

Original Article



Prediction of school belonging based on perceptions of classroom environment and academic self-concept in students

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Abstract

Background: Existing research indicates that students' perceptions of their classroom environment and their academic self-concept significantly influence their sense of school belonging. However, the precise interplay and predictive roles of these factors warrant further investigation. This study, therefore, aimed to explore the extent to which students' perceptions of their classroom environment and their academic self-concept predict their overall sense of school belonging.

Methods: A descriptive-correlational research design was utilized for this study. The sample comprised 361 female high school students, aged 13 to 15, residing in Tehran (2024). These participants were selected from a larger population using multi-stage cluster sampling. Data were collected using three instruments: the School Belonging Questionnaire, the Dundee Ready Education Environment Measure, and the Academic Self-Concept Questionnaire. Statistical analysis was performed using SPSS version 27, employing Pearson's correlation coefficient and stepwise regression to examine the relationships between variables.

Results: The findings demonstrated a statistically significant positive correlation between students' perceptions of their classroom environment and their sense of school belonging ($P < 0.001$). Similarly, a statistically significant positive correlation was observed between academic self-concept and school belonging ($P < 0.001$). Collectively, perceptions of the classroom environment and academic self-concept accounted for 27% of the variance in students' school belonging. Notably, academic self-concept exhibited a comparatively stronger predictive capacity in this relationship.

Conclusion: This study confirms that both perceived classroom environment and academic self-concept are significantly associated with students' sense of school belonging. Furthermore, academic self-concept demonstrates a more robust predictive influence than classroom environment perceptions. These findings suggest that interventions designed to improve students' academic self-perception could be particularly effective in fostering a stronger sense of belonging within the school environment.

Introduction

School belonging, a pivotal determinant of students' motivation and academic achievement, significantly influences the quality of their educational experience. This construct, arising from a complex interplay of individual and environmental variables, not only impacts academic performance but also substantially contributes to the development of adolescents' socio-emotional identity.¹ Notably, the initial year of secondary education represents a critical juncture in psychosocial development, marked by students' navigation of diverse

academic and interpersonal challenges.² School belonging, as a foundational element of educational experience quality, plays a crucial role in students' academic success and psychosocial adaptation. This multidimensional construct, also shaped by the intricate interaction of individual and environmental factors, significantly shapes adolescents' educational and social identity, beyond its influence on academic outcomes.³ During the formative period of adolescence, the school environment, second only to the family, serves as a vital context for cognitive, emotional, and social maturation.⁴ Contemporary

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research in education and health underscores the protective and developmental function of students' social and psychological connectedness to school.⁵ The construct of school belonging effectively encapsulates this phenomenon, serving as a robust predictor of academic and social outcomes.⁶ Furthermore, school belonging has been recognized as a key metric for assessing the health and dynamism of educational systems, with its promotion associated with enhanced student academic progress. Indeed, the development of school belonging was predicated on the goal of integrating affective and academic functions, and enhancing the learner-school relationship.⁷

This investigation explores the predictive capacity of 'perception of the classroom environment' and 'academic self-concept' on school belonging, focusing on these two pivotal variables. Perception of the classroom environment, conceptualized as a multidimensional construct comprising affective, pedagogical, and social dimensions, exerts a significant influence on students' school-related attitudes.^{8,9} The quality of teacher-student interactions, the classroom's emotional atmosphere, instructional methodologies, and the degree of educational adaptability are all determinants that mold students' perceptions of the learning context.¹⁰ When students perceive the classroom as a nurturing, equitable, and intellectually stimulating environment, this positive orientation tends to extend to the broader school context, thereby cultivating a sense of attachment and belonging.¹¹ Consequently, examining the predictive role of classroom environment perception on school belonging offers valuable perspectives for enhancing the quality of learning spaces. Broadly defined, classroom environment perception encompasses learners' subjective interpretations of classroom and school-related variables, which are characterized by four key components: perceived interest, challenge, choice, and enjoyment.¹²

Academic self-concept, defined as an individual's subjective appraisal of their academic capabilities and performance, constitutes a further significant determinant of school belonging.¹³ This psychological construct, undergoing intense formation and transformation during adolescence, functions as a cognitive framework through which educational experiences are interpreted.¹⁴ Students exhibiting a positive academic self-concept tend to perceive learning challenges as opportunities for personal growth and demonstrate heightened perseverance in the face of academic obstacles.¹⁵ This proactive engagement with learning fosters increased involvement in classroom activities and social interactions, thereby establishing a conducive environment for the development of school belonging.¹⁶

The importance of this investigation lies in its potential to inform the development of targeted educational interventions through an enhanced understanding of the interplay between these variables. Specifically,

optimizing the classroom environment via teacher development and curriculum refinement can positively influence students' perceptions of the learning context. Conversely, bolstering academic self-concept through structured support initiatives can facilitate students' establishment of a more constructive relationship with the educational milieu. The outcomes of this study may serve as a foundation for educational policy formulation aimed at both enhancing learning environment quality and promoting students' psychosocial well-being. Furthermore, this research contributes to addressing the existing lacuna in domestic literature concerning factors influencing school belonging. Given the cognitive and affective transformations characteristic of adolescence and students' heightened sensitivity to interpersonal dynamics, an examination of these variables provides salient insights for educational practitioners. The findings herein can be utilized to design targeted educational interventions that concurrently improve classroom environment quality and foster positive academic self-concept among students. This study investigated whether students' perceptions of the classroom environment and academic self-concept significantly predict their school belonging.

Methods

A descriptive-correlational design was implemented to explore relationships within a population of female high school students (aged 13-15) in Tehran (2024). A multi-stage cluster sampling strategy was employed, initially selecting District 3 of Tehran, followed by the random selection of six first-year secondary girls' schools and three classes per school. Sample size was determined based on structural equation modeling guidelines, targeting 10 participants per parameter ($n = 350$), with 385 students recruited to account for potential attrition. After excluding incomplete or invalid responses, a final sample of 361 was retained. Inclusion criteria stipulated female students aged 13-15, without diagnosed psychological disorders, who provided informed consent. Exclusion criteria consisted of incomplete questionnaires and non-compliance with research procedures.

Data Collection Instruments

The Sense of School Belonging Questionnaire

Students' sense of school belonging was measured using the Sense of School Belonging Questionnaire,¹⁷ a 27-item instrument employing a four-point Likert-type scale (ranging from 'completely agree' [4] to 'completely disagree' [1], with a total score range of 27 to 108, where higher scores indicate a greater sense of school belonging). This questionnaire evaluates six subscales: peer belonging, teacher support, fairness, safety, academic engagement, and wider community involvement. For this study, the total scale score was utilized. The Persian version of the questionnaire was validated by Makian and Kalantar

Koosheh,¹⁸ who established its construct validity through factor analysis among Persian students. The instrument demonstrated robust internal consistency, as evidenced by a Cronbach's alpha of 0.83, which aligns with previously reported reliability coefficients ($\alpha=0.88$).¹⁸

The Dundee Ready Education Environment Measure (DREEM)

The Dundee Ready Education Environment Measure (DREEM), a 49-item instrument developed in 2001,¹⁹ was employed to assess students' perceptions of educational quality across multiple dimensions. These dimensions encompassed students' perceptions of learning, teachers, scientific ability, the educational environment, and their social status. Responses were recorded on a five-point Likert scale, ranging from 'very low' (1) to 'very high' (5), with a maximum total score of 245. Interpretation of scores ranged from 'very poor environment' (0-50) to 'excellent environment' (151-245). The Persian adaptation of the DREEM was validated by Bahrami et al,²⁰ who confirmed its content and construct validity among Persian-speaking students. The DREEM demonstrated acceptable internal consistency in this study (Cronbach's $\alpha=0.80$), which is comparable to previously reported reliability ($\alpha=0.84$).²⁰

The Academic Self-Concept Questionnaire

Students' academic self-concept was assessed using a 15-item questionnaire, designed to measure perceptions of academic capabilities across general, institutional, and non-institutional domains. Responses were recorded on a four-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (4), with total scores ranging from 15 to 60. Higher scores indicated a more positive academic self-concept.²¹ The Persian version of this questionnaire was validated by Hamedi et al,²² who established its construct validity through confirmatory factor analysis. The instrument demonstrated robust internal consistency in this study (Cronbach's $\alpha=0.91$), which aligns with previously reported reliability coefficients ($\alpha=0.87$).²²

Statistical Analyses

Statistical analyses were conducted using SPSS version 27. Descriptive statistics, including means and standard deviations, were calculated to summarize the data. Inferential analyses, specifically Pearson's correlation coefficient and stepwise regression, were employed to assess the predictive relationship between perceptions of classroom environment and academic self-concept and students' sense of school belonging.

Results

The study sample consisted of 361 female high school students, aged 13 to 15 years. Grade distribution within the sample was as follows: 28.3% ($n=102$) in the seventh grade, 32.7% ($n=118$) in the eighth grade, and 39.0% ($n=141$) in the ninth grade.

Table 1 presents the descriptive statistics for the variables under investigation. The mean school belonging score ($M=62.99$, $SD=11.26$) indicates a relatively positive sense of school belonging among participants, with a negatively skewed distribution (Skewness = -0.82) suggesting a preponderance of higher scores. Academic support scores demonstrated the highest variability ($SD=29.14$) with a high mean ($M=145.78$), exhibiting a near-symmetrical distribution (Skewness = -0.06). Emotional self-awareness scores showed moderate levels ($M=36.71$, $SD=5.87$) with the lowest variability and a near-symmetrical distribution (Skewness = -0.09). All variables displayed slightly positive kurtosis, indicating a leptokurtic distribution, though the school belonging variable showed a more pronounced peak.

Pearson's correlation analysis revealed statistically significant positive correlations between perceptions of the classroom environment and school belonging ($r=0.39$), as well as between academic self-concept and school belonging ($r=0.49$), both at $P<0.001$ (Table 2). To evaluate the relative predictive contributions of these variables to school belonging, a stepwise regression analysis was conducted, with perceptions of the classroom environment and academic self-concept as predictors and school belonging as the criterion variable. The results of the regression analysis are presented in Table 3.

Table 3 reveals that in the initial regression model, academic self-concept emerged as the strongest predictor of school belonging. This variable exhibited a correlation coefficient of 0.49 with school belonging and accounted for 24% of the variance in the criterion variable. In the subsequent model, perception of the classroom environment was added to the equation, alongside academic self-concept. The combined correlation of these two variables with school belonging was 0.52, explaining approximately 27% of the variance in school belonging. The inclusion of classroom environment perception resulted in a 3% increase in predictive power. Considering the sequential entry of variables, academic self-concept, with a standardized beta (β) of 0.49, demonstrated the most substantial contribution to predicting variations

Table 1. Means, standard deviations (SD), skewness, and kurtosis of research variables

Variables	Means	SD	Skewness	Kurtosis
School belonging	62.99	11.26	-0.82	1.29
Perceptions of classroom environment	145.78	29.14	-0.06	0.42
Academic self-concept	36.71	5.87	-0.09	0.41

Table 2. Correlation coefficients of school belonging based on perceptions of classroom environment and academic self-concept

Variables	School belonging	P
Perceptions of classroom environment	0.39	0.001
Academic self-concept	0.49	0.001

Table 3. Summary of stepwise regression analysis

Model	Predictor variable(s)	F	R	R ²	B	SE	β	t	P
1	Academic self-concept	113.65	0.49	0.24	0.94	0.09	0.49	10.66	0.001
2	Academic self-concept, perceptions of classroom environment	67.24	0.52	0.27	0.75	0.10	0.39	7.64	0.001

in school belonging. Subsequently, both academic self-concept and classroom environment perception, with a standardized beta (β) of 0.39, significantly contributed to the prediction of school belonging.

Discussion

This research sought to evaluate the predictive capacity of students' perceptions regarding the classroom environment and their academic self-concept in relation to their sense of school belonging. The current study demonstrates a significant association between students' perceptions of the classroom environment, academic self-concept, and their sense of school belonging. These variables collectively accounted for 27% of the variance in school belonging. Specifically, a positive and significant relationship was observed between perceived classroom environment and students' school belonging, a finding corroborated by prior research.^{23,24} This outcome can be attributed to the classroom environment's multidimensional nature, encompassing affective, pedagogical, and social elements, which significantly shape students' school belonging. A perception of the classroom as supportive, equitable, and intellectually stimulating fosters a positive attitude that extends to the broader school context, promoting attachment and belonging. Aligned with self-determination theory, educational settings that meet students' fundamental needs for competence, autonomy, and relatedness facilitate intrinsic motivation and belonging. Within this framework, teacher-student relationship quality, a core component of classroom environment perception, directly influences students' feelings of security and acceptance.²³ Educators employing warm, supportive communication and clear instructional expectations cultivate an environment conducive to students' sense of value and belonging. Beyond teacher-student interactions, the classroom's emotional climate plays a pivotal role in the development of school belonging.

Learning environments defined by mutual respect, trust, and collaborative engagement facilitate students' perception of themselves as integral members of a learning community. This sense of group affiliation, particularly pronounced during adolescence when social acceptance is paramount, plays a crucial role in cultivating school belonging. Moreover, the pedagogical organization of the classroom, including instructional strategies, diverse learning activities, and adaptive responses to individual student needs, significantly impacts students' perceptions of the classroom milieu. When students experience active participation in the learning process and perceive their

contributions as valued, the probability of developing school belonging is substantially enhanced.²⁴ Students who perceive equitable treatment for themselves and their peers, and consistent application of rules, develop a more favorable disposition toward school. This perception of fairness and impartiality reinforces trust in the educational system, enabling students to view the school as a secure and reliable context.²⁵ Conversely, perceived discrimination or inequity can engender feelings of alienation and disengagement from the school environment. Furthermore, the physical classroom setting, as an element of students' environmental perception, also influences their sense of belonging. Well-maintained, organized classrooms furnished with appropriate educational resources communicate a positive message regarding the school's valuation of students, thus fostering a sense of ownership and affiliation. In light of these multifaceted mechanisms, a positive and significant association between positive perceptions of the classroom environment and school belonging is anticipated.

Furthermore, the present study revealed a positive and statistically significant correlation between academic self-concept and students' sense of school belonging. This observation aligns with findings reported in previous research.^{13,26} This relationship can be attributed to academic self-concept, which, as a student's cognitive representation of their academic abilities and performance, significantly influences the quality of their engagement with the educational context. This psychological construct, highly susceptible to social feedback during adolescence, functions as a perceptual lens through which educational experiences are interpreted. Students with a positive academic self-concept tend to perceive academic challenges as opportunities for personal development and exhibit increased resilience when confronted with academic obstacles.¹³ This proactive engagement with learning, in turn, fosters enhanced participation in classroom activities and school-based social interactions, thereby creating a conducive environment for the development of school belonging.

Drawing upon self-determination theory, perceived competence, a core element of positive academic self-concept, fosters heightened intrinsic motivation for engagement in school activities, which in turn facilitates the development of a profound sense of belonging within the educational setting.²⁷ Conversely, students with diminished academic self-concept tend to construe the school environment as threatening, characterized by persistent exposure to negative evaluations. This defensive posture may result in avoidance of classroom participation

and social isolation, thereby impeding the cultivation of school belonging. It is particularly noteworthy that academic self-concept is exceptionally malleable during early adolescence, a developmental period marked by the formation of academic identity, wherein feedback from educators and peers can exert enduring effects on self-perception. Moreover, a reciprocal relationship exists between school belonging and academic self-concept; students who experience a sense of belonging within the school community typically receive more constructive feedback, which subsequently reinforces their academic self-concept. This positive feedback loop can contribute to the sustained enhancement of both academic self-concept and school belonging.²⁶

Within a socio-cognitive framework, academic self-concept shapes students' interpretations of academic successes and failures. Students who hold a strong perception of their competence and capability tend to attribute transient failures to controllable variables, thereby transforming them into learning opportunities. This adaptive attributional pattern facilitates their ability to manage academic challenges and sustain a positive connection with the school environment. Conversely, students with a diminished academic self-concept typically attribute failures to stable and pervasive factors, potentially resulting in decreased motivation and a sense of detachment from school.²⁸ Moreover, academic self-concept modulates students' goal selection and performance standards; individuals who perceive themselves as proficient learners are inclined to set more demanding goals, the attainment of which can amplify feelings of pride and school attachment. Considering these intricate and interrelated mechanisms, a direct and significant association between positive academic self-concept and school belonging is posited, wherein the augmentation of one can foster the enhancement of the other, thereby establishing a positive feedback loop within students' educational experience.

Several limitations warrant consideration. First, the study's focus on a specific demographic—female high school students aged 13-15 in Tehran's girls' schools—restricts the generalizability of the findings. Further research is required to determine the applicability of these results to male students, other educational levels, and diverse urban populations. Second, the study did not control for potential confounding variables, such as familial socio-economic status, school culture, and educational policies, which may have influenced the observed outcomes.

Conclusion

In summary, this research furnishes empirical evidence supporting the salient impact of perceived classroom environment and academic self-concept on students' sense of school belonging. The statistically significant

positive correlations observed emphasize the critical role of these constructs in cultivating a positive affiliation with the school community. Although the combined influence of these variables explained a considerable proportion (27%) of the variance in school belonging, the relatively greater predictive efficacy of academic self-concept indicates its preeminent importance. This observation suggests that interventions designed to bolster students' academic self-perception may produce particularly significant enhancements in their sense of belonging within the educational context.

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Competing Interests

The authors declare no conflict of interest.

Ethical Approval

This study was conducted in accordance with established ethical guidelines and received formal approval from the Ethical Committee of Islamic Azad University North Tehran Branch (approval code: IR.IAU.TNB.REC.1403.262).

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