

Research Article

The Urban Academic Stress Map: How Age, Gender, and City Influence Test Anxiety and Self-Esteem in Adolescents- A Multicentric Cross-Sectional Study Across Four Indian Cities

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DOI: <https://doi.org/10.24321/2349.2880.202609>

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How to cite this article:

Bhav S Y, Kariya P, Pradeep M, Kavade S G, Shah S R, Joshi S V, Sovan A V, Pethkar K P, Bhav Y S, Kulkarni N L. The Urban. Academic Stress Map: How Age, Gender, and City Influence Test Anxiety and Self-Esteem in Adolescents- A Multicentric Cross-Sectional Study Across Four Indian Cities. Ind J Youth Adol Health. 2026;13(2):15-25.

Date of Submission: 2026-05-30

Date of Acceptance: 2026-06-17

A B S T R A C T

Introduction: Test anxiety and low self-esteem are prevalent mental health concerns among adolescents in competitive academic environments. However, limited multicentric data exist examining these constructs jointly across Indian urban settings, age groups, and genders.

Objectives: To assess self-esteem and test anxiety levels among adolescents in four Indian cities (Pune, Mumbai, Surat, and Vadodara), and to examine their interrelationship across demographic subgroups including age, gender, and city.

Methods: A multicentric cross-sectional study was conducted across four cities (Pune, Mumbai, Surat, Vadodara) with a total sample of 1,128 adolescents aged 10–24 years. Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES) and test anxiety using the Friedben Test Anxiety Scale (FTAS), which encompasses three subfactors: Social Derogation (SD), Cognitive Obstruction (CO), and Tenseness (T). Pearson correlation coefficients were computed to examine relationships between RSES and FTAS scores across the total sample and subgroups.

Results: The majority of participants had normal self-esteem (79.88%), while 13.56% had low self-esteem. Surat demonstrated the highest mean self-esteem ($M = 29.56$, $SD = 4.32$) and lowest test anxiety ($M = 7.39$, $SD = 4.75$), while Vadodara and Mumbai had the highest test anxiety ($M = 9.71$ and $M = 9.65$, respectively). A moderate-to-strong negative correlation was found between RSES and total FTAS ($r = -0.58$,

$p < .001$). Females showed stronger negative correlations than males ($r = -0.61$ vs. -0.55). Middle adolescents (14–16 years) exhibited the strongest inverse relationship ($r = -0.61$). Vadodara showed the strongest city-level RSES–FTAS correlation ($r = -0.70$), and Surat the weakest ($r = -0.52$).

Conclusion: The study highlights differences in self-esteem and anxiety which were related to the city, gender and mid-adolescence period. City-wide patterns emphasize the importance of local academic culture and family support. Overall, the findings highlight the need for age- and context-specific measures to improve adolescent emotional well-being.

Keywords: Self-Esteem, Test Anxiety; Rosenberg Self-Esteem Scale, Friedben Test Anxiety Scale, Adolescents, India, Multicentric Study

Introduction

Adolescence is a critical developmental period characterized by rapid cognitive, emotional, and social changes. Academic performance assumes central importance during this phase, and the evaluative pressures associated with examinations can substantially affect psychological well-being. Two constructs of particular relevance in this context are self-esteem and test anxiety.¹

Self-esteem—the individual’s overall subjective evaluation of their worth—plays a foundational role in psychological adjustment, academic motivation, and resilience against stress. The Rosenberg Self-Esteem Scale (RSES) remains the most widely validated instrument for measuring self-esteem across age groups and cultures.² Test anxiety, on the other hand, refers to a specific form of performance anxiety that occurs in evaluative contexts. It encompasses cognitive components (worry, mental blocks), somatic components (physiological arousal, tension), and social-evaluative concerns (fear of negative judgment by peers and authority figures). The Friedben Test Anxiety Scale (FTAS) operationalizes these dimensions through three subfactors: Social Derogation (SD), Cognitive Obstruction (CO), and Tenseness (T).^{3,4}

In India, academic pressure is compounded by a highly competitive educational landscape, cultural emphasis on examination performance as a determinant of life outcomes, and limited mental health infrastructure in school settings. Existing research from Indian urban centers has documented significant levels of anxiety among school-going children, with prevalence varying by age, gender, and geographic setting. However, most studies have been conducted within single cities or institutions, limiting generalizability and hindering comparative regional analysis.⁵

Despite growing awareness of adolescent mental health in India, multicentric studies examining test anxiety and self-esteem concurrently—across developmentally diverse age groups and multiple urban contexts—are sparse. Existing literature tends to address test anxiety and self-esteem in isolation or focuses on specific age cohorts. City-wise comparisons of these constructs, particularly through validated instruments such as RSES and FTAS, are largely absent from the published literature.

In particular, the developmental trajectory of individuals aged 10 to 19 is increasingly marked by heightened vulnerability to anxiety and stress, often manifesting as significant barriers to academic performance and emotional well-being.⁶ This study aimed to assess the levels of self-esteem and test anxiety among urban adolescents across four Indian cities (Pune, Mumbai, Surat, and Vadodara) and its association with various socio-demographic factors. Understanding the joint dynamics of self-esteem and test anxiety across diverse urban Indian settings has both preventive and clinical significance. Identifying vulnerable subgroups—by age, gender, or geographic context—can guide the design of targeted psychological interventions. Additionally, examining whether the self-esteem–anxiety relationship varies by developmental stage and city-specific academic culture can help tailor school mental health programs more effectively.

Methods

Study Design

A multicentric, cross-sectional observational study.

Study Setting

The study was conducted across four urban Indian cities: Pune, Mumbai, Surat, and Vadodara. Data collection was carried out under the auspices of the AACCI (Association of Adolescent and Child Care in India).

Study Population

The study included adolescents and young adults aged 10–24 years enrolled in educational institutions across the four cities.

Inclusion Criteria

- Age between 10 and 24 years
- Enrolled in an educational institution within the study cities
- Willing to participate and provide responses to the study instruments

Sample Size

A total of 1,128 participants were enrolled across four cities: Pune ($n = 416$), Surat ($n = 418$), Vadodara ($n = 165$), and Mumbai ($n = 129$).

Data Collection Tools

Rosenberg Self-Esteem Scale (RSES) A 10-item self-report scale measuring global self-esteem. Scores range from 10 to 40, with established cut-offs for low self-esteem (<25), normal self-esteem (25–35), and high self-esteem (>35).

Friedben Test Anxiety Scale (FTAS) A validated self-report instrument measuring test anxiety across three subfactors:

- Social Derogation (SD): Fear of negative evaluation by significant others; score range 0–8.
- Cognitive Obstruction (CO): Cognitive interference during exams (e.g., mental blocks, forgetfulness); score range 0–9.
- Tenseness (T): Physiological arousal and somatic symptoms; score range 0–6.

Total FTAS scores > 7 are associated with clinically significant test anxiety.

Variables Measured

- Primary variables: RSES total score; FTAS total score and subfactor scores (SD, CO, T)
- Demographic variables: Age (categorized as Early Adolescence 10–13 years, Middle Adolescence 14–16 years, Late Adolescence 17–19 years, Young Adults 20–24 years), gender (male/female), and city of enrolment

Statistical Analysis

Descriptive statistics (mean, median, mode, standard deviation, variance, range, minimum, and maximum) were computed for RSES and FTAS scores across the total sample and subgroups. Pearson correlation coefficients were calculated to examine the relationships between:

- FTAS total scores and subfactor scores (SD, CO, T)
- RSES total scores and FTAS total and subfactor scores

Analyses were stratified by gender, age group, and city. Statistical significance was set at $p < .05$. All analyses were conducted on the full sample ($N = 1,128$) unless otherwise specified.

Results

The total sample comprised 1,128 participants (mean age = 14.19 years, $SD = 2.71$; median age = 14, $IQR = 4$), with 549 males (48.67%) and 579 females (51.33%). Participants were distributed across four adolescent developmental stages: Early Adolescence 10–13 years ($n = 479$, 42.46%), Middle Adolescence 14–16 years ($n = 433$, 38.39%), Late Adolescence 17–19 years ($n = 169$, 14.98%), and Young Adults 20–24 years ($n = 47$, 4.17%). The young adult cohort was entirely female. City-wise, Pune contributed 36.88% ($n = 416$), Surat 37.06% ($n = 418$), Vadodara 14.63% ($n = 165$), and Mumbai 11.44% ($n = 129$). The Mumbai cohort

was entirely female, with an age range of 17–24 years (mean age = 19.17, $SD = 1.29$).

Across the total sample, the mean RSES score was 28.95 ($SD = 4.46$). The majority of participants demonstrated normal self-esteem (RSES 25–35): 79.88% ($n = 901$). Low self-esteem (RSES < 25) was present in 13.56% ($n = 153$), and high self-esteem (RSES > 35) in 6.56% ($n = 74$).

City-wise, Surat recorded the highest mean RSES score ($M = 29.56$, $SD = 4.32$), followed by Mumbai ($M = 28.89$, $SD = 3.97$), Pune ($M = 28.85$, $SD = 4.20$), and Vadodara ($M = 27.73$, $SD = 5.49$).

Gender-wise distribution of self-esteem categories revealed near-equal proportions of males and females in the low (48.37% male, 51.63% female) and normal (49.17% male, 50.83% female) categories. Among participants with high self-esteem, females were proportionally higher (56.76%) compared to males (43.24%).

Test Anxiety Scores (FTAS)

The total sample mean FTAS score was 8.28 ($SD = 5.24$), exceeding the clinical threshold of 7 for significant test anxiety. Among the FTAS subfactors, Social Derogation (SD) had the highest mean score ($M = 3.66$, $SD = 2.64$), followed by Tenseness (T) ($M = 2.67$, $SD = 1.90$) and Cognitive Obstruction (CO) ($M = 1.94$, $SD = 2.09$).

City-wise, Vadodara had the highest mean total FTAS score ($M = 9.71$, $SD = 5.91$), followed by Mumbai ($M = 9.65$, $SD = 5.30$), Pune ($M = 8.17$, $SD = 5.22$), and Surat ($M = 7.39$, $SD = 4.75$).

Within subfactor scores:

- SD subfactor: Highest in Vadodara ($M = 4.20$) and lowest in Surat ($M = 3.31$)
- CO subfactor: Highest in Vadodara ($M = 2.69$) and lowest in Surat ($M = 1.57$)
- T subfactor: Highest in Mumbai ($M = 3.46$) and lowest in Surat ($M = 2.52$)

Pearson Correlations Between FTAS Total and Subfactor Scores

Across the total sample ($N = 1,128$), FTAS total scores showed strong positive correlations with all three subfactors: SD ($r = 0.82$, $p < .001$), T ($r = 0.78$, $p < .001$), and CO ($r = 0.77$, $p < .001$). Moderate inter-subfactor correlations were observed: CO–T ($r = 0.48$), SD–T ($r = 0.45$), and SD–CO ($r = 0.38$), all $p < .001$.

Gender-wise correlations were similar for males and females. Age-wise, Early Adolescents showed the strongest FTAS–SD correlation ($r = 0.85$), while Middle Adolescents showed the highest FTAS–CO ($r = 0.79$) and FTAS–T ($r = 0.80$). In Late Adolescence, males demonstrated a notably

stronger FTAS–CO correlation ($r = 0.86$) than females ($r = 0.77$). Young Adults showed weaker inter-subfactor correlations for SD–CO ($r = 0.30$, $p < .05$) and SD–T ($r = 0.46$, $p < .05$). City-wise, the highest FTAS–SD correlation was found in Pune ($r = 0.83$) and the strongest FTAS–CO in Vadodara ($r = 0.80$). (See Table 5)

Pearson Correlations Between RSES and FTAS Scores

Across the total sample, a moderate-to-strong negative correlation was found between RSES and total FTAS ($r = -0.58$, $p < .001$). Subfactor correlations with RSES were: CO ($r = -0.57$), SD ($r = -0.41$), and T ($r = -0.39$), all $p < .001$.

Table 1. Age & Gender Distribution of Adolescents from 4 cities

(n=1128)

Adolescence stage	Male No. (%)	Female No. (%)	Total No (%)
Early 10-13 yrs	258 (53.86%)	221 (46.14%)	479 (42.46%)
Mid 14-16 yrs	231 (53.35%)	202 (46.65%)	433 (38.39%)
Late 17-19 yrs	60 (35.50%)	109 (64.50%)	169 (14.98%)
Young Adults 20-24 yrs	0 (0%)	47 (100.0%)	47 (4.17%)
Total	549 (48.67%)	579 (51.33%)	1128 (100.0%)
Age range 10-24 yrs median age IQR – 14(4) mean Age 14.19 (SD 2.71)			

Table 2. City-wise Age and Gender Distribution of Adolescents from 4 cities

(n=1128)

City and Adolescence stage	Male No. (%)	Female No. (%)	Total No (%)
Pune (n=416)	222 (53.37%)	194 (46.63%)	416 (36.88%)
Early 10-13 yrs	130 (55.08%)	106 (44.92%)	236 (20.92%)
Mid 14-16 yrs	90 (51.43%)	85 (48.57%)	175 (15.51%)
Late 17-19 yrs	2 (40.00%)	3 (60.00%)	5 (0.44%)
Age range 10-17 yrs median age IQR – 13(3) mean Age 13.02 (SD 1.76)			
Surat (n=418)	219 (52.39%)	199 (47.61%)	418 (37.06%)
Early 10-13 yrs	116 (51.10%)	111 (48.90%)	227 (20.12%)
Mid 14-16 yrs	94 (54.65%)	78 (45.35%)	172 (15.25%)
Late 17-19 yrs	9 (47.37%)	10 (52.63%)	19 (1.68%)
Age range 10-19 yrs median age IQR – 13(4) mean Age 13.16 (SD 2.03)			
Vadodara (n=165)	108 (65.45%)	57 (34.55%)	165 (14.63%)
Early 10-13 yrs	12 (75.00%)	4 (25.00%)	16 (1.42%)
Mid 14-16 yrs	47 (54.65%)	39 (45.35%)	86 (7.62%)
Late 17-19 yrs	49 (77.78%)	14 (22.22%)	63 (5.59%)
Age range 10-18 yrs median age IQR – 16(2) mean Age 15.87 (SD 1.55)			
Mumbai (n=129)	0 (0 %)	129 (100.0%)	129 (11.44%)
Late 17-19 yrs	0 (0 %)	129 (100.0%)	82 (7.27%)
Young Adults 20-24 yrs	0 (0 %)	129 (100.0%)	47 (4.17%)
Age range 17-24s yrs median age IQR – 19(2) mean Age 19.17 (SD 1.29)			

Table 3. Self-Esteem Scores (RSES)

(n=1128)

	Total (n=1128)	Pune (n=416)	Surat (n=418)	Vadodara (n=165)	Mumbai (n=129)
Mean	28.95	28.85	29.56	27.73	28.89
Std Dev	4.46	4.2	4.32	5.49	3.97

Variance	19.92	17.65	18.65	30.09	15.72
Range	30	30	27	28	21
Minimum	10	10	13	10	17
Maximum	40	40	40	38	38

Table 4. Gender Differences in Self-Esteem Levels for Adolescents from 4 cities

(n=1128)

Self-Esteem Level	Male No. of Students (%)	Female No. of Students (%)	Total No. of Students (%)
Low Self Esteem (RSES Score <25)	74 (48.37%)	79 (51.63%)	153 (13.56%)
Normal Self-Esteem (RSES Score 25-35)	443 (49.17%)	458 (50.83%)	901 (79.88%)
High Self-Esteem (RSES Score >35)	32 (43.24%)	42 (56.76%)	74 (6.56%)
Total	549 (48.67%)	579 (51.33%)	1128 (100.0%)

Table 5. Distribution of FTAS and subfactor Scores for Adolescents from 4 cities

(n=1128)

-	Total	Pune (n=416)	Surat (n=418)	Vadodara (n=165)	Mumbai (n=129)
Total FTAS Scores (Scores of more than 7 are associated with significant Test Anxiety)					
Mean	8.28	8.17	7.39	9.71	9.65
Std Dev	5.24	5.22	4.75	5.91	5.3
Social Derogation Factor (SD) Scores					
Mean	3.66	3.73	3.31	4.2	3.91
Std Dev	2.64	2.6	2.52	2.71	2.87
Cognitive Obstruction Factor (CO) scores					
Mean	1.94	1.91	1.57	2.69	2.28
Std Dev	2.09	2	1.79	2.64	2.22
Tenseness Factor (T) Scores					
Mean	2.67	2.53	2.52	2.82	3.46
Std Dev	1.9	1.87	1.86	2	1.8

Table 6. Pearson Correlations between FTAS scores & Sub-factor Scores (SD, CO & T)

-		Pearson Correlations						
		N	Total FTAS & SD	Total FTAS & CO	Total FTAS & T	SD & CO sub-factor	SD & T sub-factor	CO & T sub-factor
Total sample		1128	0.82	0.77	0.78	0.38	0.45	0.48
Male		549	0.81	0.77	0.78	0.38	0.44	0.48
Female		579	0.82	0.77	0.78	0.39	0.45	0.48
Early A 10-13 yrs	Total	479	0.85	0.71	0.77	0.37	0.47	0.39
	Male	258	0.83	0.72	0.76	0.35	0.44	0.40
	Female	221	0.86	0.70	0.78	0.40	0.50	0.39
Mid A 14-16 yrs	Total	433	0.81	0.79	0.80	0.38	0.44	0.54
	Male	231	0.80	0.77	0.81	0.34	0.45	0.55
	Female	202	0.81	0.81	0.78	0.44	0.42	0.54

Late A 17-19 yrs	Total	169	0.81	0.80	0.73	0.41	0.41	0.43
	Male	60	0.84	0.86	0.74	0.56	0.46	0.50
	Female	109	0.79	0.77	0.72	0.33	0.37	0.42
Young Adults 20- 24 yrs	Total	47	0.82	0.72	0.80	0.30 ^a	0.46 ^a	0.50
	Male	NA						
	Female	47	0.82	0.72	0.80	0.30 ^a	0.46 ^a	0.50
Pune		416	0.83	0.78	0.80	0.42	0.49	0.52
Surat		418	0.82	0.72	0.76	0.34	0.40	0.40
Vadodara		165	0.80	0.80	0.81	0.38	0.51	0.53
Mumbai		129	0.81	0.75	0.73	0.33	0.39	0.44
a. P<.05 For all other correlations, P<0.001								

Gender-wise: Females demonstrated a stronger RSES–FTAS correlation ($r = -0.61$) than males ($r = -0.55$). Females also showed stronger RSES–SD ($r = -0.46$ vs. -0.37), RSES–T ($r = -0.43$ vs. -0.37), and RSES–CO ($r = -0.56$ vs. -0.57) correlations.

Age-wise:

- Early Adolescents (10–13 years): $r = -0.51$ (weakest)
- Middle Adolescents (14–16 years): $r = -0.61$ (strongest); female subgroup $r = -0.66$
- Late Adolescents (17–19 years): $r = -0.60$; males showed strong RSES–CO correlation ($r = -0.71$)
- Young Adults (20–24 years): $r = -0.60$; weaker associations for SD ($r = -0.42$, $p < .05$) and T ($r = -0.41$, $p < .05$)

City-wise:

Vadodara: strongest RSES–FTAS correlation ($r = -0.70$, $p < .001$)

Surat: weakest RSES–FTAS correlation ($r = -0.52$, $p < .001$)

Pune: $r = -0.55$; **Mumbai:** $r = -0.56$

Discussion

This multicentric study examined self-esteem and test anxiety across 1,128 urban Indian adolescents in four cities. The principal findings were: (1) the majority of adolescents exhibited normal self-esteem, while mean test anxiety scores exceeded the clinically significant threshold across all cities; (2) a moderate-to-strong inverse relationship was consistently found between self-esteem and test anxiety; (3) females demonstrated higher test anxiety and stronger RSES–FTAS correlations than males; (4) middle adolescence (14–16 years) represented the period of greatest vulnerability; and (5) significant inter-city differences existed, with Surat showing the lowest anxiety and highest self-esteem, and Vadodara demonstrating the strongest inverse self-esteem–anxiety relationship.

Self-Esteem: In this multicentric study, students in Surat reported the highest self-esteem compared with those in Mumbai, Pune, and Vadodara. These differences may reflect variations in social and academic environments. Metro cities such as Mumbai and Pune often entail greater academic pressure, intense competition, and comparatively less family support, which may negatively affect adolescents’ self-esteem. In contrast, Surat’s strong business culture may be associated with more joint-family systems and closer family support networks, which can contribute positively to adolescents’ confidence and well-being.

Self-Esteem and Gender

Analysis of Rosenberg Self-Esteem Scale (RSES) scores showed no significant gender differences in the cohort. Minor variations observed were not statistically significant, suggesting that boys and girls in these urban settings experience comparable levels of self-esteem. While boys historically showed higher self-esteem across adolescence, recent research indicates that this gap has narrowed substantially, particularly when assessing multiple self-esteem domains (academic, affect, social acceptance, and family).⁷ Urban environments may offer more equal opportunities, shared academic expectations, and similar exposure to stressors—such as interpersonal difficulties, adjustment issues, and family concerns—leading to more aligned experiences for both genders.⁸

Test Anxiety Across Cities

Our multicenter study indicates that, within our cohort, adolescent students in Mumbai had the highest FTAS scores, followed by those in Vadodara and Pune, while students in Surat had the lowest scores. Examination of FTAS subfactor scores also showed the lowest levels in Surat, with higher and more impactful scores observed in Vadodara and Mumbai.

Although limited comparative research exists across multiple Indian cities, some individual studies suggest

similar patterns. A study conducted in Surat reported a mean Beck Anxiety Inventory (BAI) score of 10.15, with the majority of adolescents classified as having mild anxiety (92.7%), and only a small proportion showing moderate (6.5%) or severe (0.8%) symptoms. The authors noted that supportive parental responses to stress may contribute to lower anxiety levels in Surat.⁵

Conversely, a study from Mumbai found overall anxiety prevalence to be 10.8%, with older students (12–15 years) displaying higher odds of anxiety symptoms. Symptoms across various anxiety disorders were identified among participating students.⁹

Further, in a multicentric study assessing test anxiety in schools across six Indian states (rural and urban), 18% of children were categorized as having high anxiety, 48% moderate anxiety, and 34% low anxiety. Children with low anxiety scored significantly better on quality-of-life (QoL) indicators. Regression analysis identified increasing age, lower QoL, urban residence, and lower maternal education as significant predictors of anxiety.¹⁰

FTAS Subfactors & Test Anxiety Across Cities

Our study revealed clear inter-city differences in FTAS subfactors. Surat consistently had the lowest scores for cognitive obstruction (CO), social derogation (SD), tenseness (T), and overall FTAS. Mumbai recorded the highest total FTAS, with CO as the dominant subfactor, while Vadodara showed greater elevations in SD and T. Correlation analysis indicated that FTAS and SD were most strongly associated in Pune, suggesting heightened sensitivity to negative social evaluation. In Vadodara, FTAS correlated most strongly with CO, and subfactors (SD–T, CO–T) showed stronger interrelations, indicating a more interdependent anxiety profile.

Direct research on FTAS subfactors is limited. Existing literature highlights cognitive worry, fear of forgetting, and nervousness, paralleling CO and T, while social concerns such as fear of failure, parental expectations, and peer comparison align with SD.⁶ Previous studies also suggest age-related differences, with adolescents showing greater social evaluative anxiety, whereas college students experience more cognitive and physiological interference.^{11,12} In the Indian context, a strong emphasis on academic achievement and future prospects may further intensify somatic symptoms and social-evaluative fears.¹³

Gender Differences in Test Anxiety Across Cities

City-wise gender comparisons showed that female adolescents had significantly higher overall FTAS scores than males. Females also scored higher on Social Derogation (SD) and Tenseness (T), while no significant gender difference was observed for Cognitive Obstruction (CO). This indicates that anxiety among girls may be driven more by social-

evaluative concerns and physiological arousal rather than cognitive interference during exams.

Gender differences in test anxiety are well documented, although fewer studies have examined FTAS subdimensions. Consistent with our findings, prior AACCI research reports higher test anxiety among girls [14]. Meta-analyses similarly show greater test anxiety in females across grade levels, attributed to higher sensitivity to negative evaluation, lower academic self-efficacy, and perceiving exams as more threatening.¹⁵ Indian studies also highlight a stronger role of somatization (T) and social-evaluative fear (SD) in girls.¹³

Age-Wise Analysis of Test Anxiety: Multicentric Outcome

Participants were categorized into four developmental groups: early adolescence (10–13 years), middle adolescence (14–16 years), late adolescence (17–19 years), and young adulthood (20–24 years). In early adolescence, total FTAS showed the strongest correlation with Social Derogation (SD), particularly among females, indicating heightened sensitivity to social evaluation. In middle adolescence, FTAS correlated most strongly with Cognitive Obstruction (CO) and Tenseness (T), especially in males. During late adolescence, the strongest association was with CO, again more prominent among males, suggesting increasing cognitive interference as academic demands intensify.

Among young adults (females only), correlations between FTAS and its subfactors were weaker than in adolescent groups, indicating a declining influence of FTAS constructs with maturity. Overall, SD peaks early and remains relatively stable, T is highest in middle adolescence, and CO increases with age, reaching its greatest impact in late adolescence.

Previous studies report age-related increases in social evaluative anxiety during adolescence.¹⁵ However, unlike earlier findings that identified stronger physiological responses (T) in early and middle adolescence, our results show SD is highest in the youngest group, suggesting that fear of social judgment may now emerge earlier. Other research indicates that lower-performing students exhibit greater physiological anxiety, while high-achieving students experience greater cognitive pressure, consistent with our observation that CO and T increase with age and academic expectations.¹⁵ Large-scale studies also describe developmental shifts from physical and punishment-related fears toward social and achievement evaluation, reflecting growing socio-cognitive maturity.¹⁶ Our findings support this trend and suggest that such fears may begin as early as pre-adolescence.

Self-Esteem & Test Anxiety

Self-Esteem and Test Anxiety Across Cities

In our cohort, self-esteem showed a strong negative correlation with test anxiety, indicating that students

with lower self-esteem experienced higher exam-related anxiety. Among FTAS subfactors, self-esteem had the strongest inverse association with Cognitive Obstruction (CO), followed by Social Derogation (SD) and Tenseness (T). These findings are consistent with our earlier AACCI study, which also reported that declining self-esteem is closely linked to rising test anxiety, particularly cognitive performance concerns.

Previous research supports this relationship. A longitudinal study among Chinese students found that test anxiety predicted lower self-esteem over time, with a marginal negative association with self-efficacy.¹⁷ This suggests a cyclical pattern in which low self-esteem increases anxiety, and persistent anxiety further erodes self-esteem, especially among adolescents whose self-worth is closely tied to academic performance.

Several psychosocial factors influence this dynamic. Female students often report lower self-esteem and higher test anxiety during key academic stages. Family cohesion has been shown to reduce anxiety by strengthening global self-esteem and reducing dependence on external validation.¹⁸ Similarly, studies on academic self-concept demonstrate a strong inverse relationship with test anxiety, along with gender and subject-related differences.¹⁹ Supportive peer relationships, effective study skills, and lower psychological distress further enhance self-esteem and help buffer anxiety.

Rses & Ftas Subfactor Relationships

Our findings show that self-esteem has the strongest negative correlation with Cognitive Obstruction (CO), indicating that adolescents with lower self-worth are more prone to mental blocks, distractibility, and forgetfulness during exams. Feelings of inadequacy, perfectionistic pressure, and fear of failure can overload working memory, impairing task performance. Meta-analyses similarly show that cognitive worry about failure affects performance more strongly than emotional arousal by consuming attentional resources.²⁰

Social Derogation (SD) also showed a strong inverse association with self-esteem. Fear of negative evaluation by peers, parents, or teachers may trigger shame, self-doubt, and comparison, creating a cycle in which low self-esteem amplifies anxiety and fear of judgment. Repeated academic setbacks may further reinforce avoidance and learned helplessness.

Tenseness (T) demonstrated the weakest but still significant negative relationship with self-esteem. Physiological arousal such as palpitations and restlessness is common during adolescence when emotional regulation is still maturing. According to the Yerkes–Dodson principle, moderate arousal may sometimes enhance performance, which may explain its weaker link with cognitive outcomes.²¹

Protective factors such as academic buoyancy—the ability to recover from routine academic setbacks—can strengthen self-esteem, sustain motivation, and reduce test anxiety. Similarly, self-compassion and flexible self-worth help buffer emotional and social stress during academic challenges.²² Strengthening self-esteem during adolescence may therefore improve cognitive control and reduce both social and emotional components of test anxiety

Gender Differences in Self-Esteem and Test Anxiety Across Cities

Across our multicentric cohort, females showed higher test anxiety and lower self-esteem than males, consistent with existing literature. Studies report that female students experience greater anxiety in evaluative contexts and lower academic self-efficacy, which can negatively affect performance in high-stakes examinations, while gender differences are less evident in low-stakes settings.²³ Similar findings in large university samples show higher test anxiety and lower self-efficacy among females, with strong inverse correlations between the two.²⁴

Research also suggests different mechanisms underlying this gender gap. In females, the link between academic self-efficacy and test anxiety is often mediated by fear of failure and reduced sense of purpose, whereas in males these factors may independently predict anxiety.²⁵ Studies from diverse cultural contexts, including Turkey and India, similarly report higher test anxiety and lower self-esteem among females, supporting the inverse relationship observed in our cohort.²⁶

Age-wise Differences

Age8-wise patterns in our cohort show developmental shifts in the relationship between self-esteem and test anxiety. In early adolescence, the association was weaker, with relatively stable self-esteem despite increased worry. Middle adolescence showed the strongest negative correlation, coinciding with dips in self-esteem and heightened worry and tension. Late adolescence demonstrated a similar inverse pattern, reflecting rising academic and social pressures. In young adulthood, self-esteem began to recover, resulting in a slightly weaker association with anxiety. Longitudinal studies similarly report that self-esteem declines in mid-adolescence but improves into young adulthood, influenced by traits such as emotional stability and conscientiousness.²⁷ These findings highlight middle to late adolescence as a key window for interventions that strengthen coping skills, resilience, and self-efficacy.

City-wise Comparisons of Self-esteem and Test Anxiety

City comparisons revealed contextual differences. Vadodara showed the strongest negative correlation between self-esteem and test anxiety, suggesting a stronger protective

effect of self-confidence. Surat showed the weakest association, possibly reflecting relatively lower academic pressure or evaluation intensity.

Regional evidence provides supporting insights. Studies from Maharashtra report high Social Derogation (SD) scores among adolescents—especially girls—indicating that fear of negative evaluation strongly drives test anxiety.² Research from Anand, Gujarat, similarly shows that emotional difficulties, poor academic performance, and punitive school environments increase anxiety, while peer support, physical activity, and leisure act as protective factors. Across studies, SD consistently shows the strongest association with anxiety, whereas Cognitive Obstruction (CO) and Tenseness (T) show comparatively weaker links.

Overall, Vadodara's stronger inverse relationship may reflect better academic support systems and peer cohesion, while Surat's weaker association may indicate lower competitive pressure or different motivational climates

Implications

These findings have important implications for educators, policymakers, and mental-health professionals.

- **Context-specific interventions:** Cities with intense academic competition (e.g., Mumbai and Pune) may benefit from school-based stress-management programs, supportive evaluation methods, and curriculum adjustments to reduce performance pressure. In other settings, strengthening academic planning and coping strategies may be more beneficial. Increasing parental awareness and supportive communication can also reduce anxiety linked to conditional approval or comparison.
- **Gender-responsive approaches:** Girls may benefit from interventions targeting fear of negative evaluation, emotional regulation, and somatic anxiety symptoms. Programs that strengthen self-efficacy, realistic goal-setting, and resilience may reduce anxiety driven by SD and T components.
- **Developmentally targeted prevention:** Early adolescence appears particularly sensitive to social evaluative fears, making it an ideal stage for peer-support programs, school-transition counselling, and resilience training. Middle and late adolescence may require support for cognitive overload, exam preparation, and emotional regulation during competitive academic phases.

Integrating test-anxiety screening into school health programs, providing teacher training in supportive evaluation, and improving school-based mental-health access could play a key preventive role.

Overall Interpretation

The present study highlights developmental, gender-based, and regional differences in the relationship between self-esteem and test anxiety. Middle adolescence emerged as the most vulnerable period, with the strongest link between low self-esteem and heightened anxiety. While early adolescents showed relatively stable self-esteem despite worry, confidence gradually improved in late adolescence and young adulthood.

Gender analyses suggest that girls—particularly in early to middle adolescence—are more susceptible to anxiety driven by social evaluation, which may disproportionately affect self-esteem and academic confidence.

City-wise comparisons emphasize environmental influences. Vadodara showed a stronger protective role of self-esteem, whereas Surat displayed a weaker association, possibly reflecting differences in academic competition and school climate.

Overall, early and middle adolescence—especially among girls—should be prioritized for preventive interventions that enhance self-worth, reduce fear of negative evaluation, and strengthen coping skills. Tailoring strategies to local academic environments may further improve student mental health and resilience.

Strengths of the Study

- **Multicentric design:** Enables robust comparative analysis across distinct urban academic environments.
- **Large sample size:** N = 1,128 provides adequate statistical power for subgroup analyses.
- **Validated instruments:** The RSES and FTAS are well-established tools with strong psychometric properties.
- **Developmental stratification:** Analysis across four developmental stages allows nuanced age-specific interpretation.
- **Subfactor analysis:** Examining FTAS subfactors (SD, CO, T) provides granular insight beyond total anxiety scores.

Limitations

- The Mumbai cohort was entirely female, and the young adult group exclusively female, limiting gender comparisons at these levels.
- Self-report measures are subject to social desirability bias, particularly in school-based settings.
- The study did not include rural adolescents, limiting generalizability beyond urban contexts.

Future Research Directions

- Longitudinal studies are warranted to examine whether low self-esteem predicts rising test anxiety over time, or whether persistent anxiety erodes self-esteem—or both, as suggested by prior literature.

- Future studies should include balanced gender representation across all age groups and cities.
- Qualitative research exploring adolescents' subjective experiences of academic pressure across cities would enrich quantitative findings.
- Intervention trials—including school-based resilience, self-efficacy, and mindfulness programs—should be evaluated for efficacy in reducing test anxiety and enhancing self-esteem in high-risk subgroups.
- Future multicentric work should incorporate socioeconomic, parental, and school-environment variables as covariates to better disentangle contextual predictors of test anxiety.

Acknowledgments

The authors sincerely thank the management of the participating schools in Surat, Pune, and Vadodara, as well as the college in Mumbai, for granting permission and extending their valuable support in facilitating this study. We are also deeply grateful to all the students who willingly participated and devoted their time to completing the questionnaire.

Funding

This study was supported through self-funding by the Association for Adolescent and Child Care in India (AACCI).

Conflicts of Interest

The authors declare no conflicts of interest related to this study.

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