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The relationship between cognitive emotional regulation and impulsivity with the mediating role of executive functions in female students with conduct disorder

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A B S T R A C T

Objective: This study aimed to examine the relationship between cognitive emotional regulation and impulsivity, considering the mediating role of executive functions in female students with conduct disorder.

Method: The current study was descriptive-correlational predictive research, and in terms of its purpose, it was applied research. The study population comprised all female middle school students in Kermanshah during the 2023-2024 academic year, among whom 200 were selected as the sample using a simple random sampling method. In the field of data collection, both library and field methods were employed. For the field portion, to collect the necessary data, questionnaires were used including Gross and John (2003) Emotion Regulation, Buss and Perry (1992) Impulsivity, and Gioia et al. (2000) Executive Functions Behavioral Rating. Pearson correlation coefficient and regression model analysis in SPSS were used for data analysis.

Results: The study results showed that cognitive-emotional regulation affects impulsivity in female students with conduct disorder. Also, executive function affects impulsivity in these students; ultimately, the results indicated that cognitive-emotional regulation impacts impulsivity in female students with conduct disorder, mediated by executive function.

Conclusion: These results suggest that interventions aimed at improving cognitive-emotional regulation and executive functions could be effective in managing impulsivity in this population. Further, the study provides valuable insights into the complex interplay between emotional regulation, executive functions, and impulsivity, which can inform future research and practice in psychology and health, particularly in the context of educational settings and adolescent mental health.

Keywords: *cognitive emotional regulation, impulsivity, executive functions, conduct disorder*

1. Introduction

Adolescence is considered one of the most critical developmental periods in human life. Although many adolescents successfully navigate the transition to adulthood, adolescence is generally seen as a period of increased risk for psychosocial problems and behavioral and mental disorders (Parsakia, Rostami, Darbani, et al., 2023). Experiencing crisis during this period can exert significant pressure on an adolescent's psychological functioning and, in turn, be detrimental to their future development. A key concern in modern societies is addressing issues of adolescents, especially those with psychological disorders, such as conduct disorder (Marzban & Rezayan, 2020; Parsakia, Rostami, Saadati, et al., 2023; Safitri & Supratman, 2022).

By definition, conduct disorder is a common behavioral disorder that threatens an individual's mental and behavioral health in various ways. It can damage the psychosocial functioning of adolescents in families and society. Adolescents with symptoms of conduct disorder struggle to adjust their behavior to parental expectations, others, and social norms (Brunsting et al., 2022). Research has not yet identified a single factor that can justify antisocial behavior and conduct disorder, with many biological factors like genetic, neuropsychological, and prenatal causes, as well as psychological factors such as family environment and parent-child relationships, peer influence (Aritzeta et al., 2022), media, cognitive and socio-economic factors, being cited in its emergence (Ditrich, Philipsen, & Matthies, 2021). Conduct disorder in adolescents can also impact other behaviors, such as impulsivity (Dekkers, de Water, & Scheres, 2022). Impulsivity is a personality trait where many emotionally disturbed adolescents lose their ability to control anger, discouragement, and conflict. They often get angrier quicker than their peers, and their anger is more intense. Impulsivity in expressing anger vividly shows that something has caused these adolescents chronic upset and increased levels of frustration and despair. More importantly, impulsivity shows that the adolescent is struggling to ignore the sources of anger, pretending that the sources of anger do not exist. Suppressed anger and its displacement are common symptoms in adolescents drawn to unusual ways to solve their problems (Chan et al., 2023; Di Nicola et al., 2015; Yarmohammadi Vasel et al., 2015).

Several factors play a role in the increase and decrease of impulsivity, one of which is cognitive emotional regulation. Emotion plays an important role in various aspects of life, such as adapting to life changes and stressful events. Emotions are typically biological responses to situations perceived as significant opportunities or challenges, accompanied by a response to environmental events (Parsakia, Rostami, & Saadati, 2023). While emotions have a biological basis, individuals can influence how they express these emotions. This ability, called emotion regulation, involves internal and external processes responsible for controlling, evaluating, and modifying emotional responses to achieve goals (Aritzeta et al., 2022; Fillo et al., 2019). Therefore, emotional regulation is fundamental in initiating, assessing, and organizing adaptive behavior, and in preventing negative emotions and maladaptive behaviors (Besharat et al., 2016; Cristofori, Cohen-Zimerman, & Grafman, 2019; Pourhosein & Hodhodi, 2016).

Studies have also shown that executive functions and memory play a role in individuals' impulsive behaviors. Executive function is a cognitive structure used to explain behaviors apparently dependent on the functioning of the frontal lobes. It refers to the ability to maintain an appropriate problem-solving stance to achieve a goal and represents a higher cognitive skill of the brain. Executive function is associated with attention, logic, and problem-solving areas, involving activities like shifting, maintaining, inhibiting, interference control, spatial and temporal coherence, working memory, and regulation. More complex behaviors, especially social behaviors, require executive function (Cristofori, Cohen-Zimerman, & Grafman, 2019; Frick, Darling Rasmussen, & Brocki, 2022; Taghizadeh et al., 2018).

The importance of this study lies in the fact that behavioral disorders among children and adolescents are relatively common and debilitating disorders that, in addition to the individual, cause problems for families, teachers, and peers. These disorders significantly affect the academic and social performance of children and adolescents, increasing the likelihood of other psychological and behavioral damages in later life stages (de Looff et al., 2022; Di Nicola et al., 2015). The prevalence of these disorders among students is a problem affecting families, schools, and society. Another importance of this study is from the perspective of the society under examination, which comprises adolescent girls, who face many challenges and problems during adolescence. It is expected that studies like this will be effective in reducing these problems, especially in terms of conduct, and failing to examine such issues (like the current research) may lead to the persistence

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of conduct symptoms and their transfer to other life stages. Therefore, this study aims to examine the relationship between cognitive emotional regulation and impulsivity, considering the mediating role of executive functions in female students with conduct disorder.

2. Methods

2.1. Study design and Participant

Regarding its objective, this research was applied in nature and descriptive-correlational in its method of implementation. It is considered applied because the results can be utilized by students and the educational organization. The descriptive and correlational nature is due to the use of questionnaires as a tool.

The study population included all female middle school students in District 3 of Kermanshah during the 2023-2024 academic year, totaling 9,401 according to information obtained from the district's education department. The age range of the study population was between 13 to 16 years. A sample size of 200 individuals (n=200) yields acceptable results, hence 200 individuals were considered as the sample in this study.

A multi-stage cluster random sampling method was used in this research. Initially, District 3 was randomly selected from the three educational districts of Kermanshah. Then, 10 middle schools for girls from this district were randomly chosen, exclusively comprising public schools and excluding private and gifted schools. Students from classes in these schools, studying in middle school, were chosen as the sample. In the next step, students with conduct disorder were identified through clinical assessment, after which questionnaires were distributed among them.

2.2. Measures

2.2.1. Emotion Regulation

Developed by Gross and John in 2003, this questionnaire comprises 10 questions with two subscales: emotional suppression and cognitive reappraisal. Scoring is on a 7-point Likert scale (completely disagree=1 to completely agree=7). Questions 1 to 6 relate to the cognitive reappraisal factor, and questions 7 to 10 to the emotional suppression factor. Its reliability, as reported by the creators using Cronbach's alpha coefficient, is 0.79 for the whole questionnaire, 0.67 for emotional suppression, and 0.69 for cognitive reappraisal. This scale's consistency coefficient among state employees and university students was 0.68 for cognitive reappraisal and 0.63 for emotional suppression. Correlation coefficients of cognitive reappraisal with positive emotions were 0.24, and for negative emotions -0.14; for emotional suppression with positive emotions -0.15, and negative emotions 0.04 (Gross & John, 2012). This questionnaire was first translated and standardized in Iran by Ghasempour et al. (2012). In this study, the scale's reliability was determined by internal consistency with a Cronbach's alpha coefficient of 0.81, and its validity was established through principal component analysis using Varimax rotation, correlation between two factors, and satisfactory criterion validity. In a study by Soleymani and Habibi (2016, cited by Hatami and Mousavi, 2016), the questionnaire's reliability was 0.81, and the components of emotional suppression and cognitive reappraisal were estimated at 0.79 and 0.80, respectively (Aghaziarati et al., 2023).

2.2.2. Impulsivity

This self-report tool, developed by Barratt in 1995, assesses impulsivity and contains 30 questions with three subscales: non-planning, motor impulsiveness, and cognitive impulsiveness. Scoring is on a 4-point Likert scale (never=1 to always=4). Questions 5, 6, 9, 11, 20, 24, 26, and 28 pertain to cognitive impulsiveness; questions 2, 3, 4, 16, 17, 19, 21, 22, 23, and 25 to motor impulsiveness; and questions 8, 10, 12, 13, 14, 15, 18, 27, and 29 to non-planning. Barratt (1995) reported a Cronbach's alpha coefficient of 0.85 for this questionnaire. In Iran, researchers reported a reported a range between 0.78 and 0.82 for Cronbach's alpha (Yarmohammadi Vasel et al., 2015).

2.2.3. Executive Functions

Developed by Gioia and colleagues in 2000, this questionnaire examines various aspects of executive functions related to the frontal lobes' prefrontal cortex. It has two forms for parents and teachers and is applicable for children and adolescents aged 5 to 18. This study used the teacher form, consisting of 86 questions. Scoring is on a 3-point Likert scale (never=1 to most of the time=3). It measures eight executive functions: inhibition (14 questions), shifting (11 questions), emotional control (10 questions), initiation (8 questions), working memory (11 questions), planning (15 questions), organization and monitoring (8 questions). The creators reported a Cronbach's alpha coefficient of 0.73. In Iran, researchers estimated the overall executive function coefficient at 0.89, with

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dimensions ranging between 0.71 and 0.91 (Aghaziarati, Nejatifar, & Ashori, 2021).

2.3. *Data Analysis*

Pearson correlation coefficient and regression model analysis in SPSS were used for data analysis.

3. Findings and Results

One class from each school was used, making up a total of 10 sample classes. The students' ages ranged from 13 to 16 years, with 17 students aged 16, 61 aged 15, 66 aged 14, and 56 aged 13.

Table 1

Descriptive Findings

Variable	Mean	SD	Skewness	Kurtosis
Emotion Regulation	47.96	6.19	0.078	-0.132
Impulsivity	81.79	11.63	0.091	0.307
Executive Functions	169.17	29.41	0.066	-0.094

The statistical data for the research variables are presented in Table 1. Given that both skewness and kurtosis values fall within the -2 to 2 range, it can be inferred that the data distribution is normal. This justifies the use of Pearson's correlation coefficient. Below is the correlation coefficient matrix for the variables.

Table 2

Pearson correlations

Variable	1	2	3
1. Emotion Regulation	1		
2. Impulsivity	-0.171*	1	
3. Executive Functions	0.211*	-0.228*	1

* $p < 0.01$

The correlation matrix presented in Table 2 reveals interesting relationships between the variables. Emotion Regulation is positively correlated with Executive Functions ($r = 0.211$, $p < 0.05$), suggesting that better emotion regulation is associated with more effective executive functioning. However, Emotion Regulation is negatively correlated with Impulsivity ($r = -0.171$, $p < 0.05$), indicating that higher levels of emotion regulation are linked to lower impulsivity. Additionally, a negative correlation is observed between Executive Functions and Impulsivity ($r = -0.228$, $p < 0.05$), indicating that better executive functioning is associated with less impulsivity.

Table 3

Fit model indices

Index	$\chi 2/df$	RMSEA	GFI	AGFI	NFI	CFI	NNFI
Model	2.60	0.074	0.91	0.95	0.95	0.97	0.93

For assessing the suitability of the model, the metrics detailed in Table 3 were employed. A model is considered to have an excellent fit if the chi-square to degrees of freedom ratio is below 3, and if the GFI, AGFI, CFI, NFI values exceed 0.9, while the RMSEA value is under 0.1. Based on these criteria, the results indicate that the model demonstrates a good fit.

Table 4

Direct effects

Independent	Dependent	Beta	t	P
Emotion Regulation	Impulsivity	-0.23	-2.39	<0.01
	Executive Functions	0.20	2.17	<0.01
Executive Functions	Impulsivity	-0.26	2.91	<0.01

In Table 4, the analysis highlights the predictive relationships between the variables. Emotion Regulation significantly predicts Impulsivity ($\beta = -0.23$, $t = -2.39$, $p < 0.01$) and Executive Functions ($\beta = 0.20$, $t = 2.17$, $p < 0.01$). Additionally, Executive Functions are a significant predictor of Impulsivity ($\beta = -0.26$, $t = 2.91$, $p < 0.01$).

Regarding the indirect effect of Emotion Regulation on Impulsivity through Executive Functions, the calculation yields an indirect effect of -0.052. The total effect of Emotion Regulation on Impulsivity, which is the sum of its direct and indirect effects, is -0.282. This suggests that Emotion Regulation has a substantial combined impact on Impulsivity, both directly and through its influence on Executive Functions.

4. Discussion and Conclusion

This study aimed to examine the relationship between cognitive emotional regulation and impulsivity, considering the mediating role of executive functions in female students with conduct disorder. Overall, the results indicated that cognitive-emotional regulation influences impulsivity in female students with conduct disorder, mediated by executive function. These findings align with the previous

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research (Del Bianco et al., 2023; Ditrich, Philipsen, & Matthies, 2021; Frick, Darling Rasmussen, & Brocki, 2022; Shiroodaghaei, Amir Fakhraei, & Zarei, 2020; Yarmohammadi Vasel et al., 2015).

In explaining, it should be noted that the core characteristic of conduct disorder is a repetitive and persistent pattern of behaviors that violate the fundamental rights of others and age-appropriate societal norms and laws (Calleros, 2023; Chan et al., 2023; Samanifar, Bagherian, & Emadi Chashmi, 2021). Children with this disorder are highly susceptible to peer rejection, poor academic performance, increased aggressive behavior, and are at risk for mood disorders, substance abuse, delinquency, and antisocial personality disorder in adulthood (Casseus, Kim, & Horton, 2023; Chiocchetti et al., 2022). Impulsivity is a primary feature of these children, influenced by numerous factors including emotional regulation skills. Additionally, their executive functions play a significant role in creating and inhibiting impulsivity (de Looff et al., 2022). Supporting this finding, Frick et al. (2022) investigated the role of executive functions and emotion regulation in predicting symptoms of Attention-Deficit/Hyperactivity Disorder. The study was descriptive-correlational and showed that individuals with ADHD had poor executive performance, especially in working memory and sustained attention, and tended to use maladaptive emotional strategies (Frick, Darling Rasmussen, & Brocki, 2022).

Overall, the findings of this study underscore the significant influence of cognitive-emotional regulation on impulsivity among female students with conduct disorder, highlighting the crucial role of executive functions as a mediating factor. These results suggest that interventions aimed at improving cognitive-emotional regulation and executive functions could be effective in managing impulsivity in this population. Further, the study provides valuable insights into the complex interplay between emotional regulation, executive functions, and impulsivity, which can inform future research and practice in psychology and health, particularly in the context of educational settings and adolescent mental health.

5. Limitations & Suggestions

One limitation of this study was the inherent limitation of the questionnaire, including potential inaccuracies in responses from the sample. Additionally, the time-consuming nature of data collection, due to inadequate cooperation in returning questionnaires and fully answering questions, was another limitation. Therefore, it is recommended that future studies use other tools besides questionnaires, such as interview forms, qualitative methods, and observations from parents in other cities.

Based on the results of this study, the following suggestions can be made:

1. Development of Targeted Interventions: Design interventions specifically aimed at enhancing cognitive-emotional regulation skills in female students with conduct disorder. These programs should focus on teaching strategies to identify, understand, and manage emotions effectively.
2. Incorporating Executive Function Training: Include exercises and activities that strengthen executive functions, such as planning, problem-solving, and impulse control, in the curriculum for these students. This approach can help them in better managing their impulsivity.
3. Comprehensive Educational Programs: Develop educational programs for teachers and school counselors that provide them with tools and techniques to support students with conduct disorder. These programs should include training on identifying emotional and cognitive dysregulation and implementing effective interventions.
4. Parental Involvement and Education: Engage parents in the therapeutic process by educating them about conduct disorder, cognitive-emotional regulation, and executive functioning. Provide them with strategies to support their children's emotional and cognitive development at home.
5. Collaborative Approaches: Encourage collaboration between psychologists, educators, and parents to create a supportive environment for these students. This approach can ensure consistency in the application of learned strategies across different settings.
6. Regular Assessment and Monitoring: Implement regular assessments to monitor the progress of students in terms of their impulsivity and cognitive-emotional regulation. This can help in timely identification of areas needing more focus and adjustment of intervention strategies accordingly.
7. Research and Development: Encourage further research to explore more about the relationship between cognitive-emotional regulation, executive functions, and impulsivity in students with conduct disorder. This can lead to the development of more effective and tailored intervention strategies.
8. Policy and Advocacy: Advocate for policies that support mental health education in schools, particularly

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focusing on disorders like conduct disorder. Policies should also emphasize the importance of early identification and intervention to prevent the escalation of symptoms.

These suggestions aim to provide a holistic approach to address the challenges faced by female students with conduct disorder, ultimately aiding in their emotional and cognitive development and reducing impulsivity.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

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

Authors' Contributions

All authors equally contributed to this study.

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