



Structural Associations of Academic Engagement and Spiritual Vitality with Academic Buoyancy: The Mediating Role of Self-Efficacy among Female Upper-Secondary School Students

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ABSTRACT

This study examined a cross-sectional structural model linking academic engagement and spiritual vitality with academic buoyancy, directly and indirectly through self-efficacy, among female upper-secondary school students. A descriptive-correlational study was conducted with 350 students aged 15–18 years in Babol, Iran, during the 2024 academic year. Participants were selected through multistage cluster sampling. Academic buoyancy, academic engagement, spiritual vitality, and self-efficacy were assessed using self-report instruments. Structural equation modeling was performed in SPSS and AMOS. The proposed model showed acceptable fit ($\chi^2/df = 1.45$, RMSEA = .03, CFI = .98, NFI = .96, GFI = .96, and AGFI = .94). Academic engagement ($\beta = .12$, $p = .02$), spiritual vitality ($\beta = .26$, $p = .001$), and self-efficacy ($\beta = .32$, $p = .001$) were positively associated with academic buoyancy. Self-efficacy showed statistically significant indirect associations linking academic engagement (indirect $\beta = .138$, $z = 2.84$, $p = .001$) and spiritual vitality (indirect $\beta = .09$, $p = .02$) with academic buoyancy. Because the data were cross-sectional and self-reported, the findings do not establish temporal or causal effects.

Keywords: academic buoyancy; academic engagement; spiritual vitality; self-efficacy; structural equation modeling; secondary education

1. Introduction

Academic life involves routine setbacks such as examination pressure, difficult assignments, disappointing grades, competing deadlines, and negative

feedback. Academic buoyancy describes students' capacity to manage these ordinary academic adversities and to remain engaged with learning. It differs from academic resilience,

which generally concerns adaptation under severe or chronic adversity (1).

Students with greater academic buoyancy are more likely to sustain effort, regulate negative emotions, and interpret temporary failure as manageable. Academic buoyancy may also protect achievement when students experience relatively minor academic adversities (2). Identifying modifiable correlates of academic buoyancy is therefore relevant to school-based psychological and educational support.

Academic engagement is a multidimensional construct encompassing behavioral, emotional, cognitive, and agentic involvement in learning. Engaged students participate, persist, employ learning strategies, express interest, and contribute constructively to instruction (3-5). These experiences may provide mastery opportunities and feedback that support students' confidence and adaptive responses to setbacks.

Spiritual vitality was conceptualized as a positive, meaning-oriented state involving hope, purpose, inner freshness, peace, benevolence, and a constructive orientation toward life. In educational settings, meaning and hope may help students maintain effort during ordinary academic pressure. This construct should be interpreted in a culturally sensitive and non-coercive manner and should not be treated as equivalent to religious conformity. Meaning-oriented resources may influence achievement-related choices through students' expectations, values, and interpretations of educational tasks (6, 7).

Self-efficacy concerns students' beliefs that they can organize and perform the actions required to understand lessons, complete assignments, and manage academic difficulties. Social cognitive theory identifies self-efficacy as a central determinant of effort, persistence, self-regulation, and reactions to failure (8-10). Students with stronger self-efficacy may interpret setbacks as temporary and controllable rather than as evidence of fixed inability.

Self-efficacy may also provide a statistical link between engagement or spiritual vitality and buoyancy. Engagement may strengthen self-efficacy through practice, feedback, agency, and mastery experiences. Meaning, hope, and positive orientation may likewise be associated with stronger beliefs in one's ability to manage academic tasks. These

proposed pathways are theoretically plausible, but a cross-sectional model cannot establish their temporal sequence.

The present study tested whether academic engagement and spiritual vitality were directly associated with academic buoyancy and whether self-efficacy showed statistically significant indirect associations linking these variables among female upper-secondary school students in Babol, Iran.

The broader engagement literature conceptualizes school engagement as a multidimensional interaction between students and their educational environments, encompassing behavioral participation, emotional connection, cognitive investment, and agentic contribution (4, 5, 11, 12). Evidence from adolescent samples indicates that self-efficacy and perceived teacher support are associated with affective and cognitive engagement and with competencies relevant to adaptive academic functioning (13).

Research on academic buoyancy increasingly emphasizes reciprocal and contextual processes. Academic self-efficacy has been linked with buoyancy and achievement among secondary-school students, and longitudinal evidence indicates that buoyancy, engagement, and achievement influence one another across time (14-17). Research focused specifically on female secondary students further supports examining the instructional and personal resources associated with buoyancy in this population (18).

Academic buoyancy has also been associated with students' emotions, learning expectations, test anxiety, and classroom behavior (2, 19, 20). These findings support an integrated model in which engagement, personal meaning, and efficacy beliefs are examined together while recognizing that causal direction cannot be established from cross-sectional data.

2. Methods and Materials

2.1. Study Design and Setting

This applied quantitative study used a cross-sectional descriptive-correlational design and structural equation modeling. The target population comprised 8,612 female upper-secondary school students in Babol, Iran, during the 2024 academic year. The analytic sample included 350 students.

2.2. Sampling and Participants

Participants were selected using multistage cluster sampling. One educational district was randomly selected, followed by the selection of female upper-secondary schools within that district. Eligible students in the selected schools were invited to participate. Inclusion criteria were enrollment in an upper-secondary school in Babol, ability to understand the questionnaires, and voluntary participation. Incomplete questionnaires and records showing patterned or careless responses were excluded.

The sample size was considered adequate for estimating the proposed structural model. Because participants were recruited through schools, the clustered sampling structure was considered when interpreting the precision and generalizability of the estimates.

2.3. Measures

Academic buoyancy. Academic buoyancy was assessed with a six-item measure based on Martin and Marsh's work on everyday academic resilience. Items were scored from 1 (strongly disagree) to 5 (strongly agree), with higher summed scores indicating greater academic buoyancy. Cronbach's alpha in the present sample was .71.

Academic engagement. Academic engagement was assessed with a 17-item scale covering behavioral, agentic, cognitive, and emotional engagement. Items were scored from 1 (strongly disagree) to 7 (strongly agree). The total score ranged from 17 to 119; higher scores indicated greater engagement. Cronbach's alpha was .84.

Spiritual vitality. Spiritual vitality was assessed using a 60-item questionnaire covering meaning-oriented beliefs and affective-behavioral experiences, with 10 content domains. Items were scored on a Likert-type scale, and higher scores indicated greater spiritual vitality. Cronbach's alpha in the present sample was .88.

Self-efficacy. Self-efficacy was assessed with Muris's 23-item Self-Efficacy Questionnaire for Children, which includes social, academic, and emotional dimensions. Items were scored from 1 to 5, with higher scores indicating stronger perceived capability. The total self-efficacy score

was used in the reported structural model. Cronbach's alpha was .79.

2.4. Procedure and Ethics

Permission was obtained from the university and the Babol Department of Education before recruitment. School administrators coordinated questionnaire administration. Students were informed about the study purpose, voluntary participation, confidentiality, and their right to withdraw. Questionnaires were completed individually, and no identifying information was collected.

The study was conducted in accordance with institutional and educational regulations governing research with school students. Participation was voluntary, confidentiality was protected, students were informed about the procedures and their right to withdraw, and no identifying information was collected.

2.5. Statistical Analysis

Analyses were conducted in SPSS and AMOS. Descriptive statistics, skewness, kurtosis, and Pearson correlations were examined before structural modeling. Missing values were replaced using median substitution, and extreme standardized scores were replaced with the corresponding variable mean. Model fit was evaluated using χ^2/df , RMSEA, CFI, NFI, GFI, and AGFI. Direct paths were evaluated using standardized coefficients and test statistics. Indirect associations were evaluated using the Sobel test. Statistical significance was set at $p < .05$.

The analytical procedures followed the protocol reported for the study. The use of single-value replacement and the Sobel test is considered when interpreting uncertainty in the estimates.

3. Findings and Results

3.1. Participant Characteristics

The sample included 350 female students aged 15–18 years ($M = 16.40$, $SD = 0.94$). Parental education and occupation were heterogeneous, indicating variation in family socioeconomic and educational background.

Table 1
Participant characteristics

Characteristic	Category or statistic	n	%
Age	Mean (SD)	16.40 (0.94)	—
Age	Range	15–18	—
Mother's education	Elementary	52	14.9
	Diploma	68	19.4
	Associate degree	109	31.1
	Bachelor's degree	72	20.6
	Master's degree or higher	49	14.0
Father's education	Elementary	35	10.0
	Diploma	77	22.0
	Associate degree	91	26.0
	Bachelor's degree	95	27.1
	Master's degree or higher	52	14.9

3.2. Descriptive Statistics and Reliability

All reported skewness and kurtosis values were within ± 1 , indicating no substantial univariate non-normality. Academic buoyancy had a mean of 17.90 (SD = 4.57).

Table 2
Descriptive statistics and internal consistency

Variable	M	SD	Skewness	Kurtosis	α
Academic engagement	67.90	16.30	.11	.07	.84
Spiritual vitality	149.80	29.70	.03	-.48	.88
Self-efficacy	69.00	15.80	.07	-.16	.79
Academic buoyancy	17.90	4.57	.03	-.06	.71

3.3. Model Fit and Measurement Model

The structural model showed acceptable fit according to the indices reported in the source analysis: $\chi^2/df = 1.45$,

RMSEA = .03, CFI = .98, NFI = .96, GFI = .96, and AGFI = .94.

Table 3
Structural-model fit indices

Index	Observed value	Interpretive criterion	Assessment
χ^2/df	1.45	< 3.00	Acceptable
RMSEA	.03	< .08	Acceptable
CFI	.98	> .90	Acceptable
NFI	.96	> .90	Acceptable
GFI	.96	> .90	Acceptable
AGFI	.94	> .90	Acceptable

The standardized loadings for the four academic-engagement dimensions ranged from .79 to .82. Social, academic, and emotional self-efficacy loaded at .83, .83, and

.87, respectively. Both spiritual-vitality components loaded significantly on their latent construct.

3.4. Direct and Indirect Associations

Academic engagement, spiritual vitality, and self-efficacy were each positively associated with academic

buoyancy. Self-efficacy had the largest reported standardized direct coefficient.

Table 4

Direct and indirect associations with academic buoyancy

Predictor	Association	β	p
Academic engagement	Direct	.12	.02
Spiritual vitality	Direct	.26	.001
Self-efficacy	Direct	.32	.001
Academic engagement	Indirect through self-efficacy	.138	.001
Spiritual vitality	Indirect through self-efficacy	.09	.02

These estimates support statistical indirect associations through self-efficacy. They do not establish that engagement or spiritual vitality temporally caused changes in self-efficacy or buoyancy.

4. Discussion

The model showed acceptable fit, and all three principal variables were positively associated with academic buoyancy. Self-efficacy had the strongest direct coefficient, followed by spiritual vitality and academic engagement. The findings are consistent with the view that students' responses to everyday academic setbacks are related to learning behavior, meaning-oriented psychological resources, and beliefs about personal capability.

The positive association between engagement and buoyancy is theoretically plausible because participation, persistence, cognitive investment, and agency provide opportunities for mastery and feedback. Engagement is multidimensional and develops within sociocultural learning contexts rather than functioning solely as an individual trait (4, 5, 11, 12).

Self-efficacy may be especially relevant because it shapes how students interpret difficulty and select coping responses. Students who believe they can manage academic tasks may be more likely to revise strategies, seek help, and persist after disappointing performance. This interpretation is consistent with social cognitive accounts of motivation and self-regulation and with research linking efficacy beliefs to buoyancy and achievement (8, 9, 17, 21).

The positive association between spiritual vitality and buoyancy suggests that meaning, hope, purpose, and inner

vitality may be relevant to academic adjustment in this cultural context. This result should not be generalized to imply that a particular spiritual or religious orientation is necessary for academic functioning. Future work should clarify the construct's factorial validity and examine whether its effects remain after controlling for optimism, psychological well-being, and meaning in life.

The indirect associations suggest that engagement and spiritual vitality may relate to buoyancy partly through self-efficacy beliefs. However, the cross-sectional design permits reverse or reciprocal explanations. Academically buoyant students may become more engaged and may report stronger self-efficacy. Longitudinal studies are required to establish temporal ordering (14, 16, 18).

The practical implications are provisional. Schools may consider approaches that support active engagement, mastery experiences, constructive feedback, goal setting, help seeking, and culturally sensitive meaning-making. Supportive instruction has been associated with buoyancy and subsequent engagement, but intervention effectiveness should be tested experimentally before firm recommendations are made (14).

5. Limitations

- The design was cross-sectional and cannot establish causality or temporal mediation.
- All principal constructs were measured by self-report, increasing the risk of common-method, recall, and social-desirability bias.
- The sample included only female upper-secondary students from Babol, limiting generalizability.

- The analysis did not account for the clustered structure of students within schools.
- Complete correlations, confidence intervals for all path coefficients, and bootstrap intervals for indirect effects were not available in the reported analysis.
- Median replacement and mean substitution for outliers may have reduced variance and affected standard errors.
- The mediator was operationalized using the total score from a multidimensional self-efficacy instrument; future studies should test academic self-efficacy as a distinct construct.

6. Conclusion

Among female upper-secondary school students in Babol, academic engagement, spiritual vitality, and self-efficacy were positively associated with academic buoyancy. Self-efficacy had the strongest reported direct coefficient and showed statistically significant indirect associations linking engagement and spiritual vitality with buoyancy. These findings support further longitudinal and experimental investigation of efficacy beliefs as potentially modifiable correlates of students' everyday academic adaptation.

Authors' Contributions

Masoumeh Vaygani: Conceptualization, investigation, data collection, data curation, and writing—original draft. Arsalan Khanmohammadi Otaghsara: Methodology, supervision, validation, and writing—review and editing. Rajabali Mohammadzadeh Admolaei: Formal analysis, interpretation, methodological review, and writing—review and editing. All authors reviewed and approved the final manuscript.

Declaration

Generative artificial intelligence was used only to assist English-language editing, structural revision, reference checking, and document formatting. It was not used to fabricate data, generate statistical results, or make authorship decisions. The authors remain responsible for the accuracy and integrity of the manuscript.

Transparency Statement

De-identified data may be available from the corresponding author upon reasonable request, subject to institutional and ethical restrictions.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study was conducted in accordance with institutional and educational research requirements. Participation was voluntary, confidentiality was maintained, no identifying information was collected, and students were informed of their right to withdraw without penalty.

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