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Determining the Contribution of Behavioral Activation / Inhibition Brain Systems and Difficulty in Emotion Regulation in Predicting Self-Injurious Behavior in Adolescents

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A B S T R A C T

The aim of the present study was to determine the contribution of behavioral activation / inhibition brain systems and difficulty in emotion regulation in predicting self-injurious behavior in adolescents. The research method was descriptive and correlational. The statistical population of the present study was all adolescents aged 15 to 18 years studying in high schools in Tehran in the academic year 2020, from which 100 people were selected by convenience sampling. The instruments used in this study were standard self-harm questionnaires, behavioral inhibition / activation systems, and difficulty in emotion regulation. Data were analyzed using Pearson correlation test and multivariate regression stepwise. The findings of the present study showed that a positive and significant relationship between behavioral activation systems, difficulty in emotion regulation and its dimensions including rejection of emotional responses, difficulty in performing purposeful behavior, difficulty in controlling impulse, lack of emotional awareness There is limited access to emotion regulation strategies and lack of emotional clarity with self-injurious behaviors, and there is a significant negative relationship between behavioral inhibition systems and self-injurious behaviors (P <0.01). Also, the results of regression analysis showed that the variables of behavioral activator, lack of emotional awareness and rejection of emotional responses can predict 0.45, 0.22 and 0.41% of the variance of self-injurious behaviors in adolescents, respectively.

Keywords: Behavioral inhibition, Self-injury, Behavioral activator, Difficulty in emotion regulation, Adolescents.

INTRODUCTION

Adolescent mental health has received special attention in recent years (Aizpitarte, Atherton, Zheng, Alonso-Arbiol, & Robins, 2019; Bode & Roberts, 2011; Muehlenkamp & Gutierrez, 2004). Adolescence is one of the most sensitive and crucial stages of a person's life, this period is the period of transition from childhood to adulthood and adulthood. Adolescence and youth is a period full of changes and challenges, which with the awareness of people in this period can create the ground for progress and turn challenges into optimal opportunities for progress(Cloutier, Martin, Kennedy, Nixon, & Muehlenkamp, 2010; Franzen, Keller, Brown, &

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Plener, 2020). During adolescence, a sharp increase in social and emotional information may cause sensitivity to the emotions of others(Eccles, Lord, & Buchanan, 1996; Stok et al., 2018). In order to maintain his position in the family and society, adolescents may engage in high-risk and destructive behaviors that cause serious harm to them. One of these high-risk behaviors is self-injurious intentional self-harm, which can be attributed to It is mentioned as one of the destructive behaviors in adolescence and in other words, it can be concluded that the prevalence of self-harming behaviors in adolescence is higher than other age periods(Geulayov et al., 2018; Glenn & Klonsky, 2013).

Self-harm without suicide is a type of self-harming behavior in which a person directly damages different parts of his body, but there is no suicidal motive in this injury(Glenn & Klonsky, 2013). There are several factors involved in the development of self-harming behaviors, including the role of Behavioral Activation Systems (BAS) / Behavioral Inhibition (BIS) (Muris, Meesters, de Kanter, & Timmerman, 2005) and difficulty in regulating emotion(Swannell et al., 2012) noted.

The biological theory of personality has introduced two main brain systems called activation system and behavioral inhibition system, which regulate tendency and avoidance behavior in response to environmental stimuli, respectively(Jeffrey A Gray, 1991; Jeffrey Alan Gray, 1987). The behavioral deterrence system raises awareness of the potential for danger or punishment and facilitates avoidant behavior; while the behavioral activation system creates sensitivity to reward cues, and engages the individual in tendentious and dominant behaviors(Carroll et al., 2006; Seker et al., 2021). In general, it can be stated that the activity of the inhibition system causes a feeling of anxiety and stops the current and ongoing activities so that the person is able to examine the symptoms created in the situation(Hahn et al., 2009). Regarding the system of behavioral activator, it can be said that this system causes impulsive behavior, and at the same time, this impulse leads the person to an action that earns a reward and motivates the person in this direction, without realizing the potential negative consequences. In general, it can be said about the behavioral activation system that the behavioral activation system introduces the reward-seeking behavior that, the feeling of pride and hope for the reward in spite of the existing danger or threat consisting of two components of approach and avoidance. It is active that this system is responsible for conflict resolution (Morris et al., 2005). The extent and dominance of these systems vary from person to person. It seems that a person with high-risk and self-harming behaviors is unable to avoid certain behaviors and give up some pleasures (lack of behavioral inhibition) (Beck, Smits, Claes, Vandereycken, & Bijttebier, 2009; Conner, Rahm-Knigge, & Jenkins, 2018). People with symptoms of high-risk behaviors are people in whom the activating devices are highly reactive and the behavioral activating system is sensitive to the rewards of behavior and the environment, rather than attention and sensitivity to punishment. Thus, in many situations, little attention may be paid to punishment and the individual may take action to achieve rewarding results(Wilson, Barrett, & Gray, 1989). People with destructive and destructive behaviors have low levels of behavioral inhibition and therefore are reluctant to engage in inhibited behavioral reactions and react and react to events emotionally(Kooijmans, Scheres, & Oosterlaan, 2000). People with high-risk behaviors have a weak inhibition system or the overactive system of behavioral activation in them acts in a way that impairs the sensitivity of the inhibition system in these people. Jeffrey Alan Gray (1987), considers the behavioral activation system to be related to impulsivity, excitement, extraversion, and sensitivity to reward cues, and also to consider Eising's view of high-risk behaviors. It can be said that people with high-risk and harmful behaviors fail to internalize social values due to low levels of arousal and anxiety, and due to weakness in the brain set-up system and network activating apparatus. Unlike people who are normal, they cannot perceive punishment as annoying and show a variety of deviant and risky behaviors, and on the other hand, it is also

possible, these people in the search for stimulation, the level of arousal in them to the optimal level. Increase or behave impulsively due to having a behavioral activation system(Sijtsema et al., 2010). In general, it can be said that people with high-risk and deviant behaviors have a high level of activity in the behavioral activation system and a low level of activity in the behavioral inhibition system.

Another variable examined in this study is the difficulty in regulating emotion. Cognitive emotion regulation is one of the most important factors affecting the level of mental health in individuals(Wong, 2008). Emotional cognitive regulation refers to the way a person cognitively processes when faced with traumatic and stressful events, and the difficulty in regulating emotion and negative cognitive patterns is fully integrated with psychological trauma and is one of the basic correlations of idea behaviors. Suicidal and traumatic processes are considered self-inflicted(Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gardner, Betts, Stiller, & Coates, 2017). People who tend to experience negative emotions uncontrollably and often lack the skills to manage and regulate intense emotional experiences have more suicidal thoughts(Tamir & Millgram, 2017). Difficulty in regulating emotion is associated with self-harming behaviors and high-risk hurtful behaviors, and this has been confirmed in various studies (Bardeen & Fergus, 2016; Tamir & Millgram, 2017; Witte, Fitzpatrick, Joiner Jr, & Schmidt, 2005).

According to the above research and considering that adolescents in adolescence face different crises in their developmental period and self-harming behaviors such as self-injury are also observed in adolescence and these behaviors are sometimes Out of the state of attention and age requirements and causes irreparable damage to the individual and family, in the present study we seek to answer the question "Are the brain systems activated / behavioral inhibition and "Do they have difficulty regulating emotion in predicting self-harming behavior in adolescents?"

METHODOLOGY

The design of the present study was descriptive-correlational. The statistical population of the present study was all adolescents aged 15 to 18 years studying in high schools in Tehran in the academic year 2020, from which 100 people were selected by convenience sampling. Criteria for entering the study were: no psychiatric problems, experience of self-harm without the purpose of suicide and consent to participate in the study. Exclusion criteria also included dissatisfaction to continue cooperation in the research process.

Self-harm questionnaire (SHI): The self-harm questionnaire was designed by Sansone, Wiederman, and Sansone (1996), and has 22 items. In this questionnaire, behaviors that were intentionally done to self-harm are examined. Such as drug or alcohol abuse, self-harm, self-harm, self-harm, and intentional job loss. The method of answering the questionnaire is yes and no. The no option is given a score of zero and the yes option is given a score of 1. To get the overall score of this questionnaire, yes answers are added together and no good answers play a role in scoring. Subsequent research has examined the convergent validity of this tool with borderline personality self-report tools, depression, and a history of childhood abuse(Sansone et al., 1996). In this study Cronbach's alpha of the questionnaire was 0.74.

Emotion Regulation Difficulty Questionnaire (DERS): The scale introduced by Gratz and Roemer (2004), was used to assess emotion regulation difficulty. This questionnaire includes 36 items and 6 subscales. The subscales of this questionnaire include rejection of emotional responses, difficulty in performing purposeful behavior, difficulty in controlling impulse, lack of emotion awareness, limited access to emotion regulation strategies, and lack of emotion transparency. The questionnaire is graded on a 5-point Likert scale (very rarely = 1 and almost

always = 5). Items 7, 6, 2, 1, 8, 17, 10, 20, 22, 24 and 34 have inverse scoring. Scores between 36 and 72 indicate difficulty in regulating emotion at a low level, scores between 72 and 108 indicate difficulty in regulating emotion at a moderate level, and scores above 108 indicate difficulty in regulating high emotion. This questionnaire also has a significant correlation with the acceptance and practice questionnaire of Hayes, Luoma, Bond, Masuda, and Lillis (2006). Overall internal reliability for the questionnaire in Gratz and Roemer (2004) research, equal to 0.93 and for each subscale expressed 0.85, 0.89, 0.86, 0.80, 0.88, 84, respectively. / 0 has been reported. In this research, Cronbach's alpha was 0.87.

Behavioral Inhibition / Activation Systems Scale (BIS / BAS): This scale was developed by Carver and White (1994), to measure individual differences in the sensitivity of inhibitory and behavioral activation systems. This scale has 24 items that measure the activity of the behavioral inhibition system (items 2, 8, 13, 16, 19, 22 and 24) by the Sensitivity to Punishment subscale and the activity of the behavioral activation system by the three subscales. Reward response (items 4, 7, 14, 18, and 23), driver (items 3, 9, 12, and 21) and entertainment search (items 5, 10, 15, and 20) are evaluated. Subjects answer these questions on a Likert scale (completely true = 4, completely false = 1). The internal stability of behavioral inhibition is 0.72 and its differential validity is reported to be 0.55 with anxiety.

RESULTS

In the present study, 100 adolescents aged 15 to 18 years had a mean age of 15.48 and a standard deviation of 1.45.

Table 1: Mean and standard deviation of research variables

Variable	Average	The standard deviation
Self-injurious behaviors	17	1.26
Behavioral activator system	65.81	4.68
Behavioral inhibition system	7.17	1.15
Difficulty regulating excitement	34.5	3.12

Before performing the statistical tests, in order to use the parametric tests and the regression analysis test, its assumptions (test of normality of score distribution and Watson camera test) were tested. The results of Kolmogorov-Smirnov test showed that the assumptions of normality of data distribution are also valid for research variables (p> 0.01).

Table 2: Results from Pearson correlation analysis

Variables	Self-injurious behaviors	
	Pearson coefficient	p
Behavioral activator system	0.225	0.000
Behavioral inhibition system	-.0321	0.001
Not accepting emotional responses	0.411	0.000
Difficulty in performing purposeful behavior	0.315	0.001
Difficulty in controlling impulse	0.415	0.001
Lack of emotional awareness	0.614	0.000
Limited access to emotion regulation strategies	0.215	0.001
Lack of emotional clarity	0.512	0.000
Not accepting emotional responses	0.312	0.000

There is a positive and significant relationship between behavioral activation systems and difficulty in emotion regulation with self-injurious behaviors. Also, there is a positive and significant relationship between the dimensions of difficulty in emotion regulation, ie not

accepting emotional responses, difficulty in performing purposeful behavior, difficulty in controlling impulse, lack of emotional awareness, limited access to emotional regulation strategies and lack of emotional clarity with self-harming behaviors in adolescents. This means that with the increase of behavioral activator and the difficulty in regulating emotion and its dimensions, self-harming behaviors also increase and vice versa. There is also a significant negative relationship between behavioral inhibition systems and self-injurious behaviors. This means that with increasing behavioral inhibition, self-injurious behaviors in adolescents decrease and vice versa.

In order to predict self-injurious behaviors based on predictor variables, stepwise regression analysis has been used.

Table3. Predicting self-injurious behaviors based on lack of emotional awareness and rejection of emotional responses

Model	Sources	Sum Square	R	R2	DF	Mean Square	F	P
Step one: Behavioral activator system	regression The rest Total	21726.463 7824.753 29551.216	0.653	0.735	1 98 99	21726.463 31.551	688.6	0.001
Step two: Lack of emotional awareness	regression The rest Total	22533.203 7018.013 29551.216	0.671	0.763	2 97 99	11266.602 28.413	396.5	0.001
Step three: Not accepting emotional responses	regression The rest Total	23279.170 6272.046 29551.216	0.776	0.788	3 96 99	7759.723 25.496	304.3	0.001

Considering that the statistic value of Watson camera in this test is equal to 1.278; Therefore, this value is in the range of 1.5 to 2.5 and the independence of the residues can be concluded; therefore, it is possible to use the regression method. According to the findings of Table 3, the behavioral activator has a high and significant correlation with self-injurious behaviors and enters the model in the first stage with the observed F rate of 608/605 and alone can achieve 0.65 of the variance of self-injurious behaviors in Predict teens. Also, in the second stage, the lack of emotional awareness enters the equation with the observed F value of 396.530 and the predictive power increased to 0.67%; In the third stage, the non-acceptance of emotional responses entered the equation with the observed F value of 304.349 and the predictive power increased to 0.78%; This means that, predictor variables; That is, behavioral activator, lack of emotional awareness and rejection of emotional responses in three stages and jointly can predict 0.78% of the variance of the criterion variable, ie self-injurious behaviors in adolescents.

Table: 4 Results of regression coefficients

Variable	B	SE	Beta	t	P
Fixed amount	0.351	2.006	_	5.175	0.000
Behavioral activator	0.274	0.037	0.451	7.380	0.000
Lack of emotional awareness	0.439	0.074	0.22	5.948	0.001
Not accepting emotional responses	0.552	0.102	0.41	5.409	0.000

The results of Table 3 show that behavioral activator, lack of emotional awareness and rejection of emotional responses can predict self-aggression behaviors in adolescents at a significant level of 0.001.

CONCLUSION

The aim of this study was to determine the contribution of behavioral activation / inhibition systems (BAS / BIS) and difficulty in emotion regulation in predicting self-harming

behaviors in adolescents. The findings of the present study showed that between activation systems and difficulty in regulating emotion and its dimensions; That is, lack of acceptance of emotional responses, difficulty in performing purposeful behavior, difficulty in controlling impulse, lack of emotional awareness, limited access to emotional regulation strategies and lack of emotional clarity There is a positive and significant relationship with self-injurious behaviors in adolescents. There is also a significant negative relationship between behavioral inhibition systems and self-injurious behaviors.

The findings of the present study show that there is a positive and significant relationship between behavioral activator and self-injurious behaviors and there is a negative and significant relationship between behavioral inhibitions in self-injurious behaviors. These findings are consistent with the results of studies by Muris et al. (2005), And Sijtsema et al. (2010).

Explaining these findings, it can be said that reducing behavioral inhibition and increasing behavioral activator are maladaptive attempts to regulate and respond emotionally and ultimately lead to increased risky behaviors. Behavioral inhibition / activation system is associated with difficulty in properly expressing emotion in different and stressful situations, and this relationship may be due to the fact that behavioral inhibition system as a biological trait of personality, increases negative emotional responsiveness. In individuals, low sensitivity to behavioral inhibition causes inappropriate emotion expression in individuals and ultimately leads to increased risky behaviors, suicidal ideation, and deviant trauma in individuals. Increased activity in the inhibitory and behavioral activator systems leads to increased sensitivity to threatening stimuli and anxiety-related behaviors such as anxiety and rumination. Behavioral inhibition is associated with emotional responsiveness and dysfunctional emotional styles(Leen-Feldner, Zvolensky, Feldner, & Lejuez, 2004; Muris, Merckelbach, Wessel, & Van de Ven, 1999). The general concept of behavioral inhibition is synonymous with behavioral control and failure in this process leads to lack of behavioral control and involuntary behaviors, response to the situation without proper evaluation, deterrence, unresponsive response to the situation and attention to its consequences, lack of The ability to delay reward is an important dimension of impulsivity associated with high-risk behaviors, the cognitive dimension of which is the inability to control inhibition and the tendency to respond quickly without thinking or more broadly with Activating the anxiety cycle in individuals is a kind of predisposing to deviant and high-risk behaviors(Carroll et al., 2006).

Also, the findings of the present study showed that there is a positive and significant relationship between difficulty in emotion regulation and self-harming behaviors in adolescents and these findings are in line with the results of studies by Tamir and Millgram (2017), are consistent.

In explaining these findings, it can be said that in fact, the more difficult it is for people to regulate their emotions, the more risky thoughts, such as suicidal thoughts and intentional and unintentional self-harm, are created for them. When people are less emotionally aware and are not able to recognize their thoughts, feelings and emotions in the face of different situations and will not be able to recognize how to respond appropriately in the face of situations and emotionally how to deal with the situation. They are more likely to develop thoughts of self-harm. Because these people respond to stress in an inappropriate way, they reduce stress in the short term through self-harm, and instead of looking at problem-oriented emotions and regulating them, they respond in a destructive way. They give and get involved in emotions. For this reason, it can be said that emotional cognitive regulation strategies are powerful predictors of self-harm thoughts.

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