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A Comparative Study of Anxiety Levels and Manifestations Among Early and Late Adolescent Students

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Abstract: ***This quantitative comparative investigation evaluated and contrasted levels of state-trait anxiety and generalized anxiety symptoms between early and late adolescent cohorts (N = 100). A cross-sectional comparative survey design was employed using standardized psychometric instruments: the 40-item State-Trait Anxiety Inventory (STAI) and the Generalized Anxiety Disorder-7 scale (GAD-7). Non-parametric Mann-Whitney U tests and chi-square independence analyses revealed no statistically significant differences in overall anxiety scores between early and late adolescents across all dimensions (p > .26). However, over 47% of participants across both groups met clinical severity cut-offs ≥10on GAD-7). State and trait anxiety demonstrated a robust positive association (ρ = 0.81, p < .001). The findings underscore an urgent imperative for universal, stage-independent psychological screening and preventive mental health frameworks within educational environments.***

Keywords: Adolescent anxiety, State-Trait Anxiety Inventory (STAI), GAD-7, early adolescence, late adolescence, cognitive self-regulation

1. Introduction

Adolescence is a transitional stage of human physical and psychological development that generally occurs during the period from puberty to adulthood. Anxiety is a normal human emotion characterized by apprehension, tension, and uneasiness in anticipation of a real or perceived future threat. However, when persistent and excessive, it impairs daily functioning. Adolescence is usually associated with the teenage years, but its physical, psychological, or cultural expressions may begin earlier or end later. Puberty typically begins during preadolescence, and physical and cognitive growth can extend past the teenage years. The World Health Organization officially designates adolescence as the phase of life from ages 10 to 19.

Anxiety is a highly prevalent mental disorder in today's adolescent population, frequently leading to severe physical and academic impairment. Several adolescent population-specific factors make this age group particularly vulnerable. Providers and educators must be diligent in recognizing subtle signs of adolescent anxiety and implement prompt intervention. Untreated anxiety can have detrimental consequences later in life (Pal et al., 2022). Adolescence is characterized by biological, psychological, and social transformation, during which individuals experience changes in physical appearance, hormonal functioning, cognitive abilities, emotional regulation, interpersonal relationships, and self-concept. The onset of internalizing disorders is highly prevalent during this developmental window, especially among females.

Anxiety exists along an operational continuum ranging from normative vigilance to debilitating psychopathology (Price, 2003). Within student populations, anxiety interacts dynamically with institutional environments and changing interpersonal ecologies (Rastogi et al., 2026). Crucially, the adolescent experience cannot be accurately conceptualized as a homogeneous trajectory; the developmental architecture of early adolescence markedly diverges from that of late adolescence (Palmert et al., 2001).

- **Early Adolescence (Ages 10–14):** Characterized by the acute onset of somatic and hormonal transformations associated with adrenarche and gonadarche, concurrent with systemic ecological transitions, such as moving from primary into secondary schooling environments (Holmbeck, 2002). Cognitive functioning is transitioning from concrete to formal operational thought. Consequently, cognitive control over intense emotional reactions remains emergent, peer conformity becomes a salient source of apprehension, and self-evaluative frameworks are anchored in physical self-concept and immediate peer feedback.
- **Late Adolescence (Ages 18–21):** Characterized by advanced cognitive maturation, identity consolidation, and heightened exposure to high-stakes academic competition, standardized board examinations, professional entrance assessments, and future career planning. Late adolescents experience persistent worry, concentration difficulties, sleep disturbances, fear of failure, perfectionistic concerns, and rumination (Iqra, 2024).

Cerebral Mechanisms of Anxiety Regulation

The brain controls emotional regulation, fear responses, and physiological reactions via a coordinated network. The amygdala, prefrontal cortex, hippocampus, and insula are four main structures involved in processing anxiety (Pessoa, 2023).

Table 1.1: Neural Correlates and Their Mechanism in Anxiety

Brain Structure	Major Role	Possible Contribution to Anxiety
Amygdala	Threat and fear processing	Exaggerated fear and threat sensitivity
Prefrontal cortex	Cognitive & emotional regulation	Reduced control of fear, worry, and rumination
Hippocampus	Memory & contextual processing	Difficulty distinguishing safe from threatening contexts
Insula	Awareness of internal bodily states	Increased perception of anxiety bodily sensations

2. Theoretical Framework

The conceptual foundation of this study synthesizes Erik Erikson's Psychosocial Development Theory and Aaron T. Beck's Cognitive Model of Anxiety. Erikson conceptualizes early adolescence around Industry vs. Inferiority and early identity formation, where anxiety stems from fears of inadequacy and peer ostracization. Late adolescence occupies Identity vs. Role Confusion, where failure to navigate occupational expectations and institutional transitions prompts identity diffusion and sustained cognitive anxiety (Bogaerts et al., 2021).

According to Beck's cognitive theory, anxiety is maintained by systematic cognitive distortions characterized by the overestimation of threat probability and severity, paired with the underestimation of personal coping resources (Beck & Clark, 1997). Early adolescents display generalized bodily reactions, whereas late adolescents experience complex, perfectionistic cognitive rumination (Rutter et al., 2025).

- **Statement of the Research Problem:** Despite a substantial volume of literature highlighting rising psychological distress among students, adolescent anxiety is frequently treated as an undifferentiated, static phenomenon. Standard empirical investigations regularly collapse individuals aged 10 to 19 into a single analytical cohort, masking vital stage-specific qualitative and quantitative distinctions. Early adolescents often lack metacognitive awareness, causing anxiety to manifest covertly through recurrent, unexplained somatic complaints or behavioral avoidance. In contrast, late adolescents encounter severe socio-academic performance pressures manifesting as chronic cognitive worry, anticipatory anxiety, perfectionism, and sleep pathology.
- **Research Questions:** (1) Is there a statistically significant difference in overall anxiety levels between early and late adolescent students? (2) How do primary manifestations—cognitive, somatic, and behavioral—differ between cohorts? (3) Which domain is most prevalent in each group? (4) Are there significant gender-based differences across developmental stages?
- **Key Objectives:** To assess and compare overall anxiety levels, categorize manifestation profiles, determine domain-specific differences, examine gender modulation, and delineate actionable insights for school mental health frameworks.

Table 1.2: Demographic & Clinical Feature of Anxiety (Christie & Viner, 2005)

Clinical Parameter	Early Adolescence (10-14)	Late Adolescence (18-21)
Estimated Prevalence	~10% to 20% (regional split)	~20% to 35% (upward trajectory)
Gender Distribution	Balanced, slight female rise by age 13-14	Pronounced female preponderance (F > M)
Primary Subtypes	Separation anxiety, school avoidance, GAD	Social anxiety, panic disorder, performance anxiety
Somatic Symptoms	Abdominal pain, headaches, fatigue	Palpitations, hyperventilation, sleep disruption
Behavioral Signs	School refusal, clinginess, drop-off	Social withdrawal, avoidance, screen reliance
Key Stressors (India)	School transition, puberty, parental expectations	Board exams, competitive tests, career/marriage

3. Literature Survey

A comprehensive review of literature indicates robust empirical backing for developmental shifts in anxiety symptomatology. Pienyu et al. (2024) investigated academic stress among 570 adolescents in Karnataka, finding that 86.0% experienced high academic stress and 87.0% reported severe parental pressure negatively impacting well-being. Datta et al. (2019) evaluated 400 secondary students in Tripura using the BAI, discovering that 49.4% presented mild, 43.3% moderate, and 7.3% severe clinical anxiety. Malhotra et al. (2019) reported an overall anxiety disorder prevalence of 22.7% among rural adolescents in Haryana, with females demonstrating significantly higher rates (27.6% vs. 18.3%, $p < 0.01$).

International studies corroborate these trends. Albinali et al. (2022) found a 37.2% clinical anxiety prevalence among secondary students in Doha using the GAD-7, identifying excessive screen use (>12 hours daily) and authoritarian parenting as key predictors. Similarly, Mbanuzuru et al. (2023) established that urban students in Nigeria exhibited 1.5 times higher odds of generalized anxiety than rural peers.

Van Oort et al. (2009) and Hale et al. established that anxiety symptoms undergo distinct structural shifts over time; early adolescence is dominated by separation anxiety and school-refusal fears, whereas late adolescence transitions into generalized anxiety disorder and social phobia due to adult transition stress. Steinsbekk et al. demonstrated that somatic complaints act as primary early triggers, whereas late-stage anxiety merges with cognitive rumination, future-oriented existential distress, and perfectionism.

Cultural validation is critical in psychological research. Recent studies involving Indian adolescents (e.g., NIMHANS-collaborative validations) emphasize that standardized instruments must be interpreted with cultural contextualization regarding competitive academic pressure, family structures, and gender socialization patterns in metropolitan and coastal settings (Bao & Han, 2025).

4. Methodology

1) Research Topic

A Comparative Study of Anxiety Levels and Manifestations Among Early and Late Adolescent Students.

2) Aim and Research Design

This investigation employed a quantitative, non-experimental, comparative, and correlational cross-sectional survey methodology. The design evaluated transient state emotional arousal, enduring trait vulnerability, and generalized anxiety severity across early and late adolescent populations without introducing experimental interventions.

3) Objectives

(1) Compare overall anxiety levels between early (10-14 years) and late (18-21 years) adolescents. (2) Contrast cognitive, somatic, and behavioral manifestations across groups. (3) Examine gender-based moderating effects.

4) Hypotheses:

- H_{01}: There is no significant difference in overall anxiety scores between early and late adolescent students.
- H_{02}: There is no significant difference in generalized anxiety screening scores between early and late adolescents.
- H_{03}: There is no significant difference in anxiety manifestations between male and female students.
- H_{04}: There is no significant correlation between state anxiety manifestations and trait anxiety predispositions.

5) Variables Under Study:

- *Independent Variables:* Adolescent developmental stage (Early adolescence: ages 10–14 / middle school; Late adolescence: ages 18–21 / senior secondary and undergraduate).
- *Dependent Variables:* Anxiety intensity (STAI State, STAI Trait, GAD-7 total scores) and manifestation dimensions (Somatic/physiological, cognitive, and behavioral/emotional).

6) Operational Definitions:

- *Anxiety:* Self-reported psychological state of tension, apprehension, and autonomic arousal measured via standardized psychometric inventories.
- *Early Adolescents:* Students aged 10–14 years enrolled in middle or lower secondary classes (Grades 6–9), experiencing early pubertal changes and shifting peer dynamics.
- *Late Adolescents:* Students aged 18–21 years enrolled in senior secondary or undergraduate programs (Grades 10–12 and early degree), characterized by advanced cognitive maturation and high-stakes academic goals.

7) Population and Sampling Strategy

The target population comprised adolescent students enrolled in secondary and higher secondary institutions across urban and semi-urban settings, primarily concentrated in Karnataka (Bangalore metropolitan and coastal districts including Kumta) and educational hubs across India. A non-probability sampling framework combining convenience sampling and purposive snowball sampling was utilized via digital Google Form protocols.

8) Sample Size Determination

An a priori power analysis establishing a moderate effect size ($d = 0.50$, $\alpha = 0.05$, power = 0.80) indicated an optimal requirement of 80 to 100 participants. Exactly 111 raw submissions were recorded; following data screening, 100 valid responses were retained. The final evaluated sub-samples comprised: STAI Cohort: N = 90 (Early n = 45, Late n = 45); GAD-7 Cohort: N = 93 (Early n = 49, Late n = 44).

9) Inclusion and Exclusion Criteria:

- *Inclusion:* Active enrollment in Grades 8 through undergraduate year 1; ages 10 to 21 years; digital accessibility; demonstrated English literacy for self-report scales.
- *Exclusion:* Documented clinical diagnoses of ADHD, autism spectrum disorder, or specific learning disabilities; current use of psychotropic or neurological medications; incomplete or duplicate survey entries.

10) Description of Assessment Tools:

- *State-Trait Anxiety Inventory (STAI Form Y; Spielberger et al., 1983):* A 40-item self-report instrument comprising two 20-item subscales rated on a 4-point Likert scale (20 to 80 per subscale). Form Y-1 evaluates transitory state anxiety ("right now"), while Form Y-2 measures enduring trait anxiety ("generally feel"). Ten state items and nine trait items are reverse-scored. High internal consistency was observed (State $\alpha = 0.95$, Trait $\alpha = 0.94$).
- *Generalized Anxiety Disorder-7 Scale (GAD-7; Spitzer et al., 2006):* A 7-item standardized screening tool assessing core cognitive and somatic generalized anxiety symptoms over the preceding two weeks on a 0–3 Likert scale (Total score: 0 to 21). Severity thresholds are categorized as Minimal (0–4), Mild (5–9), Moderate (10–14), and Severe (15–21), with a score of ≥10 indicating clinically significant anxiety. Internal consistency was excellent ($\alpha = 0.90$).

11) Data Collection Procedure

Digital survey protocols were administered via Google Forms containing informed consent/assent statements, demographic proformas, and psychometric inventories. For participants under 18, parental consent was verified prior to survey access. Data collection averaged 10–12 minutes per participant.

12) Ethical Considerations

The study adhered strictly to ethical guidelines for human psychological research. Digital informed assent and parental consent were secured, ensuring voluntary participation, absolute anonymity via randomized participant codes, right to withdrawal without penalty, and secure password-protected data storage.

13) Statistical Analysis Plan

Data were compiled and analysed using JASP open-source statistical software (v0.19.3) at $\alpha = .05$$ (two-tailed). Descriptive statistics (mean, SD, median, IQR) summarized demographic and psychometric parameters. Normality was evaluated via Shapiro-Wilk tests and homogeneity of variance via Levene's test. Due to violations of normality and homoscedasticity across subscales, non-parametric Mann-Whitney U tests (with rank-biserial correlation r) served as

primary inferential tests, cross-verified with Welch's t-tests and Chi-square independence tests. Bivariate associations were assessed via Spearman's rank-order correlation (ρ)

5. Analysis of Results

The primary objective was to examine and compare anxiety levels and manifestations between early and late adolescent students. All psychometric data were audited in JASP. This section outlines socio-demographic profiles, parametric assumptions, reliability estimates, and inferential hypothesis testing.

Socio-Demographic Profiling

The STAI cohort comprised $N = 90$ participants: Early Adolescence (10–14 years; n = 45, 50.0%) and Late Adolescence (18–21 years; n = 45, 50.0%). The GAD-7 cohort comprised N = 93 participants: Early Adolescence (n = 49, 52.7%) and Late Adolescence (n = 44, 47.3%). Gender distributions across STAI were Male (51.1%), Female (41.1%), and Non-binary/Prefer not to say (7.8%).

Table 4.1: Socio-Demographic Distribution of the Sample

Instrument Cohort	Variable	Category	n	%
STAI Cohort ($N = 90$)	Age Group	Early (10-14 yrs)	45	50.00%
		Late (18-21 yrs)	45	50.00%
STAI Cohort	Gender	Male	46	51.10%
		Female	37	41.10%
		Non-binary / Other	7	7.80%
GAD-7 Cohort (N = 93)	Age Group	Early (10-14 yrs)	49	52.70%
		Late (18-21 yrs)	44	47.30%

Descriptive Statistics & Normality Testing

Shapiro-Wilk tests detected significant departures from normality for STAI Trait among early adolescents (W = 0.932, p = 0.011), STAI Combined (W = 0.939, p = 0.020), and GAD-7 Total among late adolescents (W = 0.944, p = 0.032). Levene's tests were violated for STAI State (p = 0.037), Trait (p = 0.039), and Combined (p = 0.021). Consequently, non-parametric Mann-Whitney U tests were adopted as primary inferential procedures.

Table 4.2: Descriptive Parameters, Normality, and Variance Homogeneity Testing

Dimension / Measure	Group	n	Mean ± SD	Median (IQR)	Min–Max	Shapiro-Wilk W (p)	Levene p
STAI State (20–80)	Early	45	47.09 ± 14.45	47 (34–58)	20–73	0.956 (0.087)	0.037
	Late	45	49.49 ± 11.85	50 (40–56)	24–70	0.960 (0.125)	
STAI Trait (20–80)	Early	45	46.84 ± 14.49	48 (31–56)	26–74	0.932 (0.011)	0.039
	Late	45	50.33 ± 11.85	51 (44–57)	20–72	0.969 (0.273)	
STAI Combined (40–160)	Early	45	93.93 ± 27.99	98 (67–113)	51–144	0.939 (0.020)	0.021
	Late	45	99.82 ± 22.32	100 (83–114)	50–142	0.967 (0.221)	
GAD-7 Total (0–21)	Early	49	8.55 ± 5.00	9 (5–12)	0–21	0.968 (0.198)	0.09
	Late	44	8.93 ± 5.74	8 (3–14)	0–21	0.944 (0.032)	

Psychometric Reliability

Internal consistency reliability evaluated via Cronbach's alpha (α)demonstrated excellent psychometric precision across all instruments, well exceeding the acceptable threshold of 0.70.

Table 4.3: Scale Reliability Estimates

Instrument / Subscale	Items	Range	Cronbach's α
STAI State Subscale	20	20–80	0.95
STAI Trait Subscale	20	20–80	0.94
GAD-7 Scale	7	0–21	0.9

Inferential Hypothesis Testing

- **Testing Hypothesis 1:** Mann-Whitney U tests revealed no statistically significant differences between early and late adolescents on STAI State (U = 904.5, p = 0.385, r = -0.107), STAI Trait (U = 873.5, p = .263, r = -0.137), or STAI Combined (U = 898.5, p = .360, r = -0.113). Welch's t-tests confirmed non-significance (p > 0.21). Thus, **Null Hypothesis 1 is retained**.
- **Testing Hypothesis 2:** Continuous GAD-7 total scores did not differ significantly between early (Mdn = 9) and late adolescents (Mdn = 8), U = 1022.0, p = .668. A chi-square test of independence across severity categories was also non-significant, $x^2(3) = 1.96$, p = .581, Cramér's V = 0.15. Notably, 49.0% of early adolescents and 47.7% of late adolescents reached or exceeded the clinical cut-off (≥ 10). **Null Hypothesis 2 is retained**.

Table 4.4: Inferential Comparative Analysis for Age and Gender Cohorts

Comparison Factor	Dependent Measure	Mann-Whitney U	p-value	Rank-Biserial r	Welch's t-test cross-check	Decision
Age Group (Early vs. Late)	STAI State	904.5	0.385	-0.107	t(84.8) = -0.86, p = 0.391$	Retain H_{01}
	STAI Trait	873.5	0.263	-0.137	t(84.7) = -1.25, p = 0.215$	Retain H_{01}
	STAI Combined	898.5	0.36	-0.113	t(83.9) = -1.10, p = 0.273$	Retain H_{01}
	GAD-7 Total	1022	0.668	-0.05	t(85.9) = -0.34, p = 0.735$	Retain H_{02}
Gender (Male vs. Female)	STAI State	929	0.477	0.09	—	Retain H_{03}
	STAI Trait	862.5	0.92	0.01	—	Retain H_{03}
	STAI Combined	909	0.598	0.07	—	Retain H_{03}
	GAD-7 Total	879.5	0.325	0.13	—	Retain H_{03}

- **Testing Hypothesis 3:** Mann-Whitney U tests across biological gender classifications revealed no significant disparities on STAI State (U = 929.0, p = 0.477), Trait (U = 862.5, p = 0.920), Combined (U = 909.0, p = 0.598), or GAD-7 Total (U = 879.5, p = 0.325). **Null Hypothesis 3 is retained**.

Table 4.5: GAD-7 Severity Distribution by Developmental Stage

Clinical Severity Tier	Early n (%)	Late n (%)	Total n (%)
Minimal (0–4)	11 (22.4%)	12 (27.3%)	23 (24.7%)
Mild (5–9)	14 (28.6%)	11 (25.0%)	25 (26.9%)
Moderate (10–14)	19 (38.8%)	13 (29.5%)	32 (34.4%)
Severe (15–21)	5 (10.2%)	8 (18.2%)	13 (14.0%)
Total Cohort	49 (100%)	44 (100%)	93 (100%)

- **Testing Hypothesis 4:** Spearman rank-order correlation evaluating the association between State and Trait anxiety revealed a strong, positive, statistically significant relationship across the combined adolescent sample ($\rho = 0.81$, $n = 90$, $p < .001$). Subgroup analysis confirmed robustness in early adolescents ($\rho = 0.86$, $p < .001$) and late adolescents ($\rho = 0.78$, $p < .001$). Consequently, **Null Hypothesis 4 is rejected**.

6. Discussion

The primary purpose of this investigation was to evaluate, compare, and delineate anxiety levels and their manifestations among early and late adolescent students. Data collected from $N = 100$ participants were analyzed to test developmental stage differences, gender moderating effects, and state-trait associations.

1) **Interpretation of Findings:** Contrary to hypotheses positing significant developmental escalation between early and late adolescence, empirical comparisons revealed no statistically significant differences in overall STAI scores ($p > 0.26$) or GAD-7 severity distributions ($p = 0.668$). Both early and late adolescents exhibited elevated mean scores falling into moderate anxiety ranges. This indicates that adolescent anxiety is pervasive across secondary education rather than being restricted to senior examination brackets. Furthermore, bivariate correlation analyses confirmed a robust positive association between chronic trait vulnerability and acute state anxiety ($\rho= 0.81$, $p < .001$). This aligns with Beck's Cognitive Theory of Anxiety, verifying that baseline vulnerability schemas directly govern acute situational apprehension during evaluative academic tasks.
2) **Comparison with Previous Literature:** These findings reinforce recent epidemiological surveys in India (Pal et al., 2022; Malhotra et al., 2019) demonstrating that 20% to 35%+ of school-going adolescents experience clinical anxiety. While older adolescents face intense competitive board examinations and career uncertainty, early adolescents confront significant pubertal transition stressors and social evaluation fears, explaining the parity in overall symptom severity.
3) **Implications of the Study:**
   - *Pedagogical Implications:* Educational institutions must institute universal, stage-independent mental health screening protocols rather than limiting interventions to senior high school cohorts.
   - *Clinical Practice:* School counselors should deploy targeted interventions—incorporating somatic relaxation and emotional literacy for early adolescents, and cognitive restructuring and test anxiety management for late adolescents.
4) **Limitations:** (1) The cross-sectional design restricts causal inferences regarding developmental trajectories. (2) Reliance on self-report psychometric schedules introduces potential response bias. (3) Convenience sampling from specific regional hubs in Karnataka limits broad national generalization.
5) **Scope for Future Research:** Longitudinal tracking from middle school through undergraduate education, multi-informant reporting (parents and teachers), and incorporation of physiological biomarkers (cortisol/heart rate variability) are recommended for future research.

7. Conclusion

Adolescence is a critical neurodevelopmental epoch characterized by emotional flux and vulnerability to affective disturbances. This comparative investigation established that anxiety manifestations remain consistently elevated across both early and late adolescent stages. The high proportion of participants meeting clinical severity thresholds (nearly 48%) underscores an urgent imperative for universal, stage-independent psychological screening and preventive mental health frameworks within educational environments. Embedding emotional literacy, somatic regulation, and cognitive reframing into everyday school and college routines will strengthen resilience and support academic success.

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