KMAN PUBLISHING INSTITUTE
Journal Website

Article history:
Received 14 June 2025
Revised 30 August 2025
Accepted 05 September 2025
Initial Published 30 October 2025
Final Publication 01 November 2025

Psychological Research in Individuals with Exceptional Needs

Volume 3, Issue 4, pp 15-25

E-ISSN: 3060-6713

The Mediating Role of Attention Bias in the Relationship Between Anxiety Sensitivity and Academic Motivation in Children With Specific Learning Disorders

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Ataei Dizaji, S., Abdollahi, M., Dadvand, F., & Zarevatan, R. (2025). The Mediating Role of Attention Bias in the Relationship Between Anxiety Sensitivity and Academic Motivation in Children With Specific Learning Disorders. *Psychological Research in Individuals with Exceptional Needs, 3*(4), 15-25.
https://doi.org/10.61838/kman.prien.4735

A B S T R A C T

This study aimed to investigate the mediating role of attention bias in the relationship between anxiety sensitivity and academic motivation among children diagnosed with specific learning disorders (SLD). A descriptive–correlational design was used, involving 400 students with specific learning disorders enrolled in learning disability centers in Tehran during the 2024–2025 academic year. The sample size was determined using the Krejcie and Morgan table. Data were collected using three standardized instruments: the Academic Motivation Scale (AMS; Vallerand et al., 1992) to measure academic motivation, the Anxiety Sensitivity Index for Children (ASIC; Laurent et al., 1998) to assess anxiety sensitivity, and the Dot-Probe Task (MacLeod et al., 1986) to evaluate attention bias. Data analysis was performed using Pearson correlation coefficients and Structural Equation Modeling (SEM) through SPSS-27 and AMOS-21 software. Model fit was assessed using multiple indices including χ^2/df, GFI, AGFI, CFI, TLI, and RMSEA. Results revealed that anxiety sensitivity was negatively correlated with academic motivation ($r = -.42$, $p < .001$) and positively correlated with attention bias ($r = .47$, $p < .001$). Attention bias was negatively correlated with academic motivation ($r = -.36$, $p < .001$). The SEM results indicated excellent model fit ($\chi^2/df = 1.63$, CFI = .97, TLI = .96, RMSEA = .039). Anxiety sensitivity significantly predicted attention bias ($\beta = 0.47$, $p < .001$) and academic motivation ($\beta = -0.33$, $p < .001$). The indirect effect of anxiety sensitivity on academic motivation through attention bias was also significant ($\beta = -0.14$, $p = .002$), confirming partial mediation. The findings suggest that attention bias partially mediates the relationship between anxiety sensitivity and academic motivation in children with specific learning disorders.

Keywords: *Anxiety sensitivity; Attention bias; Academic motivation; Specific learning disorders; Mediation model; Structural equation modeling.*

1. Introduction

Specific learning disorders (SLD) are among the most prevalent neurodevelopmental disorders that affect children's cognitive, emotional, and motivational functioning. These disorders often disrupt academic achievement, self-regulation, and psychological well-being, exerting a significant impact on a child's educational trajectory and overall life satisfaction (Conant & Miller, 2024). SLDs, as described in the DSM-5 framework, are characterized by persistent difficulties in reading, writing, or mathematics, despite adequate intelligence and educational opportunities. The prevalence of learning disorders has been rising worldwide, prompting greater attention to the underlying psychological and cognitive mechanisms influencing academic motivation and performance (Núñez et al., 2020). In particular, research has highlighted that motivational factors play a critical role in mediating the effects of cognitive and emotional challenges on students' academic engagement and outcomes (Kausik & Hussain, 2023).

Children with learning disorders frequently experience emotional disturbances such as anxiety, low self-esteem, and frustration, which interfere with their learning motivation and academic persistence (Nourizadeh & Moslem Nejad, 2023). The inability to meet educational demands or to keep pace with peers often leads to decreased self-confidence and an avoidance of challenging academic tasks. As a result, they may develop maladaptive motivational orientations characterized by fear of failure and low academic resilience (Stahopoulou & Siskou, 2023). Understanding the determinants of academic motivation in this population is therefore essential, particularly the cognitive and emotional mechanisms—such as attention bias and anxiety sensitivity—that shape children's motivational experiences.

Anxiety sensitivity, defined as the fear of anxiety-related sensations due to beliefs that these sensations have harmful physical, cognitive, or social consequences, has been found to significantly influence children's emotional regulation and attention processing (Saeedmanesh et al., 2020). High anxiety sensitivity often heightens vigilance to perceived threats and distracts cognitive resources from learning-related tasks, thereby diminishing academic motivation. Empirical studies have demonstrated that students with elevated anxiety sensitivity exhibit reduced attention control, poorer executive functioning, and lower academic persistence (Zuppardo et al., 2023). These tendencies may be exacerbated in children with learning disorders, who already face cognitive processing deficits and difficulties in managing frustration (Raji & Javaid, 2022).

Attention bias, a cognitive mechanism that directs an individual's focus preferentially toward emotionally salient or threatening stimuli, has also been closely associated with anxiety and motivational impairments (Shechner et al., 2012). When attention is automatically drawn toward threat cues, children may struggle to sustain focus on academic tasks, especially in stressful or evaluative contexts. Over time, this maladaptive attention pattern reinforces avoidance behaviors and reduces intrinsic learning motivation (Mehrinejad et al., 2016). Cognitive and emotional models suggest that attention bias functions as an intermediary process linking anxiety-related traits (such as anxiety sensitivity) to learning and motivational outcomes (Ghadampour & Bawzin, 2021).

In the context of learning disorders, deficits in executive functions—particularly selective attention and cognitive flexibility—have been repeatedly documented (Mohammadlou et al., 2024). These deficits impair the ability to control attention toward relevant academic stimuli, increasing susceptibility to distraction and emotional interference. As studies have shown, executive dysfunctions may exacerbate anxiety symptoms, further aggravating academic disengagement (Nazarboland et al., 2022). For instance, anxious students with learning disabilities often misinterpret academic challenges as threats to self-worth, triggering cognitive avoidance and diminished academic motivation.

Previous interventions designed to enhance attention and emotional regulation have shown that improving executive functioning can significantly increase children's learning performance and academic motivation (Bulut et al., 2024). Such evidence underscores the interdependence of emotional regulation, attentional control, and motivational systems in children with learning difficulties (Abdulahi Beqrabadi & Heidary rad, 2025). Furthermore, these findings align with recent theoretical perspectives that emphasize the mediating role of cognitive processes—such as attention bias—in explaining how emotional vulnerabilities translate into motivational deficits (Lievore, 2024).

A growing body of literature supports the notion that emotional and attentional mechanisms interact to shape learning behaviors and academic motivation. Children with SLD often experience elevated levels of academic anxiety and negative self-evaluation, which disrupt their attentional engagement with learning materials (Nazari, 2023).

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Emotional dysregulation caused by anxiety sensitivity may alter selective attention patterns, leading children to allocate disproportionate attention to failure-related cues rather than to mastery-oriented stimuli (Shahroudi et al., 2020). Over time, such maladaptive attention biases may create a self-reinforcing cycle: as students focus on perceived failure, their anxiety increases, their motivation declines, and learning difficulties intensify (Gao et al., 2023).

Research has also demonstrated that familial and environmental factors can influence motivational outcomes in students with learning disabilities. Supportive family structures, positive reinforcement, and adaptive teacher–student interactions can mitigate the adverse effects of anxiety and attention bias on motivation (Tiengsomboon & Luvira, 2024). Parental encouragement and structured guidance promote self-efficacy and learning persistence, even in children struggling with cognitive limitations (Fathiazar et al., 2020). Conversely, negative feedback or unrealistic expectations can heighten children's anxiety and undermine their confidence in academic contexts (Núñez et al., 2020).

From a neurocognitive perspective, anxiety sensitivity and attention bias are closely related to the functioning of the limbic and prefrontal systems that regulate emotional processing and executive control. In children with SLD, neurodevelopmental delays in these regions can contribute to difficulties in attention shifting, emotional regulation, and motivation (Conant & Miller, 2024). These neural inefficiencies may cause an overactivation of the amygdala in response to stress and an underactivation of prefrontal regions responsible for cognitive control, thereby maintaining a pattern of heightened vigilance and reduced learning motivation (Lievore, 2024).

Intervention studies have provided additional insights into these interrelations. For example, cognitive-behavioral programs that target attention bias modification have been found effective in reducing anxiety and enhancing adaptive attention allocation (Pettit et al., 2020). Similarly, mindfulness and cognitive rehabilitation interventions have been shown to improve attentional control and emotional stability, which in turn support higher academic engagement and motivation (Mohammadlou et al., 2024; Saeedmanesh et al., 2020). These findings suggest that attention bias not only reflects a symptom of anxiety but may also serve as a mediating mechanism that links anxiety sensitivity to motivation outcomes in learning-disordered children (Ghadampour & Bawzin, 2021).

Moreover, educational neuroscience approaches have emphasized that interventions integrating emotional and cognitive components can enhance learning outcomes more effectively than traditional methods (Fathiazar et al., 2020). By understanding how cognitive and affective systems interact, educators can design interventions that promote self-regulation, resilience, and motivation in students with learning difficulties (Narimani et al., 2023). Similarly, inclusive education models that provide emotional support alongside academic instruction have been shown to enhance students' motivation, self-efficacy, and overall well-being (Kausik & Hussain, 2023).

Evidence from Iranian studies corroborates these findings, highlighting that attention-focused and emotion-regulation interventions yield improvements in both academic and socioemotional functioning (Abdulahi Beqrabadi & Heidary rad, 2025; Shahroudi et al., 2020). The relationship between emotional vulnerability (e.g., anxiety sensitivity) and academic motivation appears to be dynamic and multidimensional, mediated by cognitive mechanisms such as attention bias and modulated by contextual factors including family support and teacher expectations (Nourizadeh & Moslem Nejad, 2023; Tiengsomboon & Luvira, 2024). Thus, understanding the mediating role of attention bias in this relationship may offer crucial implications for both assessment and intervention strategies.

Furthermore, scholars have noted that reduced motivation among students with learning disorders is not merely a consequence of poor academic skills but also of the cognitive-emotional imbalance that accompanies chronic anxiety (Nejatifar & Abedi, 2023). Attention bias toward threat-related stimuli can amplify this imbalance, making academic tasks seem more intimidating and less rewarding. This cognitive distortion fosters avoidance behaviors that hinder learning persistence (Stahopoulou & Siskou, 2023). Conversely, interventions that improve emotional awareness and attention control have been linked to greater motivational consistency and academic improvement (Bulut et al., 2024).

In light of these perspectives, it is plausible to propose that attention bias functions as a mediating variable between anxiety sensitivity and academic motivation in children with specific learning disorders. Anxiety sensitivity may heighten children's susceptibility to cognitive interference, which then manifests through biased attention toward anxiety-provoking stimuli. This maladaptive attentional orientation can reduce focus on learning tasks, lower self-efficacy, and ultimately decrease intrinsic academic motivation

E-ISSN: 3060-6713

(Mehrinejad et al., 2016; Shechner et al., 2012). Examining this mediational pathway may provide an integrated understanding of how cognitive-emotional processes shape academic functioning in this vulnerable group.

In conclusion, while previous studies have explored the independent effects of anxiety sensitivity and attention bias on academic performance, few have investigated their interrelated roles in explaining motivational outcomes in children with specific learning disorders. Addressing this gap is crucial for developing comprehensive interventions that target both emotional regulation and attentional control.

The present study therefore aims to investigate the mediating role of attention bias in the relationship between anxiety sensitivity and academic motivation among children with specific learning disorders.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a descriptive correlational design to examine the mediating role of attention bias in the relationship between anxiety sensitivity and academic motivation among children with specific learning disorders. The statistical population included all students diagnosed with specific learning disorder (SLD) who were enrolled in learning disability centers in Tehran, Iran, during the 2024–2025 academic year. Using the Krejcie and Morgan (1970) sample size determination table, a total of 400 participants were selected through convenience sampling. Inclusion criteria required participants to be between 9 and 12 years old, have a formal diagnosis of SLD confirmed by a psychologist, and be attending primary or lower secondary school. Exclusion criteria included comorbid intellectual disability, autism spectrum disorder, or any neurological impairment that could interfere with test performance. Data were collected in group sessions conducted at educational counseling centers, and participation was voluntary with parental consent.

2.2. Measures

The Academic Motivation Scale (AMS), developed by Vallerand et al. (1992), was used to measure the dependent variable, academic motivation. This standardized instrument is based on Self-Determination Theory (SDT) and assesses different types of motivation along a continuum from intrinsic to extrinsic motivation, as well as amotivation. The AMS consists of 28 items divided into seven subscales: intrinsic motivation to know, intrinsic motivation toward accomplishment, intrinsic motivation to experience stimulation, identified regulation, introjected regulation, external regulation, and amotivation. Responses are rated on a 7-point Likert scale ranging from 1 ("does not correspond at all") to 7 ("corresponds exactly"), with higher scores indicating greater levels of the respective motivational type. The scale has been widely validated across different cultures and age groups, including students with learning difficulties, showing excellent construct validity and internal consistency (Cronbach's alpha coefficients typically range from .70 to .86).

The Dot-Probe Task, originally developed by MacLeod, Mathews, and Tata (1986), was employed to measure attention bias. This computerized paradigm presents pairs of stimuli (e.g., threatening and neutral words or images) followed by a probe (e.g., a dot or arrow) that replaces one of the stimuli. Participants are instructed to respond as quickly as possible to the probe's location, with shorter reaction times indicating an attentional bias toward the type of stimulus that previously occupied that position. The task typically includes 120–200 trials and uses reaction time differences as the main index of attentional bias. The dot-probe paradigm has been extensively validated in child and adolescent populations and is considered a gold-standard measure for cognitive bias assessment. Its test–retest reliability and construct validity have been confirmed in numerous studies, particularly those examining anxiety-related attentional processes.

The Anxiety Sensitivity Index for Children (ASIC), developed by Laurent, Schmidt, Catanzaro, Joiner, and Kelley (1998), was used to assess anxiety sensitivity. The scale includes 18 items designed to evaluate the extent to which children fear anxiety-related sensations due to beliefs that these sensations have harmful physical, psychological, or social consequences. The ASIC comprises three subscales: Physical Concerns, Cognitive Concerns, and Social Concerns. Items are rated on a 3-point Likert scale (0 = "Not true," 1 = "Somewhat true," 2 = "Very true"), with higher total scores indicating greater anxiety sensitivity. The instrument has demonstrated high internal consistency (Cronbach's alpha ≈ .80) and strong convergent and discriminant validity in diverse samples of children, including those with learning disorders. Its psychometric properties have been supported in multiple studies, confirming its suitability for use in both clinical and educational research contexts.

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2.3. *Data Analysis*

Data were analyzed using SPSS version 27 and AMOS version 21. Descriptive statistics (mean, standard deviation, frequency, and percentage) were used to summarize the participants' demographic characteristics and study variables. Pearson correlation coefficients were computed to determine the bivariate relationships between academic motivation (dependent variable) and the independent variables (anxiety sensitivity and attention bias). To test the hypothesized mediation model, Structural Equation Modeling (SEM) with maximum likelihood estimation was conducted using AMOS. Model fit was evaluated through standard indices, including the Chi-square/df ratio, Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

3. Findings and Results

The final sample consisted of 400 children diagnosed with specific learning disorder, including 239 boys (59.8%) and 161 girls (40.2%). Participants' ages ranged from 9 to 12 years (M = 10.47, SD = 1.03). Regarding grade level, 118 students (29.5%) were in the third grade, 146 (36.5%) in the fourth grade, 91 (22.8%) in the fifth grade, and 45 (11.2%) in the sixth grade. In terms of parental education, 31.3% of fathers and 27.5% of mothers held a university degree, while 41.0% of fathers and 44.5% of mothers had completed high school. Approximately 72.8% of families reported a middle socioeconomic status, and 27.2% reported a low socioeconomic status.

Table 1

Descriptive Statistics for Study Variables (N = 400)

Variable	Mean (M)	Standard Deviation (SD)
Anxiety Sensitivity	21.73	4.58
Attention Bias	36.42	6.91
Academic Motivation	109.58	14.87

As shown in Table 1, participants reported moderate levels of anxiety sensitivity (M = 21.73, SD = 4.58) and attention bias (M = 36.42, SD = 6.91). The mean academic motivation score (M = 109.58, SD = 14.87) indicated a mid-to-high level of motivation among students with specific learning disorders. The variability across standard deviations suggests individual differences in emotional and motivational functioning within the sample.

Prior to conducting the main analyses, statistical assumptions were checked and confirmed. The Kolmogorov–Smirnov test indicated that the data were normally distributed for all variables ($p > .05$). Linearity was examined through scatterplots and found satisfactory. Multicollinearity was assessed using Variance Inflation Factor (VIF) values ranging from 1.12 to 1.87, all well below the critical value of 5. Tolerance values ranged between 0.53 and 0.89, indicating acceptable independence among predictors. The Durbin–Watson coefficient of 1.91 confirmed the absence of autocorrelation in the residuals. Homogeneity of variance was verified through Levene's test ($p > .05$), and Mahalanobis distance values (maximum = 13.42) indicated no significant multivariate outliers. Therefore, all assumptions for correlation and SEM analyses were met.

Table 2

Pearson Correlation Coefficients and Significance Levels among Variables (N = 400)

Variable	1. Anxiety Sensitivity	2. Attention Bias	3. Academic Motivation
1. Anxiety Sensitivity	1.00		
2. Attention Bias	.47*** ($p < .001$)	1.00	
3. Academic Motivation	−.42*** ($p < .001$)	−.36*** ($p < .001$)	1.00

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The correlation results in Table 2 reveal significant relationships among the study variables. Anxiety sensitivity showed a moderate positive correlation with attention bias ($r = .47$, $p < .001$), suggesting that higher anxiety sensitivity is associated with greater attentional bias toward threat-related stimuli. In contrast, anxiety sensitivity was negatively correlated with academic motivation ($r = -.42$, $p < .001$), indicating that students with higher anxiety sensitivity reported lower motivation. Similarly, attention bias was negatively correlated with academic motivation ($r = -.36$, $p < .001$), confirming that increased attentional bias corresponds to decreased motivation.

Table 3

Model Fit Indices for the Structural Equation Model

Fit Index	Chi-Square (χ^2)	df	χ^2/df	GFI	AGFI	CFI	TLI	RMSEA
Model	68.43	42	1.63	.95	.92	.97	.96	.039

As shown in Table 3, the model demonstrated excellent fit to the data. The chi-square to degrees of freedom ratio ($\chi^2/df = 1.63$) was below the recommended cutoff of 3. Both GFI (.95) and AGFI (.92) exceeded the .90 criterion, indicating good absolute fit. Incremental fit indices were also satisfactory (CFI = .97, TLI = .96), reflecting strong model performance relative to a null model. The RMSEA value (.039) indicated an excellent level of approximate fit, confirming that the hypothesized model was consistent with the observed data.

Table 4

Direct, Indirect, and Total Effects among Study Variables in the Structural Model

Path	b	S.E.	β	p
Anxiety Sensitivity → Attention Bias (Direct)	0.58	0.07	0.47	< .001
Attention Bias → Academic Motivation (Direct)	−0.41	0.09	−0.29	< .001
Anxiety Sensitivity → Academic Motivation (Direct)	−0.36	0.08	−0.33	< .001
Anxiety Sensitivity → Academic Motivation (Indirect via Attention Bias)	−0.24	0.05	−0.14	.002
Anxiety Sensitivity → Academic Motivation (Total)	−0.60	0.06	−0.47	< .001

Table 4 presents the structural path coefficients for the hypothesized model. The direct path from anxiety sensitivity to attention bias was positive and significant ($\beta = 0.47$, $p < .001$), indicating that children with higher anxiety sensitivity displayed stronger attentional bias toward threat cues. The direct effect of attention bias on academic motivation was negative and significant ($\beta = -0.29$, $p < .001$), showing that increased attention bias predicted lower motivation levels. The direct effect of anxiety sensitivity on academic motivation was also negative ($\beta = -0.33$, $p < .001$), confirming that higher anxiety sensitivity reduces academic motivation. Moreover, the indirect effect of anxiety sensitivity on academic motivation through attention bias ($\beta = -0.14$, $p = .002$) was significant, indicating partial mediation. The total effect ($\beta = -0.47$, $p < .001$) suggests that both direct and indirect pathways contribute substantially to explaining motivational deficits among students with SLD.

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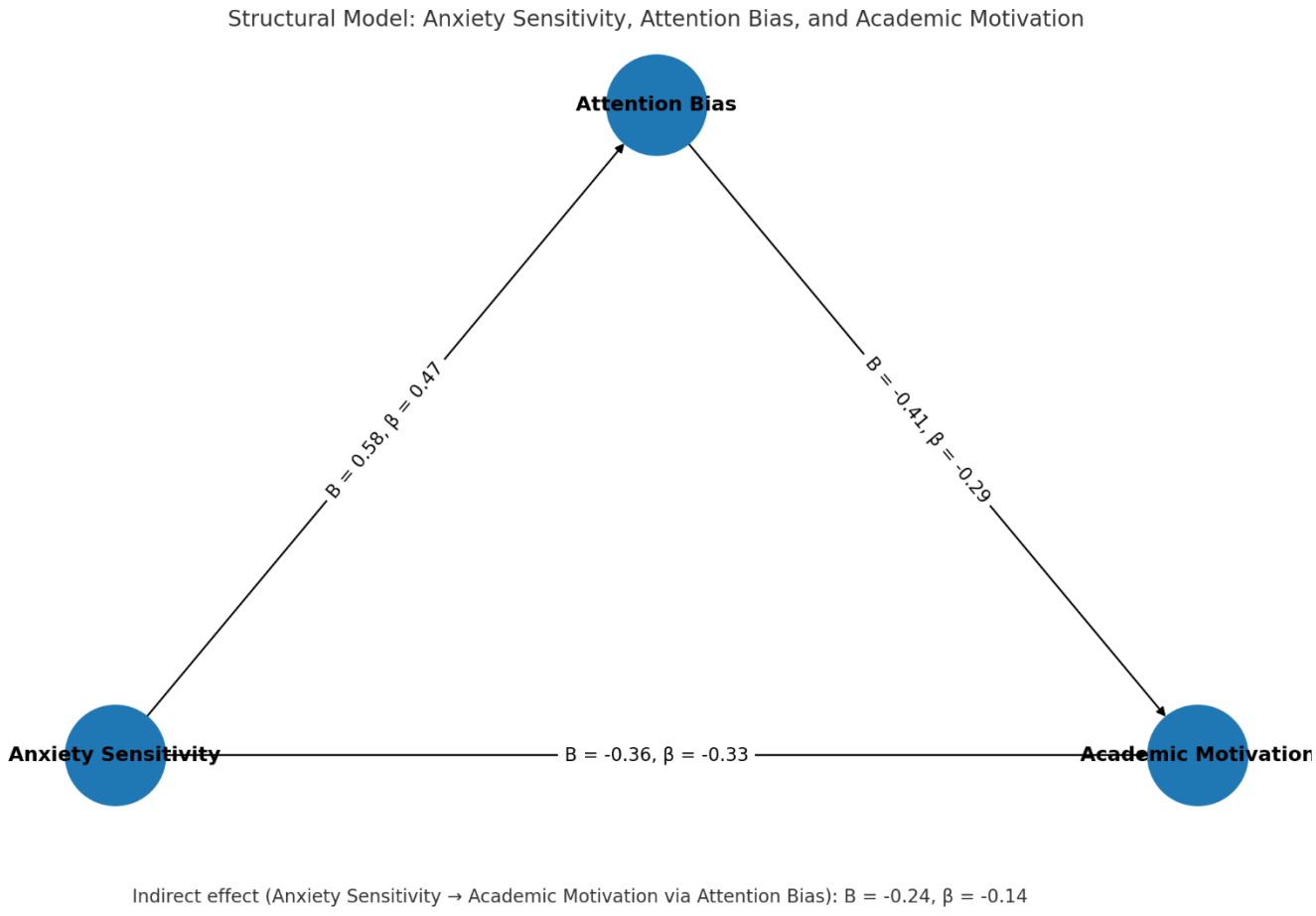
Figure 1

Structural Model of The Study



4. Discussion and Conclusion

The purpose of this study was to examine the mediating role of attention bias in the relationship between anxiety sensitivity and academic motivation among children with specific learning disorders (SLD). The results of the correlation and structural equation analyses revealed significant relationships between the main variables. Specifically, anxiety sensitivity was found to be negatively correlated with academic motivation, indicating that higher anxiety sensitivity predicts lower levels of motivation. Additionally, anxiety sensitivity was positively correlated with attention bias toward threat-related stimuli, suggesting that children who are more sensitive to anxiety-related sensations exhibit greater attentional bias toward negative or threatening cues. The mediation analysis confirmed that attention bias partially mediates the relationship between anxiety sensitivity and academic motivation, meaning that anxiety sensitivity indirectly reduces academic motivation by increasing attention bias. These findings provide empirical support for cognitive–emotional interaction models that emphasize how attentional processes influence emotional and motivational outcomes in students with learning difficulties (Ghadampour & Bawzin, 2021; Shechner et al., 2012).

The negative association between anxiety sensitivity and academic motivation found in this study aligns with previous evidence that anxiety-related traits impair students' self-regulation, academic persistence, and learning engagement (Kausik & Hussain, 2023; Nourizadeh & Moslem Nejad, 2023). Children with high anxiety sensitivity tend to interpret normal academic challenges as potential threats, triggering avoidance behaviors and reducing their intrinsic drive to learn. As shown by (Saeedmanesh et al., 2020), heightened physiological and cognitive arousal associated with anxiety sensitivity disrupts concentration and reduces cognitive flexibility, which are essential for academic success. Our findings extend these observations by demonstrating that this relationship is not direct but operates

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through the cognitive mechanism of attention bias. Anxiety-sensitive students may allocate excessive attention to failure-related or negative stimuli in academic settings, which intensifies their anxiety and further undermines motivation (Mehrinejad et al., 2016). This mediational pattern provides new insights into how emotional vulnerabilities manifest in cognitive and motivational dysfunctions among children with SLD.

The results also confirmed a significant link between attention bias and academic motivation, consistent with studies indicating that attentional control plays a crucial role in sustaining task engagement and learning motivation (Bulut et al., 2024; Mohammadlou et al., 2024). Students with an attentional bias toward threatening or anxiety-inducing stimuli often experience difficulties filtering out irrelevant information, which impairs their ability to focus on learning tasks. This attentional imbalance can make academic activities appear overwhelming and unrewarding, thereby reducing intrinsic motivation (Ghadampour & Bawzin, 2021). Similar conclusions were drawn by (Pettit et al., 2020), who reported that modifying attention bias through targeted interventions resulted in improved emotional regulation and reduced anxiety symptoms in children with high anxiety levels. In the context of learning disorders, where cognitive resources are already constrained, attention bias may have an even more detrimental effect on academic motivation, as observed in our sample.

The mediating effect of attention bias between anxiety sensitivity and academic motivation provides empirical support for integrative cognitive–affective models of learning. According to such frameworks, anxiety sensitivity generates hypervigilance toward threat cues, which biases attention away from learning-related stimuli and reinforces maladaptive avoidance patterns (Shechner et al., 2012). Our findings are consistent with (Lievore, 2024), who reported that children with specific learning disorders and heightened anxiety exhibited poorer emotion recognition and executive functioning, leading to impaired social and academic motivation. Similarly, (Nazarboland et al., 2022) demonstrated that anxiety-related attentional problems negatively impact executive functions, which are essential for goal-directed behavior and persistence in academic contexts. Taken together, these findings highlight that attention bias not only reflects an emotional vulnerability but also serves as a cognitive mechanism through which anxiety sensitivity affects academic outcomes.

The significant correlations observed between anxiety sensitivity and attention bias are also supported by prior research showing that individuals who are more anxious tend to focus preferentially on threat-related stimuli (Pettit et al., 2020; Saeedmanesh et al., 2020). Such attentional tendencies are adaptive in genuine danger but maladaptive in educational contexts, where they disrupt learning and motivation. (Mehrinejad et al., 2016) found that students with higher anxiety and body image concerns demonstrated stronger attentional biases toward threatening cues and lower cognitive flexibility. In our study, this attentional rigidity appears to contribute to reduced motivation, possibly by reinforcing the perception of academic tasks as threatening or unmanageable. These results support the argument that therapeutic interventions should aim to reduce attention bias as a means of indirectly improving academic motivation among anxious and learning-disabled children (Bulut et al., 2024).

Another notable finding concerns the magnitude of the mediation effect, which, while significant, was partial. This suggests that factors other than attention bias also contribute to the link between anxiety sensitivity and motivation. Emotional regulation, self-efficacy, and family support may all play important complementary roles in this relationship. As shown by (Tiengsomboon & Luvira, 2024), family support significantly influences children's ability to manage learning difficulties and maintain academic motivation. Similarly, (Nejatifar & Abedi, 2023) found that interventions based on motivational interviewing enhanced participation and emotional skills in individuals with learning disabilities. Thus, while attention bias represents a central cognitive pathway, it likely operates in conjunction with broader psychosocial and emotional mechanisms.

Furthermore, our findings are consistent with studies demonstrating the effectiveness of cognitive and neuropsychological interventions in improving both attentional control and motivational outcomes. For example, (Fathiazar et al., 2020) showed that educational neuroscience-based curricula enhanced academic achievement in students with mathematics learning disabilities, primarily by improving attentional and executive processes. Similarly, (Mohammadlou et al., 2024) reported that cognitive rehabilitation significantly improved selective attention, cognitive flexibility, and academic progress among students with SLD. These studies reinforce the current results by emphasizing that enhancing attentional processes not only strengthens cognitive performance but

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also boosts academic motivation through improved self-regulation and emotional balance.

The present study also supports the view that anxiety sensitivity and attention bias are interdependent constructs that influence each other dynamically over time. (Gao et al., 2023) found that early developmental factors, such as maternal age and neurodevelopmental risk, can predispose children to attention-related and learning difficulties, which may subsequently interact with anxiety traits. Moreover, (Raji & Javaid, 2022) highlighted the diagnostic challenges in distinguishing attentional and anxiety symptoms in individuals with comorbid neurodevelopmental disorders, suggesting that these domains are often intertwined. From this perspective, our findings contribute to a more nuanced understanding of how emotional sensitivity interacts with attentional biases to influence motivational outcomes.

In the Iranian context, the current results align with prior studies emphasizing the need for integrated interventions addressing both cognitive and emotional aspects of learning disorders. (Shahroudi et al., 2020) demonstrated that cognitive rehabilitation programs significantly improved academic achievement in girls with SLD, while (Abdulahi Beqrabadi & Heidary rad, 2025) found that emotion regulation training enhanced self-regulation and reduced procrastination among male students with SLD. Both studies underscore that addressing emotional processes such as anxiety sensitivity can lead to downstream improvements in motivation and performance. Our results expand on this literature by identifying attention bias as a mediating process that explains how emotional regulation difficulties translate into motivational impairments.

Additionally, the finding that anxiety sensitivity undermines academic motivation supports (Narimani et al., 2023), who reported that achievement motivation and social skills training significantly enhanced self-efficacy in students with learning disabilities. The reduction of anxiety sensitivity may thus improve motivational outcomes through increased confidence and emotional resilience. (Stahopoulou & Siskou, 2023) also emphasized the importance of integrating digital technologies and mental health promotion strategies to sustain motivation among students with learning disabilities, highlighting that adaptive emotional engagement can compensate for cognitive deficits. In line with these findings, the present study reinforces the theoretical premise that emotional and attentional mechanisms must be addressed together to foster lasting motivational improvements in students with SLD.

Overall, the results of this study contribute to the growing body of evidence that cognitive biases mediate the effects of emotional traits on motivational outcomes. They provide empirical justification for incorporating attention bias modification and anxiety sensitivity reduction strategies into educational and therapeutic interventions for children with specific learning disorders. Addressing both domains may yield synergistic effects, leading to improved attention control, reduced emotional interference, and enhanced academic motivation.

This study, while providing meaningful insights, is subject to several limitations. First, the cross-sectional design limits causal inferences between anxiety sensitivity, attention bias, and academic motivation. Longitudinal studies are needed to examine the directionality and stability of these relationships over time. Second, data were collected from a sample of students in Tehran, which may limit the generalizability of the results to other cultural or educational settings. Third, the study relied on self-report and computer-based measures, which may be influenced by response bias or situational factors such as fatigue or test anxiety. Finally, unmeasured variables such as parental stress, teacher expectations, and classroom environment might also affect the observed relationships, suggesting the need for multilevel analyses in future work.

Future research should employ longitudinal and experimental designs to investigate the causal mechanisms underlying the interplay between anxiety sensitivity, attention bias, and academic motivation. Studies could also include neuroimaging or psychophysiological assessments to provide a more detailed understanding of the neural processes mediating these relationships. Expanding the sample to include diverse cultural and socioeconomic contexts would enhance generalizability. It would also be valuable to examine moderating variables such as gender, type of learning disorder, or family support. Moreover, comparative studies assessing the effectiveness of attention bias modification and emotion regulation interventions could clarify which therapeutic components yield the most significant motivational improvements.

From an applied perspective, educators and school psychologists should design programs that integrate emotional regulation training with attention control exercises. Early screening for anxiety sensitivity and attention bias can help identify students at risk for low academic motivation, allowing for timely intervention. Incorporating mindfulness, metacognitive, and self-regulation strategies into classroom routines may improve

E-ISSN: 3060-6713

both emotional balance and motivational engagement. Collaborative efforts among teachers, parents, and mental health professionals can ensure that students with specific learning disorders receive holistic support that enhances both their cognitive skills and emotional well-being.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We would like to express our gratitude to all individuals helped us to do the project.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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