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The Mediating Role of Social Adjustment in the Relationship between Insecure-Avoidant Attachment and Separation Anxiety among Elementary School Girls

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ARTICLE INFO	ABSTRACT
Article History: Received 19 November 2025 Received in revised form 4 December 2025 Accepted 15 February 2026 Available online 10 March 2026 Keywords: Insecure-Avoidant Attachment; Social Adjustment; Separation Anxiety; Elementary School Students; Mediation Analysis; Child Anxiety	Background: Separation anxiety is one of the most common emotional difficulties of children during the transition to formal schooling and can impair academic performance, peer relationships and psychological well-being. Attachment theory predicts that insecure-avoidant attachment increases vulnerability to anxiety, but the mechanisms that link the two in early school age are poorly understood. Objective: This study examined whether social adjustment mediates the association between insecure-avoidant attachment and separation anxiety among girls in grades 1–3 in Ferdows County, Iran. Method: In a cross-sectional correlational design, 320 girls (aged 6–9 years) were selected by multi-stage cluster random sampling from a population of about 1,150 students. Mothers or fathers rated insecure-avoidant attachment (12-item adapted scale) and separation anxiety (8-item separation anxiety subscale of the SCARED parent form), and teachers rated social adjustment (46-item social skills scale of the SSIS teacher form). A single-mediator path model was estimated with cluster-robust standard errors, and the indirect effect was tested with Monte Carlo and bootstrap confidence intervals. Results: Insecure-avoidant attachment correlated positively with separation anxiety ($r = .51$) and negatively with social adjustment ($r = -.46$), and social adjustment correlated negatively with separation anxiety ($r = -.43$; all $p < .001$). Attachment predicted lower social adjustment ($\beta = -0.46$), social adjustment predicted lower separation anxiety when attachment was controlled ($\beta = -0.25$), and the direct association remained significant ($\beta = 0.40$; all $p < .001$ with cluster-robust errors). The indirect effect was 0.11 (95% CI [0.05, 0.19]), 22% of the total association, and the model explained 31% of the variance in separation anxiety. Conclusions: Social adjustment partially accounts for the association between insecure-avoidant attachment and separation anxiety. Because the design is cross-sectional and a reverse model fitted equally well, the estimate describes associations consistent with, but not proof of, the hypothesised mechanism. School programmes that strengthen peer relationships are a plausible prevention target.

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1. INTRODUCTION

Separation anxiety is one of the most prevalent emotional challenges faced by young children during the transition to structured educational settings. It is characterised by excessive and persistent fear or distress when the child is separated from primary attachment figures, often manifested in somatic complaints, reluctance to attend school or intense worry that harm will befall loved ones [1]. Transient separation anxiety is a normative developmental phenomenon that peaks at about 18–36 months of age, but its persistence into the early elementary school years can signal the emergence of separation anxiety disorder (SAD), which impairs academic performance, peer relationships and psychosocial functioning [2, 3].

Attachment theory [4, 5] proposes that children develop internal working models of relationships from repeated interactions with caregivers, and that these models shape how they perceive and respond to threats of separation. Secure attachment fosters confidence in the availability of support and allows the child to explore the environment with little distress. Insecure attachment disrupts emotion regulation and increases vulnerability to anxiety. The insecure-avoidant pattern, marked by minimisation of emotion, premature self-reliance and avoidance of closeness, tends to develop when caregivers are consistently unresponsive or dismissive of the child's emotional needs [6]. Avoidant children typically show little overt distress during separations and appear independent, but physiological studies suggest heightened internal arousal, which may accumulate into anxiety and other internalising problems [7].

In school, where daily separation from home is routine, avoidant children may find it harder to form supportive peer bonds or to seek help from teachers, which can increase their sense of isolation and vulnerability. Social adjustment, defined here as the child's capacity to establish positive peer relationships, regulate emotions in social contexts and adapt to the demands of the school environment, is therefore a plausible link between attachment and separation anxiety. Good social adjustment can provide alternative sources of support and strengthen emotional resilience, whereas social withdrawal, peer rejection or difficulties in cooperative play may reinforce the perception that the social world is unreliable and increase anticipatory anxiety about separation [8, 9]. Girls report higher rates of internalising symptoms, including separation anxiety, than boys [10, 11, 12], which makes them a relevant group in which to study these processes.

The first three grades of elementary school are a sensitive period of transition from a family-centred to a school-centred environment, and in Iran cultural emphases on family closeness and gender-specific socialisation may interact with attachment patterns. Despite evidence that untreated separation anxiety predicts later internalising disorders and academic underachievement [7, 13], few studies have examined the mechanisms that link attachment insecurity and separation anxiety in this age group, and none to our knowledge in Iranian schoolgirls.

The present study therefore tested a single-mediator model in which insecure-avoidant attachment is associated with separation anxiety both directly and indirectly through lower social adjustment. Three hypotheses were tested:

- **H1.** Insecure-avoidant attachment is positively associated with separation anxiety.
- **H2.** Insecure-avoidant attachment is negatively associated with social adjustment, and social adjustment is negatively associated with separation anxiety when attachment is controlled.
- **H3.** Social adjustment mediates part of the association between insecure-avoidant attachment and separation anxiety.

2. LITERATURE REVIEW

2.1. Attachment insecurity and child anxiety

Attachment theory [4, 5] provides the foundational framework for understanding how early caregiver–child relationships shape emotional development and vulnerability to anxiety. Although children with insecure-avoidant attachment often show little overt distress during separations, underlying physiological arousal and difficulties in emotion regulation can contribute to internalising problems, including separation anxiety [7, 14]. In a systematic review of longitudinal studies, Lam et al. [15] concluded that attachment insecurity in infancy or early childhood increases the risk of later anxiety; the review did not isolate the avoidant pattern but suggested that different insecure

patterns may follow different pathways. In school-aged children, Mofrad et al. [16] found that the three attachment patterns were differently associated with separation anxiety symptoms, with ambivalent attachment most consistently linked to higher symptoms. Feriante et al. [1] noted that anxious-ambivalent attachment is most commonly linked to SAD but that avoidant patterns can also contribute, through difficulty in using caregivers as a secure base.

2.2. Attachment and social competence

A meta-analysis by Groh et al. [8] found that early attachment security predicts children's social competence with peers ($d = 0.39$), with avoidant, resistant and disorganised attachment associated with lower peer competence, and with stronger effects for social outcomes than for broad internalising symptoms. Borowski et al. [17] compared the predictive role of early temperamental reactivity and attachment for social competence and confirmed a robust contribution of attachment. These findings suggest that social adjustment may be one route by which attachment insecurity is translated into emotional difficulties.

2.3. Social adjustment as a mediator

Several studies have identified social functioning as an intervening variable. Akyol et al. [18] found that peer relationships mediated the associations of preschool children's attachment with anxiety, aggression, social competence and self-control. Law et al. [9] showed that social and emotional adjustment at school entry mediated the association between early home experiences and later outcomes. Motoca et al. [19] reported that social skills mediated the association between anxiety symptoms and peer interactions, which suggests a reciprocal process in which impaired social adjustment and anxiety reinforce each other. Engels et al. [20] showed in adolescents that social skills and relational competence mediated the association between parental attachment and emotional adjustment. Carapeto and Veiga [14] found that emotional awareness mediated the association between attachment and anxiety in adolescents, with a unique direct effect of avoidant attachment on anxiety. Longitudinal evidence links infant attachment insecurity, together with behavioural inhibition, to later social anxiety [21], and lifespan reviews connect avoidant attachment with internalising problems through difficulties in close relationships [22].

2.4. Gap

Few studies have tested the mediating role of social adjustment in the association between insecure-avoidant attachment and separation anxiety in early elementary school, and none has done so in Iranian girls, for whom family interdependence and gender socialisation may shape the expression of these constructs. The present study addresses this gap.

3. METHOD

3.1. Design and participants

The study used a cross-sectional correlational design. The population comprised all girls enrolled in grades 1–3 of elementary schools in Ferdows County, Iran, in the 2023–2024 school year ($N \approx 1,150$). The minimum sample size given by the Krejcie and Morgan [23] table for this population (95% confidence, 5% margin of error) is about 285; to allow for non-response, 352 girls were invited. Schools were stratified by geographic district; within each district, schools and then classes were randomly selected (27 classes in 9 schools), and all eligible girls in the selected classes were invited. Inclusion criteria were enrolment in grades 1–3, no diagnosed intellectual or severe neurodevelopmental disorder according to school records, and parental consent; child assent was also obtained. Parents of 331 girls consented (94.0%), and complete parent and teacher data were available for 320 girls (90.9% of those invited), who formed the analytic sample. The girls were 6.1–9.4 years old ($M = 7.6$, $SD = 0.9$) (Table 1).

3.2. Instruments

Insecure-avoidant attachment was rated by the parent with a 12-item scale adapted from the alienation and communication items of the Inventory of Parent and Peer Attachment–Revised (IPPA-R) [24] and reworded to describe observable avoidant behaviour of young children toward the parent (e.g. “My child hides her feelings from me when she is upset”; “My child prefers to manage on her own rather than ask me for help”), rated from 1 (never)

to 5 (always); total scores range from 12 to 60. Because the IPPA-R was developed for adolescents, the adapted scale was examined in the present sample: a one-factor confirmatory factor analysis fitted well ($\chi^2(54) = 98.6$, CFI = .962, RMSEA = .051, SRMR = .041; standardised loadings .48–.74), $\alpha = .84$, the four-week test–retest correlation in a subsample of 60 girls was .79, and the score correlated .41 with the teacher-rated item “seldom seeks adult help or comfort when distressed”. These results support the reliability and convergent validity of the adapted scale, although it has not been validated against observational attachment classifications (Section 5.3).

Separation anxiety was rated by the parent with the 8-item separation anxiety subscale of the parent form of the SCARED [25, 26] (items scored 0 = not true, 1 = somewhat true, 2 = very true; range 0–16). The subscale has shown good reliability and validity in elementary-school children [26]; in the present sample $\alpha = .83$. Child self-reports were collected in grades 2–3 for screening purposes but were not used in the analyses because self-reports of children this young are of limited reliability.

Social adjustment was rated by the class teacher with the full 46-item social skills scale of the teacher form of the Social Skills Improvement System (SSIS) [27], which covers communication, cooperation, assertion, responsibility, empathy, engagement and self-control (items scored 0–3; range 0–138); $\alpha = .94$ in the present sample. Using a different informant for the mediator than for the predictor and the outcome reduces shared-method variance.

The SCARED and SSIS items were translated into Persian with forward and back-translation by two bilingual psychologists, and all instruments were pilot-tested with the parents and teachers of 30 students for comprehension. Internal consistency is reported in Table 3.

3.3. Procedure and ethics

The study was approved by the research ethics committee of Islamic Azad University, Birjand Branch, and by the Ferdows education office (teaching version: the approval code is omitted). Parents gave written informed consent and children gave oral assent. Questionnaires were sent home to parents and completed by teachers at school over four weeks; the 60 parents in the retest subsample completed the attachment scale again after four weeks.

3.4. Data analysis

Analyses were carried out in SPSS 27, AMOS 24 and the PROCESS macro (version 4.2). Missing values (less than 3% of item responses) were handled with the expectation–maximisation algorithm. Normality was checked with skewness and kurtosis, and bivariate associations with Pearson correlations.

The hypothesised model is a single-mediator path model with three observed variables (scale scores): attachment (X) predicts social adjustment (M), and both predict separation anxiety (Y). With three observed variables and three paths, this model is just-identified (saturated): it has zero degrees of freedom and reproduces the observed correlations exactly, so global fit indices such as χ^2/df , CFI, TLI and RMSEA are not defined and are not reported. Standardised path coefficients were estimated by ordinary least squares, which is equivalent to maximum likelihood for this model:

$$a = r_{XM}, \quad b = \frac{r_{MY} - r_{XY}r_{XM}}{1 - r_{XM}^2}, \quad c' = \frac{r_{XY} - r_{MY}r_{XM}}{1 - r_{XM}^2}, \quad ab = a \times b \quad (1)$$

The total association is $c = c' + ab = r_{XY}$. The indirect effect was tested with a Monte Carlo confidence interval based on 200,000 draws from the sampling distributions of a and b [28], with a percentile bootstrap interval from PROCESS Model 4 (5,000 resamples) [29], and with the Sobel test for comparison. Because students were nested in 27 classes, intraclass correlations (ICC) were computed, and cluster-robust (sandwich) standard errors were used for all paths; the Monte Carlo interval was recomputed with these standard errors. Statistical significance was set at $\alpha = .05$.

4. RESULTS

4.1. Participants

Table 1 shows the distribution of the sample across grades and the parent who completed the parent questionnaires.

Table 1. Characteristics of the sample (N = 320).

Characteristic	Category	n	%
Grade	First	108	33.8
	Second	105	32.8
	Third	107	33.4
Age (years)	M (SD); range	7.6 (0.9); 6.1–9.4	
Parent respondent	Mother	247	77.2
	Father	73	22.8
Parent education	Below high-school diploma	71	22.2
	High-school diploma	142	44.4
	University degree	107	33.4
Family economic status (parent report)	Low	58	18.1
	Middle	209	65.3
	High	53	16.6

The girls were 6.1–9.4 years old ($M = 7.6$). Most parent questionnaires were completed by mothers (77.2%), and about two thirds of families described their economic status as middle.

4.2. Descriptive statistics and reliability

Table 2 reports the descriptive statistics of the total scores. Skewness and kurtosis were within ± 1 for all variables, which indicates approximately normal distributions. Cronbach's alpha was .84 for attachment, .94 for social adjustment and .83 for separation anxiety (Table 3). The ICCs of the 27 classes were .03 for attachment, .07 for social adjustment and .04 for separation anxiety (design effects 1.33–1.76), so clustering was small but not negligible.

Table 2. Descriptive statistics of total scores (N = 320).

Variable (informant)	Range	M	SD	Skewness	Kurtosis
Insecure-avoidant attachment (parent)	12–60	27.5	6.1	0.54	−0.61
Social adjustment, SSIS (teacher)	0–138	86.4	17.9	−0.48	−0.39
Separation anxiety, SCARED-SA (parent)	0–16	6.9	3.6	0.63	−0.44

Table 3. Number of items, scoring, internal consistency and intraclass correlations.

Variable	Items	Item scoring	Cronbach's α	ICC (classes)
Insecure-avoidant attachment	12	1–5	.84	.03
Social adjustment (SSIS social skills)	46	0–3	.94	.07
Separation anxiety (SCARED-SA)	8	0–2	.83	.04

4.3. Correlations

All three variables were significantly correlated in the expected directions (Table 4). With $n = 320$, the 95% confidence intervals of the correlations are approximately ± 0.08 .

Table 4. Pearson correlations with 95% confidence intervals. ** $p < .001$.

Variable	1	2	3
1. Insecure-avoidant attachment	1		
2. Social adjustment	-.46** [-.54, -.37]	1	
3. Separation anxiety	.51** [.42, .58]	-.43** [-.51, -.34]	1

4.4. Path model

Table 5 reports the standardised coefficients of the single-mediator model, computed with Eq. (1) from the correlations in Table 4, with both conventional and cluster-robust standard errors. Insecure-avoidant attachment predicted lower social adjustment ($a = -0.46$, $p < .001$; $R^2 = .21$). Controlling for attachment, social adjustment predicted lower separation anxiety ($b = -0.25$, $p < .001$), and attachment retained a direct positive association with separation anxiety ($c' = 0.40$, $p < .001$). All paths remained significant at $p < .001$ with cluster-robust standard errors. Together, attachment and social adjustment explained 31% of the variance in separation anxiety. H1 and H2 were therefore supported.

Table 5. Standardised path coefficients of the single-mediator model ($N = 320$). The model is saturated ($df = 0$), so global fit indices are not applicable. $R^2 = .21$ for social adjustment and .31 for separation anxiety.

Path	β	SE	Cluster-robust SE	t (robust)	p
Attachment $\rightarrow$ social adjustment (a)	-0.460	0.050	0.060	-7.67	< .001
Social adjustment $\rightarrow$ separation anxiety (b)	-0.248	0.053	0.066	-3.76	< .001
Attachment $\rightarrow$ separation anxiety, direct (c')	0.396	0.053	0.064	6.19	< .001
Attachment $\rightarrow$ separation anxiety, total (c)	0.510	0.048	0.058	8.79	< .001

4.5. Indirect effect

The indirect effect of insecure-avoidant attachment on separation anxiety through social adjustment was $ab = 0.114$ (95% Monte Carlo CI [0.064, 0.171]; Sobel $z = 4.20$, $p < .001$), which corresponds to 22% of the total association (Table 6). The PROCESS percentile bootstrap gave practically the same interval (95% CI [0.066, 0.169]), and with cluster-robust standard errors the Monte Carlo interval widened to [0.052, 0.185] but still excluded zero. Because the direct association remained significant, the pattern corresponds to partial (complementary) mediation [30]. H3 was supported.

Table 6. Indirect, direct and total effects of insecure-avoidant attachment on separation anxiety (standardised). CI for the indirect effect: Monte Carlo method; for the direct and total effects: normal-theory interval.

Effect	Estimate	95% CI	Share of total
Indirect ($a \times b$)	0.114	[0.064, 0.171]	22%
Direct (c')	0.396	[0.293, 0.499]	78%
Total (c)	0.510	[0.416, 0.604]	100%

As a sensitivity check, the model was also estimated with correlations corrected for unreliability (Cronbach's α), which approximates a latent-variable model. The corrected coefficients ($a = -0.52$, $b = -0.23$, $c' = 0.49$, $ab = 0.12$) lead to the same conclusions.

4.6. Alternative (reverse) model

Because the data are cross-sectional, the temporal order of social adjustment and separation anxiety cannot be established empirically. To show how strongly the conclusion depends on the assumed direction, an alternative model was estimated in which separation anxiety was the mediator and social adjustment the outcome (attachment $\rightarrow$ separation anxiety $\rightarrow$ social adjustment). In this model, attachment predicted separation anxiety ($\beta = 0.51$),

separation anxiety predicted lower social adjustment when attachment was controlled ($\beta = -0.26$), the direct association between attachment and social adjustment remained significant ($\beta = -0.33$), and the indirect effect was -0.13 (95% Monte Carlo CI $[-0.20, -0.08]$), or 29% of the total association. The alternative model therefore fits the data equally well (both models are saturated) and yields an indirect effect of similar size. This illustrates a general property of cross-sectional mediation [31]: the data are compatible with both directions, and the choice between them must rest on theory and, ultimately, on longitudinal evidence. Attachment theory and developmental evidence that attachment patterns are formed before school entry favour the hypothesised order for the attachment variable, but the order of social adjustment and separation anxiety is genuinely uncertain and is probably reciprocal [19].

4.7. Statistical power

The power of the Monte Carlo test of the indirect effect was estimated by simulation. Samples were drawn from a multivariate normal population with the correlation matrix in Table 4, the model was re-estimated in each sample, and the proportion of samples in which the 95% Monte Carlo interval excluded zero was recorded (2,000 samples per sample size). Power was .64 for $n = 80$, .81 for $n = 120$, .89 for $n = 160$ and $> .99$ for $n = 320$. The present sample was therefore more than adequate to detect an indirect effect of the observed size, and a sample of about 120 would have been sufficient for 80% power. This also means that the study had high power to detect smaller indirect effects than the one observed, which strengthens the conclusion that the indirect effect, although modest, is not negligible.

5. DISCUSSION

This study examined whether social adjustment accounts for part of the association between insecure-avoidant attachment and separation anxiety in girls in grades 1–3. As expected, girls with stronger avoidant attachment tendencies reported more separation anxiety and showed poorer social adjustment, and social adjustment was associated with lower separation anxiety when attachment was controlled. Social adjustment accounted for about one fifth of the total association, and most of the association remained direct.

Attachment and separation anxiety: The positive association between insecure-avoidant attachment and separation anxiety is consistent with attachment theory [4, 5]: children who learn to suppress their emotional needs because caregivers are unavailable may appear calm during separations, but unresolved distress may remain and manifest as anxiety. The apparent self-reliance of avoidant children should therefore not be mistaken for security. The finding agrees with Kerns and Brumariu [7], who identified insecure attachment as a risk factor for childhood anxiety, with Mofrad et al. [16], who found that insecure attachment patterns were associated with separation anxiety symptoms, and with Feriante et al. [1]. It is worth noting that SAD is classically linked to anxious-ambivalent rather than avoidant attachment; the present association may partly reflect overlap between the avoidance measure and general attachment insecurity, which future studies should disentangle by measuring the different insecure patterns together.

Attachment and social adjustment: The negative association between avoidant attachment and social adjustment is consistent with the emotional distancing and reluctance to seek closeness that characterise avoidance, and with the meta-analytic finding that attachment security predicts peer competence [8]. Similarly, Engels et al. [20] showed that secure attachment promotes social skills and emotional adjustment.

Social adjustment and separation anxiety: Girls who were better adjusted socially reported less separation anxiety, even when attachment was controlled. Children who can build friendships, cooperate with peers and adapt to classroom demands may feel safer at school and depend less on the presence of the attachment figure. This finding agrees with evidence that social skills are linked to anxiety and peer experiences [19] and that social adjustment at school entry carries early adversity forward [9].

The mediation pattern: The indirect path accounted for 22% of the total association, which is modest but robust: the effect was detected with power above .99, and the reliability-corrected analysis produced a similar estimate (0.12). The finding is also consistent in size with the meta-analytic association between attachment security and peer

competence [8]. Nevertheless, the indirect path accounted for only 22% of the total association, so social adjustment is one, but not the main, mechanism through which avoidant attachment is related to separation anxiety. Other mechanisms suggested by the literature, such as emotional awareness and emotion regulation [14] or temperamental inhibition [21], may account for the substantial direct association.

Cultural context: Iranian family culture emphasises close mother–child relationships, interdependence and protection of daughters, and mothers completed most parent questionnaires (77%). In such a context, parental behaviours that would be interpreted as over-protection in individualistic cultures may be normative, and the meaning of both avoidance and separation distress may differ. Close family ties may also make separation at school entry particularly salient for girls. These cultural features may explain why separation anxiety scores were relatively high compared with the other scales, and they call for cross-cultural measurement-invariance studies before the size of the associations is compared with findings from Western samples.

Measurement considerations: Because all constructs were measured with questionnaires, part of the observed associations may reflect informant perspectives. Parents rated both attachment and separation anxiety, so their correlation may be inflated by a parent’s general perception of the child as “fragile”; the mediator, however, was rated by teachers, and the *a* and *b* paths therefore cross informants. The reliability-corrected analysis (Section 4.5) shows that random measurement error attenuated rather than inflated the coefficients, but it cannot correct for systematic (shared-method) error in the *c*’ path.

5.1. Practical implications

The findings support school-based programmes that strengthen social competence, such as social-emotional learning curricula, structured peer-interaction activities and teacher training aimed at creating supportive classrooms, as one component of the prevention of separation anxiety. Because the indirect effect is modest, such programmes are likely to be most effective when combined with attachment-informed guidance for parents that promotes emotional responsiveness.

5.2. Strengths

The study has several strengths. First, it focuses on a developmentally sensitive period, the first three years of formal schooling, in which separation from attachment figures becomes a daily routine. Second, it uses a reasonably large sample selected by multi-stage cluster random sampling from a defined population, which supports the representativeness of the findings for girls in the county. Third, the indirect effect was tested with a Monte Carlo confidence interval, which does not rely on the normality of the product of coefficients, and the robustness of the conclusions was examined with reliability-corrected estimates, an alternative causal ordering and a simulation-based power analysis. Fourth, it uses different informants for the mediator (teachers) and for the predictor and outcome (parents), and all computations can be reproduced from the correlation matrix reported in Table 4.

5.3. Limitations

Cross-sectional mediation: All variables were measured at the same time. Mediation estimates from cross-sectional data can differ substantially from longitudinal mediation and do not establish temporal order or causality [31]. The reverse pathway, in which anxiety impairs social adjustment [19], is equally compatible with the data.

Measurement in young children: The attachment measure was adapted from an instrument developed for adolescents. Its factor structure, internal consistency, test–retest reliability and convergent validity were supported in this sample, but it has not been validated against observational or narrative attachment classifications such as story-completion tasks, and it captures avoidant behaviour as reported by parents rather than the child’s internal working model.

Shared informants: Parents rated both the predictor and the outcome, so shared-method variance may have inflated the direct path c' .

Clustered sampling: Students were sampled within 27 classes. The ICCs were small (.03–.07), and all conclusions held with cluster-robust standard errors, but a multilevel model with more classes would allow class-level predictors to be examined.

Sample: Only girls from one county were included, which limits generalisation to boys and to other regions.

5.4. Future research

Future studies should use longitudinal designs with at least three waves, multi-informant and observational measures of attachment appropriate for young children, measures of all insecure attachment patterns, and samples of boys and girls from several regions. Intervention studies that strengthen social competence could test whether improvements in social adjustment are followed by reductions in separation anxiety.

6. CONCLUSION

In girls in the first three grades of elementary school, insecure-avoidant attachment was associated with more separation anxiety and with poorer social adjustment, and social adjustment accounted for about one fifth of the association between attachment and separation anxiety. These cross-sectional findings are consistent with the view that social adjustment is one pathway linking attachment insecurity to separation anxiety and suggest that strengthening peer relationships and classroom adaptation may help vulnerable students. Longitudinal and intervention studies are needed to establish whether this pathway is causal.

Authors' Contributions

A. Nazeri designed the study and supervised data collection; S. M. Kheirieh and M. Khodaparast collected the data and drafted the literature review; M. H. Azimzadeh analysed the data; all authors interpreted the results, revised the manuscript and approved the final version.

Declaration of Generative AI Use

During the preparation of this manuscript, the authors used generative AI tools to improve the language and readability of the text. The authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

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Declaration of Competing Interests

The authors declare that they have no competing interests.

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Ethical Considerations

The study was approved by the research ethics committee of Islamic Azad University, Birjand Branch, and conducted in accordance with the Declaration of Helsinki (teaching version: approval code omitted). Participation was voluntary; written informed consent was obtained from parents or legal guardians and oral assent from the children. Data were stored without names, and only aggregated results are reported.

REFERENCES

- [1] Feriante, J., Torrico, T. J., & Bernstein, B. (2023). Separation anxiety disorder. In *StatPearls*. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK560793/>
- [2] Hanna, G. L., Fischer, D. J., & Fluent, T. E. (2006). Separation anxiety disorder and school refusal in children and adolescents. *Pediatrics in Review*, 27(2), 56–63. <https://doi.org/10.1542/pir.27.2.56>
- [3] Dhote, V. S., Dharmadhikari, P. M., Bahadure, R. N., Thosar, N. R., & Dhote, A. V. (2021). Separation anxiety—An unseen cause for development of abnormal oral and paraoral habits and malocclusion: A review of literature and report of two cases. *International Journal of Clinical Pediatric Dentistry*, 14(Suppl. 2), S199–S205. <https://doi.org/10.5005/jp-journals-10005-2091>
- [4] Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. Basic Books.
- [5] Bowlby, J. (1980). *Attachment and loss: Vol. 3. Loss: Sadness and depression*. Basic Books.
- [6] Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Erlbaum. <https://doi.org/10.1037/t28248-000>
- [7] Kerns, K. A., & Brumariu, L. E. (2014). Is insecure parent-child attachment a risk factor for the development of anxiety in childhood or adolescence? *Child Development Perspectives*, 8(1), 12–17. <https://doi.org/10.1111/cdep.12054>
- [8] Groh, A. M., Fearon, R. P., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Steele, R. D., & Roisman, G. I. (2014). The significance of attachment security for children's social competence with peers: A meta-analytic study. *Attachment & Human Development*, 16(2), 103–136. <https://doi.org/10.1080/14616734.2014.883636>
- [9] Law, J., Tamayo, N., McKean, C., & Rush, R. (2021). The role of social and emotional adjustment in mediating the relationship between early experiences and different language outcomes. *Frontiers in Psychiatry*, 12, Article 654213. <https://doi.org/10.3389/fpsy.2021.654213>
- [10] Bakhla, A. K., Sinha, V. K., & Verma, V. (2013). Anxiety in school students: Role of parenting and gender. *Industrial Psychiatry Journal*, 22(2), 131–137. <https://doi.org/10.4103/0972-6748.132927>
- [11] Orgilés, M., Espada, J. P., García-Fernández, J. M., Méndez, X., & Hidalgo, M. D. (2011). Most feared situations related to separation anxiety and characteristics by age and gender in late childhood. *Anales de Psicología*, 27(1), 80–85.
- [12] Charbonneau, S., Journault, A.-A., Cernik, R., Longpré, C., Wan, N., Giguère, C.-É., & Lupien, S. (2023). Anxiety in the classroom: Only girls' anxiety is related to same-sex peers' anxiety. *International Journal of Environmental Research and Public Health*, 20(1), Article 84. <https://doi.org/10.3390/ijerph20010084>
- [13] Jreisat, S. (2023). Separation anxiety among kindergarten children and its association with parental socialization. *Health Psychology Research*, 11, Article 75363. <https://doi.org/10.52965/001c.75363>

- [14] Carapeto, M. J., & Veiga, G. (2023). Emotional awareness mediates the relationship between attachment and anxiety symptoms in adolescents. *Mental Health & Prevention*, 30, Article 200269. <https://doi.org/10.1016/j.mhp.2023.200269>
- [15] Lam, L., Rai, A., & Lam, M. (2019). Attachment problems in childhood and the development of anxiety in adolescents: A systematic review of longitudinal and prospective studies. *Mental Health & Prevention*, 14, Article 100154. <https://doi.org/10.1016/j.mhp.2019.02.002>
- [16] Mofrad, S., Abdullah, R., & Uba, I. (2010). Attachment patterns and separation anxiety symptom. *Asian Social Science*, 6(11), 148. <https://doi.org/10.5539/ass.v6n11p148>
- [17] Borowski, S. K., Groh, A. M., Bakermans-Kranenburg, M. J., Fearon, P., Roisman, G. I., van IJzendoorn, M. H., & Vaughn, B. E. (2021). The significance of early temperamental reactivity for children's social competence with peers: A meta-analytic review and comparison with the role of early attachment. *Psychological Bulletin*, 147(11), 1125–1158. <https://doi.org/10.1037/bul0000346>
- [18] Akyol, N. A., Güven Karaman, N., Yilmaz, A., & Essau, C. (2025). The predictive role of preschool children's attachment on social competence, anxiety, aggression and self-control: Peer relationships as a mediator. *Child Psychiatry & Human Development*, 56(6), 1788–1799. <https://doi.org/10.1007/s10578-024-01773-4>
- [19] Motoca, L. M., Williams, S., & Silverman, W. K. (2012). Social skills as a mediator between anxiety symptoms and peer interactions among children and adolescents. *Journal of Clinical Child & Adolescent Psychology*, 41(3), 329–336. <https://doi.org/10.1080/15374416.2012.668843>
- [20] Engels, R. C. M. E., Finkenauer, C., Meeus, W., & Deković, M. (2001). Parental attachment and adolescents' emotional adjustment: The associations with social skills and relational competence. *Journal of Counseling Psychology*, 48(4), 428–439. <https://doi.org/10.1037/0022-0167.48.4.428>
- [21] Lewis-Morrarty, E., Degnan, K. A., Chronis-Tuscano, A., Pine, D. S., Henderson, H. A., & Fox, N. A. (2015). Infant attachment security and early childhood behavioral inhibition interact to predict adolescent social anxiety symptoms. *Child Development*, 86(2), 598–613. <https://doi.org/10.1111/cdev.12336>
- [22] Dagan, O., Groh, A. M., Madigan, S., & Bernard, K. (2021). A lifespan development theory of insecure attachment and internalizing symptoms: Integrating meta-analytic evidence via a testable evolutionary mis/match hypothesis. *Brain Sciences*, 11(9), Article 1226. <https://doi.org/10.3390/brainsci11091226>
- [23] Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- [24] Armsden, G. C., & Greenberg, M. T. (1987). The Inventory of Parent and Peer Attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, 16(5), 427–454. <https://doi.org/10.1007/BF02202939>
- [25] Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J., & Neer, S. M. (1997). The Screen for Child Anxiety Related Emotional Disorders (SCARED): Scale construction and psychometric characteristics. *Journal of the American Academy of Child & Adolescent Psychiatry*, 36(4), 545–553. <https://doi.org/10.1097/00004583-199704000-00018>
- [26] Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): A replication study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38(10), 1230–1236. <https://doi.org/10.1097/00004583-199910000-00011>
- [27] Gresham, F. M., & Elliott, S. N. (2008). *Social Skills Improvement System (SSIS) rating scales*. Pearson

Assessments. <https://doi.org/10.1037/t02650-000>

- [28] Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. *Communication Methods and Measures*, 6(2), 77–98. <https://doi.org/10.1080/19312458.2012.679848>
- [29] Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.
- [30] Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197–206. <https://doi.org/10.1086/651257>
- [31] Maxwell, S. E., & Cole, D. A. (2007). Bias in cross-sectional analyses of longitudinal mediation. *Psychological Methods*, 12(1), 23–44. <https://doi.org/10.1037/1082-989X.12.1.23>