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Examining the Role of Stressful Events and the Behavioral Brain System in Youth Addiction Tendencies in Yasuj

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A B S T R A C T

Objective: Drug use, considered a socially unacceptable habit across all human societies, has involved countless individuals, particularly from adolescence and youth to middle age. This study aimed to determine the role of stressful events and the behavioral brain system in addiction tendencies among the youth of Yasuj.

Methods and Materials: This study was descriptive and correlational in nature. The statistical population included all young people aged 18 to 35 years in Yasuj in 2022. Based on the Krejcie and Morgan table (1987) and using multi-stage cluster random sampling, 384 young people from Yasuj were selected and studied. Data collection was conducted using the Holmes and Rahe Stressful Life Events Questionnaire (1960), the Behavioral Inhibition/Activation System by Carver and White (1994), and the Addiction Potential Scale by Weed and Butcher (1992). After data collection and extraction, the participants' scores were analyzed using Pearson's correlation coefficient and the fitted values, with the help of SPSS-24 statistical software.

Findings: The results of Pearson's correlation coefficient showed a significant positive relationship between stressful life events and addiction tendencies among the youth of Yasuj ($P < 0.01$). There was a significant negative relationship between the behavioral inhibition system and addiction tendencies among the youth of Yasuj ($P < 0.01$). There was a significant positive relationship between the behavioral activation system and addiction tendencies among the youth of Yasuj ($P < 0.01$).

Conclusion: Based on the results, by identifying stressful life events and the behavioral activation system in young people, measures can be taken to prevent their tendency toward addiction.

Keywords: *Stressful Events, Behavioral Brain System, Addiction, Youth.*

1. Introduction

The quality of human resources is the most crucial factor affecting the productivity of a society. Young, efficient, healthy, and motivated human capital is one of the most significant national assets for the development and growth of any country (Jibir et al., 2023). Issues and problems are inherent in every land, existing throughout history, and every country must seek rational and effective strategies to address them and prevent social harm. Addiction is one of these problems, which has become the largest and most complex social phenomenon in every

human society today (Shearer et al., 2022). Substance abuse is a pathological dependency on one or more drugs, leading to drug-seeking behaviors, and in the absence of the desired drugs, withdrawal symptoms appear in the addict; moreover, individuals continue to use despite the existence of laws, social norms, and awareness of its adverse consequences (Parvaz et al., 2022; Simmons & Suárez, 2016). Addiction is among the most critical problems of the present century and can be the foundation of many social and familial issues. Today, addiction is considered a biological-psychological-social disease, and various factors contribute to the tendency to substance abuse (Cadet, 2016).

Given that opioid addiction is the most prevalent global problem, it is consequently a priority for the World Health Organization. Despite increased public awareness of the adverse and destructive effects of drugs, we still witness an increase in substance abuse, particularly methamphetamine and its derivatives. Amphetamine, fenmetrazine, cocaine, and methamphetamine (meth) are primarily industrial substances, whereas heroin, alcohol, cannabis, opium, and opium resin are traditional drugs (Ahadi et al., 2021; Mohammadi AhmadAbadi & Golestani Nezhad, 2021). The World Health Organization has classified drugs alongside weapons of mass destruction, environmental pollution, and the class divide as the four major disasters of the twenty-first century. Addiction is one of the unfortunate dilemmas of modern human societies, widespread across the globe and attracting the attention of governments worldwide. The extensive psychological, health, physical, moral, cultural, political, economic, security, legal, and familial consequences of addiction significantly impact the young population. Drug use leads to psychological or physiological dependence on substances, causing abnormal behavior and activities in physical, mental, and social aspects of the individual (Ahadi et al., 2021; Ball et al., 2018).

Substance abuse is a pathological dependency on one or more drugs, leading to drug-seeking behaviors, and in the absence of the desired drugs, withdrawal symptoms appear. Additionally, individuals continue to use despite the existence of laws, social norms, and awareness of its adverse consequences. Solving this problem is often more challenging than understanding the causative and facilitating factors (Simmons & Suárez, 2016). The impact of addiction on the psychological state, mental health, and family relationships is undeniable. This disease affects the psychological adjustment and quality of life of the addict. According to the latest statistics from the World Drug Control Organization, 246 million people worldwide are dependent on drugs. According to the latest official statistics from the Iranian Drug Control Headquarters, the number of addicts in Iran is estimated at 2.808 million (Mohammadi AhmadAbadi & Golestani Nezhad, 2021).

Identifying the causes of addiction readiness or dependency is a priority in prevention programs. Research conducted on identical and fraternal twins estimates the role of genetics in readiness for substance use at 40%. Genetics and the environment have a reciprocal relationship. Individuals exposed to socio-economic problems and adverse life events have a higher propensity for substance dependence (Kimbrel et al., 2007; Roberts et al., 2017). Therefore, the scope of the causes of readiness and inclination toward substance use and its consequences is vast and widespread, involving multiple social, economic, interpersonal, and individual factors, often making it difficult to identify the main cause (Roberts et al., 2018). Research in the field of addiction has highlighted numerous risk factors for this disorder, including high levels of family conflict, academic problems, concurrent mental disorders such as depression and personality disorders, stressful life events, peer and parental substance use, impulsivity, and reduced psychological well-being (Simons et al., 2008).

Many facilitators exist for readiness and inclination toward addiction. Many unpleasant events occur throughout life that can be one of these facilitators (Sabouri & Mansouri, 2022). Stressful life events are incidents that occur relatively suddenly and unpredictably during an individual's life and have serious effects (Buccheri et al., 2018). Holmes and Rahe (1967) first attempted to measure the amount of stress humans experience, creating the Social Readjustment Rating Scale. These researchers believed that any change in life, whether positive or negative, that requires lifestyle adjustments, can be considered stressful. In their latest review in 2017, they listed 18 stressful events, including the death of a spouse, friends, relatives, imprisonment, floods and house fires, severe illness, dismissal, separation and divorce, identity theft, unexpected problems, starting a new job, planning a wedding, the birth of the first child, travel delays, terrorist threats, losing a mobile phone, moving to a new home, going on vacation, promotion, and career success. Initial evidence showed that stressful life events, along with perceived stress, are positive predictors of addiction (Cadet, 2016; Holmes & Rahe, 1967; Roberts et al., 2017; Roberts et al., 2018; Sabouri & Mansouri, 2022).

The pressure from any stimulus that causes tension and stress in humans is called psychological stress. When this pressure exceeds the individual's tolerance, the person

cannot adapt. Individual differences play a fundamental role in creating pressure. In other words, a factor may cause pressure and tension in one person but be ineffective in another (Roberts et al., 2017). Robert et al. (2018) believe that stressful life events can strongly predict psychosocial outcomes and risky behaviors, including the tendency to addiction in adolescence and youth (Roberts et al., 2018). Similarly, Salvatore et al. (2014) concluded that stressful life events are positively associated with the tendency of youth to use drugs (Salvatore et al., 2014). Paying attention to stress sources is crucial in social and psychological studies because failing to intervene in stress caused by life events can lead to significant personal, familial, and substance abuse problems. It appears that stressful life events play a significant role in the onset or recurrence of substance abuse (Mohammadi AhmadAbadi & Golestani Nezhad, 2021).

In recent years, the role of biological foundations (behavioral brain system) in the predisposition to addiction has received much attention. Hence, many studies refer to addiction as a brain disease (Parvaz et al., 2022). According to Beck's cognitive theory, various mental disorders and tendencies toward risky behaviors, such as risky sexual behaviors and addiction tendencies, are related to the functioning of individuals' brain systems (Banerjee et al., 2019). The behavioral brain systems model, known as the reinforcement sensitivity theory, is one of the neuropsychological personality models based on individual differences in responses to punishment (BIS) and reward (BAS) stimuli. Each system responds to different reinforcing events with different behaviors and is controlled by a separate set of interconnected brain structures that process environmental information (Banerjee et al., 2019). Each system operates at three levels: behavioral (analyzing system inputs and outputs), neurophysiological (system function and structure), and cognitive (system information processing function) (Pickett et al., 2011). One factor affecting psychological vulnerability is the behavioral brain systems (Khodapanah et al., 2018).

Over time, an addict loses complete control and behavioral mastery, and only the presence of addictive substances in the brain's nervous system can maintain their physical and mental balance (Babaei et al., 2016). The reason for this is the alteration and deviation in the normal functioning of the brain's reward circuit following the use of these substances. This circuit is part of the mesolimbic system, which exerts its reinforcing effect by releasing the neurotransmitter dopamine. Dopamine release in the mesolimbic dopaminergic pathways is associated with normal reinforcement processes, such as eating, drinking, sexual activity, and social interactions (Kajbaf & Rahimi, 2011). The deviation effect in the brain's reward circuits continues for years after cessation of use. The result of these changes can be observed in two states of the addict: first, they quit multiple times, but most treatments fail; second, when confronted with stimuli related to the substance, intense cravings (urge) for use are triggered. Many researchers studying the relationship between brain reward circuit sensitivity and addiction have found that the reinforcement sensitivity theory beautifully provides a biological model of personality, including three brain/behavioral systems (Franken & Muris, 2006). The activity of each system triggers different emotional responses, such as excitability, anxiety, and fear. The first system in this model is the behavioral activation system, whose activity leads to experiencing positive emotions, pleasure, extraversion, and excitability. Impulsive behaviors refer to behaviors that, if individuals correctly judge their consequences, are inhibited or stopped. The second system, the behavioral inhibition system, causes negative emotions such as anxiety and passive and weak coping in stressful situations. This system is responsible for inhibiting and stopping behaviors that lead to punishment. The third system is the fight-or-flight system, which is sensitive to aversive stimuli (Hundt et al., 2008; Kimbrel et al., 2007).

Substance abuse is currently one of the major public health concerns, and Iran, compared to global averages, requires more effort to control this problem. The high prevalence of substance abuse, with statistics exceeding 1.8 million people in the country, highlights the importance of addressing this issue (Ahadi et al., 2021). Addiction, as a trackable and treatable disease, is one of the top research priorities. Therefore, considering the above, the present study seeks to answer the question of whether there is a significant relationship between the role of stressful events and the behavioral brain system with addiction tendencies among the youth of Yasuj.

2. Methods and Materials

2.1. Study Design and Participants

This applied research is descriptive-correlational in terms of methodology. The statistical population included all young people aged 18 to 30 years in Yasuj in 2022, with a population of approximately 100,000 based on the 2016 census. According to the Krejcie and Morgan table (1987), the estimated sample size was 384, but considering sample

attrition and incomplete questionnaires, the researcher increased the sample size to 400. Finally, after excluding defective questionnaires, 384 individuals were included in the analysis. The sample size was determined using multi-stage cluster random sampling. Several educational, administrative, and medical centers in Yasuj were randomly selected, and from these centers, young people meeting the study criteria (based on diagnostic interviews) were chosen and responded to the stress events, behavioral brain system, and addiction tendency scales. Inclusion criteria were: - not receiving psychiatric medication and not being diagnosed with severe personality or clinical disorders (determined by diagnostic interview and direct questioning), - interest and willingness to participate voluntarily, - minimum age of 18, - literacy in reading and writing. Exclusion criteria were receiving psychiatric medication, being diagnosed with severe personality or clinical disorders, and unwillingness to participate.

2.2. Measures

2.2.1. Stressful Events

Developed by Holmes and Rahe in the 1960s, this scale includes 43 stressful life events. Each event is assigned a specific score based on its severity (referred to as the mean value), with the highest score given to the "death of a spouse." Each individual can calculate their total score based on the types of events they have experienced. Holmes and Rahe found that individuals with high scores in life changes were more likely to develop a stress-related illness within the next two years. This scale has content, face, and predictive validity. Holmes and Rahe (1960) used Cronbach's alpha method to determine the scale's reliability, reporting a reliability coefficient of 0.79 and a validity coefficient of 0.36 using Pearson's correlation (Mohammadi AhmadAbadi & Golestani Nezhad, 2021). In the present study, the Cronbach's alpha reliability for the overall questionnaire was 0.85.

2.2.2. Behavioral Inhibition/Activation System

The Carver and White Behavioral Inhibition/Activation System (1994) includes 24 self-report questions and two subscales: BIS and BAS. BIS Subscale: This subscale consists of seven items (2, 8, 13, 16, 19, 22, 24) measuring behavioral inhibition system sensitivity or responses to threats and feelings of anxiety when faced with threatening cues. BAS Subscale: This 13-item subscale measures behavioral activation system sensitivity and includes three other subscales: Drive (BAS-DR): Four items (3, 9, 12, 21): Reward Responsiveness (BAS-RR): Five items (4, 7, 14, 18, 23): Fun Seeking (BAS-FS): Four items (5, 10, 15, 20). Items are rated on a four-point scale from strongly agree (4 points) to strongly disagree (1 point). Items 1, 6, 11, 17 do not affect the scoring and are included for consistency with other items. The scores from the 24 items are summed, with a minimum score of 24 and a maximum score of 96. Scores between 24 and 40 indicate low sensitivity, 40 to 60 indicate moderate sensitivity, and above 60 indicate high sensitivity. Carver and White (1994) reported internal consistency for the BIS subscale as 0.74 and for the BAS subscale as 0.71. The psychometric properties of the Persian version of this scale were reported as satisfactory by Mohammadi (2008) among Shiraz students, with test-retest reliability for the BAS scale at 0.68 and for the BIS subscale at 0.71. Abdollahi Majarshin (2016) reported test-retest reliability for the BAS subscale at 0.78 and for the BIS subscale at 0.81 (Khodapanah et al., 2018). In the present study, the Cronbach's alpha reliability for the entire questionnaire was 0.83, and for the BIS and BAS subscales, it was 0.81 and 0.85, respectively.

2.2.3. Addiction Potential

Developed by Weed and Butcher (1992), this questionnaire has been adapted for the psychological and social conditions of Iran by Zargar, Najarian, and Naeimi (2008). It consists of 36 items plus five lie detection items, combining two factors: active and passive readiness. In the second factor (passive readiness), most items relate to lack of assertiveness and depression. Zargar et al. (2008) used two methods to calculate the scale's validity. The criterion validity of the addiction readiness scale effectively distinguished between addicted and non-addicted groups. Construct validity was measured by correlating the scale with a 25-item clinical symptom checklist, resulting in a significant correlation of 0.45. The reliability of the scale, calculated using Cronbach's alpha, was 0.90, indicating high reliability. Each question is scored on a continuum from 0 (completely disagree) to 3 (completely agree), with lie detection questions (12, 15, 21, and 33) scored inversely. The total score is the sum of scores, excluding lie detection items, ranging from 0 to 108. Higher scores indicate a greater propensity for addiction (Babaei et al., 2016; Mohammadi AhmadAbadi & Golestani Nezhad, 2021). In the present

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study, the Cronbach's alpha reliability for the entire scale was 0.81.

2.3. Data analysis

Descriptive data was analysed using SPSS version 24, and the proposed model was evaluated using AMOS version 24.

3. Findings and Results

The demographic characteristics of the sample group are as follows: The age distribution shows that the majority of participants are aged 20 to 30 years (38%), followed by those aged 18 to 20 years (35%), and 30 to 35 years (27%). Regarding educational attainment, 46% of participants have a high school diploma or a bachelor's degree, 43% have a master's degree, and 11% hold a doctoral degree. In terms of employment status, 53% are students, 27% work part-time, and 20% are employed full-time. Finally, the marital status distribution indicates that 67% of participants are single, 28% are married, and 5% are divorced.

Table 1

Descriptive Findings of Stressful Events, Behavioral Brain System, and Addiction Tendency Variables

Variable	M	SD
Stressful Life Events	207.6	85.8
Addiction Tendency		
- Active Readiness Factor	94.39	10.40
- Passive Readiness Factor	66.09	11.80
Behavioral Inhibition/Activation		
- BIS Subscale	15.67	3.31
- BAS Subscale	23.18	4.49

The results of Table 1 show that the mean and standard deviation of stressful life events are 207.6 (85.8), behavioral inhibition/activation system are 38.85 (7.59), and the mean and standard deviation of addiction tendency are 160.48 (17.97).

The Kolmogorov-Smirnov test significance level for all variables is greater than the significance level of 0.05 ($p > 0.05$), confirming the normality assumption for these variables. Additionally, based on the Central Limit Theorem in statistics, given the large sample size ($n > 30$), it can be assumed that all variables follow a normal distribution.

Table 2

Correlation Matrix of Research Variables

Variable	1	2	3	4
1. Addiction Tendency	1			
2. Stressful Life Events	.559**	1		
3. Behavioral Inhibition System	-.474**	-.381**	1	
4. Behavioral Activation System	.424**	.221**	-.132**	1

**p<0.01

Table 2 presents the correlation coefficients between the research variables, with most correlations significant at the 0.01 level. The correlation results indicate a significant positive relationship between stressful life events and addiction tendency among the youth of Yasuj. A significant negative relationship exists between the behavioral inhibition system and addiction tendency among the youth of Yasuj. Additionally, a significant positive relationship exists between the behavioral activation system and addiction tendency among the youth of Yasuj.

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Table 3

Fitted Model Parameter Values

Pathway	b	β	p-value	Result
Stressful Life Events → Addiction Tendency	0.366	0.559	<0.001	Significant
Behavioral Activation System → Addiction Tendency	-0.611	-0.747	<0.001	Significant
Behavioral Inhibition System → Addiction Tendency	0.394	0.345	<0.001	Significant

The results in Table 3 show that the significance level for the stressful life events variable is very close to zero. Therefore, statistically, there is a significant direct relationship between stressful life events and addiction tendency. Given the standardized beta coefficient, the direct effect of stressful life events on addiction tendency is 0.559. Thus, with a one-unit increase in stressful life events, the tendency for addiction increases by 55.9%. Consequently, the first hypothesis is confirmed with 95% confidence.

Furthermore, the significance level for the behavioral activation system variable is very close to zero. Statistically, there is a significant direct relationship between the behavioral activation system and addiction tendency. The standardized beta coefficient indicates that the direct effect of the behavioral activation system on addiction tendency is -0.747. Thus, with a one-unit increase in the behavioral activation system, the tendency for addiction increases by 74.7%. Consequently, the second hypothesis is confirmed with 95% confidence.

Finally, the results show that the significance level for the behavioral inhibition system variable is very close to zero. Statistically, there is a significant direct relationship between the behavioral inhibition system and addiction tendency. The standardized beta coefficient indicates that the direct effect of the behavioral inhibition system on addiction tendency is 0.345. Thus, with a one-unit increase in the behavioral inhibition system, the tendency for addiction increases by 34.5%. Consequently, the third hypothesis is confirmed with 95% confidence.

4. Discussion and Conclusion

The present study aimed to investigate the role of stressful events and the behavioral brain system in the addiction tendencies of young people in Yasuj. To test the hypotheses related to this objective, 384 young people from Yasuj were selected using multi-stage cluster random sampling based on the Krejcie and Morgan table (1987). They responded to scales measuring stressful events, the behavioral brain system, and addiction tendencies. The correlation results showed a significant positive relationship between stressful life events and addiction tendencies in the youth of Yasuj ($P < 0.01$). There was a significant negative relationship between the behavioral inhibition system and addiction tendencies ($P < 0.01$) and a significant positive relationship between the behavioral activation system and addiction tendencies ($P < 0.01$).

Regarding the correlation and positive role of stressful life events with addiction tendencies in youth, these results are consistent with prior findings (Cadet, 2016; Mohammadi AhmadAbadi & Golestani Nezhad, 2021; Roberts et al., 2017).

Robert et al. (2018) believe that stressful life events can be strong predictors of psychosocial outcomes and risky behaviors, including addiction tendencies during adolescence and youth (Roberts et al., 2018). Similarly, Salvatore et al. (2014) found a positive correlation between stressful life events and youth's tendency to use drugs (Salvatore et al., 2014). Attention to stress sources is crucial in social and psychological studies because failing to address stress from life events can lead to significant personal, familial, and substance use problems (Roberts et al., 2017). Considering these findings and the results of the present study, it appears that stress and stressful life events play a significant role in youth's inclination toward drug use and addiction.

In explaining these results, it can be said that young people who experience stressful events in their lives undergo higher psychological pressure compared to those who experience fewer stressful events. Consequently, these individuals exhibit a higher readiness for addiction. Stressful events such as divorce, insufficient income, academic failure, the death of a spouse, etc., occur throughout life, imposing psychological pressure on individuals. Initially, these individuals may try to resist, but with increasing stressful events and the psychological pressure from them, they lose their tolerance and seek quick solutions for regaining peace. Consequently, they engage in risky behaviors, such as substance use, making them more susceptible to addiction (Cadet, 2016; Mohammadi AhmadAbadi & Golestani Nezhad, 2021).

Another explanation is that when a person faces significant stressful events impacting their life, they

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experience tensions that, without proper emotional regulation skills and effective coping mechanisms, make it challenging to withstand these conditions. According to the self-medication hypothesis, individuals seeking to alleviate experienced tensions and calm themselves may turn to addiction as a maladaptive regulatory strategy over time.

The results of the present study regarding the role of the behavioral brain systems in addiction tendencies are consistent with prior findings (Babaei et al., 2016; Franken & Muris, 2006; Hundt et al., 2008; O'Connor et al., 2009; Parvaz et al., 2022). Therefore, the behavioral brain systems play a predictive role in individuals' tendency to use drugs. High activity in these systems can make individuals more sensitive to reward-seeking, pleasure, and drive cues, leading to substance use. Franken et al. (2006) found that the behavioral activation system is highly active among addicts. This activity and increased sensitivity can trigger emotions and active avoidance, with behavioral activation system sensitivity indicating impulsivity. High activity and sensitivity in the behavioral activation system lead to behaviors seeking rewards and reinforcement, highlighting biological predispositions in individuals susceptible to addiction (Franken & Muris, 2006).

In explaining this finding, the behavioral activation system controls approach and pleasurable motivation, associated with euphoric emotional states. Individuals with strong behavioral activation systems are more prone to substance use and abuse. Higher levels of behavioral activation correlate with increased substance use and addiction tendencies. Increased activity in the behavioral activation system makes individuals actively and impulsively seek out substances as highly pleasurable stimuli. Thus, greater sensitivity in the behavioral activation system correlates with heightened substance use and addiction.

Furthermore, the revised reinforcement sensitivity theory (Kimbrel et al., 2007) posits that the behavioral activation system (BAS) is responsible for responding to all pleasant stimuli, linked to personality traits such as impulsivity, risk-taking, and addictive behaviors. High activity in this system, a fundamental cause of impulsivity in substance-dependent individuals, leads to behaviors likely resulting in rewards, disregarding negative consequences (Hundt et al., 2008; Kimbrel et al., 2007).

5. Limitations & Suggestions

The main limitation of this study was the use of correlation methods and self-report tools. Discovered relationships cannot be assumed as causal, and self-report tools may not capture individuals' self-reflection accurately. Additionally, controlling for intervening variables like the socio-economic status of the youth in Yasuj was not feasible. The study focused on the direct relationship between behavioral brain systems and addiction tendencies, ignoring the role of various intermediate variables. Future studies using structural equation modeling should consider these intermediary variables. Considering the link between impulsivity, brain system activity, and addiction tendencies in youth is crucial for prevention efforts. This study's findings can help identify new predispositional factors for addiction and understand individual differences in neural sensitivity and vulnerability to substance use. Thus, new educational interventions can be proposed to prevent stressful life events and predispositional mental and social factors, aiming to reduce youth addiction and substance use. Based on this study, addiction treatment and rehabilitation counselors can offer strategies to improve mental health for addicts and their families to prevent relapse.

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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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