Original Article

Prediction of adolescent depression based on core and compensatory early maladaptive schemas

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Abstract

Background: Adolescence is accompanied by emotional fluctuations and an increased risk of depression. Early maladaptive schemas have been identified as important cognitive vulnerabilities. However, despite growing evidence linking these schemas to depression, little is known about whether different types of schemas—core versus compensatory—contribute to depressive symptoms through distinct cognitive and emotional pathways. Examining these schemas simultaneously may provide new insight into the cognitive mechanisms underlying adolescent depression. Therefore, the present study aimed to investigate how core and compensatory schemas differentially predict depressive symptoms among adolescents.

Methods: This correlational study was conducted among high school students (aged 15–18) in Isfahan, Iran. Using multistage cluster sampling, 251 valid questionnaires were analyzed. The instruments included the Young Schema Questionnaire–Short Form and the Beck Depression Inventory. Data were analyzed using multiple regression analysis in SPSS.

Results: The findings showed that both types of schemas significantly predicted adolescent depression and jointly explained 45% of its variance (Adjusted $R^2 = 0.45$). Core schemas had a greater predictive contribution than compensatory schemas.

Conclusion: The findings highlight the role of both core and compensatory schemas in adolescent depression and contribute to a more comprehensive schema-based understanding of depressive vulnerability in adolescence, with implications for prevention and intervention. In particular, the results suggest that school-based schema-focused prevention programs—such as psychoeducational and emotional regulation interventions targeting maladaptive beliefs—may help reduce adolescents' vulnerability to depression. Limitations include the restricted sample from Isfahan, reliance on self-report instruments, and the correlational design, which limits causal inference.

Keywords: Adolescents; Depression; Early Maladaptive Schemas.

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Introduction

Adolescence is a developmental stage of human growth that lies between childhood and adulthood [1]. This period is often referred to as the "storm and stress" stage of adolescence, meaning that adolescents typically experience emotional fluctuations, conflicts with parents, feelings of alienation from the adult community, engagement in risky behaviors, and rejection of adult-accepted values [2]. Cognitively, adolescents enter a realm of abstract thinking and reasoning,

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reflecting deeply on their own identity and the realities surrounding them [3]. Alongside these biological, psychological, and social changes, one of the most significant issues during this stage is the marked increase in the prevalence of depression among adolescents [4–5].

Adolescent major depressive disorder (MDD) is considered one of the most serious public health challenges, with nearly one in five adolescents experiencing at least one episode of depression before the end of adolescence [6–7]. This high prevalence rate is particularly significant, as adolescent depression often follows a recurrent pattern, typically emerging in mid-adolescence and reappearing in about 80% of cases every five to seven years [8–9].

Depression can have far-reaching consequences for adolescents' academic performance, interpersonal relationships, and behavioral health, and it is associated with increased risks such as substance use, persistence of depressive symptoms into adulthood, and even suicidal behavior [6–7]. Moreover, this disorder disrupts emotional development, family relationships, and peer interactions. Among the biological, psychological, and social risk factors for depression are a family history of the disorder, being female, experiences of childhood neglect or abuse, exposure to stressful life events, chronic illness, and the presence of early maladaptive schemas [10–12].

Early maladaptive schemas (EMSs) are central cognitive-emotional structures underlying emotional disorders, particularly depression [12–13]. Schemas are internalized patterns that shape individuals' expectations and influence how they perceive and interact with themselves, others, and the world [14–15]. Forming part of one's identity, these schemas serve as early frameworks for future thinking and behavior [15–16]. The concept of schema has its roots in Beck's cognitive theory, which posits that negative schemas increase vulnerability to psychological disorders [17–18]. Within schema therapy, EMSs are conceptualized across five domains—Disconnection and Rejection, Impaired Autonomy and Performance, Impaired Limits, Other-Directedness, and Overvigilance and Inhibition—and are understood as contributing to the formation of maladaptive beliefs. Young also distinguishes between core schemas, which arise from disruptions in the developing self-concept, and compensatory schemas, which develop as coping mechanisms in response to these core vulnerabilities [16,19–21].

According to cognitive theory, depression may emerge when maladaptive schemas—especially those shaped by adverse childhood experiences—become activated in vulnerable individuals, leading them to interpret internal and external information in distorted ways [13]. Young likewise emphasizes that EMSs play a critical role in the development and maintenance of various forms of depression and anxiety, and that identifying these schemas can help determine more appropriate therapeutic pathways. He argues that some schemas, particularly core schemas formed through early adverse experiences, may function as the foundation of psychological disorders such as depression [19].

It is evident that schemas interact with stressful situations and life events. When maladaptive schemas are activated, they may trigger intense emotional responses and, either directly or indirectly, lead to disorders such as depression, anxiety, academic underachievement, substance use, and interpersonal conflicts [22].

Several studies have shown that schemas such as Defectiveness/Shame, Dependence/Incompetence, and Vulnerability to Harm or Illness can generate specific emotional patterns and evoke feelings of shame, despair, and hopelessness [23]. From a theoretical standpoint, these two categories are

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expected to influence depression through different cognitive–emotional mechanisms [23]. Moreover, beyond their cognitive and emotional dimensions, core and compensatory schemas may also develop in response to broader social contexts, including family dynamics, peer interactions, and cultural expectations that shape adolescents' mental health [16].

Accordingly, the present study seeks to contribute to a more precise understanding of the cognitive roots of depression. Although early maladaptive schemas (EMSs) have been widely examined in relation to depression, most empirical studies have investigated schemas at the level of individual schemas or schema domains, rather than distinguishing between their functional types. Within schema therapy, however, Young and subsequent researchers have conceptually differentiated between core schemas, which reflect early disruptions in the developing self-concept, and compensatory schemas, which emerge as coping responses to these underlying vulnerabilities [16,21]. Despite this theoretical distinction, relatively few studies have empirically examined the differential roles of these schema types in adolescent depression. Clarifying whether core and compensatory schemas contribute to depressive symptoms through distinct cognitive and emotional mechanisms may provide a more precise understanding of vulnerability to depression during adolescence. Therefore, the present study aims to investigate how core and compensatory schemas differentially predict depressive symptoms among adolescents.

Methods

Participants and Procedure

This correlational study targeted upper secondary school students in the city of Isfahan, aged 14 to 19 years. Sampling was carried out using a multistage cluster method. First, 10 schools were randomly selected from different educational districts. Within each selected school, classes were randomly chosen, and all students in those classes were invited to participate. After excluding invalid questionnaires, data from 251 participants were analyzed. Data collection was carried out between February and March 2025. Before data collection, the objectives of the study were explained to the participants, emphasizing the voluntary nature of participation, confidentiality of information, and the possibility of withdrawal at any stage.

Instruments

(a) Young Schema Questionnaire–Short Form (YSQ-SF; 2003): This short form of Young's measure of EMSs consists of 75 items rated on a 6-point Likert scale, assessing 15 schemas across five domains. This instrument has high validity and utility in research and clinical settings, and domestic studies have also reported appropriate reliability (average Cronbach's alpha around 0.80) [24]. In this study, Cronbach's alpha coefficients for the domains were: Disconnection and Rejection (0.90), Impaired Autonomy and Performance (0.86), Impaired Limits (0.78), Other-Directedness (0.80), and Overvigilance and Inhibition (0.79). Cronbach's alpha for the total schemas was 0.95.

The 15 schemas were categorized into core and compensatory types based on Young's theoretical framework [16, 19–21]. Core schemas included the Disconnection and Rejection, Impaired Autonomy, and Impaired Limits domains, whereas compensatory schemas comprised Other-Directedness and Overvigilance and Inhibition domains. These classifications guided the computation of composite scores for regression analyses.

(b) Beck Depression Inventory–Second Edition (BDI-II): This 21-item inventory assesses the severity of depressive symptoms, with scores ranging from 0 to 63 and classified into four levels from minimal to severe. BDI-II is widely recognized for its validity and reliability, with Cronbach's

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alpha ranging from 0.73 to 0.92 and test-retest reliability up to 0.93 [25]. In the present study, Cronbach's alpha was 0.90.

Data Analysis

Data were analyzed using SPSS 26. Multiple regression analyses were conducted, with depressive symptoms (BDI-II) as the dependent variable and core and compensatory schema scores as independent predictors. The assumptions of linearity, normality, independence of residuals, and absence of multicollinearity were checked before performing the analyses. A significance level of $p < .05$ was adopted for all tests.

Results

The study sample consisted of 251 adolescents aged 15 to 18 years residing in the city of Isfahan during the 2024–2025 academic year (from September 2024 to June 2025). Of these, 195 participants (77.7%) were female and 56 participants (22.3%) were male. The mean age and standard deviation of the study sample were 16.42 ± 0.83 for females, 16.25 ± 1.16 for males, and 16.38 ± 0.91 for the total sample.

Table 1 presents the mean, standard deviation, skewness, and kurtosis of the variables under study.

Table 1: Central tendency and dispersion indices of the variables

Variable	Mean	SD	Skewness	Kurtosis
Core Schemas	172.51	54.47	0.49	-0.14
Compensatory Schemas	57.16	16.47	0.46	0.22
Depression	16.53	10.68	0.69	0.34

SD: standard deviation

Based on Table 1, the mean and standard deviation of the scores were 172.51 ± 54.47 for core schemas, 57.16 ± 16.47 for compensatory schemas, and 16.53 ± 10.68 for depression. Additionally, the skewness and kurtosis values presented in Table 1 (all of which are between -1 and +1) indicate that the dispersion of the variables under study was within an acceptable range, allowing for data analysis using parametric statistical methods. Table 2 presents the correlation matrix among the research variables.

Table 2. Correlation matrix of the variables

Variable	1	2	3
Core Schemas	1		
Compensatory Schemas	0.71**	1	
Depression	0.65**	0.59**	1

Based on the findings presented in Table 2, the relationship between core schemas and depression ($r = 0.65$, $p < .01$) and the relationship between compensatory schemas and depression ($r = 0.59$, $p < .01$) were positive and statistically significant.

Considering the results of the correlation matrix and in order to examine the role of core and compensatory schemas in predicting adolescent depression, multiple regression analysis was employed. However, before applying this method, its assumptions were first evaluated. According to Kline's recommendation for assessing the normality of data distribution, the absolute values of skewness and kurtosis of the variables should not exceed 3 and 10, respectively [26]. Based on the results in Table 1, the normality assumption was confirmed.

Additionally, the assumption of no multicollinearity was assessed using tolerance and variance inflation factor (VIF) indices. In this analysis, none of the calculated tolerance or VIF values for the research variables indicated a violation of the multicollinearity assumption. Finally, the assumption of independence of error terms was evaluated using the Durbin–Watson test. Given that the calculated value (1.92) did not exceed the critical bounds (1.5–2.5), this assumption was also satisfied. Therefore, the assessment of statistical assumptions indicated that the use of multiple regression analysis for the study data was appropriate. The results of this evaluation are presented in Table 3.

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Table 3: Summary of the multiple regression model predicting adolescent depression based on core and compensatory schemas

Statistic	Correlation Coefficient (R)	Coefficient of Determination (R^2)	Adjusted Coefficient of Determination (Adjusted R^2)	Sum of Squares	Degrees of Freedom (df)	Mean Squares	F Statistic	Significance Level (p)
Regression	0.67	0.45	0.45	12945.53	2	6472.76	102.99	< .001

Table 4: Significance of regression coefficients

Variable	B	Standard Error	Beta	T	Significance Level (p)	95 % Confidence Interval (CI)
Constant	-8.69	1.88	—	-4.63	< .001	[-12.38 to -4.99]
Core Schemas	0.09	0.01	0.47	7.06	< .001	[0.07 to 0.12]
Compensatory Schemas	0.16	0.04	0.25	3.69	< .001	[0.07 to 0.25]

The contents of Table 3 indicate that adolescent depression can be predicted based on core and compensatory schemas ($F = 102.99$, $p < .001$), and together, these schemas were able to predict 45% of the variance in adolescent depression (Adjusted $R^2 = 0.45$). Subsequently, to determine the contribution of each core and compensatory schema in predicting adolescent depression, beta coefficients, t-tests, and the significance of these variables were calculated. The results are presented in Table 4.

The results presented in Table 4 indicate that both core schemas ($\beta = 0.47$, $t = 7.06$) and compensatory schemas ($\beta = 0.25$, $t = 3.69$) were positive and statistically significant predictors of adolescent depression ($p < .001$).

Discussion

The present study provides robust evidence that both types of early maladaptive schemas, namely core and compensatory schemas, are significant predictors of adolescent depression. In particular, core schemas demonstrated a stronger predictive effect compared to compensatory schemas, a finding consistent with the foundational principles of schema therapy proposed by Young, Klosko, and Weishaar. This therapy posits that core schemas, which develop in response to unmet developmental needs, serve as fundamental vulnerabilities for psychological disorders. The significant contribution of compensatory schemas also highlights the complexity of maladaptive coping strategies in adolescent emotional regulation [16].

These results are aligned with the findings of Calvete, Orue, and Hankin. In a longitudinal study involving 1,281 Spanish adolescents, they found that specific domains of early maladaptive schemas, including Other-Directedness and, particularly, Disconnection and Rejection and Impaired Autonomy, were associated with higher levels of depressive symptoms and social anxiety, and predicted the stability of depressive symptoms over time. This is consistent with the present study's findings regarding the prominent role of core schemas, especially those rooted in dysfunctional relational experiences and emotional neglect. Calvete and colleagues reported that core schemas accounted for approximately 38% of the variance in depression—a figure very close to the predictive power observed in our study when combined with compensatory schemas [27].

Taken together, these findings suggest that core schemas function as enduring cognitive-emotional vulnerabilities that shape depressive trajectories across developmental contexts. The convergence between our results and longitudinal evidence indicates that core schemas may operate not merely as correlates of depression but as structural mechanisms that sustain emotional distress over time.

Moreover, our finding regarding the significant role of compensatory schemas,

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such as Other-Directedness and Overvigilance and Inhibition, in depression is consistent with the results of Pugh. In her systematic review of schema therapy research in eating disorders, she found that individuals with high levels of Other-Directedness reported higher levels of emotional suppression, low self-esteem, and depressive symptoms. She argued that although these schemas may initially function as protective strategies to avoid rejection or abandonment, they ultimately lead to emotional exhaustion and reduced sense of agency. This finding aligns with our study, which shows that although the direct effect of compensatory schemas is smaller than that of core schemas, they still play a significant role in the persistence of depressive symptoms [28].

Further support for our findings comes from Balsamo and colleagues, who examined the relationship between co-rumination, depression, and early maladaptive schemas in a non-clinical sample of young people. Their results indicated that the schema domains of Overvigilance and Inhibition and Other-Directedness were significantly associated with both co-rumination and depression and could serve as mediating factors. This pattern was more pronounced in females. Overall, the findings suggest that co-rumination may be associated with higher levels of early maladaptive schemas, which in turn are linked to depression [29].

Across these studies, a coherent pattern emerges: maladaptive schemas appear to influence depressive symptoms through their impact on interpersonal processing and emotion regulation. Both core and compensatory schemas may intensify vulnerability by reinforcing maladaptive relational tendencies such as emotional suppression, excessive self-sacrifice, and co-rumination, thereby sustaining negative affect during adolescence.

Additionally, Tariq, Reid, and Chan, in a meta-analysis of 24 studies, found that adolescents and young adults with high levels of early maladaptive schemas experienced higher levels of depressive symptoms. These findings confirm that schemas are not merely passive cognitive patterns but actively contribute to the formation and maintenance of negative emotions [11]. Including compensatory schemas as significant predictors is also consistent with the views of Jacob and Arntz, who highlighted that coping strategies in schema therapy—overcompensation, avoidance, and surrender—are often rigid and maladaptive [30].

By integrating these strands of evidence, the present study advances theoretical understanding by demonstrating that compensatory schemas contribute unique explanatory power beyond core schemas. This finding suggests that adolescent depression may be conceptualized as the interaction between early structural vulnerabilities (core schemas) and the maladaptive coping responses (compensatory schemas) developed to manage them. Such an integrative perspective extends traditional cognitive models that focus solely on distortions or life stressors and underscores the dynamic interplay between vulnerability and coping processes.

An additional contribution of this study is that the variance explained by core and compensatory schemas exceeded that of models focusing solely on cognitive distortions or negative life events (e.g., Hankin and Abramson). This suggests that the schema framework provides a more integrative understanding of adolescent depression, encompassing both underlying vulnerabilities (core schemas) and coping responses (compensatory schemas) that sustain depressive patterns [31].

From a clinical perspective, the findings underscore the importance of simultaneously addressing core and compensatory schemas in preventive and therapeutic interventions for adolescent depression. Renner and colleagues

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demonstrated that schema therapy, through targeting early adversities, cognitive characteristics, and interpersonal patterns, can reduce depressive symptoms [32]. Although this model focuses on adults, its principles align with adolescent psychological structures and may inform age-appropriate adaptations.

The limitations of this study include sampling only from students in the city of Isfahan, which may limit generalizability. The use of self-report instruments may introduce response bias, and the correlational design restricts causal inference. Longitudinal and experimental research is needed to clarify directional mechanisms. Future studies may also examine potential moderators such as gender, peer attachment, and family functioning to further refine the schema-based model of adolescent depression. Despite these limitations, the findings provide a foundation for future theoretical refinement and intervention development in adolescent populations.

Conclusion

This study indicates that both core and compensatory EMSs are significantly associated with adolescent depression. These findings suggest that interventions targeting both schema types may enhance prevention and treatment outcomes. Future research should employ longitudinal and experimental designs to clarify the temporal and causal dynamics of these relationships.

Moreover, exploring mediating and moderating factors—such as coping styles, peer attachment, and family functioning—can deepen our understanding of how schemas interact with emotional vulnerability. From a clinical perspective, schema-informed psychoeducation, emotion regulation training, and early school-based interventions could provide practical approaches for reducing depressive symptoms among adolescents.

Authors' contribution

All Authors contributed equally to the study design, implementation, data analysis, and manuscript preparation. All authors collaborately reviewed and approved the final version of the manuscript.

Informed consent

Questionnaires were filled with the participants' satisfaction and written consent was obtained from the participants in this study.

Ethical Approval

This study was approved by the Ethics Committee of the University of Tabriz under the ethical code IR.TABRIZU.REC.1404.023. This article is extracted from the Master's thesis of the third author.

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Conflict of interest

The authors declare no potential conflict of interest with respect to research, authorship, and/or publication of this article.

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