The University of Tehran Press

Journal of Cognitive Science Research

2025, 1(2), 53-62

Home Page: https://jcsr.ut.ac.ir/

Developing a Model of Psychological Flexibility in Students Based on Academic Resilience: The Mediating Role of Sense of Coherence

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ARTICLE INFO

Article type:
Research Article

Article History:
Received: 05 May 2025
Revised: 15 May 2025
Accepted: 07 Jun 2025
Published: 01 Jul 2025

Keywords:
Psychological flexibility, academic resilience, sense of coherence, high school students, structural equation modeling.

ABSTRACT

This study aimed to develop a model of psychological flexibility in high school students based on academic resilience, with sense of coherence as a mediating variable. A descriptive correlational design utilizing structural equation modeling was employed, involving 350 secondary school students from Khorramabad, Iran, in the 2023–2024 academic year, selected through cluster random sampling. Data were collected using the Multidimensional Cognitive Flexibility Questionnaire, the Sense of Coherence Questionnaire (short version), and the Academic Resilience Scale. Statistical analyses were conducted using $SPSS_{26}$ and $AMOS_{24}$. The findings revealed significant direct effects of academic resilience ($\beta=0.31$, $p<0.001$) and sense of coherence ($\beta=0.51$, $p<0.001$) on psychological flexibility, as well as a direct effect of academic resilience on sense of coherence ($\beta=0.56$, $p<0.001$). Additionally, sense of coherence partially mediated the relationship between academic resilience and psychological flexibility (indirect effect=0.28, $p<0.001$), with academic resilience explaining 32% of the variance in sense of coherence and, together with sense of coherence, accounting for 52% of the variance in psychological flexibility. These results suggest that fostering academic resilience and sense of coherence can significantly enhance students' psychological flexibility, providing a foundation for designing educational and psychological interventions to improve mental health and academic performance.

Cite this article: Sadeghi, M., Eslami, M., Mirzaeinia, MA., & Morshedi, MM. (2025). Developing a Model of Psychological Flexibility in Students Based on Academic Resilience: The Mediating Role of Sense of Coherence. *Journal of Cognitive Science Research*, *1*(2), 53-62. doi:10.22059/jcsr.2025.398800.1014

Publisher: University of Tehran Press
DOI: https://doi.org/10.22059/jcsr.2025.398800.1014

Introduction

High school students are at a sensitive and transitional stage of development, characterized by complex cognitive, emotional, and social challenges (Azimi et al., 2025; Hatami Nejad, Mikaeili, et al., 2024; Mohammadi et al., 2025). In addition to managing rapid internal changes, they are often exposed to external pressures such as academic demands, social comparisons, career planning, and identity formation (Hatami Nejad, Sadri Damirchi, et al., 2024). The way students respond to these challenges significantly influences their educational performance, mental health, and long-term psychosocial development (Noroozi Homayoon, Hatami Nejad, et al., 2024). Hence, identifying psychological capacities that enhance students' adaptability and coping mechanisms is of growing importance in contemporary educational and mental health research.

One such capacity is psychological flexibility, which refers to the individual's ability to adapt to changing situational demands, shift perspectives, tolerate internal experiences such as negative emotions or thoughts, and engage in goal-directed behavior that aligns with personal values (Memarzadeh et al., 2025). Psychological flexibility has been identified as a core component of psychological health and well-being, especially in contexts of stress and uncertainty (Rolffs et al., 2018). Among high school students, this construct is crucial for navigating academic stress, interpersonal conflicts, and identity struggles (Mohammadi et al., 2025). Research has shown that students with greater psychological flexibility are more likely to exhibit emotional regulation, persistence in the face of obstacles, and better overall mental health (Sharifi et al., 2025; Türk, 2025). Despite its importance, psychological flexibility remains an underexplored construct in educational settings, particularly in relation to variables that may enhance or support it (Mohammadkhani et al., 2022). Therefore, developing a model that explains how psychological flexibility is fostered in students is essential for designing interventions that promote academic and emotional adjustment.

One of the variables that appears to be closely linked to psychological flexibility is academic resilience. Academic resilience refers to the ability of students to effectively deal with academic challenges, maintain motivation and engagement in learning, and recover from failure or adversity in educational settings (Khoshgoftar et al., 2023). Students who are academically resilient tend to demonstrate perseverance, optimism, and goal-orientation despite encountering obstacles (Pakenham et al., 2023). Such characteristics are likely to foster flexible psychological responses, enabling students to reframe difficulties, regulate distress, and maintain adaptive functioning in stressful academic environments (Jo et al., 2024). While prior studies have confirmed the role of resilience in educational success, its specific contribution to psychological flexibility is less frequently addressed. A deeper understanding of this relationship could shed light on the psychological pathways through which students become more adaptable and mentally robust in their academic pursuits(Azimi et al., 2025).

In addition to academic resilience, another construct that may play a mediating role in this relationship is sense of coherence. Sense of coherence, as conceptualized by Antonovsky, is a global orientation that reflects the extent to which individuals perceive life as comprehensible, manageable, and meaningful (Antonovsky, 1993). A strong sense of coherence enables students to interpret stressful situations in an organized and predictable manner, believe that they have sufficient resources to meet demands, and view challenges as worth investing effort in (Mirsadegh et al., 2021). These qualities are deeply relevant to psychological flexibility, which involves openness to experience and the ability to act effectively under stress (Hailikari et al., 2022). Students with a higher sense of coherence are more likely to reappraise academic challenges in constructive ways, sustain focus on long-term values, and remain engaged despite discomfort or setbacks (Norouzi et al., 2023). Therefore, examining sense of coherence as a

mediating variable offers important theoretical insight into how internal perceptions and meaning-making processes influence flexible adaptation.

In sum, given the increasing complexity of academic and psychological demands faced by high school students, there is a pressing need to develop models that explain the underlying psychological mechanisms promoting adaptive functioning. Psychological flexibility is a foundational construct in this regard, yet it cannot be fully understood without considering the supportive roles of academic resilience and sense of coherence. Investigating how these variables interact can provide a more integrated understanding of student adjustment and inform practical efforts to strengthen coping strategies, emotional well-being, and academic success in adolescents.

Method

The present research method is descriptive correlation (structural equation modeling) and is fundamental in purpose. The statistical community in this study includes all secondary school students in the district of the city of Khorramabad in the academic year 2023–2024. To estimate the sample size in the opinion (Loehlin, 2004) and (Kline, 2023), the value of 100 is undesirable and more than 200 samples are desirable, and to adapt to the modeling of structural equations, the sample size should be at least 20 times the visible variable, so according to the number of visible variables and taking into account the probability of a drop in the sample size, the value of 350 samples was considered and entered into statistical analysis. The sampling method in this study was clustered randomly, so that from the district schools of a secondary school in Khorramabad, 10 schools and from each school, 2 classes were randomly selected. Being a student and consciously consenting to accountability were the criteria for entering the research, as well as not completing the questionnaire and not wanting to participate in the research, which were the criteria for leaving. Before the questionnaires were distributed to observe the ethics of the research, the purpose of the research was to explain how to implement it, to ensure that the principle of secrecy is maintained, and to give participants the right to choose to cooperate or withdraw while answering the questions of the questionnaires. It was also used to analyze data from SPSS 26 and AMOS 24 software.

Measurement Tools

Multidimensional Cognitive Flexibility Questionnaire

This questionnaire was developed by Rolfes and colleagues in 2018 and consists of 60 items designed to assess both cognitive flexibility and inflexibility (Rolffs et al., 2018). The scoring method is based on a six-point Likert scale ranging from "never" to "always." The questionnaire includes 12 subscales. The flexibility dimension comprises six subscales: acceptance, present-moment awareness, self-as-context, defusion, values, and committed action. The inflexibility dimension also includes six subscales: experiential avoidance, lack of contact with the present moment, self-as-content, fusion, lack of contact with values, and inaction. Rolfes et al. (2018) reported Cronbach's alpha coefficients ranging from 0.87 to 0.97 for the 12 subscales (Rolffs et al., 2018). Additionally, factor analysis results and fit indices specifically AVE values greater than 0.50 and CR values greater than 0.70 indicate that the scale possesses good validity and reliability. In Iran, this questionnaire was adapted and standardized by Azadfar et al (2022) using a sample of 307 individuals (Azadfar et al., 2022). In the present study, the reliability for the cognitive flexibility dimension was calculated with a Cronbach's alpha coefficient of 0.89.

Sense of Coherence Questionnaire – Short Version

The Sense of Coherence (SOC) questionnaire was developed by Antonovsky in 1987. Initially, this tool included 29 items and comprised three subscales: comprehensibility, meaningfulness, and manageability (Antonovsky, 1993). The short version has been reduced to 13 items,

covering comprehensibility (items 2, 6, 8, 9), meaningfulness (items 4, 7, 11, 12), and manageability (items 1, 3, 5, 10, 13). Scoring is based on a 7-point Likert scale, with a minimum score of 13 and a maximum of 91, indicating the lowest and highest levels of sense of coherence, respectively **(**Antonovsky, 1993**)**. Previous studies have confirmed the reliability of the SOC scale with Cronbach's alpha coefficients ranging from 0.70 to 0.92 **(**Rohani et al., 2010**)**. Internal construct validity has also been reported between 0.82 and 0.86 in various studies **(**Hatami Nejad, mirderikvand, et al., 2024**)**. The version standardized in Iran was conducted on university students, with Cronbach's alpha calculated separately for males and females as 0.75 and 0.78, respectively **(**Mahammadzadeh et al., 2010**)**. In the present study, the Cronbach's alpha coefficient was found to be 0.83.

Academic Resilience Scale

Samuels developed this scale in 2004 (Samuels, 2004). The original version of the scale includes 40 items. In Iran, Soltani-Nejad and colleagues adapted and standardized this questionnaire in 2014, reducing the number of items to 29. In their study, three subscales were confirmed for this measure: communication skills, future orientation, and problem-focused/positive thinking. The scoring is based on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Scores are calculated by obtaining the average of the items for each subscale, after reverse-scoring certain items. **(**Samuels, 2004**)** used Cronbach's alpha to estimate the reliability of this scale and reported an alpha coefficient of 0.89. The construct validity was also reported to be satisfactory in his study. Examined the psychometric properties of this questionnaire in their research. They reported Cronbach's alpha coefficients for the subscales ranging from 0.63 to 0.77 in a student sample, and from 0.62 to 0.76 in a university student sample (Soltaninejad et al., 2014). To determine the factorial structure of the construct, a principal component analysis with Varimax rotation was conducted. Eleven items were removed due to having factor loadings below 0.30 or due to having significant and equal loadings on more than one factor, resulting in a final version with 29 items (Sadri et al., 2023). In the present study, the reliability for the Academic Resilience was calculated with a Cronbach's alpha coefficient of 0.87.

Results

Demographic Description

Based on the analysis of participant demographics, the final research sample consisted of 350 high school students, including 160 boys (45.7%) and 190 girls (54.3%). In terms of educational level, 97 students (27.7%) were enrolled in the 10th grade, 116 students (33.1%) in the 11th grade, and 137 students (39.1%) in the 12th grade. The participants' ages ranged across typical high school years, with a mean age of 16.70 years and a standard deviation of 2.89, indicating a relatively normal age distribution within the expected adolescent developmental stage.

Descriptive Indices

Table 1 provides descriptive statistics for the main research variables, including the mean and standard deviation of each construct. In addition, the table displays skewness and kurtosis values, which were examined to assess the distributional properties of the data. As shown, the skewness and kurtosis indices for all observed variables fall within the acceptable range of -2 to +2, suggesting that the data distribution does not significantly deviate from normality and is appropriate for further statistical analyses particularly structural equation modeling (SEM). Prior to conducting SEM, the fundamental assumptions of the method were evaluated. One of the key assumptions normality of the variable distributions was tested using the Kolmogorov–Smirnov test. The results revealed no significant deviation from normality across the variables ($p>0.05$), further supporting the suitability of the data for SEM. Since SEM is grounded in the analysis of relationships among variables through the sample correlation matrix, these

correlations are presented in Table 2 to provide a comprehensive view of the interrelations among the core constructs in the study.

Table 1-Descriptive statistics of research variables

Variables	Mean	SD	Skewness	Kurtosis
Academic Resilience	98/27	33/16	-0/89	0/55
Sense of Coherence	51/43	18/87	0/91	1/12
Psychological Flexibility	87/61	16/32	0/84	0/37

Examination of the Assumptions of Parametric Tests

The results of Table 2 show that there is a meaningful correlation between all the variables of the study. To investigate the hypothesis of no self-correlation in the research error, the Durbin-Watson statistic was used, which obtained a value of 2/02, since the calculated value is in the range from 1/5 to 2/5, it can be stated that the hypothesis of no self-correlation has been confirmed. The co-linear hypothesis for the research exogenous variable was also examined using the Tolerance coefficient and Variance Inflation Factors (VIF). The results showed that the co-linear hypothesis was confirmed, as the Tolerance coefficient in all variables was close to 1 and the factor values (VIF) in all of them were less than the critical limit of 2. The Kaiser-Meyer-Olkin index (KMO) (0/87) and Bartlett index (df= 28 and p<0/01) indicated the fulfillment of the necessary assumptions for modeling structural equations (Hatami Nejad et al., 2025; Loehlin, 2004). Table 5 shows the indicators of the validity of the research model. The results of Table 5 show that, according to (Hu & Bentler, 1999), the model has a favorable fit. The standard coefficients of the conceptual model paths are shown in Figure 1.

Table 2-Correlation coefficient of research variables

Variable	1	2	3
1- Academic Resilience	1		
2- Sense of Coherence	0/57**	1	
3- Psychological Flexibility	0/49**	0/61**	1

**P<0/01

Table 3 shows the direct effects between research variables.

Table 3- Standard and unstandardized coefficients of the research variables

Path	β	T	SE	C.R	P
Academic Resilience→ Psychological Flexibility	0/31	0/43	0/081	5/30	0/001**
Sense of Coherence→ Psychological Flexibility	0/51	0/94	0/053	7/37	0/001**
Academic Resilience→ Sense of Coherence	0/56	0/44	0/127	8/15	0/001**

**P<0/01

Table 3 presents the path analysis results, demonstrating that the estimated path coefficients between the primary variables academic resilience, psychological flexibility, and sense of coherence are statistically significant at the 0.05 level. These findings confirm the direct associations hypothesized in the structural model and support the conceptual framework underpinning the study. Table 4 also shows the indirect effects of the research.

Table 4- Results of the bootstrap test indirect effect of the research model

Path indirect	Indirect effect	Upper Bounds	Lower Bounds	sig
Academic Resilience → Sense of Coherence → Psychological Flexibility	0/28	0/568	0/266	0/001*

**P<0/01

As shown in Table 4, the results confirmed a statistically significant indirect effect. Sense of coherence partially mediated the relationship between academic resilience and psychological

flexibility. Additionally, academic resilience explained 32% of the variance in sense of coherence, while academic resilience and sense of coherence together accounted for 52% of the variance in psychological flexibility.

Table 5- The fit indices of the research model

Fit indices	Recommended value	Calculated values
the ratio of X2 to degrees of freedom (X^2/df)	1-3	1/53
comparative fit index (CFI)	≥0.90	0/99
normed fit index (NFI)	≥0.90	0/98
Tuckere Lewis index (TLI)	≥ 0.90	0/99
Root mean of square error approximation (RMSEA)	< 0.08	0/03

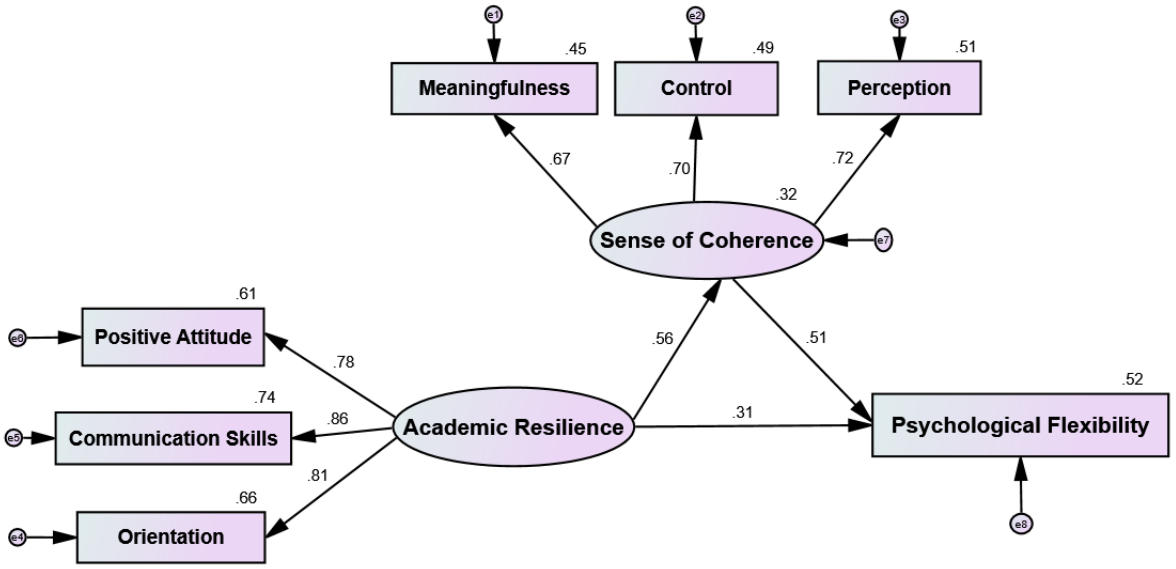

Figure 1-The final research model

Discussion and Conclusion

The present study was conducted with the aim of developing a model of psychological flexibility based on academic resilience and the mediating role of sense of coherence among students. The findings revealed that academic resilience and sense of coherence together could explain 52% of the variance in psychological flexibility. Moreover, sense of coherence was found to partially mediate the relationship between academic resilience and psychological flexibility. According to the first hypothesis, the results indicated that academic resilience has a direct effect on psychological flexibility—a finding that aligns with the results of (Cherry et al., 2024; Jo et al., 2024; Mohammadkhani et al., 2022; Pakenham et al., 2023; Türk, 2025). This direct relationship reflects the deep connection between these two key constructs in the process of learning and psychological development. Academic resilience, defined as students' capacity to face educational challenges, manage academic pressure, and maintain motivation in the face of setbacks, plays a crucial role in enhancing psychological flexibility (Türk, 2025). This ability helps students utilize coping skills, self-regulation strategies, and problem-solving techniques to demonstrate greater resistance to stress and environmental changes (Cherry et al., 2024). In other words, academic resilience by strengthening self-confidence, fostering a positive attitude, and enhancing the ability to generate creative solutions promotes psychological flexibility and enables students to respond more adaptively to complex problems. This relationship can serve as a foundation for designing educational and psychological interventions aimed at improving students' mental health and academic performance through the enhancement of academic resilience.

Another key finding of the study revealed a direct effect of sense of coherence on students' psychological flexibility. This result is consistent with the findings of (Hailikari et al., 2022; Memarzadeh et al., 2025; Norouzi et al., 2023; Raisi Nasehi et al., 2020). In explaining this finding, it can be stated that sense of coherence as the capacity to perceive and organize life experiences in a meaningful and coherent way has a direct and positive impact on students' psychological flexibility. This construct enables students to better understand challenges and complex situations, thereby responding more adaptively to psychological pressures and environmental changes(Memarzadeh et al., 2025). By fostering a sense of control, meaning, and connection to personal goals, sense of coherence empowers students to cope more flexibly with academic and social stressors and to employ more effective coping strategies(Hailikari et al., 2022). This relationship suggests that students with a higher sense of coherence are better able to maintain a positive outlook and, with confidence and creativity, find solutions to problems ultimately contributing to enhanced mental health and improved academic performance.

Another important finding of the study highlights the direct effect of academic resilience on students' sense of coherence. This result aligns with the findings of previous studies (García-Crespo et al., 2021; Mirsadegh et al., 2021; Noroozi Homayoon, Sadeghi, et al., 2024; Versteeg et al., 2022). In interpreting this finding, it can be stated that the direct influence of academic resilience on sense of coherence reflects a meaningful and positive relationship between these two psychological and educational constructs. Academic resilience defined as students' ability to overcome academic obstacles, manage educational stress, and maintain motivation in the face of challenges plays a central role in strengthening their sense of coherence. Sense of coherence, which consists of three components: comprehensibility (perceiving situations as structured and understandable), manageability (believing in one's ability to cope with challenges), and meaningfulness (perceiving life as purposeful), helps students organize their experiences in a coherent and meaningful way (Antonovsky, 1993). By enhancing coping skills such as self-regulation, problem-solving, and adaptability to failure, academic resilience enables students to better understand and manage complex and stressful academic situations with greater confidence. This process, in turn, reinforces their sense of coherence. Students who successfully navigate academic challenges gain a greater sense of control over their environment and perceive their academic and personal lives as more meaningful(García-Crespo et al., 2021). This reciprocal relationship can serve as a foundation for designing educational and psychological interventions. For example, programs that strengthen academic resilience through training in coping strategies and the provision of social support may also enhance students' sense of coherence ultimately contributing to improved mental health, academic motivation, and overall performance. Moreover, this finding underscores the importance of considering psychological factors in educational settings. Fostering academic resilience not only promotes academic success but, by enhancing the sense of coherence, also helps students adopt a more positive and structured outlook on life and the challenges they face.

Overall, this study, by examining the effect of academic resilience on psychological flexibility through the mediating role of sense of coherence, offered valuable insights into the psychological mechanisms that enhance students' adaptability. However, it was not without limitations. The use of self-report questionnaires may have been influenced by response biases or students' limited self-awareness, potentially affecting the accuracy of the data. Furthermore, the study population was restricted to high school students in the city of Khorramabad, which may limit the generalizability of the findings to other regions or age groups. For future research, it is recommended to use longitudinal designs to track long-term changes in these constructs

and to incorporate qualitative methods such as interviews to gain a deeper understanding of students' perspectives. Additionally, conducting studies with larger and more diverse populations could enhance the generalizability of the results. In sum, this study demonstrated that academic resilience and sense of coherence function as key factors in strengthening psychological flexibility. These findings can inform the development of educational and psychological interventions aimed at improving students' mental health and academic success.

Declarations

Author Contributions

All authors contributed actively to the conception, design, and execution of the research.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Acknowledgements

We sincerely thank everyone who collaborated and supported us during the various stages of this research.

Ethical considerations

In this research, all ethical standards were observed, including informed consent from participants and parents, ensuring the confidentiality of individuals' information, and voluntary participation and withdrawal of individuals. Additionally, ethical considerations were addressed in accordance with research ethics principles.

Funding

This research was conducted without any external funding and was entirely financed by the Authors' personal resources.

Conflict of interest

The authors declare that there is no conflict of interest in reporting the results of this research.

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