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Developing a Causal Model of Academic Buoyancy in Gifted Students in Tehran Based on Perceived Parental Relationships and Perceived Teacher–Student Relationships: The Mediating Role of Academic Pressure and Socio-Emotional Competence

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A B S T R A C T

Objective: This study aimed to develop and test a causal model of academic buoyancy in gifted secondary school students based on perceived parent–child relationships and teacher–student relationship quality, with the mediating roles of socio-emotional competence and perceived academic pressure.

Methods and Materials: The study adopted an applied, descriptive–correlational design using structural equation modeling (SEM). The population consisted of gifted students enrolled in the first and second levels of secondary education in Tehran during the 2023–2024 academic year. A total of 392 students were selected through simple random sampling. Data were collected using standardized questionnaires assessing academic buoyancy, parent–child relationships, teacher–student relationship quality, socio-emotional competence, and perceived academic pressure. Data analysis was conducted using SPSS and AMOS software. Pearson correlation coefficients were calculated, and SEM with maximum likelihood estimation was employed. Indirect effects were tested using bootstrapping with 2,000 resamples to evaluate mediating pathways.

Findings: Structural equation modeling indicated that mother–child relationships ($\beta = 0.37$, $p < .05$) and teacher–student relationship quality ($\beta = 0.42$, $p < .05$) had significant direct positive effects on academic buoyancy, whereas the direct effect of father–child relationships was not significant. Socio-emotional competence showed a strong positive direct effect on academic buoyancy ($\beta = 0.45$, $p < .01$), while perceived academic pressure had a significant negative direct effect ($\beta = -0.39$, $p < .01$). Bootstrapping results revealed significant indirect effects of parent–child relationships and teacher–student relationship quality on academic buoyancy through socio-emotional competence (positive) and perceived academic pressure (negative). The overall model demonstrated acceptable goodness-of-fit indices.

Conclusion: The findings highlight academic buoyancy as a relationally embedded and psychologically mediated construct, indicating that supportive

parental and teacher relationships enhance gifted students' vitality primarily by strengthening socio-emotional competence and reducing perceived academic pressure.

Keywords: *academic buoyancy; gifted students; parent–child relationships; teacher–student relationship quality; socio-emotional competence; academic pressure*

1. Introduction

Academic buoyancy often conceptualized as students' adaptive capacity to remain engaged, energetic, and effective when facing routine academic setbacks and pressures has become a focal construct in contemporary educational and school psychology because it captures the "everyday resilience" that students need to sustain learning over time (Martin, 2013; Martin & Marsh, 2020). In contrast to classic resilience, which is typically invoked under severe adversity, buoyancy/vitality addresses normative challenges such as examination stress, heavy workload, fluctuating motivation, and interpersonal frictions in school contexts (Martin, 2013; Martin & Marsh, 2020; Putwain et al., 2015). Empirical work increasingly shows that buoyancy-related constructs are not merely desirable outcomes but also function protectively, predicting achievement and adjustment and buffering the adverse effects of academic stressors (Collie et al., 2015; Martin & Marsh, 2020; Putwain et al., 2015). In higher education and advanced training contexts, similar patterns appear: academic buoyancy relates to motivation, self-efficacy, performance, and effective engagement strategies, suggesting that its core mechanisms generalize across age groups and learning environments (Guo et al., 2024; Suharsono, 2024; Xu & Wang, 2024).

A central reason academic buoyancy matters—particularly for high-performing or gifted students—is that high expectations and intensified evaluative climates can amplify perceived academic pressure, which may erode well-being and foster maladaptive coping despite strong cognitive ability (Çelik, 2019; Putwain et al., 2020). Academic pressure is increasingly recognized as a multidimensional stressor associated with problem behaviors and reduced subjective well-being through complex pathways involving self-control, parent–child conflict, and psychological resources (Jiang et al., 2022). Achievement emotions also operate reciprocally with performance, and buoyancy can moderate or reshape these emotional dynamics, supporting persistence under stress and helping students recover from setbacks (Putwain et al., 2020). From an applied perspective, mapping how pressure translates into reduced vitality—and which relational or intrapersonal resources interrupt this pathway—is therefore essential for prevention and intervention in adolescent school populations.

Motivational theories provide a strong framework for explaining why academic buoyancy should be embedded within students' social ecologies. Situated expectancy–value theory emphasizes that students' beliefs about success and the value they assign to school tasks develop through ongoing interactions with parents, teachers, and peers, and are shaped by cultural and contextual affordances (Eccles & Wigfield, 2020). Broader developmental perspectives similarly argue that schools and communities influence development by structuring opportunities, norms, and supportive relationships that enable competence and adaptive functioning (Eccles & Roeser, 2015). Within these frameworks, vitality is not a purely individual trait; rather, it is an emergent outcome of students' appraisals of demands and supports in their environments, including perceived relational security, autonomy support, and the extent to which learning contexts foster control and competence (Collie et al., 2015; Eccles & Wigfield, 2020).

Among the most consistently implicated contextual resources are parent–child relationships and family communication processes. Family Communication Patterns Theory highlights how families socialize adolescents through conversational and conformity orientations, shaping how youth interpret expectations, handle conflict, and regulate emotions in achievement contexts (Koerner & Schrodt, 2014). High levels of psychological control or intrusive "helicopter" parenting can undermine academic motivation and autonomy, potentially increasing pressure and weakening adaptive engagement (Schiffrin & Liss, 2017). Conversely, supportive parenting characterized by effective monitoring and autonomy support is more likely to facilitate adaptive functioning, though its effectiveness can depend on the broader parenting profile and adolescent characteristics (Rodríguez-Meirinhos et al., 2019). Evidence across educational stages suggests that stronger parent–child relationships can predict academic outcomes via positive psychological pathways such as gratitude and psychological capital, underscoring the plausibility of indirect routes from perceived parenting to vitality-related outcomes (Li et al., 2022). In Iranian and regional research traditions,

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attachment-related security and adaptive emotion regulation have also been positioned as key antecedents of academic buoyancy, reinforcing the value of integrating relational and self-regulatory mechanisms into causal models (Sheikhol-Islami & Taheri, 2017).

Teacher–student relationships constitute a second major relational axis that is particularly relevant during adolescence, when school demands intensify and students spend substantial time in classrooms where teacher practices can either buffer or exacerbate stress. Research indicates that supportive teacher–student relationships promote school adjustment and act as protective factors during transitional periods (e.g., moving from middle to high school), when vulnerability to stress and disengagement can increase (Longobardi et al., 2016). Even in classrooms with "difficult" students, teacher–student relationship quality can moderate negative outcomes, pointing to its role as a stabilizing interpersonal resource (Dietrich et al., 2020). Links to academic achievement are also documented, and the strength of these links can depend on parental involvement—suggesting a cross-contextual interplay in which family and school supports jointly shape achievement processes (Ma et al., 2021). Qualitative and ethnographic work further emphasizes that teacher–student relationships are not reducible to simple warmth; they include trust, perceived fairness, responsiveness, and interactional patterns that may directly influence students' sense of control and their willingness to persist under challenge (Raufelder et al., 2013).

Beyond relational contexts, socio-emotional competence is frequently advanced as a proximal mechanism translating support into adaptive academic functioning. Social and emotional learning frameworks propose that competencies such as self-awareness, emotion regulation, responsible decision-making, and relationship management support learning by improving self-regulation and classroom engagement, thereby enhancing performance and adjustment (Tarbetsky et al., 2017). Empirical studies provide an evidence base for linking social–emotional learning to academic performance, supporting the view that socio-emotional skills help students manage stressors and sustain goal-directed behavior in academic environments (Panayiotou et al., 2019). Measurement work has strengthened confidence in assessing socio-emotional development and competence across cultures and age groups, enabling more rigorous modeling of its mediating role in academic processes (Chen et al., 2019; Zych et al., 2018). For gifted and high-achieving adolescents, socio-emotional competence may be particularly critical because heightened expectations can intensify evaluative pressure, and adaptive emotional and interpersonal skills can determine whether high standards translate into thriving or strain (Çelik, 2019; Putwain et al., 2015).

Academic buoyancy research also highlights a set of psychological resources that may interface with socio-emotional competence, including self-efficacy, self-regulation, grit, mental toughness, emotional intelligence, and growth mindset. Students with stronger self-efficacy beliefs and more supportive classroom learning environments tend to show better achievement outcomes, consistent with models that position efficacy as a key motivational driver for persistence and adaptive coping (Boz et al., 2016; Weißenfels et al., 2023). Contemporary structural models propose that motivational factors influence buoyancy through grit, mental toughness, and perceived control, underscoring that buoyancy is embedded within a broader constellation of psychological resources (Tammeh et al., 2025). Similarly, growth mindset and emotional intelligence have been identified as psychological resources that support buoyancy, implying that socio-emotional competence (and closely related emotional intelligence capacities) can be a central pathway through which students maintain vitality under academic demands (Liu, 2025; Suharsono, 2024). Evidence from language-learning and other achievement domains also suggests that buoyancy interacts with emotional processes and self-regulated learning strategies, reinforcing the rationale for incorporating emotional–social capacities into explanatory models of academic buoyancy (Theiyab Alazemi et al., 2023; Xu & Wang, 2024).

Academic pressure, however, can disrupt these protective processes when demands are appraised as uncontrollable or as threats to self-worth. In test contexts, buoyant students tend to be less anxious and perform better, suggesting that buoyancy/vitality operates partly by reducing maladaptive anxiety responses and supporting performance under evaluative stress (Putwain et al., 2015). More recent syntheses emphasize that buoyancy can be cultivated as a means of overcoming test anxiety and setbacks, positioning it as a practical target for school-based programs (Putwain et al., 2023). Yet, pressure is not exclusively test-related; it can also reflect ongoing parent-driven expectations and perceived constraints, which may contribute to stress and avoidance even among capable students (Çelik, 2019; Schiffrin & Liss, 2017). Chain mediation evidence indicates that pressure can relate to adolescent problem behavior via

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self-control, parent–child conflict, and well-being, illustrating that pressure effects may be multi-step and relationally embedded rather than purely individual (Jiang et al., 2022). Accordingly, academic buoyancy in gifted students should be modeled with explicit attention to both relational antecedents (parents, teachers) and intrapersonal mediators (socio-emotional competence), as well as the undermining role of perceived academic pressure.

Prior scholarship in Iran and comparable contexts provides additional justification for focusing on these pathways. For example, causal modeling research has linked academic buoyancy to family emotional climate and learning environment factors through mediators such as academic engagement and academic self-efficacy, suggesting that vitality is shaped by layered interpersonal and motivational processes (Fakhariyan et al., 2019). Work specifically examining perceived parental relationships and teacher–student relationships in relation to academic buoyancy has also reported meaningful associations, supporting the relevance of relational perceptions as predictors of vitality in student populations (Hajazi & Abasi, 2021). Complementary studies have emphasized the role of self-regulation, self-efficacy, and resilience as mechanisms underpinning buoyancy, reinforcing that the student's adaptive capacities are pivotal in translating contextual inputs into everyday academic thriving (Tamannaeifar & Arbabi Ghohroudi, 2023). More recent research has linked goal orientations and basic psychological needs to academic buoyancy, consistent with motivation-based explanations and the view that buoyancy/vitality is sustained when competence, autonomy, and relatedness needs are supported (Eccles & Wigfield, 2020; Khodashahi, 2025).

At the same time, conceptual clarity is needed regarding how "vitality" and "buoyancy" are operationalized and how they relate to academic outcomes and well-being across different educational tracks. The reciprocal relations between buoyancy and adversity indicate that buoyancy can reduce subsequent adversity over time, implying a dynamic protective process rather than a static individual difference (Martin & Marsh, 2020). Cross-lagged evidence further suggests that buoyancy relates to achievement through perceived control, highlighting control appraisals as a key psychological bridge between stress and performance (Collie et al., 2015). In vocational and special-needs educational planning, models that foreground fit between learner needs and training environments further underscore that educational contexts must be designed in ways that prevent chronic stress and support adaptive functioning, a principle that can be extended to gifted education where "misfit" may occur in the form of excessive pressure or limited socio-emotional scaffolding (Kalbali et al., 2020). Additionally, while much of the buoyancy literature originates from general education contexts, emerging evidence from university and specialized contexts demonstrates that buoyancy is associated with engagement, well-being, and self-regulated learning, strengthening the argument for its broad applicability and for testing integrative models in diverse populations (Guo et al., 2024; Suharsono, 2024; Xu & Wang, 2024).

A rigorous model for gifted students should therefore integrate (a) perceived parent–child relationships as foundational socialization experiences shaping appraisals of expectations and support, (b) teacher–student relationship quality as a proximal school-based protective factor, (c) socio-emotional competence as a mechanism enabling self-awareness, regulation, and adaptive interpersonal functioning, and (d) perceived academic pressure as a risk mechanism that can undermine vitality and neutralize the benefits of support. This integrative approach aligns with evidence that parental relationship quality can promote achievement-related functioning through psychological capital and other positive resources (Li et al., 2022), that teacher–student relationships protect adjustment and promote achievement (Longobardi et al., 2016; Ma et al., 2021), that socio-emotional competence supports academic performance (Panayiotou et al., 2019; Tarbetsky et al., 2017), and that academic pressure can operate through relational conflict and self-control to predict maladjustment (Jiang et al., 2022). It is also consistent with intervention-oriented scholarship suggesting that cultivating buoyancy may be an actionable pathway for improving outcomes under test anxiety and academic setbacks (Putwain et al., 2023).

Finally, contemporary scholarship in adjacent fields underscores the importance of translating research evidence into practice through clear guidelines and reduced reliance on nonrecommended approaches. Although originating in pediatric healthcare, research documenting trends in test and treatment use following clinical guideline publication illustrates how evidence dissemination and implementation can change practice patterns over time (House et al., 2021). By analogy, well-specified, empirically supported models of academic buoyancy can inform school-based guidelines and interventions (e.g., parent–teacher collaboration protocols, socio-emotional competence programs, and pressure-reduction strategies), particularly in high-stakes

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environments such as gifted education where stakeholder expectations are intense and the costs of burnout are substantial (Hajazi & Abasi, 2021; Putwain et al., 2020). Moreover, extending model testing to gifted adolescents in large urban settings can contribute to the international buoyancy literature by examining whether established pathways hold in contexts where academic competition, parental investment, and educational stratification may differ from settings where much prior research has been conducted (Eccles & Roeser, 2015; Martin, 2013).

The aim of this study was to develop and test a causal model of gifted students' academic buoyancy based on perceived parent–child relationships and perceived teacher–student relationship quality, considering the mediating roles of perceived academic pressure and socio-emotional competence.

2. Methods and Materials

2.1. Study Design and Participants

This study was applied in terms of purpose and, based on the data collection method, was descriptive–correlational using structural equation modeling (SEM), which is a multivariate correlational approach. The statistical population of this study included all gifted students at the first and second levels of secondary education in Tehran during the 2023–2024 academic year. The sampling method used in this study was simple random sampling. The sample consisted of 392 gifted students from the first and second secondary levels in Tehran who were selected through simple random sampling.

After obtaining the necessary permissions from the Organization for the Education of Gifted Students in Tehran and coordinating with school administrators, the researchers attended educational centers. With access to the academic records of gifted students, and after explaining the objectives of the study, students were asked to respond to the questionnaire items according to their personal characteristics and, as far as possible, not to leave any items unanswered. Subsequently, inclusion criteria were examined, including: (1) being a gifted student in Tehran, (2) an age range of 13 to 19 years, (3) absence of physical–motor problems that would prevent participation in the study, and (4) willingness and informed consent to participate in the research. Exclusion criteria included: (1) having emotional and behavioral problems based on the student's electronic counseling record, (2) a history of smoking or substance use, and (3) failure to respond to five questionnaire items.

In this study, based on Cohen's formula (1988), Westland (2010), and Soper (2022), the target effect size was set at 0.19, the statistical power at 0.90, the number of latent variables at six, and the number of observed variables at 18 (questionnaire factors). The Type I error rate was set at 0.05 to achieve confidence levels of 95% or 99%. According to these parameters, the minimum required sample size was estimated to be 200 participants. In the present study, data from 392 participants were collected and entered into the analyses.

2.2. Measures

Academic Buoyancy Questionnaire (AVQ): Dehghani Zadeh and Hossein Chari (2012) developed this scale based on the Academic Buoyancy Scale by Martin et al. (2006). The questionnaire consists of nine items. Items are rated on a five-point Likert scale ranging from completely disagree (1) to completely agree (5). Dehghani Zadeh and Hossein Chari (2012) reported a Cronbach's alpha coefficient of 0.80 and a test–retest reliability coefficient of 0.73, indicating acceptable reliability. Internal validity analysis showed that item–total correlations ranged from 0.51 to 0.68. To examine the factor structure (construct validity), principal component analysis was conducted, and the results indicated that all items had factor loadings above 0.40, with the nine items collectively explaining 37% of the variance in the academic buoyancy construct.

Parent–Child Relationship Scale (PCRS): In the present study, the Parent–Child Relationship Scale developed by Fine, Moreland, and Schwebel (1983) was used to assess parent–child relationships. This questionnaire consists of 24 items and is used to measure adolescents' perceptions of their relationships with their parents. The scale has two identical forms: one assessing the child's relationship with the mother and the other assessing the relationship with the father, differing only in the parent referenced. The total score is obtained by summing the mean scores of the subscales. The scale demonstrated internal consistency with Cronbach's alpha coefficients ranging from 0.89 to 0.94 for the father-related subscales and an overall alpha of 0.96, as well as alpha coefficients ranging from 0.61 to 0.94 for the mother-related subscales with an overall alpha of 0.96 (Javadi, Emami-Pour, & Rezaei Kashi, 2009). The validity of the Parent–Child Relationship Scale has been supported through known-groups validity and predictive validity,

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effectively distinguishing between children from divorced and intact families (Faramarzi, Esmaili, Eskandari, & Hatami, 2017). In the study by Faramarzi et al. (2017), Cronbach's alpha coefficients ranged from 0.50 to 0.89 for father-related subscales with an overall alpha of 0.92, and from 0.66 to 0.82 for mother-related subscales, with an overall Cronbach's alpha of 0.87 for the entire scale.

Teacher–Student Relationship Quality Scale: In this study, the Teacher–Student Relationship Quality Scale developed by Tronberg et al. (2022) was used to measure the quality of teacher–student relationships. This scale is a nine-item questionnaire designed to assess students' perceptions of the quality of their interpersonal relationships with teachers (e.g., "My teachers care about me," "My teachers listen to me when I have something to say," and "I feel that I can trust my teachers"). Some items are reverse-scored prior to forming the composite variable (e.g., "My teachers yell at me" and "My teachers dislike me"), such that higher scores indicate more positive relationships. Students respond to each item on a five-point scale ranging from 4 (always) to 0 (never). Tronberg et al. (2022) examined construct validity using exploratory and confirmatory factor analyses across two samples. Exploratory factor analysis indicated a single-factor structure for the scale, and confirmatory factor analysis showed acceptable model fit indices ($\chi^2/df = 3.421$, RMSEA = 0.07, IFI = 0.94, CFI = 0.92, GFI = 0.94, AGFI = 0.92). Cronbach's alpha reliability was reported as 0.88, and test–retest reliability as 0.92. Concurrent validity with the Academic Engagement Questionnaire by Hart et al. (2011) yielded a correlation of 0.44, indicating acceptable concurrent validity. In the present study, confirmatory factor analysis based on the criteria proposed by Hair et al. (2019) indicated good construct validity and model fit ($\chi^2/df = 2.784$, GFI = 0.92, AGFI = 0.89, TLI = 0.94, IFI = 0.94, CFI = 0.94, RMSEA = 0.07, PCLOSE = 0.87).

Socio-Emotional Competence Questionnaire: The Socio-Emotional Competence Questionnaire is a 25-item instrument developed by Zhao and Yi (2012). It consists of five dimensions: self-awareness (Items 1, 6, 11, 16, and 21), emotional awareness (Items 2, 7, 12, 17, and 22), self-regulation (Items 3, 8, 13, 18, and 23), relationship management (Items 4, 9, 14, 19, and 24), and responsible decision-making (Items 5, 10, 15, 20, and 25). All items are rated on a six-point Likert scale ranging from 1 (completely false) to 6 (completely true). Total scores range from 25 to 150. The validity and reliability of the questionnaire have been supported in multiple studies. Zhao and Yi (2012) reported that first-order confirmatory factor analysis supported the proposed five-factor model, with all factor loadings exceeding 0.30. Aguilar et al. (2019) also demonstrated adequate internal consistency, with Cronbach's alpha coefficients of 0.72 for self-awareness, 0.76 for social awareness, 0.81 for self-regulation, 0.73 for relationship management, and 0.82 for responsible decision-making. In Iran, the findings of Farnoudian et al. (2019), based on a sample of female upper secondary school students, confirmed acceptable validity through exploratory and confirmatory factor analyses. Additionally, Cronbach's alpha coefficients were reported as 0.86 for self-awareness, 0.70 for self-regulation, 0.86 for social awareness, 0.79 for relationship management, and 0.87 for responsible decision-making.

Perceived Parental Academic Pressure Scale (PPAPS): This scale was developed by Kainak et al. (2020). The questionnaire consists of 32 items assessing three subscales: psychological pressure, restriction, and unrealistic expectations. Responses to each item are rated on a five-point scale ranging from completely inappropriate (1) to completely appropriate (5). Kainak et al. (2020) reported an overall internal consistency of 0.90 for the questionnaire. Internal consistency coefficients for the subscales were reported as 0.85 for psychological pressure, 0.84 for restriction, and 0.79 for high expectations. Exploratory and confirmatory factor analyses ultimately supported a three-factor structure with 20 items, including Items 1, 4, 7, 10, 13, 16, and 19 for psychological pressure; Items 2, 5, 8, 11, 14, 17, and 20 for restriction; and Items 3, 6, 9, 12, 15, and 18 for unrealistic expectations. McDonald's omega reliability coefficients were reported as 0.85 for restriction, 0.79 for very high expectations, and 0.91 for the total scale. Construct validity confirmed the presence of three factors: psychological pressure, restriction, and high expectations. In the present study, confirmatory factor analysis based on the criteria of Hair et al. (2019) indicated good model fit ($\chi^2/df = 3.019$, GFI = 0.90, AGFI = 0.88, TLI = 0.90, IFI = 0.90, CFI = 0.92, RMSEA = 0.08, PCLOSE = 0.86).

2.3. Data Analysis

Prior to data analysis, a comprehensive assessment of data quality was conducted, including evaluation of data screening, management of missing data, and examination of parametric assumptions. Normality was assessed using skewness and kurtosis indices, linearity was examined using scatterplots, outliers were assessed using boxplots, multicollinearity was evaluated using tolerance and variance

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inflation factors, and the independence of residuals was examined using the Durbin–Watson statistic. In descriptive statistics, frequency, percentage, mean, standard deviation, minimum, and maximum values were used to describe the data. In inferential statistics, Pearson correlation coefficients were calculated using SPSS version 26, and structural equation modeling using the maximum likelihood (ML) estimation method was conducted with AMOS version 24. Evaluation of total, direct, and indirect paths was performed using the bootstrapping method with 2,000 resamples.

3. Findings and Results

The mean age (and standard deviation) of the students participating in the study was 15.45 (SD = 2.74), with a minimum age of 12 and a maximum age of 19 years. The results of the independent-samples t test indicated that there was no significant difference in age among the students. Among the participating students, 15.30% (n = 60) were in Grade 7, 19.13% (n = 75) in Grade 8, 20.40% (n = 80) in Grade 9, 19.13% (n = 75) in Grade 10, 12.75% (n = 50) in Grade 11, and 13.26% (n = 52) in Grade 12. The frequency and percentage distribution of students' gender are presented. According to the table, 217 students (55.35%) were female and 175 students (45.35%) were male. The mean (and standard deviation) of the overall grade point average of gifted students was 18.41 (SD = 4.55).

Table 1

Descriptive Findings of the Study Variables

Variable	M	SD	Minimum	Maximum	Skewness	Kurtosis
Psychological pressure	15.03	5.61	7	22	0.280	−0.044
Restrictions	14.38	4.13	6	20	0.368	0.953
Unrealistic expectations	13.52	3.29	7	18	0.656	0.201
Adolescents' academic pressure	42.93	8.35	20	60	0.932	3.723
Self-awareness	17.35	4.33	5	21	1.115	0.511
Emotional awareness	16.54	3.84	5	20	0.796	−0.114
Self-regulation	15.78	2.91	5	20	0.889	0.008
Relationship management	17.03	3.83	5	20	0.928	−0.001
Responsible decision-making	16.70	3.62	5	20	0.457	−0.470
Socio-emotional competence	84.40	9.18	25	101	1.065	−0.076
Positive affect toward father	9.67	3.09	5	21	0.562	0.084
Father involvement/enmeshment	22.14	6.04	6	34	0.589	0.096
Communication (father)	10.32	4.23	4	22	0.663	0.084
Anger (father)	2.84	2.10	1	7	0.998	−0.261
Relationship with father	44.97	10.47	22	73	−0.656	0.682
Positive affect toward mother	34.31	9.81	6	42	0.911	0.184
Rejection/role diffusion (mother)	7.12	3.34	2	14	0.881	0.260
Identity (mother)	19.95	4.45	4	28	0.487	−0.605
Communication (mother)	34.67	9.74	6	42	−1.360	0.902
Relationship with mother	96.05	21.49	24	126	0.088	−0.639
Teacher–student relationship quality	16.16	3.90	0	36	−1.358	1.949
Academic buoyancy	17.63	4.78	9	38	−1.309	0.746

As shown in Table 1, the mean (and standard deviation), minimum, and maximum values of the study variables are reported. According to the table, the mean total score of adolescents' academic pressure was 42.93 (SD = 8.35), socio-emotional competence was 84.40 (SD = 9.18), relationship with father was 44.97 (SD = 10.47), relationship with mother was 96.05 (SD = 21.49), teacher–student relationship quality was 16.16 (SD = 3.90), and academic buoyancy was 17.63 (SD = 4.78). In this study, the absolute values of skewness and kurtosis coefficients were less than 3 and 10, respectively, indicating that the data were normally distributed. The skewness and kurtosis coefficients for the study data were computed and are presented.

In this study, the assumption of linearity was confirmed using scatterplot methods. Outliers were identified for the variables of adolescents' academic pressure, relationship with mother, relationship with father, socio-emotional competence, teacher–student relationship quality, and academic buoyancy; all outliers at the lower and upper bounds of these variables were removed from the statistical

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analyses. In addition, the results showed that tolerance statistics for all predictor variables were greater than 0.10 and variance inflation factor (VIF) values were less than 10. Therefore, based on the criteria proposed by Klein (2016), no multicollinearity was observed in this study. Furthermore, the Durbin–Watson statistic for all exogenous variables with mediators was approximately 2 (ranging roughly from 1.77 to 2.12), indicating that the model did not violate the assumption of independence of residuals, which is one of the main assumptions of regression models. In conclusion, the results indicated that the fundamental assumptions of the regression model were adequately met.

Table 2

Correlation Coefficients Between Exogenous Variables With Mediators and the Endogenous Variable

Variable	1	2	3	4	5	6	7	8	9	10	11
1	−0.438**	−0.356**	−0.303**	−0.347**	0.289**	0.299**	0.301**	0.219**	0.256**	0.247**	0.255**
2	0.312**	0.423**	0.385**	0.419**	−0.303**	−0.289**	−0.321**	−0.328**	−0.289**	−0.278**	−0.289**
3	−0.325**	−0.274**	−0.312**	−0.254**	0.263**	0.241**	0.326**	0.307**	0.244**	0.256**	0.277**
4	0.254**	0.318**	0.397**	0.287**	−0.231**	−0.289**	−0.321**	−0.328**	−0.289**	−0.278**	−0.289**
5	−0.512**	−0.413**	−0.321**	−0.287**	0.245**	0.266**	0.239**	0.247**	0.241**	0.247**	0.263**
6	−0.326**	−0.287**	−0.354**	−0.299**	0.301**	0.289**	0.323**	0.303**	0.289**	0.301**	0.287**
7	0.326**	0.241**	0.270**	0.263**	−0.287**	−0.324**	−0.212**	−0.241**	−0.277**	−0.245**	−0.216**
8	−0.365**	−0.364**	−0.247**	−0.269**	0.287**	0.316**	0.202**	0.254**	0.263**	0.274**	0.236**
9	−0.345**	−0.218**	−0.306**	−0.297**	0.321**	0.287**	0.341**	0.269**	0.345**	0.323**	0.374**
10	−0.314**	−0.289**	−0.344**	−0.374**	0.356**	0.365**	0.288**	0.263**	0.274**	0.303**	0.278**
11	−0.245**	−0.321**	−0.401**	−0.387**	0.254**	0.236**	0.277**	0.364**	0.296**	0.356**	0.278**

1. Positive affect toward father; 2. Father involvement/enmeshment; 3. Communication (father); 4. Anger (father); 5. Relationship with father; 6. Positive affect toward mother; 7. Rejection/role diffusion (mother); 8. Identity (mother); 9. Communication (mother); 10. Relationship with mother; 11. Teacher–student relationship quality

*p<0.05; **p<.01

As shown in Table 2, there is a significant negative relationship between father–child relationships and adolescents' academic pressure (r = −0.287). In addition, father–child relationships are positively associated with socio-emotional competence (r = 0.247) and academic buoyancy (r = 0.263).

There is also a significant negative relationship between mother–child relationships and adolescents' academic pressure (r = −0.374). Moreover, mother–child relationships are positively associated with socio-emotional competence (r = 0.303) and academic buoyancy (r = 0.278).

Finally, there is a significant negative relationship between teacher–student relationship quality and adolescents' academic pressure (r = −0.387). In addition, teacher–student relationship quality is positively associated with socio-emotional competence (r = 0.356) and academic buoyancy (r = 0.278).

Table 3

Goodness-of-Fit Indices for the Proposed Model

Index	χ^2	df	CMIN/DF	p	RMSEA	CFI	NFI	TLI	GFI	AGFI	IFI
Proposed Model	1156.789	289	2.874	p < .001	0.08	0.91	0.91	0.89	0.90	0.89	0.91

As shown in Table 3, the goodness-of-fit indices—including the chi-square to degrees of freedom ratio (χ^2/df = 2.874), Incremental Fit Index (IFI = 0.91), Comparative Fit Index (CFI = 0.91), Goodness-of-Fit Index (GFI = 0.90), Tucker–Lewis Index (TLI = 0.89), Adjusted Goodness-of-Fit Index (AGFI = 0.89), Normed Fit Index (NFI = 0.91), and Root Mean Square Error of Approximation (RMSEA = 0.08)—indicate an acceptable fit of the proposed model to the data. The standardized and unstandardized direct path coefficients of the well-fitting model are presented in Table 4.

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Figure 1

Standardized Path Coefficients Diagram Examining Parent–Child Relationships and Teacher–Student Relationship Quality in Relation to Academic Buoyancy With the Mediating Roles of Socio-Emotional Competence and Academic Pressure

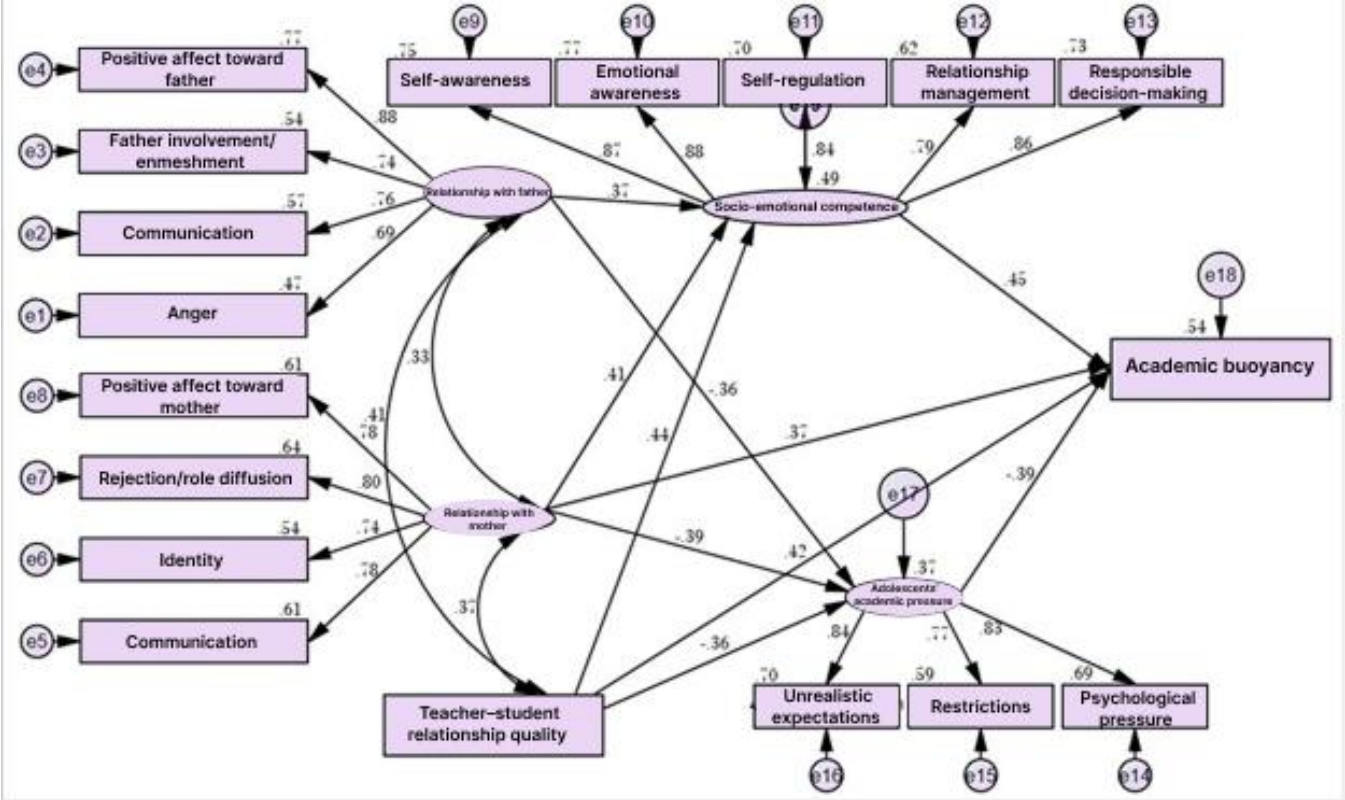

Table 4

Standardized and Unstandardized Coefficients of the Study Variables

Paths	β	B	SD	CR	p
Relationship with father ← Socio-emotional competence	0.375	0.348	0.041	8.487	p < .01
Relationship with father ← Academic pressure	−0.362	−0.287	0.037	−7.756	p < .01
Relationship with mother ← Socio-emotional competence	0.413	0.456	0.052	8.769	p < .001
Relationship with mother ← Academic pressure	−0.392	−0.358	0.044	−8.136	p < .001
Relationship with mother ← Academic buoyancy	0.374	0.365	0.044	8.295	p < .01
Teacher–student relationship quality ← Socio-emotional competence	0.442	0.412	0.051	8.078	p < .001
Teacher–student relationship quality ← Academic pressure	−0.364	−0.288	0.049	−7.428	p < .01
Teacher–student relationship quality ← Academic buoyancy	0.423	0.367	0.052	7.057	p < .01
Socio-emotional competence ← Academic buoyancy	0.453	0.412	0.043	9.581	p < .001
Academic pressure ← Academic buoyancy	−0.391	−0.369	0.049	−7.530	p < .001

The results presented in Table 4 show the standardized and unstandardized regression weights of the observed indicators and latent constructs. Accordingly, the direct standardized coefficients of mother–child relationships on academic buoyancy (β = 0.374, p < .01), teacher–student relationship quality on academic buoyancy (β = 0.423, p < .001), socio-emotional competence on academic buoyancy (β = 0.453, p < .001), and academic pressure on academic buoyancy (β = −0.391, p < .001) were statistically significant. Therefore, given the significance levels (p < .01), it can be inferred that these variables have effects significantly different from zero and play meaningful roles in predicting academic buoyancy.

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4. Discussion

The findings of the present study provide a coherent picture of how relational and psychological mechanisms jointly shape academic buoyancy among gifted students. The results showed that perceived mother–child relationships and teacher–student relationship quality had direct and positive effects on academic buoyancy, whereas the direct effect of father–child relationships was not statistically significant. In addition, socio-emotional competence exerted a strong positive direct effect on academic buoyancy, while perceived academic pressure had a significant negative direct effect. Beyond these direct paths, both parental relationships and teacher–student relationship quality influenced academic buoyancy indirectly through socio-emotional competence and perceived academic pressure. Taken together, these findings support a multilevel explanation of academic buoyancy that integrates social relationships, emotional–social capacities, and stress-related processes, and they align well with contemporary theoretical and empirical work on academic buoyancy and vitality.

The strong positive association between socio-emotional competence and academic buoyancy underscores the central role of emotional and interpersonal resources in sustaining adaptive engagement under academic demands. This result is consistent with social and emotional learning frameworks, which posit that self-awareness, emotion regulation, responsible decision-making, and relationship management enable students to cope effectively with stressors and persist in goal-directed behavior (Panayiotou et al., 2019; Tarbetsky et al., 2017). Prior research has demonstrated that socio-emotional competence is linked to academic performance and adjustment because it facilitates self-regulation and adaptive responses to challenge (Chen et al., 2019; Zych et al., 2018). The present findings extend this literature by showing that, among gifted students, socio-emotional competence is not merely correlated with positive outcomes but operates as a key explanatory pathway through which relational contexts translate into academic buoyancy. This is also congruent with evidence indicating that emotional intelligence and growth mindset function as psychological resources for academic buoyancy (Liu, 2025; Suharsono, 2024).

The negative direct effect of perceived academic pressure on academic buoyancy further highlights the dual-edged nature of high expectations in gifted education. While challenge can be motivating, excessive or uncontrollable pressure appears to undermine students' energy, engagement, and persistence. This finding aligns with prior studies showing that academic pressure is associated with maladaptive outcomes such as anxiety, problem behavior, and reduced well-being, particularly when mediated by relational conflict and diminished self-control (Çelik, 2019; Jiang et al., 2022). Research on achievement emotions also suggests that stress and anxiety can reciprocally interact with performance, and that students with lower buoyancy are more vulnerable to the detrimental effects of pressure (Putwain et al., 2015; Putwain et al., 2020). The present results reinforce the view that academic buoyancy functions partly as a stress-buffering construct and that unchecked pressure can erode this protective capacity, even among high-ability students.

A notable contribution of this study lies in clarifying the distinct roles of parental relationships. The direct effect of mother–child relationships on academic buoyancy was significant, whereas the direct effect of father–child relationships was not. This pattern may reflect differential caregiving roles or variations in emotional closeness and daily academic involvement, particularly in cultural contexts where mothers are more directly engaged in monitoring and supporting children's educational activities. Nevertheless, both mother–child and father–child relationships exerted significant indirect effects on academic buoyancy through socio-emotional competence and perceived academic pressure. This suggests that even when direct effects are weak or absent, parental relationships remain influential by shaping adolescents' emotional resources and stress appraisals. These findings are consistent with research demonstrating that supportive parent–child relationships promote academic outcomes through psychological capital and related positive resources (Li et al., 2022), whereas psychologically controlling or expectation-laden parenting can heighten stress and undermine motivation (Rodríguez-Meirinhos et al., 2019; Schiffrin & Liss, 2017). Prior causal modeling work has similarly highlighted the role of family emotional climate in predicting academic buoyancy through self-efficacy and engagement (Fakhariyan et al., 2019; Sheikhol-Islami & Taheri, 2017).

The significant direct and indirect effects of teacher–student relationship quality further emphasize the importance of school-based relational supports. The present findings showed that positive teacher–student relationships directly enhanced academic buoyancy and indirectly promoted it by increasing socio-emotional competence and reducing perceived academic pressure. This is in line with a robust body of evidence identifying teacher–student

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relationships as protective factors for school adjustment and achievement, especially during transitional and high-demand periods (Dietrich et al., 2020; Longobardi et al., 2016). Research has also indicated that teacher–student relationships can interact with parental involvement to shape academic outcomes, suggesting that students benefit most when support is consistent across home and school contexts (Ma et al., 2021). Qualitative studies further reinforce that trust, responsiveness, and perceived care from teachers contribute to students' sense of control and willingness to persist under challenge (Raufelder et al., 2013). The present study adds to this literature by demonstrating that teacher–student relationships are not only directly beneficial but also instrumental in fostering emotional–social capacities that sustain vitality.

The mediating role of socio-emotional competence in the relationships between parental and teacher–student relationships and academic buoyancy is theoretically and practically significant. It suggests that supportive relationships may enhance vitality primarily by equipping students with the emotional and interpersonal skills needed to navigate academic demands. This finding resonates with expectancy–value and developmental perspectives, which emphasize that motivation and engagement emerge from interactions between individuals and their social environments (Eccles & Roeser, 2015; Eccles & Wigfield, 2020). It also complements evidence that self-efficacy, self-regulation, and related motivational resources are central to academic buoyancy and resilience (Boz et al., 2016; Tamannaeifar & Arbabi Ghohroudi, 2023; Weißenfels et al., 2023). In this sense, socio-emotional competence may function as a proximal mechanism linking contextual support to adaptive academic functioning.

Similarly, the mediating role of perceived academic pressure highlights how relational contexts can either amplify or mitigate stress. Supportive parental and teacher relationships were associated with lower perceived pressure, which in turn predicted higher academic buoyancy. This aligns with chain-mediation findings showing that pressure operates through relational conflict and psychological processes to influence adolescent outcomes (Jiang et al., 2022). It also supports the argument that academic buoyancy is not simply the absence of stress but the product of effective stress appraisal and coping, facilitated by relational and emotional resources (Martin, 2013; Martin & Marsh, 2020). Interventions that focus solely on individual coping without addressing relational sources of pressure may therefore be insufficient, particularly in high-stakes gifted education environments.

5. Conclusion

Overall, the present findings are consistent with and extend prior models of academic buoyancy and vitality. Previous research has shown that buoyancy predicts achievement and buffers adversity over time (Collie et al., 2015; Martin & Marsh, 2020), and that it is supported by motivational and emotional resources such as self-efficacy, grit, and emotional intelligence (Liu, 2025; Tammeh et al., 2025). The current study integrates these strands by demonstrating that socio-emotional competence and academic pressure serve as key mechanisms linking relational contexts to vitality. By focusing on gifted students, the study also addresses a population for whom high expectations and competitive environments may pose unique risks, thereby contributing to a more nuanced understanding of vitality in high-achievement contexts (Hajazi & Abasi, 2021; Putwain et al., 2020). In doing so, it provides empirical support for integrative, context-sensitive models that move beyond individual traits to encompass family, school, and emotional processes.

6. Limitations & Suggestions

Despite its contributions, the present study has several limitations that should be acknowledged. First, the cross-sectional design precludes causal inference, even though structural equation modeling was used. Second, reliance on self-report measures may have introduced common method variance and social desirability bias. Third, the sample was restricted to gifted students in a single metropolitan area, which may limit the generalizability of the findings to other educational tracks, regions, or cultural contexts. Fourth, potential moderating variables such as gender, socioeconomic status, or school climate were not examined and may have influenced the observed relationships.

Future studies should employ longitudinal designs to examine the temporal dynamics and reciprocal relationships among parental relationships, teacher–student relationships, socio-emotional competence, academic pressure, and academic buoyancy. Expanding samples to include students from diverse educational tracks and cultural contexts would enhance generalizability and allow for meaningful comparisons. Researchers are also encouraged to test potential moderators, such as gender or school climate, and to incorporate multi-informant data (e.g., parents, teachers)

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to reduce common method bias. Finally, experimental or intervention-based studies could clarify whether enhancing socio-emotional competence or reducing perceived academic pressure leads to sustained improvements in academic buoyancy.

From a practical perspective, the findings suggest that efforts to promote academic buoyancy in gifted students should adopt a systemic approach that involves families and schools. Programs aimed at strengthening parent–child communication and reducing maladaptive pressure may be particularly beneficial. Teacher professional development that emphasizes relational competence, emotional support, and stress-sensitive instructional understanding could further enhance students' vitality. In addition, integrating socio-emotional competence training into gifted education curricula may help students manage high expectations more effectively and maintain engagement and well-being over time.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

S.E.M. was responsible for the conceptualization and design of the study, selection of instruments, data collection, and implementation of the research procedures. The author conducted the statistical analyses using structural equation modeling, interpreted the findings, and drafted the manuscript. S.E.M. also reviewed and approved the final version of the manuscript and takes full responsibility for the integrity and accuracy of the work.

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