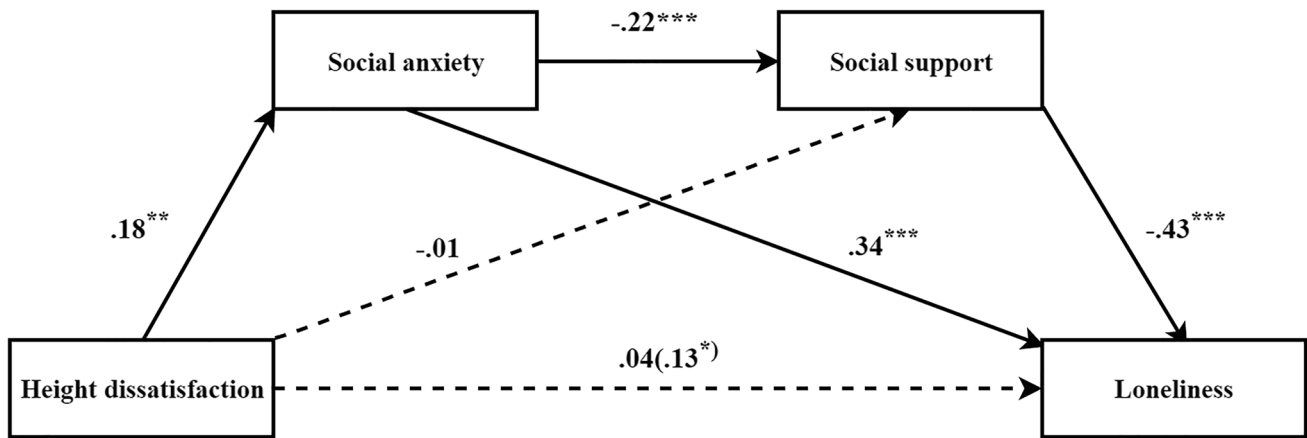


Fig. 1 Chain mediation model indicating the mediating roles of social anxiety and social support in the association between height dissatisfaction and loneliness. Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2 Chain mediating paths between height dissatisfaction and loneliness

	Effect	Boot SE	95% CI	
			Lower	Upper
Total effect	.13	.06	.02	.23
Direct effect	.04	.04	-.05	.13
Total indirect effect	.08	.04	.01	.16
Height dissatisfaction → social anxiety → loneliness	.06	.02	.02	.10
Height dissatisfaction → social support → loneliness	.01	.02	-.04	.06
Height dissatisfaction → social anxiety → social support → loneliness	.02	.01	.01	.03

CI confidence interval

Table 3 Analysis results of the moderating effect of gender

Predictor	Social anxiety				Social support				Loneliness			
	Effect	SE	95% CI		Effect	SE	95% CI		Effect	SE	95% CI	
			Lower	Upper			Lower	Upper			Lower	Upper
Height dissatisfaction × Gender	-.16	.09	-.33	.01	-.04	.09	-.21	.13	.02	.07	-.12	.16
Social anxiety × Gender					.11	.09	-.06	.29	.07	.07	-.07	.21
Social support × Gender									.06	.07	-.09	.20

CI confidence interval

Additionally, to examine the possible effect of body height on loneliness and its mechanism, we also tested a chain mediation model in which the predictor was replaced with body height, and the other variables were the same as in the first model. It should be noted that body height is sexually dimorphic, which means that the same body height may have different meanings for males and females (Bai et al., 2016; Fink et al., 2007), therefore, we used z-scoring body height within the bounds of participants' own gender in the analysis. The model revealed that body height did not predict social anxiety ($\beta = -.07, p = .122$) and social support ($\beta = -.004, p = .921$), but can directly predict loneliness ($\beta = -.10, p < .01$). All three paths in the chain mediation model were not significant.

Discussion

Contributions

Very few studies have examined whether and how height dissatisfaction influences loneliness, especially in adolescents. We found that height dissatisfaction was positively associated with loneliness in adolescents in China, and this relationship was partially mediated by social anxiety and social support.

We contribute to the literature on height dissatisfaction and loneliness in the following ways. First, to our knowledge, this is the first study to examine the relationship between height dissatisfaction and loneliness, and to reveal the psychological mechanism underlying their association. Specifically, height dissatisfaction can affect adolescents' loneliness both through the mediating role of social anxiety and through the chain mediating role of social anxiety and social support. Feelings of inferiority and the worry of being negatively evaluated by others could mean height-dissatisfied adolescents are less confident and more anxious in social situations. Consequently, adolescents with social anxiety might exclude themselves from social interactions, which means receiving less social support and, thus, feeling a stronger sense of loneliness. Another interesting finding of the present study was that height dissatisfaction does not directly affect the level of social support adolescents receive, but can affect it through social anxiety, and this in turn affects loneliness. This indicates that one factor leading to loneliness is not that others alienate an adolescent because of their height, but that adolescents dissatisfied with their height actively avoid social interactions. Thus, the negative perception of body height held by adolescents themselves and the resulting social anxiety could be key contributing factors to their loneliness. Moreover, we found that height did not predict social anxiety or social support, which further supports our interpretation that adolescents'

negative perceptions of height and the resulting social anxiety underlie their loneliness. Thus, an intervention strategy could be to change adolescents' negative perceptions of body height to help them reduce the psychological burden in social situations.

Second, we extend previous research on the antecedents of loneliness, and found that adolescents' height dissatisfaction is an important predictor of loneliness. This suggests that beyond personality traits (Zhang et al., 2015; Zhao et al., 2018), external environments (Li et al., 2019; Pengpid & Peltzer, 2018; Pilgrim & Blum, 2012; Yu et al., 2019), and interpersonal relationships (Carissa & Melanie, 2014; Xiao et al., 2021), self-perceptions of physical characteristics can also predict adolescents' loneliness. Future research could further examine the relationship between loneliness and adolescents' perceptions of other physical characteristics (e.g., weight and appearance). This finding has practical implications for the treatment of loneliness in adolescents, and suggests that educators should pay active attention to the physical growth of adolescents and guide them to form a positive perception of their bodies.

Third, we extend previous research on the impact of height dissatisfaction on mental health. Prior research has provided some evidence that individuals with height dissatisfaction are more likely to experience poor well-being (Griffiths et al., 2017; Griffiths et al., 2018). The present study found that height dissatisfaction increases adolescents' loneliness, which further highlights the negative effects of height dissatisfaction on mental health. We call for future investigations to explore the relationship between height dissatisfaction and other psychological factors (e.g., belief, resilience). A recent study by Bai et al. (2018) showed that individuals' height can shape their belief in a just world, and can also predict their inclination to blame innocent victims. As a subjective perception of body height, height dissatisfaction is strongly correlated with body height (O'Gorman et al., 2019). Thus, we can postulate that height dissatisfaction may also potentially influence individuals' beliefs about the world and others (e.g., whether the world is fair, and whether victims are to blame). Additionally, a few studies revealed that social support is associated with resilience among adolescents and college students (Çiçek, 2021a; Ye et al., 2020). As we found that height dissatisfaction can affect individuals' levels of social support via social anxiety in the present study, it could be speculated that height dissatisfaction may also affect individuals' resilience. Future research could empirically examine these issues.

Limitations

Several limitations of the present study remain to be addressed in future studies. First, the sample only included students at two high schools in China. Future studies should

examine the generalizability of these findings. Second, we used a cross-sectional design in the present study, which prevents the determination of causal relationships. Future studies could employ longitudinal or experimental designs to provide stronger evidence of causal relationships between the variables examined in this study. Third, body height was collected from students' self-reports, which may not be very accurate (Bai et al., 2018). Future studies might use a stadiometer to gauge subjects' body weight and height.

Implications

The present work also highlights other interesting directions for future research. Our failure to demonstrate a mediating role of social support in the relationship between height dissatisfaction and loneliness could be because participants were high school students whose height may still increase. Furthermore, in the Chinese context, high school students' main sources of social support, such as teachers and classmates, tended to focus more on an individual's academic performance rather than their height. By contrast, for adults, their body height may influence how others perceive and treat them. For example, in the workplace, taller employees are usually considered more competent and powerful (Stulp et al., 2013), and thereby receive more attention and respect from others (Yang et al., 2017). Thus, future research could consider selecting a sample of working adults or college students to further examine whether social support mediates the relationship between height dissatisfaction (or body height) and loneliness.

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Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest We declare that we do not have any commercial or associative interest that represents a conflict of interest in connection with the work submitted. We have complied with APA ethical standards in the treatment of human subjects.

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