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Psychological Resilience, Body Appreciation, and Associations with Anxiety and Depression in Pubertal Gynecomastia: A Case-Controlled Study

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WHAT IS ALREADY KNOWN ON THIS TOPIC?

- *Pubertal gynecomastia is associated with increased psychological vulnerability during adolescence, including risks of internalizing symptoms such as anxiety, depression, and body image dissatisfaction.*
- *Existing studies have primarily focused on negative body image and general psychopathology, but few have explored positive body image components, such as body appreciation.*
- *The concept of psychological resilience, although well-established as a protective factor in adolescent mental health, has not yet been studied in adolescents with pubertal gynecomastia.*

ABSTRACT

Objective: Pubertal gynecomastia may have adverse psychosocial consequences, yet the influence of psychological resilience has been insufficiently explored.

Methods: In this case-control study, 36 adolescents with clinically and ultrasonographically confirmed pubertal gynecomastia and 40 healthy controls (ages 11-18) were assessed. Body mass index (BMI) and gynecomastia severity (Rohrich classification) were recorded. Participants completed the Revised Child Anxiety and Depression Scale–Child Version (RCADS-CV), the Adolescent Psychological Resilience Scale (APRS), and the Body Appreciation Scale (BAS). Between-group comparisons and correlations were examined, and MANCOVA was conducted to control for potential confounders.

Results: Adolescents in the pubertal gynecomastia group reported significantly lower levels of psychological resilience ($F(1, 70) = 62.198$, $P < .001$, $\eta^2P = 0.471$) and body appreciation ($F(1, 70) = 5.21$, $P = .026$, $\eta^2P = 0.069$) compared to the control group, even after controlling for BMI. Although overall anxiety and depression scores did not differ significantly, social phobia approached the significance threshold ($t(74) = 1.893$, $P = .062$). Gynecomastia severity was linked to reduced body appreciation ($F(2, 28) = 6.621$, $P = .004$, $\eta^2P = 0.321$). BMI independently predicted lower resilience ($F(1, 70) = 4.77$, $P = .032$, $\eta^2P = 0.064$) and body appreciation ($r = -0.308$, $P = .007$) but did not directly contribute to anxiety or depression.

Conclusion: While pubertal gynecomastia may not invariably manifest as clinical anxiety or depression, it appears to elevate social phobia risk and undermine both body image and resilience. Psychosocial interventions can mitigate these adverse effects, especially in adolescents who are not candidates for surgical intervention.

Keywords: Adolescents, anxiety, body appreciation, psychological resilience, pubertal gynecomastia

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INTRODUCTION

Gynecomastia is a benign proliferation of glandular breast tissue in males due to an imbalance between estrogen and androgen activity.[1] It commonly occurs at three life stages: neonatal, pubertal, and senescent periods, with pubertal gynecomastia affecting approximately 4% to 69% of adolescent

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WHAT THIS STUDY ADDS ON THIS TOPIC?

- *This is the first study to show that adolescents with pubertal gynecomastia report significantly lower psychological resilience than healthy peers, independent of body mass index and internalizing symptoms.*
- *The study demonstrates that both gynecomastia severity and higher levels of anxiety and depression are negatively associated with body appreciation, underscoring the importance of positive body image as a separate construct.*
- *These findings highlight the need for psychosocial interventions aimed at enhancing resilience and body appreciation in adolescents with pubertal gynecomastia, especially those who are not candidates for surgical treatment.*

males.[2,3] Recent large-scale epidemiological studies, however, suggest a lower true incidence of 1.08% when excluding obesity-related pseudo-gynecomastia.[2] The peak prevalence occurs between ages 13 and 14, with spontaneous resolution in most cases within one to three years.[4,5] Nevertheless, approximately 8% of cases persist into adulthood, leading to significant physical and psychological consequences.[3,6] Although gynecomastia is often considered a benign condition, its psychosocial consequences can be profound, particularly during adolescence—a critical period for identity development and self-esteem formation.[7-10]

A growing body of evidence suggests that pubertal gynecomastia is associated with significantly higher levels of internalizing disorders, including anxiety, depression, social phobia, and disordered eating behaviors, highlighting the broad psychological impact of the condition.[5,7,9-11] Moreover, adjustment disorders also appear to be common, often co-occurring with heightened symptoms of internalizing disorders and social avoidance.[7,9] Affected juveniles commonly exhibit reduced self-esteem, social withdrawal, and emotional distress—difficulties that may persist even after spontaneous resolution.[5,7,9,12] They also consistently score lower on measures of psychosocial well-being compared to their healthy peers, with elevated risk for disordered eating behaviors that appear independent of body mass index.[11,13] Additionally, findings indicate that the longer gynecomastia persists, the more severe its psychological impact becomes, reinforcing the need for timely assessment and intervention.[7,10]

Beyond these adverse psychological outcomes, adolescents with pubertal gynecomastia often experience pronounced difficulties related to body image. Body image dissatisfaction—defined as a negative appraisal of one's physical appearance—typically arises from perceived discrepancies between actual and ideal body standards, influenced by sociocultural norms and processes of social comparison.[14,15] Conversely, body appreciation represents a core component of positive body image, characterized by acceptance, respect, and gratitude toward one's body.[16,17] Importantly, positive body image is not simply the absence of dissatisfaction; rather, individuals may simultaneously hold conflicting perceptions of their appearance.[18] Beyond hormonal and psychiatric factors, body image dissatisfaction and social stigmatization further contribute to emotional distress and social withdrawal in pubertal gynecomastia.[19] Many affected individuals report avoiding sports, swimming, and other activities that require upper body exposure, leading to further isolation and decreased quality of life.[2,9] Given the strong association between body image dissatisfaction and mental health disorders, untreated pubertal gynecomastia may serve as a precursor to long-term psychological morbidity, reinforcing the necessity for both medical and psychological interventions.[2,9,13] This clinical minimization contributes to delayed identification and intervention, thereby intensifying the psychological burden experienced by affected adolescents.[2,20] Although existing studies on pubertal gynecomastia have explored certain aspects of body image,[5,10,21] research specifically focusing on body appreciation in this population remains limited.

Another key concept in coping with the psychological burden of chronic illnesses is psychological resilience.[22] Psychological resilience refers to an individual's ability to adapt to adversity, manage emotional stress, and maintain mental well-being despite negative experiences.[23] In various populations, higher resilience levels have been linked to lower depression and anxiety symptoms, as well as improved coping strategies in individuals with body image disturbances.[24,25] While previous research has extensively documented the association between gynecomastia and psychological distress, no study has specifically examined the role of psychological resilience.

Pubertal gynecomastia is not merely a cosmetic issue but a significant psychosocial stressor associated with elevated rates of internalizing problems and body dissatisfaction. Despite the psychological vulnerabilities associated with the condition, it is frequently regarded by clinicians as a temporary and primarily cosmetic concern. While surgical intervention has been shown to improve psychosocial outcomes,[11,13,26] resilience as a potential protective psychological factor remains underexplored in this population. This study seeks to fill this gap by examining how psychological resilience influences mental health outcomes in pubertal gynecomastia, potentially paving the way for more effective non-surgical psychological interventions.

This study aims to examine psychological resilience and body appreciation alongside internalizing problems, including anxiety, depression, and social phobia, in relation to anthropometric measures using a case-control design. Based on existing literature, we propose that adolescents with gynecomastia will report higher levels of anxiety and depression, along with lower body appreciation and psychological resilience, compared to their healthy peers. By addressing these hypotheses, this study aims to contribute to a more nuanced understanding of the psychological impact of gynecomastia and the potential role of resilience in adolescent mental health.

MATERIALS AND METHODS

Study Design and Participants

This case-control study was conducted between November 2023 and April 2024 at Ordu University, Pediatric Endocrinology, and Child Psychiatry outpatient clinics. The study population consisted of male adolescents aged 11-17 years. The case group included 36 adolescents (M: 13.72 ± 1.72) diagnosed with pubertal gynecomastia through clinical examination and ultrasonography at the Pediatric Endocrinology outpatient clinic. None of the participants were receiving psychiatric, pharmacological, or surgical treatment for gynecomastia at the time of assessment in order to avoid potential confounding effects of interventions known to positively influence psychosocial outcomes. The control group comprised 40 adolescents (M: 14.90 ± 1.00) who visited the Pediatric Endocrinology or Child Psychiatry outpatient clinics and had no history of pubertal gynecomastia or presence or history of any psychiatric disorders.

Participation was voluntary, and written informed consent was obtained from both the adolescents and their parents. Adolescents with severe cosmetic deformities affecting body image perception, neurodevelopmental disorders such as autism spectrum disorder or intellectual disability, or any other psychiatric condition that could interfere with participation were excluded from the study. Those who refused participation or whose parents did not provide consent were also excluded.

This study has been reviewed and approved by the Ordu University Clinical Research Ethics Committee (Date: 22.12.2023; Approval no: 340). All procedures will be conducted in accordance with ethical principles, and written informed consent will be obtained from both adolescents and their parents before participation.

Procedures and Data Collection

All participants who met the inclusion and exclusion criteria underwent structured assessments, including clinical, psychological, and anthropometric evaluations. For the case group, anthropometric measurements—such as height, weight, and BMI—were recorded. The severity of pubertal gynecomastia was assessed by a pediatric endocrinologist using ultrasonography and classified according to Rohrich's grading system. To rule out pathological causes of gynecomastia, all participants underwent a comprehensive clinical evaluation, including assessment of age, physical examination findings, medical history (e.g., chronic illness, medication use), and routine laboratory tests. These tests included serum levels of LH, FSH, total testosterone, estradiol, prolactin, and β-hCG. Ultrasonographic evaluation was conducted to confirm the presence of true glandular breast tissue and to differentiate gynecomastia from pseudogynecomastia. Additionally, ultrasonography was used to rule out rare pathological causes of breast enlargement, such as testicular or adrenal abnormalities, to ensure diagnostic accuracy and sample homogeneity.[27] Only individuals consistent with physiological pubertal gynecomastia based on clinical, hormonal, and imaging findings were included in the study.

Adolescents in both groups completed standardized psychological assessments, including the Revised Child Anxiety and Depression Scale – Child Version (RCADS-CV), the Body Appreciation Scale (BAS), and the Adolescent Psychological Resilience Scale (APRS). Additionally, parents of all participants provided demographic and clinical background information by completing a sociodemographic questionnaire. The control group underwent anthropometric measurements limited to height, weight, and BMI.

Measurement Instruments

Sociodemographic Form

Participants' sociodemographic and clinical information was collected through a researcher-designed form completed by parents. The form included details regarding the child's age, school grades, presence of any mental illness or chronic physical illness, and parental ages.

Body Appreciation Scale

The Body Appreciation Scale was developed by Avalos, Tylka, and Wood-Barcalow (2005) to assess individuals' levels of body appreciation.[16] The Turkish adaptation revealed a two-factor structure: (1) General body appreciation (items 1, 2, 3, 4, 5, 8, 9) and (2) investment in body image (items 6 and 7). The scale consists of 9 items rated on a 5-point Likert scale, with higher scores indicating greater body appreciation. Internal consistency analysis demonstrated a Cronbach's alpha of 0.92, indicating high reliability.[28] No items require reverse scoring, and the average completion time is approximately 3 minutes.

Adolescent Psychological Resilience Scale

The Adolescent Psychological Resilience Scale was developed by Bulut, Doğan, and Altundağ (2013) to assess psychological resilience in adolescents. The scale comprises 29 items across six subdimensions: family support (7 items), peer support (5 items), school support (5 items), adaptability (4 items), perseverance (5 items), and empathy (3 items). The structural validity of the scale was confirmed through exploratory and confirmatory factor analyses, explaining 56.99% of the total variance. The internal consistency reliability of the scale was $\alpha = 0.87$, and the test-retest reliability was also reported as 0.87. Higher scores indicate greater psychological resilience, with subscale scores providing additional insights into specific resilience factors. Several items (10, 11, 14, 15, 16, 17, 22, and 23) are reverse-scored. The scale is scored on a 4-point Likert scale, where participants rate each statement from "not at all true" (1) to "very true" (4).[29]

Revised Child Anxiety and Depression Scale – Child Version

The Revised Child Anxiety and Depression Scale – Child Version (RCADS-CV) is a widely used screening tool for anxiety disorders and depression in children and adolescents, based on DSM-IV criteria.[30] It consists of 47 items, divided into six subscales: Generalized Anxiety Disorder (GAD) (6 items), Separation Anxiety Disorder (SAD) (7 items), Panic Disorder (PD) (9 items), Obsessive-Compulsive Disorder (OCD) (6 items), Social Phobia (SP) (9 items), and Major Depressive Disorder (MDD) (10 items). Each item is rated on a 4-point scale ranging from 0 ("never") to 3 ("always"). The total anxiety score is derived by summing the subscales of GAD, SAD, PD, OCD, and SP, while the overall RCADS-CV score includes all items. The Turkish adaptation of the scale demonstrated excellent internal consistency (Cronbach's alpha = 0.95), with reliability coefficients ranging from 0.75 to 0.86 across subscales, confirming its suitability for clinical and research applications.[31]

The Rohrich Classification

The Rohrich Classification is a clinically useful system developed to categorize the severity of gynecomastia based on the volume of glandular hypertrophy and the degree of breast ptosis. It defines four grades: Grade I refers to minimal hypertrophy (less than 250 grams) without ptosis; Grade II involves moderate hypertrophy (250-500 grams) also without ptosis; Grade III indicates severe hypertrophy (greater than 500 grams) with Grade I ptosis; and Grade IV includes severe hypertrophy with more advanced ptosis—Grade II or Grade

Table 1. Descriptive Statistics and Independent Samples *t*-test

Variable	Gynecomastia (M ± SD)	Control (M ± SD)	t	df	*P*	Mean Difference	95% CI (Lower-Upper)
Age	13.72 ± 1.72	14.90 ± 1.00	−3.695	74	**<.001**	−1.18167	−1.81894 to −0.54440
Weight	63.63 ± 15.19	65.77 ± 12.51	−0.672	74	.504	−2.13722	−8.47412 to 4.19968
Height	163.29 ± 10.13	170.05 ± 7.23	−3.373	74	**.001**	−6.76111	−10.75471 to −2.76752
BMI	23.68 ± 4.42	22.69 ± 3.86	1.049	74	.298	0.99586	−0.89571 to 2.88743
School grades	79.63 ± 10.76	78.41 ± 9.17	0.421	46	.676	1.21370	−4.5956 to 7.0231
Mother's age	41.36 ± 6.62	41.19 ± 4.58	0.095	50	.925	0.174	−3.494 to 3.841
Father's age	45.03 ± 5.96	44.75 ± 3.84	0.171	48	.865	0.279	−3.003 to 3.562

Statistically significant *P*-values are presented in bold.

III. This classification aids in standardizing clinical assessment and guides the selection of appropriate surgical techniques depending on the anatomical severity.[32]

Statistical Analysis

All statistical analyses were conducted using Jamovi 2.6.19 software (Jamovi Version 2.6.19; The Jamovi Project, Sydney, Australia). Initially, descriptive statistics including means (M), SDs, sample sizes (N), and independent samples *t*-tests were conducted to assess group differences in demographic and anthropometric variables. Subsequently, Pearson correlation analyses were performed to examine the relationships among variables. Finally, a MANCOVA model was constructed to evaluate group differences and grade effects on psychosocial resilience and body appreciation. All analyses were conducted with a significance level of $P < .05$, and effect sizes for significant findings were reported using partial eta squared (η^2p).

RESULTS

Comparison of Groups for Demographic and Anthropometric Measures

Group differences in demographic and anthropometric measures were assessed using independent samples t-tests (see Table 1). The gynecomastia group was significantly younger (M = 13.72, SD = 1.72) compared to the control group (M = 14.90, SD = 1.00), t(74) = −3.695, $P < .001$. Additionally, participants in the gynecomastia group were significantly shorter in height (M = 163.29 cm, SD = 10.13) than those in the control group (M = 170.05 cm, SD = 7.23), t(74) = −3.373, $P = .001$. However, no significant group differences were observed for weight (kg), Body Mass Index (BMI), school grades, mother's age, or father's age ($P > .05$ for all comparisons).

Distribution of Gynecomastia Severity

The frequency distribution of gynecomastia severity according to the Rohrich classification is presented in Table 2. The majority of valid cases (N = 35) were classified as Grade 1 (minimal hypertrophy without ptosis, 48.6%) and Grade 2 (moderate hypertrophy without ptosis, 40.0%), accounting for 88.6% of the total sample. A smaller proportion of individuals were classified as Grade 3 (severe hypertrophy with grade I ptosis, 11.4%), while no participants met the criteria for Grade 4 (severe hypertrophy with grade II or III ptosis, 0.0%).

Table 2. Frequency Distribution of Gynecomastia Severity (Rohrich Classification)

Rohrich Classification	Count (n)	% of Total (N = 36)	% of Valid Cases	Cumulative % (Valid)
Grade 1	17	47.2	48.6	48.6
Grade 2	14	38.9	40.0	88.6
Grade 3	4	11.1	11.4	100.0
Grade 4	0	0.0	0.0	100.0
Missing	1	2.8	–	–

Correlation Analysis

Gynecomastia severity was positively correlated with BMI (r = 0.552, $P < .001$) and negatively correlated with Body Appreciation Scale (BAS) Total Score (r = −0.479, $P < .01$) and BAS Investment in Body Image (r = −0.493, $P < .01$). No significant correlation was found between gynecomastia severity and RCADS-CV MDD or RCADS-CV Anxiety. Body Appreciation Scale Total Score was negatively correlated with RCADS-CV Anxiety (r = −0.340, $P < .01$) and RCADS-CV MDD (r = −0.455, $P < .001$). Body Appreciation Scale Investment in Body Image was also negatively correlated with RCADS-CV MDD (r = −0.482, $P < .001$) and RCADS-CV Total Anxiety (r = −0.374, $P < .001$). Body Appreciation Scale General Body Satisfaction was positively correlated with APRS Total Score (r = 0.233, $P < .05$). A weak but significant positive correlation was observed between age and APRS Total Score (r = 0.277, $P < .05$). No significant correlation was found between gynecomastia severity and APRS Total Score. For a detailed overview of all correlations, refer to Table 3.

Comparison of Revised Child Anxiety and Depression Scale–Child Version Total and Sub-Scores Between Groups

An independent samples *t*-test comparing the gynecomastia and control groups on the RCADS-CV subscale scores revealed no statistically significant differences across most anxiety and depression domains ($P > .05$ all). Specifically, separation anxiety (t(74) = 0.604, $P = .548$), generalized anxiety (t(74) = 0.857, $P = .394$), panic disorder (t(74) = −1.380, $P = .172$), obsessive-compulsive disorder (t(74) = −0.646, $P = .520$), major depression (t(74) = 0.660, $P = .511$), total anxiety (t(74) = 0.470, $P = .640$), and total anxiety-depression scores (t(74) = 0.525, $P = .601$) did not differ significantly between groups. Although the social phobia subscale approached significance (t(74) = 1.893, $P = .062$) with a mean difference of 4.439 (95% CI: −0.233 to 9.110), it did not reach the conventional threshold for statistical significance. See Table 4.

Multivariate Analysis of Covariance Examining the Effects of Pubertal Gynecomastia Diagnosis on Psychosocial Resilience and Body Appreciation

A MANCOVA was performed to examine the effects of gynecomastia status, BMI, anxiety symptoms, depressive symptoms, and age on psychosocial resilience (APRS Total Score) and body appreciation (BAS Total Score) (see Table 4). Wilks' Lambda indicated a significant overall multivariate effect, $\Lambda = 0.512$, F(2, 69) = 32.823, $P < .001$.

Table 3. Correlation Matrix for Study Variables

	1	2	3	4	5	6	7	8
1. Age	–							
2. Gynecomastia grade	0.042	–						
3. BMI	0.127	0.552***	–					
4. BAS total score	0.102	−0.479**	−0.308**	–				
5. BAS general body satisfaction	0.115	−0.169	−0.212	0.660***	–			
6. BAS investment in body image	0.074	−0.493**	−0.289*	0.959***	0.427***	–		
7. RCADS-CV MDD	0.098	0.058	0.100	−0.455***	−0.189	−0.482***	–	
8. RCADS-CV total anxiety T-Score	−0.112	0.034	0.157	−0.340**	−0.120	−0.374***	0.661***	–
9. APRS total score	0.277*	0.267	−0.262*	0.218	0.233*	0.171	−0.056	−0.059

APRS, Adolescent Psychological Resilience Scale; BAS, Body Appreciation Scale; BMI, body mass index; RCADS-CV, revised child anxiety and depression scale–child version.
*$P < .05$.
**$P < .01$.
***$P < .001$.

Table 4. Independent Samples *t*-Test for Revised Child Anxiety and Depression Scale–Child Version and Subgroups Comparing Pubertal Gynecomastia and Control Groups

Dependent Variable	*t*	*df*	*P*	Mean Difference	95% CI Lower	95% CI Upper
Separation anxiety	0.604	74	.548	1.542	−3.545	6.629
Generalized anxiety	0.857	74	.394	1.961	−2.598	6.520
Panic disorder	−1.380	74	.172	−3.300	−8.066	1.466
Social phobia	1.893	74	.062	4.439	−0.233	9.110
Obsessive-compulsive disorder	−0.646	74	.520	−1.511	−6.171	3.148
Major depression	0.660	74	.511	1.947	−3.928	7.822
Total anxiety score	0.470	74	.640	1.147	−3.721	6.016
Total anxiety-depression score	0.525	74	.601	1.367	−3.816	6.549

Table 5. Multivariate Analysis of Covariance Examining Group Differences on Psychosocial Resilience and Body Appreciation

Effect	Dependent Variable	Sum of Squares	*df*	Mean Square	*F*	*P*	η^2p
Gynecomastia	APRS total	17 757.67	1	17 757.67	62.20	**<.001**	0.471
	BAS total	243.29	1	243.29	5.21	**.026**	0.069
BMI	APRS total	1361.15	1	1361.15	4.77	**.032**	0.064
	BAS total	326.33	1	326.33	6.99	**.010**	0.091
RCADS-CV total anxiety	APRS total	20.06	1	20.06	0.07	.792	0.001
	BAS total	516.50	1	516.50	11.06	**.001**	0.137
RCADS-CV MDD	APRS total	7.48	1	7.48	0.03	.872	0.000
	BAS total	422.78	1	422.78	9.05	**.004**	0.114
Age	APRS total	1.51	1	1.51	0.01	.942	0.000
	BAS total	20.92	1	20.92	0.45	.506	0.006
	APRS total	19 985.08	70	285.50			
	BAS total	3270.21	70	46.72			

η^2p = partial eta squared.
APRS, Adolescent Psychological Resilience Scale; BAS, Body Appreciation Scale; BMI, body mass index; RCADS-CV, revised child anxiety and depression scale–child version. Statistically significant *p*-values are presented in bold.

In a multivariate analysis examining predictors of resilience and body appreciation, pubertal gynecomastia diagnosis emerged as the strongest predictor of lower psychosocial resilience, $F(1, 70) = 62.20$, $P < .001$, $\eta^2P = 0.471$. Additionally, higher BMI significantly predicted lower resilience, $F(1, 70) = 4.77$, $P = .032$, $\eta^2P = 0.064$, whereas neither anxiety nor depressive symptoms, nor age, significantly contributed to resilience ($P > .05$, $P = .942$, respectively). For body appreciation, adolescents with gynecomastia reported significantly lower scores than controls, $F(1, 70) = 5.21$, $P = .026$, $\eta^2P = 0.069$, and higher BMI was similarly associated with lower body appreciation, $F(1, 70) = 6.99$, $P = .010$, $\eta^2P = 0.091$. Moreover, both anxiety and depressive symptoms significantly predicted lower body appreciation, with anxiety demonstrating a particularly strong effect ($F = 11.06$, $P = .001$, $\eta^2P = 0.137$) and depression a moderate effect ($F = 9.05$, $P = .004$, $\eta^2P = 0.114$), while age did not significantly predict body appreciation ($P = .506$). See Table 5.

Table 6. Multivariate Analysis of Covariance Examining Effect of Grade of Gynecomastia on Psychosocial Resilience and Body Appreciation

Factor	Dependent Variable	Sum of Squares	*df*	Mean Square	*F*	*P*	η^2P
Gynecomastia total grade	BAS total score	520.80	2	260.40	6.621	**.004**	0.321
	APRS total score	1069.08	2	534.54	1.326	.282	0.095
Residuals	BAS total score	1101.20	28	39.33			
	APRS total score	11286.59	28	403.09			

Age, BMI, RCADS-CV MDD, and RCADS-CV Total Anxiety were included as covariates and controlled for in the analysis.
APRS, Adolescent Psychological Resilience Scale; BAS, Body Appreciation Scale. Statistically significant *p*-values are presented in bold.

Multivariate Analysis of Covariance Examining Effect of Grade of Pubertal Gynecomastia on Psychosocial Resilience and Body Appreciation

A MANCOVA was conducted to examine the effect of gynecomastia severity on body appreciation (BAS Total Score) and adolescent psychological resilience (APRS Total Score) while controlling for age, BMI, depressive symptoms, and anxiety symptoms. The multivariate test results demonstrated that gynecomastia severity had a significant overall effect on the dependent variables (Wilks' Lambda = 0.558, F(4, 54) = 4.568, $P = .003$), suggesting that higher gynecomastia severity is associated with differences in body appreciation and psychological resilience after accounting for the control variables, including age, BMI, RCADS-CV MDD, and RCADS-CV Total Anxiety.

Univariate analyses further indicated that gynecomastia severity had a significant effect on BAS Total Score (F(2, 28) = 6.621, $P = .004$, $\eta^2P = 0.321$), suggesting that individuals with more severe gynecomastia reported significantly lower body image satisfaction after controlling for age, BMI, depressive symptoms, and anxiety. However, the effect of gynecomastia severity on APRS Total Score was not statistically significant (F(2, 28) = 1.326, $P = .282$, $\eta^2P = 0.095$), indicating that gynecomastia severity was not strongly associated with psychological resilience even when several associated factors were accounted for. Refer to the Table 6 for details.

DISCUSSION

This study employed a case-control design to examine the impact of a pubertal gynecomastia diagnosis and its severity on psychological resilience and body appreciation in adolescents, while also investigating potential differences in anxiety and depression scores. Our findings indicate that the pubertal gynecomastia group had significantly lower levels of psychological resilience and body appreciation compared to the control group. However, no statistically significant difference emerged between the two groups regarding total anxiety and depression scores. To the best of our knowledge, this is the first study to demonstrate a significant reduction in psychological resilience among adolescents with gynecomastia, highlighting the need to explore risk factors associated with adverse psychological outcomes in this population.

One of the most significant contributions of this research is the investigation of psychological resilience—a critical risk factor for the emergence of psychopathology—in a pubertal gynecomastia sample. Multivariate analyses demonstrate that gynecomastia significantly reduces psychological resilience (F = 62.198, $P < .001$, $\eta^2P = 0.471$), whereas depression and anxiety scores showed no direct effects on resilience. Given that resilience is widely regarded as a protective resource against various forms of psychopathology,[23] enhancing resilience through psychosocial interventions before more severe dysfunction emerges could have a protective effect for adolescents with gynecomastia. Because this finding appears to be unprecedented in the literature, caution is advised in interpretation, and replication with larger samples is recommended.

Another major finding of the study is that even after controlling for age, BMI, and anxiety and depression scores, adolescents with gynecomastia continued to present significantly lower "body appreciation" scores than those in the control group. Gynecomastia severity, along with anxiety and depressive symptoms, were identified as predictive factors that negatively impact body appreciation, and a negative correlation was noted between BMI and body appreciation. Similar outcomes have been reported in previous studies conducted in the Turkish population, which have documented distorted body image perception in adolescents with pubertal gynecomastia.[10,21] Another case-control study indicated that body image can be impaired independently of gynecomastia severity.[5] Furthermore, numerous studies have consistently associated pubertal gynecomastia with lower self-esteem, suggesting a potential link between the condition and negative self-evaluation, including dissatisfaction with body image.[5,8,10,11] Previous studies on pubertal gynecomastia have primarily focused on body image perception, which refers to individuals' evaluative judgments about their physical appearance and often emphasizes dissatisfaction stemming from discrepancies between actual and ideal body image.[15] While conceptually related, body appreciation represents a distinct yet complementary dimension of body image, characterized by acceptance, respect, and gratitude toward one's body regardless of appearance.[17] Our study is among the first to investigate body appreciation in this population, offering a novel perspective. However, given the conceptual proximity yet theoretical differences between these constructs, the findings should be interpreted with caution.

In our study, the social phobia scores neared statistical significance, with adolescents with gynecomastia reporting higher levels of social phobia—an outcome consistent with the limited data in the literature. Early research involving case series of adolescents with gynecomastia described common behavioral patterns characterized by withdrawing from activities and deliberately avoiding any setting where the body might be exposed.[33,34] Similarly, there are reports of widespread teasing and exclusion by peers among these individuals,[35] and of a strong link between avoiding activities like sports or swimming—where the chest is visible—and fear of social rejection.[36] In some cases, adolescents have considered leaving school altogether as a result of severe bullying and ridicule.[7] During this process, coping strategies such as wearing multiple layers of clothing, wrapping the chest with plastic film or tape, and slumping one's shoulders have been documented, leading adolescents to further withdraw from social environments.[7] These findings underscore additional difficulties that adolescents with gynecomastia may face, particularly due to the risk factors associated with body image. Collectively, these observations suggest that enlargement of male

breast tissue could jeopardize gender-specific identity formation and disrupt social functioning.[8,37]

In our research, contrary to our hypothesis, no significant difference was found between the pubertal gynecomastia and control groups in any subscale (SAD, GAD, PD, SP, OCD, MDD) or total scores (Total Anxiety, Total Anxiety Depression) measured by the RCADS-CV. Nevertheless, the social phobia subscale approached statistical significance ($P = .062$), hinting that juveniles with pubertal gynecomastia may experience elevated social anxiety. However, this finding does not fully align with the results of the few existing studies on the topic.[9] For example, Storch et al. (2004) reported higher depressive scores in two boys with pubertal gynecomastia compared to same-aged peers, noting pronounced loneliness in one case and heightened social anxiety in the other.[38] Another study of 24 adolescents found higher anxiety, depression, and social phobia scores relative to community norms.[7] Although these two studies had weaker methodological designs, a larger sample case-control study in Türkiye observed significantly higher internalizing disorders among adolescents diagnosed with pubertal gynecomastia.[10] Another case-control study found that juveniles with pubertal gynecomastia had significantly lower scores on self-esteem, general health, social functioning, and mental health than controls, even after controlling for BMI.[5]

Several factors might explain why our findings do not fully mirror earlier literature. First, approximately half of the individuals in our pubertal gynecomastia cohort were categorized as grade 1 (48.6%), and a substantial proportion as grade 2 (40%), with only about 11% being grade 3 cases; no grade 4 cases were included. This distribution could be important for understanding the psychological effects of gynecomastia severity. Indeed, our analysis suggests a negative correlation between the severity of gynecomastia and body image ($F(2, 28) = 6.621$, $P = .004$, $\eta^2P = 0.321$). Additionally, the absence of structured clinical interviews for assessing anxiety and depression raises concerns regarding the validity of relying solely on self-report measures, thereby limiting the interpretability of the findings. Another explanation might be that our sample size failed to meet the threshold for uncovering a genuine difference. It is worth noting that although age was statistically controlled for in the analyses, the developmental stage may still influence psychological responses. The case group was younger than the control group, and previous studies suggest that body image concerns and related emotional distress typically intensify in mid-adolescence due to increased self-awareness and social comparison processes.[39] Thus, our results should be interpreted with caution and supplemented by future cohort studies tracking the cumulative psychological trajectory of pubertal gynecomastia, including the progression from subclinical anxiety or depression to full-blown psychopathology.

Another important point is that BMI showed a specifically negative association with psychological resilience and body appreciation, while no direct relationship was observed with anxiety or depression scores. Although the statistical model was constructed under the theoretical assumption that BMI may influence resilience, it is important to acknowledge that this association—supported by a modest but significant negative correlation ($r = –0.262$, $P < .05$)—may also be bidirectional. Some studies have suggested that adolescents who are overweight or obese may be especially vulnerable to the psychosocial ramifications of gynecomastia.[10,11] While our results suggest that BMI adversely affects body appreciation and resilience, the precise mechanisms by which excess weight exacerbates depression or anxiety remain unclear. Additional mediating factors—such as peer bullying, inadequate social support, or higher gynecomastia severity—may be instrumental in this process. Furthermore, issues surrounding gender identification and masculinity may vary in this sample, warranting more extensive investigation of both protective and risk factors in future studies.

Future studies may benefit from exploring the longitudinal trajectory of pubertal gynecomastia—over one to two years, for example—along with fluctuations in resilience, social support, and cultural variations. Longitudinal designs would shed more light on changes in anxiety, depression, and body image over time, and whether these parameters can be improved through surgical or non-surgical means. Although surgery has proven beneficial for moderate-to-severe cases of gynecomastia,[11,13] it should be remembered that not all families opt for surgery and that some adolescents may be deterred by potential risks.[37] Medical treatment with tamoxifen has been shown to be effective and safe in selected cases of pubertal gynecomastia; however, no studies to date have examined its psychological outcomes, and its use is typically recommended only for cases with a disc diameter of ≥3 cm.[40] Consequently, further scientific evidence regarding psychosocial interventions such as group therapy, cognitive-behavioral techniques, or family counseling is needed, particularly for mild cases or those not seeking surgical correction.

An original aspect of our findings is the possibility that anxiety and depression scores in gynecomastia may not necessarily diverge sharply from those of a control group—depending on severity—yet social phobia scores may heighten and body satisfaction may significantly drop. This suggests that not all adolescents with gynecomastia progress to clinical depression or generalized anxiety, but they are at considerable risk for social anxiety and persistent body dissatisfaction. Alongside that, our demonstration of lower resilience among the gynecomastia sample highlights the potential importance of resilience-focused psychosocial interventions. While prior works have explored the details of surgical intervention, the effects of non-surgical support remain comparatively underexplored. Therefore, gynecomastia may be viewed as a "body stressor" during adolescence which, in combination with low resilience, increases the likelihood of developing significant mental health disorders later on.

Though this study offers important insights, several limitations warrant consideration. First, despite controlling for age differences between gynecomastia and control groups through MANCOVA, residual confounding effects may still influence the interpretation of psychological outcomes. Second, our relatively small sample size, along with the predominance of mild-to-moderate gynecomastia cases, limits the generalizability of findings and precludes definitive conclusions about psychological outcomes in adolescents with severe gynecomastia. Third, assessments of anxiety and depression relied solely on self-report measures rather than clinical diagnostic interviews, potentially compromising the reliability and depth of psychological evaluations. In addition, height—originally collected for the purpose of BMI calculation—was found to differ significantly between groups. This variable may have functioned as a confounding factor, particularly in relation to body appreciation and psychological resilience, as height can influence adolescents' perceptions of their physical appearance. Since the current study did not specifically aim to isolate or control for cosmetic and visual characteristics, this difference may constitute an additional interpretative limitation. Finally, the absence of detailed assessments for family and peer support

restricts our ability to fully explore the protective or exacerbating roles of social factors on psychological resilience, anxiety, and depression. Future research utilizing larger, demographically matched samples across gynecomastia severity levels, incorporating clinical interviews, and including comprehensive social-context measures would provide greater insight into these psychosocial dynamics.

Our findings reveal that adolescents with gynecomastia exhibit notably reduced psychological resilience and body satisfaction in comparison to controls, yet they do not display significantly different total anxiety and depression scores. This contrast suggests that gynecomastia may not invariably lead to full-blown clinical anxiety or depression, but it can still impose a substantial psychosocial burden characterized by social phobia tendencies and concerns related to body image. Moreover, our research underscores psychological resilience as a potentially valuable focal point in designing prophylactic psychosocial strategies. Targeted interventions aimed at strengthening resilience—such as school-based mental health programs, structured peer group interventions, and psychoeducational workshops—may help adolescents with gynecomastia better cope with body image-related challenges and reduce the risk of internalizing symptoms. Although more moderate-to-severe gynecomastia cases may benefit from surgery, further investigation into non-surgical interventions—particularly for milder presentations or families skeptical of surgery—could produce significant therapeutic value. Future prospective, longitudinal work, augmented by clinical interviews and more comprehensive social-context assessments, will be essential for clarifying the interplay of gynecomastia severity, resilience, and psychosocial outcomes in this vulnerable adolescent population.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was approved by the Ordu University Clinical Research Ethics Committee (Date: 22.12.2023; Approval no: 340).

Informed Consent: Written informed consent was obtained from both adolescents and their parents who agreed to take part in the study.

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