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Explaining the Mediating Role of Emotional Processing in the Relationship Between Mindfulness and Aggression Among Adolescent Girls in Babol

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ABSTRACT

Purpose: The present study aimed to examine the mediating role of emotional processing in the relationship between mindfulness and aggression among female adolescents in the second cycle of secondary education.

Methods and Materials: This study employed a basic, cross-sectional design using a descriptive–correlational approach based on covariance-based structural equation modeling (CBSEM). The statistical population consisted of all female students in the second cycle of secondary education in Babol (N = 3,343), from whom 360 participants were selected using multi-stage cluster random sampling; after excluding incomplete questionnaires, 351 cases were included in the final analysis. Data were collected using the Buss–Perry Aggression Questionnaire (Buss & Perry, 1992), the Emotional Processing Scale (Baker et al., 2010), and the Kentucky Inventory of Mindfulness Skills (Baer et al., 2004). Data were analyzed using SPSS version 27 and AMOS version 24 at a significance level of .05. Assumptions of normality, absence of multicollinearity, and independence of errors were examined prior to model testing.

Findings: Structural equation modeling indicated that mindfulness had a direct, negative, and statistically significant effect on aggression ($\beta = -0.34$, $p < .01$). Mindfulness also showed a significant negative direct effect on maladaptive emotional processing ($\beta = -0.48$, $p < .01$). Emotional processing demonstrated a direct, positive, and statistically significant effect on aggression ($\beta = 0.37$, $p < .01$). Furthermore, the indirect effect analysis revealed that mindfulness significantly reduced aggression through its impact on emotional processing ($\beta = -0.18$, $p < .01$), confirming the mediating role of emotional processing in the structural model.

Conclusion: The findings suggest that mindfulness reduces aggressive behavior among female adolescents both directly and indirectly through improving emotional processing. Enhancing mindfulness skills may therefore contribute to healthier emotional integration and decreased aggression during adolescence, highlighting the importance of incorporating mindfulness-based interventions within school-based prevention and mental health programs.

Keywords: Mindfulness; Emotional Processing; Aggression; Female Adolescents

1. Introduction

Adolescence represents a critical developmental period characterized by heightened emotional reactivity, identity formation, and increased sensitivity to social contexts. During this stage, difficulties in emotion regulation and self-control may manifest in various maladaptive behaviors, including aggression. Aggression among adolescents—ranging from verbal hostility to relational and physical forms—poses significant challenges for mental health, academic functioning, and interpersonal relationships. Contemporary psychological research has increasingly focused on identifying protective and risk factors associated with aggressive behavior, emphasizing intrapersonal processes such as mindfulness, emotional processing, emotion regulation, and self-control as central explanatory mechanisms (Kapoor et al., 2024; Kim et al., 2025). Understanding how these variables interact is essential for developing theoretically grounded and empirically supported interventions targeting adolescent aggression.

Mindfulness, broadly conceptualized as a nonjudgmental awareness of present-moment experiences, has been widely studied as a protective factor in psychological functioning. Trait mindfulness has been associated with reduced hostility, decreased impulsive reactivity, and lower levels of aggressive behavior across diverse populations (Anjum, 2024; Revels-Strother et al., 2024). Empirical evidence suggests that individuals with higher dispositional mindfulness exhibit enhanced attentional control, greater emotional clarity, and more adaptive coping strategies, thereby reducing the likelihood of externalizing behaviors such as aggression. For example, research has shown that lower dispositional mindfulness partially explains higher levels of trait hostility and aggression (Revels-Strother et al., 2024). Similarly, critical analyses among student populations have demonstrated an inverse relationship between mindfulness and aggression, highlighting mindfulness as a significant predictor of reduced aggressive tendencies (Anjum, 2024).

Intervention-based studies further corroborate the role of mindfulness in aggression reduction. Comparative investigations examining emotion regulation training and mindfulness training among female students have revealed that mindfulness-based approaches significantly decrease aggressive behaviors, particularly among adolescents with academic vulnerabilities (Mehraban et al., 2024; Mehrban et al., 2024). In marital contexts, positive mindfulness therapy

has been shown to reduce covert relational aggression and improve relational quality of life (Fouladi et al., 2024). Moreover, mindfulness-based interventions targeting adolescents have demonstrated that improvements in self-control and reductions in emotion dysregulation mediate decreases in aggressive behavior (Zhang & Zhang, 2023). These findings underscore mindfulness not merely as a static trait but as a trainable skill that influences aggression through intermediary psychological mechanisms.

One such mechanism is emotional processing. Emotional processing refers to the manner in which individuals experience, interpret, regulate, and integrate emotional information. Maladaptive emotional processing—characterized by suppression, avoidance, and unresolved emotional experiences—has been linked to various psychological difficulties, including aggression and emotional eating (Babakhanlou, 2023). Research indicates that deficits in emotional processing may amplify impulsive responses and reactive aggression, particularly when individuals struggle to integrate negative affect adaptively. For instance, mindfulness-based cognitive therapy has been shown to enhance emotional processing and reduce perceived stress in clinical populations, suggesting that improved emotional processing may serve as a pathway through which mindfulness exerts its beneficial effects (Mahdieh et al., 2021). Similarly, mindfulness-based cognitive therapy and guided imagery interventions have demonstrated positive effects on emotional processing among mothers of children with autism spectrum disorder (Safikhani et al., 2020).

The association between emotional dysregulation and aggression has been consistently supported in adolescent research. Difficulties in regulating negative emotions have been associated with relational aggression, with forgiveness serving as a mediating factor in high school students (Şahan & Ceyhan, 2025). Moreover, negative emotional states have been linked to pathological gaming and aggressive behaviors in adolescents, with self-control functioning as a key explanatory mechanism (Kim et al., 2025). These findings suggest that emotional processes play a central role in the manifestation of aggressive behaviors during adolescence. Emotional intelligence has also been identified as a protective factor, inversely associated with aggression and positively related to psychological well-being in young adults (Khan et al., 2025). In digital contexts, online verbal aggression has been found to undermine interpersonal trust, with emotional intelligence and core self-evaluation mediating these relationships (Yao, 2025). Collectively,

these studies highlight the importance of emotional competencies and processing mechanisms in explaining aggressive tendencies.

Within this framework, mindfulness may operate as a higher-order regulatory capacity that influences aggression through its impact on emotional processing and emotion regulation. Mindfulness-based interventions have been shown to reduce aggression in adolescents by enhancing self-control and reducing emotion dysregulation (Zhang & Zhang, 2023). Furthermore, social exclusion has been associated with online aggressive behavior, with ego depletion mediating this relationship and mindfulness moderating its strength (Zhao et al., 2025). This evidence suggests that mindfulness not only directly reduces aggression but also buffers the impact of emotionally taxing experiences on aggressive responses. Similarly, forgiveness has been identified as a mediator in the association between trait mindfulness and psychological partner aggression among college students, reinforcing the notion that mindfulness exerts its effects through intermediate socio-emotional processes (Edwards et al., 2024).

Beyond aggression, mindfulness has been associated with broader adaptive outcomes, including increased self-compassion and positive reappraisal, which mediate the relationship between mindfulness and posttraumatic growth (Aliche, 2023). In clinical populations, mindfulness therapy has been shown to enhance tolerance of uncertainty and reduce maladaptive cognitive processes such as thought-action fusion in individuals with obsessive-compulsive disorder (Asli Azad et al., 2019). These findings collectively position mindfulness as a transdiagnostic regulatory construct that influences emotional, cognitive, and behavioral outcomes through multiple pathways.

Despite the growing body of literature linking mindfulness to aggression, fewer studies have explicitly examined the mediating role of emotional processing in this relationship, particularly among adolescent girls. Although emotion regulation training has been compared with mindfulness training in reducing aggression (Mehraban et al., 2024; Mehrban et al., 2024), and emotional processing has been identified as a mediator in related constructs such as emotional eating (Babakhanlou, 2023), an integrative structural model examining mindfulness, emotional processing, and aggression simultaneously remains underexplored. This gap is particularly salient given that adolescence is marked by neurobiological and psychosocial changes that intensify emotional experiences and may

predispose individuals to reactive aggression when emotional information is poorly processed.

Moreover, cultural and contextual factors may shape how adolescents experience and regulate emotions. Studies conducted in diverse sociocultural contexts have emphasized the importance of emotion regulation, forgiveness, resilience, and mindfulness as predictors or mediators of aggression (Kapoor et al., 2024; Şahan & Ceyhan, 2025). However, structural equation modeling approaches that simultaneously evaluate direct and indirect pathways among these constructs provide a more nuanced understanding of their interrelations. Such approaches enable researchers to test whether mindfulness reduces aggression directly, indirectly through emotional processing, or via a combination of both pathways.

In summary, existing evidence suggests that mindfulness is inversely related to aggression and positively associated with adaptive emotional functioning (Anjum, 2024; Revels-Strother et al., 2024). Emotional processing deficits, in turn, are linked to maladaptive outcomes, including aggression and dysregulated behaviors (Babakhanlou, 2023; Kim et al., 2025). Intervention studies support the efficacy of mindfulness-based approaches in reducing aggression and enhancing emotional regulation (Fouladi et al., 2024; Zhang & Zhang, 2023). Nevertheless, the specific mediating role of emotional processing in the relationship between mindfulness and aggression among adolescent girls warrants further empirical investigation using rigorous structural modeling techniques.

Therefore, the aim of the present study was to examine the mediating role of emotional processing in the relationship between mindfulness and aggression among female adolescents using covariance-based structural equation modeling.

2. Methods and Materials

2.1. Study Design and Participants

Given the nature of its objective, the present study is categorized as basic research, and in terms of data collection procedures, it constitutes a cross-sectional study. The data were examined using a descriptive-analytical approach, and regarding the type of relationship among variables, the study employed a correlational design based on structural equation modeling (SEM). Specifically, regression equations derived from the integration of path analysis and second-order factor analysis were utilized in this investigation.

In this study, a covariance-based structural equation modeling (CBSEM) approach was applied, implemented using AMOS software. Within this framework, model parameters—including path coefficients and factor loadings—were estimated by minimizing the discrepancy between the observed covariance matrix derived from the sample data and the covariance matrix estimated by the theoretical model. In addition, to examine the mediating role of emotional processing, the stepwise procedure proposed by Baron and Kenny (1986) was employed. In the first step, the relationship between exogenous variables and the mediator variable was assessed; in the second step, the association between the mediator and the endogenous variable was tested; and in the final step, the mediating effect of the mediator variable on the relationship between the exogenous variables and the endogenous variable was evaluated.

2.2. Measures

Buss–Perry Aggression Questionnaire. This questionnaire was developed by Buss and Perry (1992) and consists of 29 items rated on a 5-point Likert scale ranging from very much to not at all. The developers reported an internal consistency coefficient of .89 using Cronbach's alpha. Hosseini Anjedani (2008) reported a Cronbach's alpha coefficient of .86 for this instrument. The questionnaire comprises four subscales: Verbal Aggression, Physical Aggression, Anger, and Hostility. Higher scores indicate greater levels of aggression.

Emotional Processing Scale. The Emotional Processing Scale was originally developed by Baker et al. (2007). The initial version consisted of 48 items and was subsequently shortened by Baker et al. (2010) to a 25-item version. The scale includes five dimensions (subscales): Suppression, Signs of Unprocessed Emotion, Unpleasant Emotional Experience, Avoidance, and Emotional Control. Items are rated on a 5-point Likert scale, with 1 assigned to strongly disagree, 2 to disagree, 3 to neither agree nor disagree, 4 to agree, and 5 to strongly agree. Subscale scores are calculated as follows: Suppression (Items 7, 9, 16, 19, 25); Unpleasant Emotional Experience (Items 3, 8, 11, 12, 22); Signs of Unprocessed Emotion (Items 1, 5, 2, 20, 24); Avoidance

(Items 4, 13, 14, 21, 23); Emotional Control (Items 6, 10, 15, 17, 18). Baker et al. examined the factorial structure of the questionnaire using exploratory factor analysis and extracted five factors. The Cronbach's alpha and test–retest reliability coefficients were reported as .92 and .79, respectively. In Iran, Lotfi reported a correlation coefficient of .54 between this scale and an emotion regulation scale, indicating acceptable convergent validity.

Kentucky Inventory of Mindfulness Skills (KIMS). This questionnaire was developed by Baer et al. (2004) to assess mindfulness skills. It consists of 39 items designed to measure four components of mindfulness: Observing, Describing without labeling, Acting with Awareness, and Accepting without Judgment. The items are rated on a 5-point Likert scale ranging from very rarely true to almost always true, with higher scores reflecting greater mindfulness skills. Psychometric analyses conducted by Baer et al. (2004) demonstrated high internal consistency, with Cronbach's alpha coefficients of .91, .84, .83, and .87 for the Observing, Describing, Acting with Awareness, and Accepting without Judgment subscales, respectively. Narimani Zahed and Golpour (2012) confirmed the content validity of the questionnaire and reported a Cronbach's alpha coefficient of .76. In the present study, the overall Cronbach's alpha coefficient was .83 for the cancer patient group and .85 for the non-clinical group.

2.3. Data Analysis

The final data were analyzed using descriptive statistics, including means, standard deviations, and frequency distribution tables, to describe the demographic characteristics of the sample and the status of the primary research variables. Subsequently, inferential analyses were conducted to test the research hypotheses using SPSS version 27 and AMOS version 24. In all statistical tests, the level of significance was set at .05.

3. Findings and Results

The participants in the present study consisted of 351 female students enrolled in the second cycle of secondary education. The distribution of the sample according to grade level and field of study is presented in Table 1.

Table 1

Demographic Distribution of the Sample

Indicator	Group	Frequency	Percentage
Grade Level	10th Grade	54	15.4
	11th Grade	124	35.3
	12th Grade	173	49.3
Field of Study	Humanities	171	48.7
	Experimental Sciences	76	21.7
	Mathematics	104	29.6

The table indicates that 15.4% of students were in the 10th grade, 35.3% in the 11th grade, and 49.3% in the 12th grade. Furthermore, 48.7% of the students were enrolled in Humanities, 21.7% in Experimental Sciences, and 29.6% in Mathematics.

Prior to conducting statistical analyses, data screening procedures were performed. The results indicated that there were no missing values in the dataset. Univariate outliers were examined using boxplots, and the findings showed no

univariate outliers. Multivariate outliers were assessed using Mahalanobis distance statistics. The obtained distances were then adjusted based on the number of predictor variables in the model using the chi-square (χ^2) criterion (Mirz et al., 2017). The results indicated the absence of multivariate outliers. Consequently, the analyses proceeded with data from all 351 participants. The descriptive statistics of the research variables are presented in Table 2.

Table 2

Descriptive Statistics of Research Variables

Construct	Variables	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
Mindfulness Skills	Observing	20	46	34.73	5.49	-0.29	-0.60
	Describing Without Labeling	12	34	22.94	4.43	-0.01	-0.52
	Acting with Awareness	14	30	21.81	3.80	-0.22	-0.77
	Accepting Without Judgment	12	36	23.36	5.89	-0.05	-0.65
	Total Score	67	135	102.86	14.72	-0.53	-0.19
Emotional Processing	Suppression	9	25	18.62	3.61	-0.15	-0.73
	Unpleasant Emotional Experience	7	25	17.44	4.41	-0.17	-0.55
	Unprocessed Emotion	7	25	18.30	4.47	-0.44	-0.40
	Avoidance	6	25	15.60	4.77	-0.16	-0.68
	Emotional Control	9	25	18.16	3.70	-0.33	-0.87
Aggression	Total Score	41	118	88.13	15.70	-0.02	-0.80
	Verbal Aggression	21	34	28.63	3.14	-0.67	-0.28
	Physical Aggression	5	23	13.67	3.85	0.15	-0.59
	Anger	12	34	22.51	4.57	0.10	-0.59
	Hostility	9	39	27.32	6.75	-0.49	-0.25
	Total Score	56	125	92.13	14.18	-0.15	-0.17

The table indicates that among the dimensions of mindfulness skills, Observing and Acting with Awareness had the highest and lowest mean scores, respectively (34.73 vs. 21.81). Among the dimensions of emotional processing, Suppression had the highest mean (18.62), whereas Avoidance had the lowest mean (15.60). Finally, among the dimensions of aggression, Verbal Aggression had the highest mean and Physical Aggression had the lowest mean (28.63 vs. 13.67).

In examining the assumptions of structural equation modeling, univariate and multivariate normality, absence of

multicollinearity, and independence of errors were assessed in accordance with the recommendations of Mirz et al. (2017). As shown in Table 2, considering the thresholds of ± 2 for skewness and ± 7 for kurtosis, the assumption of univariate normality was satisfied. To assess multivariate normality, standardized residuals were calculated, and the distribution of residuals was examined using the one-sample Kolmogorov–Smirnov test. The results indicated that the residuals in the aggression prediction model were normally distributed ($Z = 0.05$, $df = 351$, $p > .05$).

Table 3*Direct and Indirect Effects of Mindfulness and Emotional Processing on Aggression*

Path	b	β	p	95% CI Lower	95% CI Upper
Mindfulness → Aggression	-0.25	-0.34	.001	-0.48	-0.19
Mindfulness → Emotional Processing	-0.36	-0.48	.002	-0.59	-0.33
Emotional Processing → Aggression	0.35	0.37	.001	0.22	0.57
Mindfulness → Emotional Processing → Aggression (Indirect Effect)	-0.13	-0.18	.001	-0.27	-0.10

Table 3 presents the direct and indirect effects of mindfulness and emotional processing on aggression. The results indicate that mindfulness had a direct, negative, and statistically significant effect on aggression ($\beta = -0.34$, $p = .001$), with the 95% confidence interval not including zero (-0.48 to -0.19). Mindfulness also demonstrated a significant negative direct effect on emotional processing ($\beta = -0.48$, $p = .002$), suggesting that higher levels of mindfulness were associated with lower levels of maladaptive emotional processing. Emotional processing, in turn, showed a direct, positive, and statistically significant effect on aggression ($\beta = 0.37$, $p = .001$), indicating that higher levels of maladaptive emotional processing were associated with increased aggression.

Furthermore, the indirect effect analysis revealed that mindfulness exerted a significant indirect effect on aggression through emotional processing ($\beta = -0.18$, $p = .001$). The 95% confidence interval for this indirect path (-0.27 to -0.10) did not include zero, confirming the statistical significance of the mediating effect. These findings provide empirical support for the mediating role of emotional processing in the relationship between mindfulness and aggression.

4. Discussion and Conclusion

The present study aimed to examine the mediating role of emotional processing in the relationship between mindfulness and aggression among female adolescents using covariance-based structural equation modeling. The findings revealed that mindfulness had a direct, negative, and statistically significant effect on aggression. In addition, mindfulness demonstrated a significant negative association with maladaptive emotional processing, whereas emotional processing had a direct, positive, and significant effect on aggression. Most importantly, the indirect effect analysis confirmed that mindfulness reduced aggression through its impact on emotional processing, indicating a significant

mediating role of emotional processing in this structural model.

The direct negative association between mindfulness and aggression is consistent with a growing body of empirical evidence demonstrating that higher levels of dispositional mindfulness are associated with lower hostility, reduced impulsivity, and diminished aggressive behavior. Previous research has shown that lower levels of dispositional mindfulness partially explain heightened trait hostility and aggression (Revels-Strother et al., 2024). Similarly, studies conducted among students have identified mindfulness as a protective factor inversely related to aggression, emphasizing its role in enhancing attentional regulation and emotional awareness (Anjum, 2024). The present findings reinforce this theoretical perspective by demonstrating that adolescents with higher mindfulness skills report lower levels of aggressive behaviors, even when controlling for emotional processing.

The findings also align with intervention-based research demonstrating the effectiveness of mindfulness training in reducing aggression. Comparative studies have shown that mindfulness training significantly decreases aggression among female students with academic vulnerabilities, sometimes outperforming traditional emotion regulation training (Mehraban et al., 2024; Mehrban et al., 2024). Furthermore, mindfulness-based interventions have been shown to reduce relational aggression and improve relational functioning in women experiencing marital discord (Fouladi et al., 2024). These intervention studies provide convergent evidence supporting the present findings and suggest that mindfulness not only correlates with lower aggression but also causally contributes to its reduction through structured training programs.

Beyond the direct effect, the present study demonstrated that mindfulness significantly predicted lower levels of maladaptive emotional processing. This finding supports theoretical models positing mindfulness as a metacognitive regulatory capacity that promotes adaptive emotional awareness and reduces experiential avoidance, suppression,

and unresolved emotional experiences. Previous research has shown that mindfulness-based cognitive therapy enhances emotional processing and reduces psychological distress in clinical populations, such as women with breast cancer (Mahdieh et al., 2021). Similarly, mindfulness-based interventions have improved emotional processing among mothers of children with autism spectrum disorder (Safikhani et al., 2020). These findings suggest that mindfulness facilitates healthier engagement with emotional experiences, thereby reducing maladaptive processing patterns that may otherwise escalate into aggressive responses.

The positive and significant association between maladaptive emotional processing and aggression observed in this study is also consistent with prior research. Emotional processing deficits—such as suppression, avoidance, and difficulties integrating negative emotions—have been linked to maladaptive behaviors, including emotional eating and impulsive reactions (Babakhanlou, 2023). In adolescent populations, difficulties in regulating negative emotions have been associated with relational aggression, with forgiveness mediating these relationships (Şahan & Ceyhan, 2025). Moreover, negative emotional states have been shown to predict pathological gaming and aggressive behaviors, particularly when self-control mechanisms are compromised (Kim et al., 2025). The present findings extend this literature by demonstrating that maladaptive emotional processing directly contributes to aggression among adolescent girls.

The mediating role of emotional processing constitutes a central contribution of the present study. While previous research has demonstrated that mindfulness reduces aggression through mediators such as self-control and emotion dysregulation (Zhang & Zhang, 2023), and that mindfulness moderates the effects of ego depletion on online aggression (Zhao et al., 2025), fewer studies have explicitly tested emotional processing as a mediating mechanism within a structural equation framework. The current findings indicate that mindfulness exerts both direct and indirect effects on aggression, with emotional processing serving as a significant pathway. This suggests that mindfulness reduces aggressive behavior not only by enhancing conscious awareness and inhibitory control but also by transforming the way adolescents experience and integrate emotional information.

These findings are further supported by research emphasizing the role of emotional intelligence and forgiveness as mediators between mindfulness and

aggression-related outcomes. Emotional intelligence has been identified as inversely associated with aggression and positively linked to psychological well-being in young adults (Khan et al., 2025). Similarly, forgiveness has been found to mediate the association between mindfulness and psychological partner aggression (Edwards et al., 2024). These studies collectively suggest that mindfulness influences aggression through multiple socio-emotional pathways. The present study adds emotional processing to this network of mediating mechanisms, highlighting its centrality in adolescent aggression.

Moreover, mindfulness has been shown to enhance positive reappraisal and self-compassion, which mediate its relationship with posttraumatic growth (Aliche, 2023). Mindfulness therapy has also been effective in reducing maladaptive cognitive processes such as thought–action fusion and intolerance of uncertainty (Asli Azad et al., 2019). These findings underscore the broader regulatory capacity of mindfulness in reshaping emotional and cognitive processing patterns. Within this conceptual framework, maladaptive emotional processing may represent a proximal mechanism translating dysregulated emotional experiences into aggressive behavior. By attenuating maladaptive processing patterns, mindfulness disrupts this pathway and reduces the likelihood of aggression.

The present findings also contribute to cross-cultural and educational research on adolescent aggression. Studies examining resilience and aggression as predictors of mindfulness in adolescents have underscored the reciprocal relationships among these constructs (Kapoor et al., 2024). Research conducted in digital contexts has shown that emotional competencies mediate the relationship between online aggression and interpersonal trust (Yao, 2025). Taken together, these findings highlight the importance of emotional and cognitive regulatory skills in shaping aggressive behaviors across contexts. The current study extends this body of research by providing structural evidence for a mediational pathway linking mindfulness, emotional processing, and aggression in a sample of female adolescents.

From a theoretical perspective, the findings support integrative models of emotion regulation and cognitive self-regulation. Mindfulness enhances present-moment awareness and reduces automatic reactivity, thereby promoting adaptive emotional processing. When emotional experiences are acknowledged and processed rather than suppressed or avoided, the intensity and duration of negative

affect diminish, reducing the likelihood of aggressive outbursts. Conversely, maladaptive emotional processing—characterized by unresolved emotional experiences and suppression—may amplify physiological arousal and cognitive distortions, increasing aggressive tendencies. The structural model tested in this study empirically substantiates this theoretical sequence.

In summary, the findings indicate that mindfulness plays a dual role in reducing aggression: directly through enhanced self-awareness and inhibitory control, and indirectly through improving emotional processing. Emotional processing emerges as a significant explanatory mechanism linking mindfulness to aggression. These results align with previous empirical evidence and expand the literature by demonstrating the mediating function of emotional processing within a comprehensive structural framework.

Despite its contributions, this study has several limitations. First, the cross-sectional design limits the ability to draw causal inferences regarding the directionality of relationships among mindfulness, emotional processing, and aggression. Longitudinal or experimental designs would provide stronger evidence of causal pathways. Second, the reliance on self-report questionnaires may introduce response biases, including social desirability and shared method variance. Multi-informant assessments or behavioral measures could enhance validity. Third, the sample was restricted to female adolescents from a specific geographical region, which may limit the generalizability of findings to male adolescents or other cultural contexts.

Future research should employ longitudinal and experimental designs to examine the temporal sequencing of mindfulness, emotional processing, and aggression. Investigating gender differences in these pathways would also be valuable, given potential variations in emotional socialization and aggression expression. Additionally, future studies may explore additional mediators and moderators, such as emotional intelligence, self-compassion, and peer relationships, to develop more comprehensive models. Incorporating neurobiological or physiological indicators of emotional processing could further deepen understanding of underlying mechanisms.

From an applied perspective, the findings highlight the importance of incorporating mindfulness-based programs into school curricula to reduce aggressive behaviors among adolescents. Interventions should focus not only on enhancing present-moment awareness but also on explicitly training adaptive emotional processing skills, such as emotional acceptance and constructive emotional

expression. School counselors and educators can integrate mindfulness exercises, reflective practices, and emotion-focused discussions into routine educational activities. Such preventive efforts may contribute to improved mental health, reduced aggression, and healthier peer relationships during adolescence.

Authors' Contributions

All authors significantly contributed to this study.

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.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the study and participated in the research with informed consent.

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