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Predicting Students Academic Achievement based on Academic Persistence and Academic Flow

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ABSTRACT

Objective: The identification of the determinants and variables influencing academic performance has consistently represented a focal point of inquiry for professionals within the realms of education and training; consequently, the current investigation was undertaken to examine the influence of academic persistence and academic flow in forecasting students' academic success.

Methods: This research was characterized as descriptive-correlational, with the study population consisting of all sixth-grade female students residing in District 2 of Tehran in the year 2023, from which 100 eligible participants were selected through convenience sampling methods. The participants responded to the Howard and Crayne Multidimensional Persistence Scale, the Martin and Jackson Academic Flow Scale, and the Dortaj Academic Achievement Questionnaire. Data analysis was conducted employing the Pearson correlation coefficient test and multiple regression techniques.

Results: The findings indicated a positive and statistically significant correlation between academic persistence and academic flow concerning academic achievement, with academic persistence and academic engagement accounting for approximately 0.57 of the variances observed in academic success ($P<0.01$).

Conclusions: The implications of this study underscore the critical significance of academic persistence and academic flow in enhancing students' academic performance.

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Introduction

The advancement and evolution of any societal construct is intrinsically linked to its educational framework, whereby academic progression is deemed one of the most salient determinants within any educational paradigm (Shafiei et al., 2023). The academic advancement of students serves as a critical metric for assessing educational efficacy, and all endeavors within this framework are fundamentally regarded as efforts for society to address this imperative. Society, in a broader context, as well as the educational framework specifically, exhibits a vested interest and concern regarding the future trajectories of children, their successful maturation and development, and their societal standing, thereby anticipating that students will thrive and excel across multiple dimensions, including cognitive development and the acquisition of competencies and abilities, in addition to emotional and personality growth (Rezaei Gazki et al., 2019). Academic success is characterized as the acquired or learned capabilities of a student in relation to educational matters and is quantified through standardized national assessments or assessments devised by educators; furthermore, the ongoing evaluation of academic success constitutes one of the fundamental cornerstones for enhancing the quality of the educational framework, which can facilitate superior development of educational curricula and elevate educational standards (Kubiszyn & Borich, 2024). Academic persistence represents one of the most pivotal determinants of educational success that has attracted considerable scrutiny from scholars and psychologists. Researchers have designated the term academic persistence to encapsulate these continuations; hence, academic persistence refers to the continuity and sustainability within the educational realm and embodies the intentional actions of students to uphold their academic standing and pursue further educational attainment, conceptualized as a behavioral commitment to education and learning, characterized by perseverance in the face of adversity (Burrus et al., 2013); therefore, the deliberate and practical resolve of the learner to preserve the existing state and advance their educational journey at elevated tiers is referred to as academic persistence (Thalib et al., 2018). Broadly, academic persistence signifies continuity and a behavioral commitment to the domains of education and learning (Soleymani et al., 2024). An individual exhibiting academic persistence demonstrates significant tenacity and maintains a relentless pursuit of knowledge acquisition. Such an individual is dedicated to the continuation of their educational journey and, when confronted with challenges and impediments, amplifies their efforts rather than succumbing to despair (Roland et al., 2016).

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Conversely, another significant element that may influence academic progression is academic flow, a term initially introduced by Csikszentmihalyi et al. (2005). Flow is described as a constructive psychological state in which an individual becomes fully engrossed in a demanding task, characterized by elevated arousal and concentration, commensurate with a particular level of skill ((Mäkikangas et al., 2010). Faghihi et al. (2018) further assert that students who experience heightened levels of enthusiasm are more likely to complete activities and assignments due to the challenge and enjoyment derived from the undertaking, rather than solely from external reinforcing stimuli.

Flow represents a cognitive state characterized by heightened attention that is internalized and generally manifests during an individual's active engagement with challenging tasks (Toussi & Ghanizadeh, 2012). As per the flow experience theory, the simultaneous acquisition of intense focus, interest, and gratification in an activity is requisite for the emergence of flow. This psychological state correlates with intrinsic motivation, a high degree of perceived control, diminished self-awareness, and a sense of enjoyment (Admiraal et al., 2011).

Education constitutes a fundamental pillar of any society, and the advancement and development of any nation are intrinsically linked to the caliber of its educational system. Consequently, academic progress and regression serve as critical indicators of the efficiency of the educational framework; thus, the identification and analysis of the variables influencing this phenomenon significantly contribute to a more profound comprehension and forecasting of academic outcomes. Understanding the determinants affecting academic progress can facilitate enhanced educational planning and fortify the educational infrastructure. In light of this, the present investigation was undertaken with the objective of examining the influence of academic persistence and academic flow on the prediction of students' academic progress; it specifically aims to address the inquiry: do academic persistence and academic flow contribute to the prediction of students' academic progress?

Material and Methods

The current investigation represents a descriptive correlational analysis. The research population encompassed all female students in the sixth grade residing in the second district of Tehran during

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the academic year 2023, from which 100 eligible students who expressed a willingness to participate were selected through convenience sampling methods. The inclusion criteria consisted of being a female, enrolled in the sixth grade, possessing informed consent (parents), and demonstrating mental health as per the health records, while the exclusion criteria encompassed a lack of cooperation in the study and incomplete questionnaires. The instrument utilized for data collection comprised several questionnaires.

Multidimensional Persistence Scale: This scale was formulated by Howard and Crayne (2019) and consists of 13 items categorized into three components: persistence in the face of difficulty (items 1 to 5), persistence despite fear (items 6 to 10), and inappropriate persistence (items 11 to 13). Scoring is conducted on a five-point Likert scale ranging from very low (score of 1) to very high (score of 5), with the composite scores spanning from 13 to 65. The validity of the scale was substantiated through factor analysis, while reliability was ascertained via Cronbach's alpha for the factors of persistence despite difficulty, persistence despite fear, and misplaced persistence, yielding total scores of 0.79, 0.82, 0.81, and 0.87, respectively. The study conducted by Alipour et al. (2020) corroborated the factor analysis outcomes, affirming the three-factor model of the questionnaire. These three factors accounted for 0.82 of the total variances observed in the assessment.

The Academic flow Scale: This scale has 9-item and developed by Martin and Jackson (2008), is also scored on a 5-point Likert scale (strongly disagree: score 1 to strongly agree: score 5). The scoring range spans from 9 to 45, with elevated scores signifying greater academic infatuation and conversely. Martin and Jackson (2008) employed confirmatory factor analysis to ascertain internal validity and utilized Martin's Motivation and Passion Scale to evaluate external validity. They further examined the correlation between the short and long infatuation scales to enhance the comprehension of their respective psychometric properties within a sample. The Cronbach's alpha calculated from the available data was 0.92, while the construct reliability was determined to be 0.95. Overall, the short infatuation scale has garnered adequate psychometric endorsement through confirmatory analyses and the examination of relationships with other psychological constructs. In Iran, Faghihi et al. (2018) reported that the internal consistency coefficient for the entire scale, as measured by Cronbach's alpha, was 0.85, with the Guttman coefficient for evaluating split-half reliability measuring 0.82. The positive correlation of this scale with intrinsic motivation at 0.83

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signifies convergent validity, while its correlation with amotivation at -0.85 indicates divergent validity of the assessment. Confirmatory factor analysis substantiated the single-factor structure, and the findings of this study demonstrated that the Persian version of the flow scale possesses robust validity and reliability within the academic domain.

Standard Academic Achievement Questionnaire: This instrument was developed by Dartaj (2004) with the objective of assessing the performance levels and developmental progress of students. It encompasses 48 items that range from strongly disagree, receiving a score of one, to strongly agree, receiving a score of five, which correspond to the five dimensions of self-efficacy: specifically, items 1, 2, 3, 4, 12, 28, 29, 30, 31, 32, 36, 37, 40, 42, 46, 47, and 48, which are scored in a straightforward manner, while item 9 is scored in a reversed manner. The emotional dimensions (items 8, 13, 14, 15, 16, 17, 18, 19, 20) are scored directly, whereas items 31, 32, 35, and 36 are scored in a reversed manner. The planning-related items include 5, 41, 45, 46, and item 26, which is also scored in reverse. The lack of outcome control is assessed through items 8, 38, and 39, which are scored directly. The motivational aspects are evaluated through items 21, 22, 23, and 24, all of which are scored directly, with item 43 being scored in reverse. In the investigation conducted by Pourghorban Gourabi et al. (2021), content validity was utilized to ascertain the validity of the questionnaire. Consequently, the questionnaire was presented to a cohort of experts in educational sciences and psychology, who subsequently endorsed it. The reliability coefficients obtained across the various domains related to academic performance were as follows: the first dimension (92%), the second dimension (93%), the third dimension (73%), the fourth dimension (64%), and the fifth dimension (0.72).

Implementation method: Following the acquisition of requisite permissions from the Education Organization, essential coordination was facilitated with school officials and administrators. Upon entering the educational institutions, the adequacy of the conditions and physical environment was meticulously verified. Given the impracticality of compiling a comprehensive roster of student names, the random sampling technique was employed under these circumstances, a methodology that was thoroughly delineated in the research design section. Ultimately, through dialogues with school administrators, while adhering to ethical principles, including the confidentiality of information and the right to withdraw from participation, students were afforded the opportunity to consciously engage in completing the research questionnaires. Subsequent to the administration

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of the questionnaires, the data obtained were subjected to analysis via the Pearson correlation coefficient and multiple regression analyses, utilizing SPSS version 22 software.

Results

The correlation matrix, mean, standard deviation, skewness and elongation of the research variables are presented in table 1. According to Table 1, there is a positive and significant relationship between academic persistence and academic flow with students' academic achievement (P<0.01), therefore, with increasing academic persistence and academic flow, the level of academic achievement increases.

Table 1. The Descriptive indices of research variables

Variable	Academic persistence	Academic flow	Academic achievement
Academic persistence	1		
Academic flow	0.52**	1	
Academic achievement	0.64**	0.39*	1
Mean	42.87	28.72	47.87
SD	2.90	3.87	5.65
Skewness	0.42	0.85	0.48
Kurtosis	0.28	0.25	0.86

** p < 0.01, * p < 0.05

Before analyzing the data with the regression method, its assumptions were examined. The assumption of normality was not rejected due to the skewness and kurtosis values being in the range of +2 to -2 for any of the variables. Also, the variance inflation factor for predicting academic achievement based on academic persistence and academic engagement was 1.42 and the Durbin-Watson value for predicting academic achievement based on academic persistence and academic engagement was 1.85. Since if the variance inflation factor is less than 10, the multiple collinearity assumption is rejected, and if the Durbin-Watson value is in the range of 1.5 to 2.5, the residual correlation assumption is rejected, so the use of regression for analysis is allowed. Table 2 provided summary of the multiple regression model of academic persistence and academic flow in predicting academic achievement is presented.

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Table 2. Summary of the multiple regression model of academic persistence and academic engagement in predicting academic achievement

Variable	R	R^2	Adjusted R^2	D-W test
Academic persistence and academic flow	0.582	0.338	0.237	1.85

As delineated in Table 2, the correlation coefficient is quantified at 0.582, and the square of this coefficient (0.338) indicates that approximately 33.8 percent of the variance in academic achievement can be anticipated through the constructs of academic persistence and academic flow. Table 3 elucidates the findings of the multiple regression analysis employing a stepwise model to forecast academic achievement predicated on the dimensions of academic persistence and academic flow.

Table 3. Multiple regression analysis with the stepwise method results in academic achievement based on academic persistence and academic flow

Model	Variable	B	Beta	S.E	T(C.R)	P	R	R^2	F	P
1	Academic persistence	0.48	0.38	0.125	8.58	0.001	0.42	0.26	7.58	0.001
2	Academic persistence and	0.60	0.32	0.115	4.78	0.001	0.75	0.57	56.86	0.001
	academic flow	0.67	0.37	0.104	5.38	0.004				

According to Table 3, in the initial model, the variable of academic persistence was incorporated into the analytical model, and this construct exhibited a statistically significant capability to forecast 0.26 percent of the variance. In the subsequent model, both academic persistence and academic flow collectively demonstrated a significant ability to account for 0.57 percent of the alterations in academic achievement ($p<0.05$).

Discussion

The phenomenon of academic persistence and flow constitutes a pivotal element and a significant metric for enhancing the caliber of educational outcomes; consequently, the current investigation was undertaken with the objective of elucidating the influence of academic persistence and flow on the forecast of students' academic performance. The findings revealed a positive and statistically significant correlation between academic persistence and academic achievement, indicating that academic persistence possesses predictive capabilities regarding academic success. The results garnered are congruent with the findings of antecedent research within this domain.

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For instance, Krupnov et al. (2017) revealed a noteworthy correlation between sustained learning and academic achievement among elementary school students. The outcomes of Hedayati et al. (2015) indicated a significant positive association among psychological resilience, achievement motivation, and quality of life. In elucidating the aforementioned findings, it can be posited that academic persistence signifies an enduring commitment and behavioral dedication to the educational process and learning endeavors (Soleymani et al., 2024). An individual exhibiting academic persistence demonstrates substantial perseverance and consistently pursues knowledge acquisition. Such individuals remain steadfast in their educational journey, and when confronted with challenges, they amplify their efforts and maintain a sense of determination (Roland et al., 2016). Austin and Vispoel (1998) also posit that student involvement in extracurricular activities and engagement in relevant planning are critical components of academic persistence. Initially, academic persistence and its theoretical frameworks were perceived as adversaries to academic motivation and its corresponding models; however, it has since become evident that these constructs are interdependent, each contributing to a comprehensive understanding of the other. Therefore, academic persistence serves as a predictor and facilitator of academic achievement.

The results indicated a positive and significant correlation between academic flow and academic accomplishment, alongside the capacity of academic flow to forecast academic success. The findings obtained align with the outcomes of previous investigations in this area. For example, the research conducted by Naqsh and Shafipour Motlagh (2016) demonstrated a positive and significant relationship between academic flow, academic creativity, and academic success in conjunction with academic self-actualization. Additionally, the study by Sadoughi and Eskandari (2024) illustrated that fostering an interactive and participatory environment, along with challenging and engaging assignments, contributes to the enhancement of students' academic flow and facilitates the learning process. In the context of the aforementioned findings, it can be articulated that when students actively participate in the learning process, they are more inclined to experience a state of engagement, as they become fully immersed in the course material, often to the extent that they may lose track of time and overlook their surroundings; thus, intrinsic academic motivation significantly influences the nature and intensity of their engagement, ultimately leading to superior academic achievement.

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The constraints inherent in this investigation encompass the procurement of data via a questionnaire, which may diverge significantly from actual behavior due to the potential for self-reporting bias, coupled with the restricted sample size of primary school female students; hence, prudence is warranted when extrapolating the findings. It is recommended that subsequent inquiries incorporate alternative methodologies for data acquisition, such as interviews and participants from varied educational tiers across different urban locales. Furthermore, policymakers and educational administrators may enhance students' academic perseverance and motivation by implementing suitable educational programs and fostering an encouraging environment, thereby facilitating student advancement towards the enhancement of their competencies.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the ethics committee of Allameh Tabataba'i University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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