Structural Modeling of Risk-Taking Behaviors Based on Attention Systems with the Mediating Role of Emotion Regulation in Substance Users

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ABSTRACT

Objective: The aim of the current study was to determine the structural model of risk-taking behaviors based on the attention system with the mediating role of emotion regulation among substance users.

Methods and Materials: This research was a descriptive-correlational study using structural equation modeling. The population included all marijuana users in Isfahan who visited addiction treatment centers in 2023. The sample comprised 250 marijuana users selected via convenience sampling based on inclusion and exclusion criteria. Data were collected using cognitive training software for attention and memory, the Cognitive Emotion Regulation Questionnaire (CERQ), and a risky behavior questionnaire. Descriptive statistics such as mean and standard deviation were used to organize, summarize, and describe the data on participant characteristics and research variables. In the inferential statistics section, structural equation modeling and Pearson correlation methods were employed to analyze the data using SPSS 22 and AMOS 22.

Findings: The model fit indices PCFI = 0.599, PNFI = 0.611, CMIN/DF = 2.88, RMSEA = 0.072, IFI = 0.913, CFI = 0.920, and GFI = 0.909 indicated a good fit of the proposed model with the data. Thus, the proposed model exhibited satisfactory fit.

Conclusion: Therefore, it can be concluded that the structural model of risk-taking behaviors based on the attention system with the mediating role of emotion regulation is appropriate for substance users.

Keywords: Risk-taking behaviors, Attention, Emotion regulation, Substance use.

1. Introduction

Drug addiction is a new phenomenon specific to modern life (Shabtari et al., 2023). This is because even if the use of drugs existed in the past, it was not recognized as addiction or deviation (Sadeghi & Karimi, 2019). However, with the expansion of modern culture, modern values and norms have also spread, and actions and behaviors such as drug addiction are perceived as contrary to these norms (Chitsazha et al., 2019; Rahmani et al., 2019). According to the fifth edition of the Diagnostic and

Statistical Manual of Mental Disorders, substance-related disorders include ten separate categories of substances: alcohol, caffeine, cannabis, hallucinogens (with separate classifications for phencyclidine and other hallucinogens), inhalants, opioids, sedatives, hypnotics or anxiolytics, stimulants (amphetamines, cocaine, and other stimulants), tobacco, and other (unknown) substances (APA, 2022).

If the physical, psychological, and social consequences of other risky behaviors such as drug use, violence, and risky sexual behaviors are also considered, the resulting damages are multiplied (Dastjerdi et al., 2010). Risky behaviors are those that endanger the health and well-being of individuals. These behaviors are divided into two categories; the first includes behaviors that endanger the individual's own health, and the second comprises behaviors that threaten the health and well-being of others in society (Claro et al., 2015; Crockett et al., 2006; Cyders et al., 2007).

Contemporary neurocognitive models identify addiction as a brain disorder involving severe neuronal damage, leading to substance use despite negative consequences. There is substantial evidence showing that individuals with substance abuse exhibit significant deficits in neuropsychological functions, especially in executive functions (Basharpoor & Mozaffari, 2015). Research also shows that these neuronal deficits affect neural systems involved in motivation, emotion, learning, memory, and executive functions and there are numerous indications that the likelihood of cognitive impairments increases with substance use even after cessation (Yarmohammadi Vasel et al., 2015). Attention, one of the cognitive variables related to substances, is the ability to inhibit irrelevant information while processing important data during tasks. This important neural function can be disrupted due to certain disorders (Fadardi & Cox, 2008; Rosenberg, 2009).

Studies have shown that individuals with severe substance abuse have significant cognitive processing issues (Fajnerova et al., 2020; Faraone et al., 2021). Drug use causes destruction of the functioning of the prefrontal cortex in various areas of cognitive processes such as memory, learning, attention, perception, recognition, mental flexibility, response inhibition, impulse control, and decision-making, and despite the evident signs of cognitive process destruction observed in the individual, the insight into the damaging effects of drug use is lost, leading to further degradation of cognitive processes over time, often to an extent that recovery becomes impossible (Fajnerova et al., 2020; Ruisoto & Contador, 2019). Additionally, memory can be described as a system with limited capacity, playing a fundamental role in integrating, processing, storing, and manipulating information from various sources (internal and external) (Sisakhti et al., 2021). The phenomenon of addiction is also associated with cognitive function impairments such as inhibition. Dependent individuals show lesser response inhibition and poorer planning abilities compared to normal individuals (Lee et al., 2020).

Moreover, many theorists in the field of substance abuse believe that emotional factors influence individuals' tendencies toward substance use and the craving of those with substance abuse disorders (Aazam et al., 2014; Cavicchioli et al., 2019; Collado et al., 2020). According to Garnefski and Kraaij (2006), emotion regulation involves actions related to how a person copes with stressful situations or adverse events. Inability to regulate emotions provides a foundation for various psychiatric disorders and having this ability inversely relates to the symptoms and signs of psychiatric disorders such as depression and anxiety (Cavicchioli et al., 2019; Collado et al., 2020). Overall, it can be stated that the most valuable resource for the progress of any country is its human workforce, wherein the role of the youth and adolescents in the workforce is of greater importance due to their impact on production and the future of the country. Considering the discussed issues, examining factors such as drug use that cause harm to the efficiency and growth of the youth and adolescents in society is of high importance. Given the significance of the youth and adolescent period and the fact that these individuals are the future builders of the country, identifying factors related to drug use, such as the attention system where defects are linked to a predisposition towards drug use, is beneficial. Thus, the aim of the current research is to determine the structural model of risky behaviors based on the attention system with the mediating role of emotion regulation in drug users.

2.   Methods and Materials

2.1.   Study Design and Participants

This research was a descriptive-correlational study utilizing structural equation modeling. The population of the study consisted of all individuals using drugs (marijuana) in Isfahan who visited addiction treatment centers in 2023. The sample included 250 marijuana users selected through convenience sampling based on inclusion and exclusion criteria. According to Kline, if structural equation modeling is used, approximately 15 samples per observable variable are needed. Moreover, a minimum sample size of 200 is

defensible (Klein, 1998). The inclusion criteria were: being a drug user, aged 25 to 40, literacy in reading and writing, having used drugs for one year or more, and willingness to participate. However, exclusion criteria included lack of cooperation and damaged questionnaires.

In the current study, negotiations were first held with addiction treatment centers in Isfahan, and after obtaining approval from the center's authorities and the researcher signing an ethical agreement, sample group members were selected. Participants were then informed about the overall process of the study, and upon their agreement to participate, preliminary information about the research was provided, and they were given the research questionnaires to complete. Ethical considerations of the research included: 1- All participants received written information about the research and participated voluntarily. 2- Participants were assured that all information would be confidential and used only for research purposes. 3- To protect privacy, the names and surnames of participants were not recorded.

2.2. Measures

2.2.1. Attention

In this study, attention is measured by the scores individuals receive on the focused and diffuse attention test of the Sina Institute software, developed by Yazdi (2011). This test had a reliability of 0.87, which is considered acceptable. The test procedure involves a display on a computer monitor where the participant creates space by pressing the space bar upon seeing a circle and a candle but must avoid pressing it if another shape appears. The system records the time and number of correct responses, and ultimately, attention is assessed based on the pattern of frequency and speed.

2.2.2. Cognitive Emotion Regulation

Emotion regulation here refers to the scores obtained on the Cognitive Emotion Regulation Questionnaire by Garnefski and Kraaij (2006). The CERQ is an 18-item tool that measures cognitive emotion regulation strategies in response to threatening events and life stresses on a 5-point Likert scale from 1 (never) to 5 (always) across 9 subscales, including self-blame; blaming others; rumination/focus on thought; catastrophizing; putting into perspective; positive refocusing; positive reappraisal; acceptance; and refocus on

planning. The minimum and maximum scores per subscale are 2 and 10, respectively, where higher scores indicate greater use of that cognitive strategy. Emotion regulation strategies in the CERQ are divided into adaptive (accommodative) and maladaptive (non-accommodative) strategies. The subscales of putting into perspective, positive refocusing, positive reappraisal, acceptance, and refocus on planning are adaptive strategies, while self-blame, blaming others, rumination/focus on thought, and catastrophizing are maladaptive strategies. Positive and negative cognitive emotion regulation strategies in this research are calculated from the total scores obtained in response to the subscales of positive and negative regulation in the CERQ by Garnefski, Kraaij, and Spinhoven.

2.2.3. Risky Behavior

Risky behaviors in this research are measured by the scores obtained on the BART (Balloon Analogue Risk Task), developed by Lejuez in 2002. This computerized test assesses real-life risk-taking by evaluating the participant's risk-taking strategy. The program is designed to measure both profitable risk-taking with rewards and uncontrolled risk-taking with losses calculated as hypothetical fines.

2.3. Data analysis

In this research, descriptive statistics such as mean and standard deviation were used to organize, summarize, and describe the data on the characteristics of the subjects and research variables. In the inferential statistics section, structural equation modeling and Pearson correlation methods were used for data analysis using SPSS 22 and AMOS 22 software.

3. Findings and Results

In this study, 200 married women from the city of Rasht were selected as the sample. Age-wise, 106 individuals (42.4%) were 18 years and under, 76 individuals (30.4%) were 19 to 23 years, 49 individuals (19.6%) were 24 to 28 years, and 19 individuals (7.6%) were 29 years and older. Additionally, in terms of gender, 188 individuals (75.2%) were male, and 62 individuals (24.8%) were female. Table 1 reports the descriptive statistics (mean, standard deviation, skewness, and kurtosis) for the research variables.

Table 1

Descriptive Indices (Mean and Standard Deviation) of Research Variables (n=250)

Variable	Mean	Standard Deviation	Range	Skewness	Kurtosis
Risk-taking behaviors	31.73	8.20	8-53	0.000	-0.226
Attention	149.30	27.02	50-240	-0.094	0.509
Emotion regulation	53.70	12.60	18-90	0.062	-0.210

According to Table 1, considering that the kurtosis and skewness for all research variables are between -2 and 2, it can be concluded that the data are normally distributed.

Table 2 presents the Pearson correlation information between the variables of the research.

Table 2

Correlation Matrix Among Predictor, Mediator, and Dependent Variables of the Proposed Model

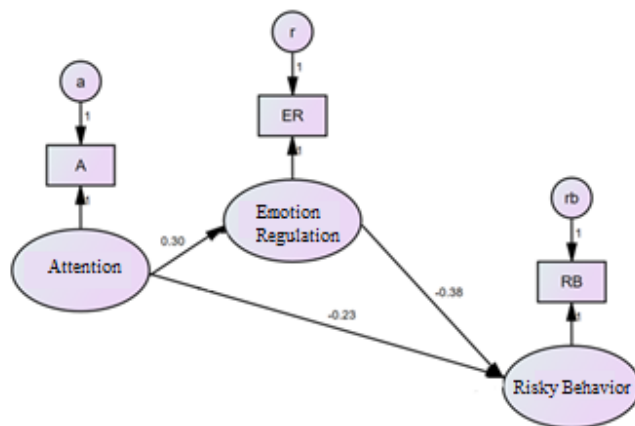| Variable	1. Risk-taking behaviors	2. Emotion regulation	3. Attention
1. Risk-taking behaviors	1		
2. Emotion regulation	-0.41*	1	
3. Attention	-0.20*	-0.27*	1

*P < .01

From the results in Table 2, it can be seen that the correlations among the research variables are significant at a 5% error level. Initially, the assumptions of the structural model were examined, followed by the reporting of the fit of the proposed model, and finally, the research hypotheses were addressed. In this study, multicollinearity was examined using tolerance and variance inflation factor statistics. No multicollinearity among the research variables was observed. Moreover, the fit indices PCFI = 0.599, PNFI = 0.611, CMIN/DF = 2.88, RMSEA = 0.072, IFI = 0.913, CFI = 0.920, and GFI = 0.909 indicate a good fit of the proposed model with the data. Therefore, the proposed model shows satisfactory fit, and the mediating role of emotion regulation in the relationship between risk-taking behavior and attention was confirmed. Figure 1 displays the parameters (standardized coefficients) related to the direct effects of the variables on each other in the proposed model.

Figure 1

Results of Bonferroni Follow-Up Test for Pairwise Comparisons of Group and Time Effects on Internet Addiction

In Figure 1, the numbers on the paths, or the beta weights, show that the direct effect of attention on emotion regulation is 0.30, the direct effect of attention on risk-taking behaviors is -0.23, and the direct effect of emotion regulation on risk-taking behaviors is -0.38.

4. Discussion and Conclusion

The results of the statistical analysis of the data collected through the questionnaire indicated that the fit indices suggest a good fit of the proposed model with the data. Therefore, the proposed model has satisfactory fit. Thus, it can be concluded that the first hypothesis of the research, which posits that "the structural model of risk-taking behaviors based on the attention system with the mediating role of emotion regulation in substance users fits well," is confirmed. The findings of this study are consistent with prior studies (Aazam et al., 2014; Borjali et al., 2015; Cavicchioli et al., 2019; Collado et al., 2020; Seyedasiaban et al., 2018; Yarmohammadi Vasel et al., 2015).

To explain this finding and to describe the mediating role of emotion regulation in this model, it can be said that cognitive emotion regulation refers to the cognitive management and manipulation of information that evokes emotion; in other words, cognitive emotion regulation strategies apply to how individuals think after experiencing a negative event (Borjali et al., 2015; Cavicchioli et al., 2019). Therefore, individuals who lack the skills to cope with their emotional experiences are more likely to engage in risk-taking behaviors when managing and controlling negative emotions. Since maladaptive and defective emotion regulation strategies are significant predictors of risk-taking behaviors (Yarmohammadi Vasel et al., 2015), emotion regulation can strengthen the existing relationship in the model presented in the previous hypothesis as a mediating variable. This model, with the addition of emotion regulation as a mediating variable, thus has a satisfactory fit. It can be argued that the ability to regulate and manage emotions causes individuals not to choose risk-taking behaviors in decision-making processes, making emotion regulation significant in addicts who are always prone to revert to negative mood states that they try to escape through addiction and thus are likely to engage in risk-taking behaviors to reduce these negative emotional states (Cavicchioli et al., 2019; Collado et al., 2020).

Further explaining this finding, it can be said that an individual can manage their feelings and states when their mind can retrieve memories or previously learned skills to solve a problem or issue (Aazam et al., 2014). This shows the importance of memory and selective attention in various situations. Furthermore, inhibition is an action that can slow down or completely prevent a behavior in different situations. To better understand addicts who have recently quit drugs, they initially need to be able to pause in preparing and using substances and then with the help of others, revisit previously learned skills, review past situations, and remember the costs incurred due to substance use. In other words, self-control is the other side of the coin of self-regulation (Lee et al., 2020). Moreover, those with low levels of emotion regulation hastily engage in risk-taking behaviors. Instead of relying on their memory and reflecting based on it, these individuals are inclined to make hasty decisions. Additionally, it should be noted that part of memory and attention plays an important role in recalling cognitive and mental skills in such a way that if human memory or attention is weak in similar situations, emotional regulation and cognitive skills might also be ineffective or even destructive (Seyedasiaban et al., 2018). Also, when the behavioral inhibition system is weak, emotion regulation can act as a mediating variable, causing an inability to inhibit initial responses and also an inability to act on a secondary response (Chitsazha et al., 2019; Fadardi & Cox, 2008).

5. Limitations & Suggestions

This study, like any other, had limitations which are mentioned below. Additionally, based on the results obtained, practical and research recommendations are proposed. The sample selection for the study was limited to people visiting counseling centers in one area of Tehran; therefore, caution should be exercised in generalizing the findings of this study and all empirical research with human samples. The participants' attitudes towards the tests used, their cooperation with the researcher, and their sincerity and interest in collaborating in the study are factors that are almost beyond the researcher's control and could affect the results. Using questionnaires as a data collection tool can influence results in two ways; firstly, the reliability of the tool itself carries some error as no tool's reliability equals one and there is always measurement error in measuring the desired variable; secondly, the way participants respond can be biased or not adhere to honesty, all of which reduce the generalizability of the current study's results.

Given the results obtained in the current study and considering its limitations, the following recommendations are made for further research in the future: It is recommended that, due to the importance of the research topic, a similar study be conducted for other communities with the inclusion of different variables, and more independent and dependent variables, particularly mediating and moderating variables, be added and the results compared with the current study. Given the principle of falsifiability in

science and the need for caution in generalizing results, the findings of the current study should be analyzed with high accuracy and a critical view, and more research should be conducted to mature and present a more comprehensive model. Researchers are advised to use the model obtained in the current study to prepare and develop therapeutic protocols. It is suggested that in effectiveness studies conducted on the addict population, the model obtained in this study and its constituent variables be used. It is recommended that more attention be paid to the role of emotion regulation in the research model in future studies. Counseling centers, addiction treatment clinics, and addiction prevention centers can use the model obtained in this study. It is suggested that specialists and therapists use the model of the current study in therapeutic approaches and various techniques, especially emotion-focused techniques. Given the importance of treatment and especially addiction prevention, and also considering that addiction itself is considered a high-risk behavior, the model of this study can be used both in treatment and in preventing addiction. It is suggested that cognitive and emotion-focused approaches be prioritized by specialists in the field of addiction and risk-taking behaviors. It is recommended that the model presented in the current study be used in psychological training workshops related to the issue of addiction.

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Declaration

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

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethics Considerations

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

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors contributed equally.

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