

## The Impact of Pubertal Signs on Body Appreciation and Loneliness in Adolescent Girls

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### Abstract

**Background:** Adolescent girls face unique challenges regarding body appreciation and loneliness, often intensified by developmental changes like puberty.

**Aim:** This study was conducted with aim to investigate the impact of pubertal signs on body appreciation and loneliness among middle school girls.

**Method:** This cross-sectional study was conducted on 281 middle school girls aged 13–15 years in Neyshabur. The statistical population included all female middle school students in Neyshabur during the 2023–2024 academic year. A school was selected using two-stage simple random sampling, and all available students who met the inclusion criteria were included. Eligible participants were unmarried girls with normal body mass index, willing to participate, and no psychiatric history. Pubertal signs were identified based on menstrual experience reported in the demographic questionnaire. Data were collected using a demographic questionnaire, the Body Appreciation Scale-2(BAS-2), and the UCLA Loneliness Scale-Version 3(LS3). Data were analyzed by SPSS-25 software.  $p < 0.05$  was considered statistically significant.

**Results:** A significant difference was found between groups with and without signs of puberty in terms of age and BMI ( $p < 0.001$ ). However, after controlling for these factors, no significant difference was observed in body appreciation or loneliness ( $p > 0.05$ ). A significant negative correlation was identified between loneliness and body appreciation in both groups.

**Implications for Practice:** Puberty alone may not determine body appreciation or loneliness, emphasizing the need to explore social and environmental influences. Supportive family interactions and school based educational, counseling, and peer programs may reduce loneliness and enhance body appreciation, contributing to better adolescent mental health.

**Keywords:** Body Image, Menstruation, Social Isolation

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## Introduction

Adolescence, a transitional phase between childhood and adulthood, is characterized by significant changes in various social and emotional aspects (1). According to the latest UNICEF (United Nations Children's Fund) statistics, the adolescent population in Iran exceeds 12.8 million, while globally it surpasses 1.3 billion (2). Although the age range of adolescence varies across cultures, the World Health Organization (WHO) generally defines it as the period between 10 and 19 years old (1, 3). Adolescence leaves lasting impacts on an individual's physical and psychological dimensions (1). Puberty is the main sign of the transition to adolescence, involves physical, psychological, and social growth, equipping adolescents with resources essential for future parenthood (4, 5). Adolescent girls are more vulnerable to negative body image due to the physical and sexual changes of puberty. Additionally, the psychosocial challenges of this period can lead to negative feelings and insecurity regarding body image (6, 7). Body appreciation is recognized as one of the main aspects of positive body image and refers to accepting the body despite its deviations from social beauty ideals, having positive attitudes towards the body regardless of appearance, respecting the body and its needs, and engaging in healthy and protective behaviors for the body, which is accompanied by rejecting unrealistic media body ideals (8, 9).

Puberty, due to physical and mental changes, is a stressful stage which can lead to feelings of loneliness (10, 11). Loneliness, as one of the predictors of adaptation problems in children and adolescents in later years of life, has attracted much attention among researchers (12). Loneliness in adolescents can lead to shyness, reduced self-esteem and self-confidence, poor social skills, fewer close friends, increased stress, and physical symptoms such as headaches and digestive problems (13, 14). Prolonged loneliness is also associated with mental disorders such as major depression, anxiety disorders, and schizophrenia, as well as physical health problems such as cardiovascular diseases and poorer immune system functioning (15, 16).

Although numerous studies have examined puberty and its psychosocial consequences, the need and importance of the present research lies on aspects that have been largely overlooked. Mulgrew (2020) in a study stated that body image is a broad construct with multiple components, and more investigation is needed into its positive subdimensions particularly body appreciation (17). Indeed, most studies have primarily focused on the negative dimension of body image rather than its positive dimension, particularly 'Body Appreciation'. Zinovyeva et al. (2016) demonstrated that body dissatisfaction (which is considered a dimension of negative body image) is associated with loneliness (18). In another study, Joan Chrisler (2015) noted that menstruation, as an important function in women, has been underexplored, and assessing its effects during adolescence provides a foundation for future preventive interventions (19). Gholami and colleagues (2020), in their study, demonstrated that early puberty can be associated with issues such as reduced self-esteem, loneliness, shame, conflict, and ambivalence (20). Moreover, most studies concerning puberty have primarily focused on the effects of precocious and delayed puberty, while no literature was found that specifically compared the effects of pubertal signs in girls at the normative age of puberty.

A comprehensive review of the literature revealed no studies—either internationally or within Iran—that directly compare body appreciation and loneliness between girls with and without puberty signs. This absence of targeted research is further compounded by the lack of local data, such as for Neyshabur, highlighting the need for localized evidence. Addressing these gaps will provide essential insight for designing targeted, context-appropriate interventions in families, schools and communities to support adolescent girls' mental health. Accordingly, the present study was conducted with aim to investigate the impact of pubertal signs on body appreciation and loneliness among middle school girls in Neyshabur.

## Methods

This cross-sectional study was conducted among all female students in middle schools of Neyshabur during the 2023–2024 academic year. The target population comprised adolescent girls aged 13–15 years studying in girls' middle schools in Neyshabur who met the inclusion criteria. Sampling was conducted in April 2024 in two stages; Neyshabur city has six educational districts. First, one district was selected by simple random sampling (lottery). In the second stage, a list of all 33 girls' middle schools within the selected district was prepared, and one school was chosen using a table of random numbers. Subsequently, a census approach was applied within the selected sampling unit, meaning

that all students who met the inclusion criteria were recruited using convenience sampling. Inclusion criteria were: girls aged 13-15, unmarried, willingness and consent to participate, ability to complete the questionnaire, and a normal BMI (Body Mass Index) based on age and gender reference percentiles, and no history of mental illness, no use of psychotropic medication, and no psychiatric hospitalization (based on student self-report). Students who did not complete more than 10% of the questionnaire were excluded.

One Girls' middle School was selected in District 4 of Neyshabur through simple random sampling. The school had a total of 309 students aged 13–15 years who met the inclusion criteria. Twenty-eight students were excluded because they didn't meet inclusion criteria, leaving a final sample of 281 students. At first, a demographic questionnaire was provided to all participants. This questionnaire collected information on age, height, weight, family size, birth order, number of siblings, socioeconomic status (low, moderate, high), parental occupation and education, approximate date of first menstruation, history of hospitalization, underlying medical conditions, and use of medications. Based on the menstrual experience reported in the demographic questionnaire, the students were classified into two groups: those who had experienced menstruation were considered with puberty signs, and those who had not experienced menstruation were considered without puberty signs.

This study utilized the Body Appreciation Scale-2 (BAS-2) developed by Tylka Wood-Barcalow (2014). The validated Persian version, adapted by Atari (2016), contains 10 items rated on a 5-point Likert scale (1 = never to 5 = always), producing scores from 10 to 50; higher scores reflect greater body appreciation. In Atari's (2016) psychometric study, content validity was established through qualitative assessment by 10 experts in psychology and nursing, who evaluated each item's clarity, simplicity, and cultural relevance. All items achieved satisfactory CVI values (>0.9) and met the Lawshe CVR threshold for retention. Reliability in the same study was confirmed with a Cronbach's alpha of 0.97, indicating excellent internal consistency, and a two-week test-retest correlation of 0.91, confirming high temporal stability. In the present study, the validated Persian version reported by Atari (2016) was used without re-calculation of reliability indices (21-23).

The University of California, Los Angeles, Loneliness Scale-Version 3 (UCLA LS3), developed by Russell (1996), was used to measure loneliness. This scale includes 20 items assessing dissatisfaction with social relationships in two dimensions: lack of intimate relationships and lack of social network. Scoring was based on a 4-point Likert scale, with total scores ranging from 20 to 80; higher scores indicate greater loneliness. A score of 50 is considered the cutoff point between high and low loneliness (24-26). The scale's Persian translation, adaptation, and modification were conducted by Shekarkan & Mirderkvand (2008) (27). In the study by Hasanzadeh et al. (2018), the content validity of this instrument was assessed qualitatively by ten expert behavioral scientists at Golestan University of Medical Sciences and confirmed, ensuring each item was culturally and conceptually appropriate for Iranian adolescents. Internal consistency reliability, calculated using Cronbach's alpha, was reported as 0.79 in a sample of 278 high school students in Golestan province (25). In the current study, the validated Persian version documented by Hasanzadeh et al. (2018) was used without re-calculation of reliability indices.

Data were analyzed using SPSS (version 25), employing descriptive and inferential statistical methods. Inferential statistics included Chi-square and Fisher's exact tests for comparing qualitative variables, and independent samples t-tests for comparing quantitative variables between the two groups. Analysis of covariance (ANCOVA) was used to analyze body appreciation and loneliness while controlling for age and BMI. Pearson's correlation assessed the correlation between quantitative variables. Finally, logistic regression was used to compare loneliness and body appreciation while controlling for age and BMI.  $p < 0.05$  was considered statistically significant.

### **Ethical Consideration**

The study was approved by the Ethics Committee in Research of the School of Nursing and Midwifery and the Faculty of Rehabilitation of Tehran University of Medical Sciences (Ethical code: IR.TUMS.FNM.REC.1402.240). In the first stage, before starting the work, the objectives of the study were explained to the school officials, and comprehensive information about the research was provided to the participants. Participants were also informed that participation in the study was entirely voluntary and their information would be kept confidential. After obtaining informed consent, the researcher proceeded to collect data through the completion of questionnaires.

## Results

The findings showed that 58.8% of the fathers of the studied girls had freelance/self-employed jobs, and 78.3% of their mothers were housewives. Also, 40.1% of the fathers and 56.9% of the mothers had a diploma level of education, which had the highest frequency compared to other educational levels. In addition, individual characteristics of the parents of girls in the groups with and without signs of puberty did not have a significant difference and were homogeneous ( $p>0.05$ ). There was no significant difference between girls with and without signs of puberty in terms of individual characteristics ( $p>0.05$ ). However, based on the results of the independent t-test, the mean age in the group of girls with signs of puberty was significantly higher than the group of girls without signs of puberty ( $p<0.001$ ). Also, the mean BMI in girls with signs of puberty was significantly higher than in girls without signs of puberty ( $p<0.001$ ) (Table 1).

**Table 1: Demographic characteristics of girls with and without puberty signs**

Characteristic	Puberty Signs		Total (n=281) N (%)	Test Result
	Without puberty signs (n=33) N (%)	With puberty signs (n=248) N (%)		
<b>Parental Divorce/Death</b>				
No	33 (100)	237 (95.6)	270 (96.1)	* $p=0.373$
Yes	0 (0)	11 (4.4)	11 (3.9)	
<b>Family Size</b>				
2-3	1 (3)	24 (9.7)	25 (8.9)	* $p=0.219$
4-5	28 (84.8)	209 (84.3)	237 (84.3)	
6-7	4 (12.2)	15 (6)	19 (6.8)	
<b>Birth Order</b>				
First Child	12 (36.4)	107 (43.1)	119 (42.3)	$\chi^2=4.233$ df=2 ** $p=0.120$
Middle Child	11 (33.3)	45 (18.1)	56 (19.9)	
Last Child	10 (30.3)	96 (38.7)	106 (37.7)	
<b>Number of Siblings</b>				
1	1 (3)	20 (8.1)	21 (7.5)	* $p=0.076$
2	10 (30.3)	122 (49.2)	132 (47)	
3	18 (54.5)	88 (35.5)	106 (37.7)	
4	4 (12.1)	18 (7.3)	22 (7.8)	
<b>Socioeconomic Status</b>				
Weak	1 (3)	10 (4)	11 (3.9)	* $p=0.128$
Average	26 (78.8)	219 (88.3)	245 (87.2)	
Good	6 (18.2)	19 (7.7)	25 (8.9)	
Total	33 (100)	248 (100)	281 (100)	
<b>Age (Mean <math>\pm</math> SD)</b>	13.48 $\pm$ 0.87	14.26 $\pm$ 0.82	14.17 $\pm$ 0.86	$t=5.1$ df=279 $p<0.001$
<b>BMI (Mean <math>\pm</math> SD)</b>	17.54 $\pm$ 2.67	20.52 $\pm$ 2.8	20.17 $\pm$ 2.94	$t=5.774$ df=279 $p<0.001$

\*Fisher's exact test, \*\* Chi-square test

The mean loneliness score among the participants was  $49.81 \pm 10.91$ , approximating the instrument's midpoint (50). Girls with signs of puberty scored  $50 \pm 10.81$ , whereas those without scored  $48.45 \pm 11.66$ . The mean body appreciation score was  $38.32 \pm 8.6$ , exceeding the instrument's midpoint (30). Body appreciation scores among girls with and without signs of puberty were  $38.1 \pm 8.91$  and  $39.96 \pm 5.66$ , respectively (Table 2).

**Table 2: Body appreciation and loneliness in girls with and without puberty signs**

Variable	(Mean $\pm$ SD)		Analysis of covariance*	
	Without puberty signs	With puberty signs	F	p
Body appreciation and loneliness	$39.96 \pm 5.66$	$38.1 \pm 8.91$	F=2.52	$p=0.114$
	$48.45 \pm 11.66$	$50.0 \pm 10.81$	F=0.587	$p=0.444$

\*Covariance analysis with adjustment for age and BMI

After controlling for age and body mass index, the ANCOVA results showed that there was no statistically significant difference between girls with and without signs of puberty in body appreciation and loneliness (Table 3). The results showed a negative and significant relationship between body appreciation and feelings of loneliness in both groups of with signs of puberty and without signs of puberty. In the group without signs of puberty, a significant inverse correlation was observed between these two variables ( $r = -0.563, p = 0.001$ ), meaning that an increase in body appreciation is associated with a decrease in feelings of loneliness. This relationship also exists in the group with signs of puberty, but it is weaker ( $r = -0.369, p < 0.001$ ) (Table 4).

**Table 3: Parameter estimates of the effect of puberty signs on loneliness and body appreciation, controlling for age and BMI**

Variable		$\beta$	Std. Error	<i>t</i>	<i>p</i>	95% Confidence Interval	
						Lower Bound	Upper Bound
Loneliness	Intercept	47.206	12.005	3.932	< 0.001	23.572	70.839
	Age	0.434	0.795	0.546	0.585	-1.130	1.999
	BMI	-0.166	0.236	-0.703	0.482	-0.630	0.298
	Puberty Signs =No	-1.700	2.219	-0.766	0.444	-6.070	2.669
	Puberty Signs =Yes	0*					
Body Appreciation	Intercept	22.831	9.421	2.423	0.016	4.285	41.377
	Age	1.024	0.624	1.642	0.102	-0.204	2.252
	BMI	0.032	0.185	0.174	0.862	-0.332	0.396
	Puberty Signs =No	2.765	1.742	1.588	0.114	-0.664	6.194
	Puberty Signs =Yes	0*					

\*This parameter is set to zero because it is redundant.

**Table 4: Correlation between loneliness and body appreciation**

Loneliness	Body appreciation
With puberty signs	$r = -0.369$ $p < 0.001$
Without puberty signs	$r = -0.563$ $p = 0.001$

## Discussion

The purpose of the present study was to compare body appreciation and loneliness in adolescent girls with and without signs of puberty in Neyshabur middle schools. The results showed that feelings of loneliness were slightly higher in girls showing signs of puberty compared to those without, but this difference was not statistically significant and remained at a moderate level. This suggests that puberty has only a minor impact on loneliness, insufficient to be considered a primary factor in its development or increase during adolescence. This could be because other factors, such as family support, friendships, and social relationships, play an important role in reducing or increasing loneliness during adolescence, as demonstrated by Von Soest et al. (2020), who found that supportive parents, close friends, and living at home until age 18 contributed to reduced loneliness (28). Therefore, the study sample may have benefited from favorable social factors that maintained loneliness at a moderate and relatively equal level for both groups. Furthermore, Yilmaz et al. (2021) demonstrated that better menstrual support infrastructure in schools reduces the likelihood of girls reporting feelings of loneliness and sadness during menstruation (29). Amber et al. (2023) found that the group reporting early menarche experienced higher levels of negative emotions such as loneliness and depression (30). Hemberg et al. (2021) suggest that loneliness can arise when an adolescent enters a developmental stage involving growth; this transition can lead to feelings of alienation. In other words, adolescent identity development is often associated with various struggles such as self-doubt, social withdrawal, loneliness, low self-esteem, and depression (31). The research by Hemberg et al. (2021) and Amber et al. (2023) aligns with the current study; puberty, as a new life stage, can contribute to feelings of loneliness in adolescents. Overall, the present study, along with the aforementioned research, indicate that loneliness in adolescence is influenced by both puberty and social factors, but family support and social relationships can play a moderating role in reducing these

feelings. These studies highlight the importance of supportive factors in improving adolescents' mental health.

This study showed that body appreciation was relatively high among adolescent girls, both with and without signs of puberty, with no statistically significant difference between the two groups. This suggests that entering puberty did not negatively impact body image, and adolescents, despite physical changes, maintained a sense of body appreciation. This finding is somewhat inconsistent with the studies showing that puberty and physical changes can lead to body dissatisfaction. Duncan et al. (1985) found body dissatisfaction, particularly concerning weight, in 69% of the girls (32). Another study by Kaczmarek et al. (2016) confirmed a correlation between body image dissatisfaction in adolescent girls and different stages of the menstrual cycle (6). The mentioned study showed that menstruation and the changes that occur during the cycle can have a negative impact on body image, which is inconsistent with the present study in this regard. However, the present results may be influenced by family attitudes and support, attachment styles, social environment, cultural attitudes, school and community education, peer relationships, and social media, all of which may have helped adolescents cope with their physical changes and maintain a positive body image. Tort Nasari et al. (2023) investigated positive body image in adolescents and found that family values, parenting practices, and media literacy play a role in promoting self-esteem and positive body image within the family and educational environments (33). Cohen et al. (2021) showed that one potential benefit of engaging with positive body image content on social media is the strengthening of positive body image at the population level (34). Given the increasing prevalence of social media, the promotion of positive body image through shared content may explain the higher levels of body appreciation observed. Creating a positive body image in adolescents requires education to improve parent-child relationships, strengthening attachment, and media, cultural, and educational efforts to combat imposed beauty standards and conditional self-acceptance (35).

Correlation analysis revealed a significant negative correlation between loneliness and body appreciation in both groups of the present study. Increased loneliness was associated with decreased body appreciation. These findings highlight the importance of emotional and social relationships in shaping body image and satisfaction. Loneliness, as a negative emotional experience, has a detrimental impact on body image. Conversely, individuals with higher body appreciation experience less loneliness. These results align with Zinovyeva et al. (2016), who found that body dissatisfaction in adolescents, particularly girls, increases loneliness and social withdrawal (18). Both studies emphasize the link between body image and social relationships. Zinovyeva et al. mentioned that adolescents dissatisfied with their bodies may avoid social interaction due to reduced self-esteem and feelings of social rejection (18). This is reflected in the current study, where higher loneliness was observed in girls with lower body appreciation. Furthermore, some studies support these findings and have shown that social relationships and the quality of interactions are related to various dimensions of body image and satisfaction with it (36-38). These findings indicate that loneliness impacts not only emotional well-being but also body image and attitudes towards one's body.

The present study had some limitations. The first limitation was that the study was conducted in a single school in Neyshabur that may limit the generalizability of the results to other populations or geographic areas. This limitation was unavoidable due to the small number of girls' middle schools in Neyshabur. A second limitation is the use of self-report questionnaires, which can be susceptible to social desirability bias, fatigue, or rushed responses, potentially reducing the accuracy of the results. To improve the generalizability of the current study conducted in a school in Neyshabur, future studies should expand the sample to include middle schools for girls in other cities of Khorasan Razavi and even different regions of Iran. The use of complementary data collection methods, such as semi-structured interviews in addition to questionnaires, can reduce the potential errors resulting from self-reporting biases and increase the validity of the results. Determining the criteria for selecting schools and sample characteristics, and defining the geographical scope of the study (e.g., limited to Khorasan Razavi or throughout Iran), are of utmost importance for the generalizability and validity of future study results.

### **Implications for practice**

The results of this study demonstrated that increased feelings of loneliness were associated with decreased body appreciation. Puberty did not negatively impact attitudes towards the body, and

adolescents maintained a sense of body appreciation despite physical changes. These findings highlight the importance of social and cultural support in maintaining a positive body image and reducing feelings of loneliness during adolescence. Families can help reduce loneliness and improve adolescents' positive attitudes toward their bodies by creating a safe and intimate environment for discussing the challenges of puberty, strengthening self-confidence, and providing psychological support. Schools can also assist students in coping with the physical and social changes of adolescence and facilitate their mental health by implementing educational programs on puberty, social skills workshops, and peer support groups.

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### **Conflicts of interest**

No conflict of interest exists among the authors of this paper.

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### **Authors' Contributions**

M.R contributed to the conception, design of the study and data collection process. E.J performed statistical analysis. I.T conducted writing of the first draft of manuscript. A.Gh contributed to response to referees' comments and edition of manuscript. P.M supervised the research project and helped in conceptualization and edition of manuscript. All the authors contributed to the drafting and revising of the article and agreed with the final version of the manuscript to be submitted to the journal; they also met the criteria of authorship. All authors contributed equally in the preparation of this manuscript.

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