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The Impact of Intelligence and Motivational Beliefs on Academic Engagement Mediated by Academic Self-Concept

Soraya. Vahid[1], Ahmad Ali. Jadidian[2*], Davood. Jafari[3]

[1] PhD Student, Department of Psychology, Sanandaj Branch, Islamic Azad University, Sanandaj, Iran
[2] Assistant Professor, Department of Psychology, Kangavar Branch, Islamic Azad University, Kangavar, Iran
[3] Assistant Professor, Department of Psychology, Malayer Branch, Islamic Azad University, Malayer, Iran

*** Corresponding author email address**: ahjadidi53@gmail.com

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A B S T R A C T

Objective: The objective of this research was to investigate the impact of intelligence and motivational beliefs on academic engagement mediated by academic self-concept.

Methods and Materials: The population of this study consisted of 2,500 female high school students in Hamadan. Based on Cochran's formula and the estimated population variance, the sample size was estimated at 300 participants. The sampling method used was multi-stage cluster sampling. The current research method was applied in terms of objective, and descriptive-correlational and survey in terms of nature and data collection methods. Data were collected through both library studies to examine literature and research background and field studies to achieve the research objective. For measuring intelligence beliefs, the questionnaire by Abdel-Fattah and Yates (2006) was used; for motivational beliefs, the questionnaire by Pintrich and De Groot (1999); for academic self-concept, the questionnaire by Yessen Chen (2004); and for academic engagement, the questionnaire by Martin and Jackson (2005) was utilized. The data from the questionnaires were analyzed using SPSS 25 and LISREL 8.8 software.

Findings: The findings indicated that intelligence beliefs had a significant positive impact on academic engagement; motivational beliefs also had a significant positive impact on academic engagement; academic self-concept, in turn, positively affected academic engagement.

Conclusion: Ultimately, the results demonstrated that academic self-concept mediated the impact of intelligence beliefs on academic engagement as well as the impact of motivational beliefs on academic engagement.

Keywords: *Intelligence beliefs, Motivational beliefs, Academic engagement, Academic self-concept.*

1. Introduction

ngagement is described as "a positive mental state where the individual is deeply immersed in a challenging activity with high arousal and complete focus" (Bakker, 2008; Liu et al., 2023; Mahmodi et al., 2023; Mäkikangas et al., 2010). Engagement results from a balance between the skills required for the activity and the challenges it presents (Chiang et al., 2011). Three conditions are essential for achieving engagement: firstly, a clear goal must be chosen to encourage activity; secondly, there should be a good balance between perceived challenge and task-related skills; and thirdly, the task must receive immediate and clear feedback (Abdolmaleki et al., 2023). Engagement can occur during any activity but is more likely when the task is performed for intrinsic goals (Javan Mojarad et al., 2022; Maleki, 2022). One of the newer variables in the field of education is academic engagement. Wallen (1999) believed that engagement is a suitable goal for education because it encourages children to participate in learning. When students are actively involved in learning environments, engagement is more likely. It is no wonder that students in non-traditional learning environments, which emphasize active learning, are more likely to experience engagement (Tatiana et al., 2022). There are three areas to enhance intrinsic motivation and engagement in students. First, the student themselves. Csikszentmihalyi introduced a concept called "overlearning," in which students practice new skills beyond basic mastery, leading to automatization. Overlearning enables the mind to focus on the desired performance as a unique, integrated act, thus increasing the individual's capacity for engagement. The second and third areas are the support structures of parents and teachers. Parents should provide two things: first, emotional support, acceptance, and traditions that bring the family together and let the child feel that their goals are supported. Second, challenge with high expectations in a way that provides opportunities for the child's personal and private growth (Chen & Zhang, 2022; Javan Mojarad et al., 2022).

The theory of engagement is closely related to the concept of motivation. For example, according to Chen and Ahern (1999), engagement explains how the structure of an activity in terms of challenge, purpose, feedback, focus, and control has significant effects on intrinsic motivation. Engagement nurtures basic psychological needs including competence, autonomy, and relatedness, which are significantly linked to increased affection, pleasure, and intrinsic motivation (Robayo-Tamayo et al., 2020; Rossi et al., 2017). Csikszentmihalyi (1990) believes that "engagement represents the ultimate form of motivation on the path of internalization and intrinsic motivation. Also, the pleasure derived from an activity, the intrinsic motivation to perform an activity, and becoming completely absorbed in it are important aspects of the engagement experience" (Mahmodi et al., 2023).

Motivational beliefs refer to a set of personal and social standards that individuals refer to for performing or avoiding an action. These motivational standards are formed by the approval or disapproval of significant people in one's life. However, internal standards can also form in various ways such as identification, modeling, direct teaching, personal experience, encouragement, and punishment (Green et al., 2007). Research has shown that the use of a person's talents depends on their motivation. It has often been seen that students with very similar learning abilities and talents differ greatly in academic progress (Burić & Kim, 2020; Dehghani & Hekmatiyan Fard, 2020; Zhang & Liu, 2019). In terms of motivational beliefs, important research has shown that students' beliefs about their abilities are important for their progress and academic motivation (Green et al., 2007; Smit et al., 2017). The study by Pintrich and De Groot (1990) indicated a difference between genders in terms of self-efficacy. These researchers showed that boys have a higher sense of self-efficacy than girls, but there are no differences between boys and girls in terms of academic performance, cognitive strategies, and intrinsic motivation (Pintrich & De Groot, 1990).

On the other hand, an individual's belief in their abilities can affect both their social cognition and their academic engagement. People's beliefs about their abilities have different emotional, cognitive, and behavioral outcomes (Bandura, 1997). Intelligence is one of the abilities that people have different beliefs about. According to the cognitive-social approach by Dweck & Leggett (1998), Dweck & Molden (2005), and Dweck (2011), people's intelligence beliefs include incremental beliefs and innate beliefs. According to Dweck (2000), intelligence beliefs are semantic systems that direct an individual's behavior and make predicting their behavior for others possible. In fact, according to her, it is these beliefs that organize the world around us, lead to greater understanding of the social environment and surroundings, give meaning to our experiences, and generally form each person's behavioral and semantic system, making their behaviors predictable. Dweck (2000) believes that intelligence beliefs are related to students' academic achievements. In behavioral sciences and within the framework of examining relationships between a set of variables, conditions are such that the impact of

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context-related variables cannot be ignored, as these contextual factors can play a unique role in determining the nature and quality of these relationships (Dweck, 2013).

On the other hand, over the past two decades, self-concept has been recognized as an important and influential motivational behavior on individuals' academic progress (Huang, 2011; Marsh et al., 1991; Mohajeran et al., 2017; Pinxten et al., 2015; Skaalvik & Valås, 2001; Zahed Babolan et al., 2017). Self-concept is a general concept that refers to a person's perceptions of their abilities, capabilities, and limitations. This perception encompasses various performance-related areas. Part of the self-concept is academic self-concept, which has a significant impact on students' behavior. Academic self-concept refers to a student's perception of their competence regarding academic learning (Mohajeran et al., 2017) and means one's perception of their academic capabilities and limitations, which plays an important role in understanding students' learning, growth, and success in school (Martin & Liem, 2010). In fact, a strong academic self-concept has many educational outcomes for students and positively predicts students' academic success (Chevalère et al., 2023). Pekrun et al. (2011) defined academic self-concept as the process of forming self-evaluations influenced by students' evaluative experiences and interpretation of the educational environment. Academic self-concept gradually takes shape in the early years of schooling, and over time, the individual forms a positive or negative perception of themselves in academic matters as academic self-concept. Individuals who feel more confident and capable in academic tasks compared to others have a higher academic self-concept, and consequently, such self-concepts lead to the growth and academic progress of the individual and prevent the emergence of negative emotions (Basharpoor & Heidari, 2022; Kocaj et al., 2018; Lohbeck & Moschner, 2021; Miao et al., 2018; Mousavi & Badri, 2016; Nasiri et al., 2017; Zahed Babolan et al., 2017).

Given what has been said and considering that students spend most of their time in school, they are constantly exposed to social interactions and are evaluated. These evaluations, whether direct or indirect, have their effects on the person, and it is through these evaluations that the individual gains a perception of their academic status (Zahedbabolan, Karimian Pour, Dashti, 2018). Therefore, this thesis seeks to investigate how the impact of intelligence and motivational beliefs on academic engagement is mediated by academic self-concept (Case Study: High Schools in Hamadan City)?

2. Methods and Materials

2.1. Study Design and Participants

The current research method was applied in terms of its objectives and descriptive-correlational and survey-based in terms of its nature. The study population consisted of all female high school students in Hamadan during the 2021-2022 academic year, totaling 2,500 according to statistics from the Hamadan Department of Education. Based on Cochran's formula and the estimated population variance, the sample size was estimated at 300. The sampling method employed was multi-stage cluster sampling.

2.2. Measures

For the measurement of intelligence beliefs, the 14-item questionnaire by Abdel-Fattah and Yates (2006) was used (Hejazi et al., 2009); for motivational beliefs, the 22-item questionnaire by Pintrich and De Groot (1999); for academic self-concept (Pintrich & De Groot, 1990), the 15-item questionnaire by Yessen Chen (2004); and for academic engagement, the 9-item questionnaire by Martin and Jackson (2005) was utilized (Hejazi et al., 2009). The research questionnaires used a 5-point Likert scale ranging from "Strongly Agree (5)" to "Strongly Disagree (1)." The validity of the questionnaires was confirmed through content validity and expert consultation with university professors and also through confirmatory factor analysis (CFA) in the analysis section. The reliability of the questionnaires was calculated using Cronbach's alpha, resulting in an overall reliability coefficient of 0.923, which is much higher than the standard number of 0.7, indicating excellent reliability of the research questionnaire. The reliability coefficient for each of the four research variables and the eight related dimensions was also above 0.7, which is very satisfactory.

2.3. Data analysis

The data from the questionnaires were analyzed using SPSS 25 and LISREL 8.8 software and SEM method.

3. Findings and Results

The analysis of demographic data showed that regarding fathers' education, 124 individuals had fathers with below a high school diploma, 85 had fathers with a high school diploma, 48 had fathers with a bachelor's degree, 37 had fathers with a master's degree, and 6 had fathers with a doctorate or higher. Regarding mothers' education, 100

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individuals had mothers with below a high school diploma, 103 had mothers with a high school diploma, 60 had mothers with a bachelor's degree, 34 had mothers with a master's degree, and 3 had mothers with a doctorate or higher. Concerning the type of family residence, 5 lived in relatives' homes, 11 in organizational housing, 56 in mortgaged homes, 37 in rented homes, and 191 in privately owned homes. In terms of household income, 37 individuals had an income of less than 5 million tomans, 163 between 5 to 10 million tomans, 81 between 10 to 20 million tomans, and 19 had more than 20 million tomans. Table 1 shows the descriptive statistics (mean, standard deviation, variance, and total scores) for the variables and dimensions of the study for the research sample.

Table 1

Descriptive Indices of Variables and Dimensions of the Study

Variable	Dimension	Mean	Standard Deviation	Variance
Intelligence Beliefs	Innate Intelligence Beliefs	3.71	1.114	1.243
	Incremental Intelligence Beliefs	4.18	1.113	1.241
	Total	3.94	0.881	0.778
Motivational Beliefs	Self-efficacy	4.37	0.877	0.771
	Intrinsic Valuation	4.37	0.879	0.773
	Test Anxiety	4.41	1.045	1.093
	Total	4.38	0.721	0.520
Academic Self-Concept	General	4.46	1.024	1.050
	Laboratory	5.33	0.909	0.828
	Non-Laboratory	6.01	1.185	1.405
	Total	5.27	0.733	0.538
Academic Engagement	-	4.77	1.094	1.198

As can be observed in Table 1, the overall mean for the variable "Intelligence Beliefs" is 3.94, which is slightly below the midpoint (i.e., the number 4 on a 7-point Likert scale); the overall mean for the variable "Motivational Beliefs" is 4.38, slightly above the midpoint; the overall mean for the variable "Academic Self-Concept" is 5.27, which is substantially above the midpoint; and finally, the overall mean for the variable "Academic Engagement" is 4.77, slightly above the midpoint. Among the dimensions of "Intelligence Beliefs," the "Incremental Intelligence Beliefs" dimension with a mean of 4.18 is higher than the "Innate Intelligence Beliefs" dimension with a mean of 3.71. Among the dimensions of "Motivational Beliefs," the "Test Anxiety" dimension ranks first with a mean of 4.41, followed by both "Self-efficacy" and "Intrinsic Valuation" with a mean of 4.37 each. Among the dimensions of "Academic Self-Concept," the "Non-Laboratory" dimension scored the highest with a mean of 6.01, followed by the "Laboratory" and "General" dimensions with means of 5.33 and 4.46, respectively.

Table 2

Pearson Correlation Matrix Between the Four Research Variables

Variable	Academic Engagement	Academic Self-Concept	Motivational Beliefs	Intelligence Beliefs
Intelligence Beliefs	.521	.566	.492	1.000
Motivational Beliefs	.601	.482	1.000	-
Academic Self-Concept	.458	1.000	-	-
Academic Engagement	1.000	-	-	-

According to Table 2, all pairwise relationships are significant at the 99% level (Sig = .000). The highest correlation coefficient is between "Motivational Beliefs" and "Academic Engagement" (.601); the lowest correlation coefficient is between "Academic Self-Concept" and "Academic Engagement" (.458). The coefficient of determination is .223 (R^2 = .4722), meaning that the three variables "Intelligence Beliefs," "Motivational Beliefs," and "Academic Self-Concept" together can predict approximately 22% of the variance in the dependent variable "Academic Engagement."

As indicated in, all correlation coefficients between the variables (dimensions and subscales of the desire for, self-differentiation, ego strength, and irrational beliefs) are

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positive and significant at the .05 level. Structural Equation Modeling (SEM) was applied to concurrently test the presumed relationship constructs in the current hypothesis. Table 3 shows the structural model, paths, and their standardizations in the final hypothesis model.

Table 3

Pearson Correlation Test Results Among the Eight Dimensions of the Study and Academic Engagement

Variable	Innate Intelligence Beliefs	Incremental Intelligence Beliefs	Self-Efficacy	Intrinsic Valuation	Test Anxiety	General	Laboratory	Non-Laboratory	Academic Engagement
Innate Intelligence Beliefs	1	.253	.115	.233	.231	.326	.329	.256	.241
Incremental Intelligence Beliefs		1	.370	.154	.235	.247	.200	.231	.331
Self-Efficacy			1	.470	.286	.303	.126	.115	.648
Intrinsic Valuation				1	.432	.331	.122	.218	.510
Test Anxiety					1	.473	.449	.421	.513
General						1	.116	.245	.312
Laboratory							1	.468	.441
Non-Laboratory								1	1
Academic Engagement									1

According to Table 3, all pairwise relationships are significant at the 99% level (Sig = .000). The highest correlation coefficient is between "Self-Efficacy" and "Academic Engagement" (.648); the lowest correlation coefficients are between "Innate Intelligence Beliefs" and "Self-Efficacy" as well as between "Self-Efficacy" and "Non-Laboratory," both at .115.

Table 4

Fit Indices for Structural Equation Modeling

Fit Indices	Research Values	Ideal Values	Fit Result
	1.774	≥ .5	Excellent Fit
Root Mean Squared Error of Approximation (RMSEA)	.080	≥ .1	Excellent Fit
Adjusted Goodness of Fit Index (AGFI)	.84	≤ .9	Excellent Fit
Normed Fit Index (NFI)	.94	≤ .9	Excellent Fit
Non-Normed Fit Index (NNFI)	.94	≤ .9	Excellent Fit
Comparative Fit Index (CFI)	.95	≤ .9	Excellent Fit
Incremental Fit Index (IFI)	.95	≤ .9	Excellent Fit
Goodness of Fit Index (GFI)	.90	≤ .9	Excellent Fit
Root Mean Square Residual (RMR)	.045	≥ .05	Excellent Fit
Standardized Root Mean Square Residual (SRMR)	.033	≥ .05	Excellent Fit

According to Table 4, the model fit indices are in a very favorable state. After confirming the appropriateness of the fit indices, the structural equation model is presented; it is important to show this model in a significant state to confirm that the paths are significant. Figure 1 shows the structural equation model in a significant state.

The values on the path in the structural equation model represent the t-statistic. If this statistic is outside the range of

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±1.96, the relationship is significant at the 95% level; if it is outside the range of ±2.58, it is significant at the 99% level. As observed in Figure 2, all t-statistics are outside the range of ±2.58; therefore, all relationships are significant at the 99% level. We now turn to the presentation of the structural equation model in its standardized form. Figure 2 shows this model in its standardized state.

The structural equation model shown in Figure 2 consists of two parts: A) Confirmatory Factor Analysis (CFA) or the measurement model, and B) Path Analysis or the structural model.

A) Confirmatory Factor Analysis: Figure 2 includes four (4) measurement models or confirmatory factor analyses, consisting of: 1) the latent variable of intelligence beliefs with its 14 related items connected by arrows, 2) the latent variable of motivational beliefs with its 22 related items connected by arrows, 3) the latent variable of academic self-concept with its 15 related items connected by arrows, and 4) the latent variable of academic engagement with its 9 related items connected by arrows. The numbers on the paths between the items (manifest variables) and the latent variable (four research variables) are called "factor loadings." As shown in Figure 3, all factor loadings for the 60 items of the study are above 0.3, indicating that the items (manifest variables) have a high explanatory effect and a strong relationship with their respective latent variables, which demonstrates the construct validity and high reliability of the model and the questionnaire items that measure the independent, mediating, and dependent variables effectively.

B) Path Analysis: In structural equation modeling, path analysis is used to test the research hypotheses. In structural equation modeling, the path coefficient or beta (β) is the number that shows how much the dependent variable changes (increases, decreases, stays the same) with a one-unit increase in the independent variable. Table 5 shows the results of the hypothesis testing using structural equation modeling (SEM) and specifically path analysis (PA).

Table 5

Testing Hypotheses 1 to 5 in Research

Hypothesis Type	Hypothesis Group	Independent Variables	Dependent Variables	Path Coefficient or β	t-Statistic	Hypothesis Outcome
Direct	Sub-hypothesis 1	Intelligence Beliefs	Academic Engagement	.76	14.88	Confirmed
Direct	Sub-hypothesis 2	Motivational Beliefs	Academic Engagement	.84	15.26	Confirmed
Direct	Sub-hypothesis 3	Academic Self-Concept	Academic Engagement	.72	14.50	Confirmed
Indirect	Sub-hypothesis 4	Intelligence Beliefs → Academic Self-Concept → Academic Engagement	.453 (.72*.63)	(14.50)(13.98)	Confirmed	
Indirect	Sub-hypothesis 5	Motivational Beliefs → Academic Self-Concept → Academic Engagement	.497 (.72*.69)	(14.50)(14.10)	Confirmed	

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Figure 1

Model with T-Values

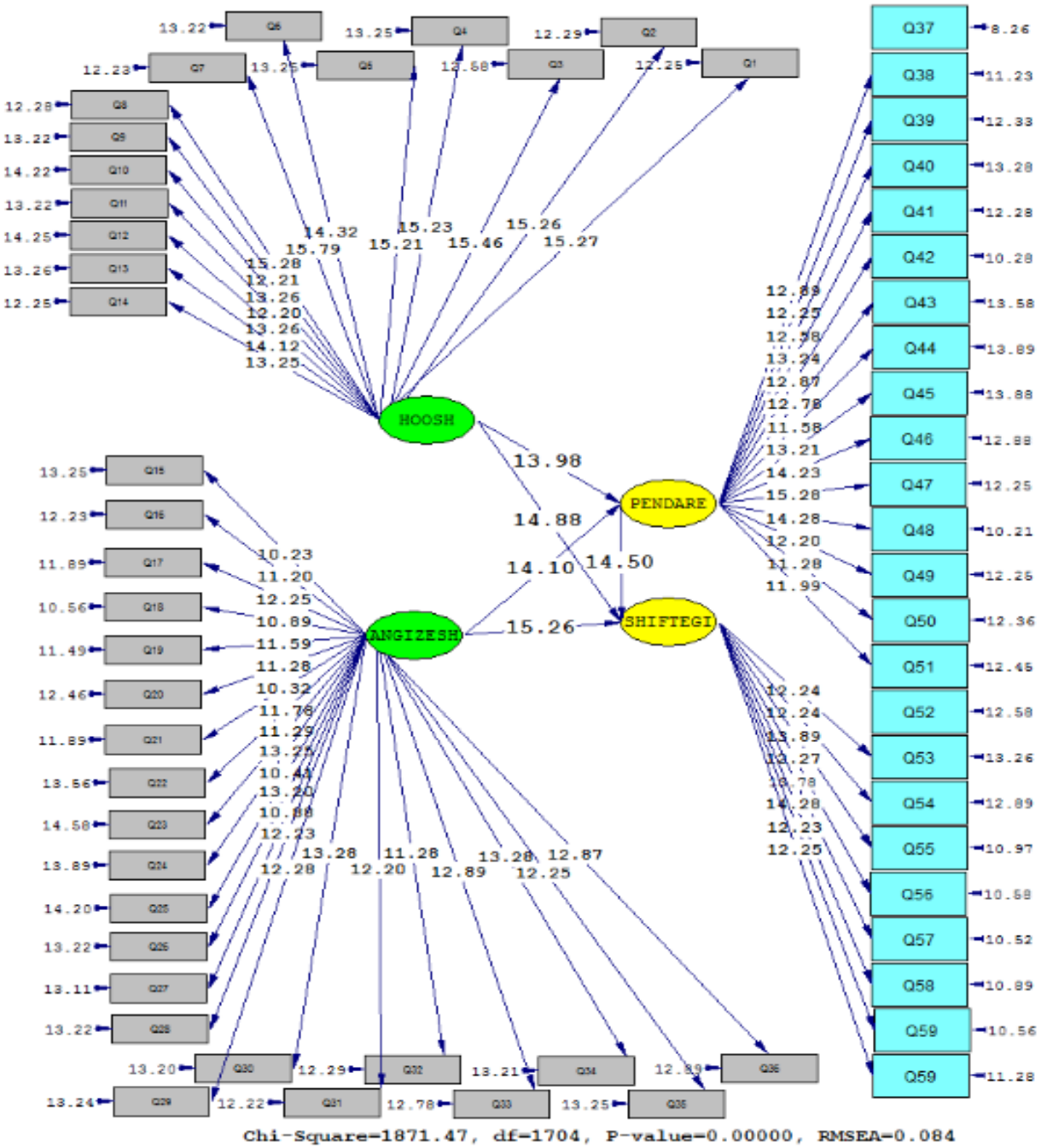

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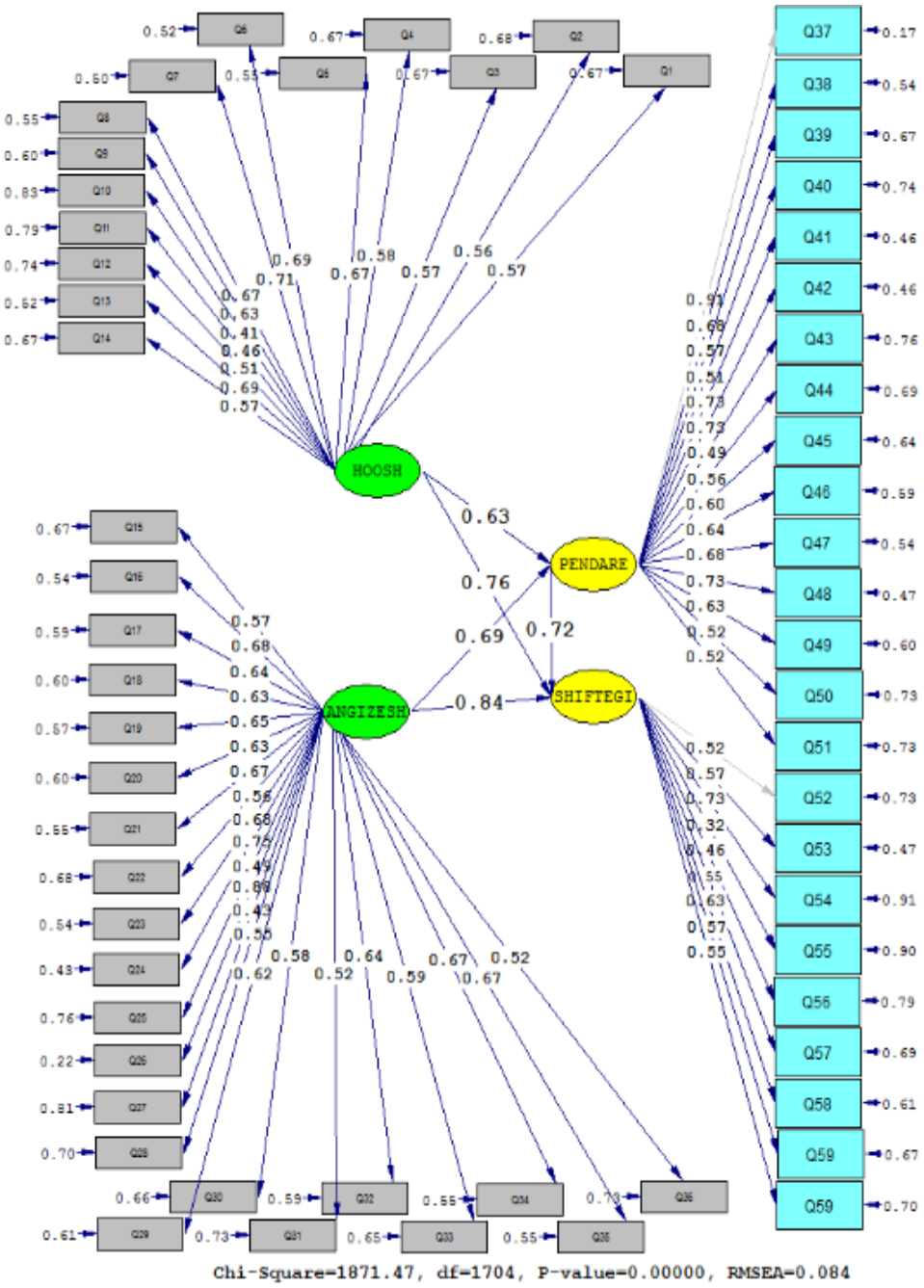
Figure 2

Model with Beta Values



HOOSH = Intelligence Beliefs; ANGIZESH= Motivational Beliefs; PENDAREH = Academic Self-Concept; SHIFTEGI = Academic Engagement

In structural equation modeling, acceptance or rejection of hypotheses depends on the t-statistics; if these values are outside the range of ±1.96, the hypothesis is accepted at the 95% level, and if outside the range of ±2.58, it is accepted at the 99% level. According to Table 5, since the t-statistics for all five direct research hypotheses and also the two indirect hypotheses are outside the range of ±2.58, all seven research hypotheses are significant at the 99% level, and thus are confirmed.

4. Discussion and Conclusion

In this study, we aimed to explore the impact of intelligence and motivational beliefs on academic engagement mediated by academic self-concept among

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female high school students in Hamadan. After designing an appropriate structural equation model (SEM) and verifying the suitability of the measures, we distributed and collected 300 questionnaires to assess the four research variables. Following the collection of the questionnaires, the designed constructs were tested through structural equation modeling (SEM) and, after achieving satisfactory model fit, the research hypotheses were tested, yielding the following results:

The result of the first hypothesis of the study indicated that "intelligence beliefs" with a beta coefficient (β) of 0.76 have a significant positive impact on "academic engagement" among female high school students in Hamadan. This finding is implicitly consistent with the prior research results (Hejazi et al., 2009). In explaining the findings from this hypothesis, it can be said that students who hold incremental beliefs about intelligence typically emphasize improving their competencies and acquiring new knowledge and strive to overcome past failures. They prefer tasks that are challenging and new. Conversely, individuals with innate intelligence beliefs tend to choose performance-oriented goals and prefer tasks that they can perform without error. Students who see intelligence as malleable and incremental exert more effort compared to those who believe in fixed intelligence. Students with incremental beliefs prefer challenging tasks (Chen & Zhang, 2022; Hejazi et al., 2009).

The result of the second hypothesis of the study showed that "motivational beliefs" with a beta coefficient (β) of 0.76 significantly positively affect "academic engagement" among these students. This finding coincides, implicitly, with the findings from prior studies (Bakker, 2008; Burić & Kim, 2020; Dehghani & Hekmatiyan Fard, 2020; Dweck, 2013; Green et al., 2007; Kocaj et al., 2018; Lohbeck & Moschner, 2021; Mäkikangas et al., 2010; Martin & Liem, 2010; Pintrich & De Groot, 1990; Smit et al., 2017; Zhang & Liu, 2019). In elucidating this finding, it can be stated that motivation is a three-dimensional phenomenon that includes an individual's beliefs about the reasons for performing a behavior and the emotional response to it. Educational motivation refers to behaviors that lead to learning and progress. Motivation encompasses three dimensions: intrinsic, extrinsic, and amotivation. In intrinsic motivation, the task itself is pleasurable for the individual, whereas in extrinsic motivation, the task is seen as a means to achieve another goal, and in amotivation, there is no link between behavior and its outcomes, and the individual attributes the cause of the behavior to forces outside their control (Martin & Liem, 2010; Pintrich & De Groot, 1990; Smit et al., 2017). People with high intrinsic motivation perform better than others and consider the utility and value of tasks and skills, as well as improving knowledge, overcoming weaknesses, and enhancing cognitive strengths as important and necessary. Consequently, these individuals increase their level of attention and effort, resulting in better outcomes (Green et al., 2007). Students with high intrinsic academic motivation pursue competence and mastery of academic subjects, feel responsible for achieving success, have high perseverance, and redouble their efforts in case of failure; on the other hand, extrinsic motivation involves behavior regulated to obtain positive outcomes or avoid negative consequences, essentially motivated by external environment and aimed at achieving external desires. Therefore, it can be said that these two variables stem from the same source, and the more successful an individual is in achieving external standards and expectations, the higher their extrinsic motivation becomes. Furthermore, in explaining this finding, it can be said that students with high extrinsic motivation are more goal-oriented towards external factors such as obtaining grades, excelling, receiving approval from teachers or peers, or even avoiding the consequences of failure, obtaining a diploma, achieving a better and preferred job, and preparing for a future career (Lohbeck & Moschner, 2021). Therefore, it is expected that motivational beliefs of students can directly affect their academic engagement.

The result of the third hypothesis showed that "academic self-concept" with a beta coefficient (β) of 0.72 has a significant positive impact on "academic engagement" among these students. This finding is implicitly consistent with the prior studies (Basharpoor & Heidari, 2022; Chevalère et al., 2023; Huang, 2011; Kocaj et al., 2018; Lohbeck & Moschner, 2021; Miao et al., 2018; Mousavi & Badri, 2016; Nasiri et al., 2017; Pinxten et al., 2015; Zahed Babolan et al., 2017). Individuals who consider themselves more effective, confident, and capable in performing tasks compared to others will have a higher academic self-concept, which consequently leads to growth and future academic progress, increased interest and motivation in them, and thus greater academic engagement (Mousavi & Badri, 2016; Pinxten et al., 2015). Accordingly, individuals who start their education with a positive perception of themselves and their capabilities foster this positive thinking, leading to their academic progress. Moreover, their academic progress provides positive feedback to their self-concept and the accuracy of their perception of themselves

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and their capabilities. According to Bandura's theory (2000), self-concept is a constructive power that effectively organizes cognitive, social, emotional, and behavioral skills to achieve various goals. Students form their academic self-concept in each subject using two judgments. The first is an external judgment, where an individual's skills in a subject are compared with those of other students, and the second is an internal judgment, where an individual's skills in one subject are compared with their skills in other subjects (Chevalère et al., 2023; Huang, 2011). According to the theory of academic learning, cognitive entry behaviors such as an individual's previous learning history, general intelligence, overall aptitude, verbal ability, and learning style, and emotional entry characteristics such as interests, attitudes, and emotions play a significant role in the formation and shaping of their academic self-concept (Lohbeck & Moschner, 2021).

The result of the fourth hypothesis showed that "intelligence beliefs" with a beta coefficient (β) of 0.453 have a significant positive impact on "academic engagement" among students mediated by "academic self-concept." This finding is implicitly consistent with the prior studies (Abdolmaleki et al., 2023; Chen & Zhang, 2022; Hejazi et al., 2009). In explaining the findings from the fourth hypothesis, it can be said that, according to the control-value theory, intelligence beliefs are a type of cognitive evaluation that affects the mental control and value people place on activities and academic outcomes. Individuals with incremental beliefs think that they can enhance their competence level through substantial effort (Smit et al., 2017). Hence, striving for success is valuable. These individuals have a higher sense of mental control over learning and its outcomes, which leads to pride and satisfaction from performance. As a result, the propensity for academic engagement increases. While individuals with innate beliefs assume that their abilities and competences are fixed, and effort and struggle do not play a role in changing their abilities. These individuals believe they have no, or very little, control over activities. Learning is not only important in itself, but external reinforcers such as good grades, others' encouragement, and rank advancement are valued (Abdolmaleki et al., 2023). Therefore, academic engagement increases. In this situation, academic self-concept can influence the relationship between intelligence beliefs and increased academic engagement.

The result of the fifth hypothesis showed that "motivational beliefs" with a beta coefficient (β) of 0.497 have a significant positive impact on "academic engagement" among students mediated by "academic self-concept." This finding is implicitly consistent with the prior studies (Kocaj et al., 2018; Lohbeck & Moschner, 2021; Martin & Liem, 2010; Pintrich & De Groot, 1990; Smit et al., 2017; Zhang & Liu, 2019). When an individual has a good perception of themselves, they feel capable and think confidently, thus they strive to ensure their behavior is associated with success, which later contributes to an increased sense of self-worth. Conversely, a student who considers themselves unsuccessful will perform academically below the level of their inherited talent and ability (Lohbeck & Moschner, 2021). That is, this student is capable of succeeding but cannot reach the expected level due to factors other than intelligence because they believe they are incapable (Kocaj et al., 2018). Thus, it can be claimed that students with a better self-concept, who trust in their academic abilities and capabilities, exert more effort in academic matters, which likely leads to greater interest in academic matters and student success. In such conditions, a student envisions greater motivational beliefs for their education and future academic purposes, which in turn enhances their academic engagement.

5. Limitations & Suggestions

Given the significant role of intelligence and motivational beliefs in students' academic performance, it is recommended that schools conduct training workshops to familiarize students, teachers, administrators, and parents with intelligence and motivational beliefs and their role in students' academic engagement. Moreover, considering the mediating role of academic self-concept in the relationship between motivational and intelligence beliefs and students' academic engagement, teachers should enhance academic engagement by creating the necessary conditions to elevate students' motivation, especially intrinsic motivation. To this end, teachers should be as flexible as possible in their classroom programs and avoid rigid, unchangeable plans. They should also assign tasks that are associated with personal success; or by demonstrating successful performance, provide similar and appropriate role models to reduce students' negligence and fatigue.

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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

All authors equally contributed in this article.

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