

# Behavioral activation and inhibition system's role in predicting addictive behaviors of patients with bipolar disorder of Roozbeh Psychiatric Hospital

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## ABSTRACT

**Background:** Nowadays, prevalence of addictive behaviors among bipolar patients is considered to be a serious health threat by the World Health Organization. The aim of this study is to investigate the role of behavioral activation and inhibition systems in predicting addictive behaviors of male patients with bipolar disorder at the Roozbeh Psychiatric Hospital.

**Materials and Methods:** The research method used in this study is correlation. The study population consisted of 80 male patients with bipolar disorder referring to the psychiatrics clinics of Tehran city in 2014 who were referred to the Roozbeh Psychiatric Hospital. To collect data, the international and comprehensive inventory diagnostic interview, behavioral activation and inhibition systems scale, and addictive behaviors scale were used.

**Results:** The results showed that there is a positive and significant relationship between behavioral activation systems and addictive behaviors (addictive eating, alcohol addiction, television addiction, cigarette addiction, mobile addiction, etc.). In addition, correlation between behavioral inhibition systems and addictive behaviors (addictive eating, alcohol addiction, TV addiction, cigarette addiction, mobile addiction) is significantly negative. Finally, regression analysis showed that behavioral activation and inhibition systems could significantly predict 47% of addictive behaviors in patients with bipolar disorder.

**Conclusions:** It can be said that the patients with bipolar disorder use substance and addictive behaviors for enjoyment and as pleasure stimulants; they also use substances to suppress unpleasant stimulants and negative emotions. These results indicate that behavioral activation and inhibition systems have an important role in the incidence and exacerbation of addictive behaviors. Therefore, preventive interventions in this direction seem to be necessary.

**Key words:** Addictive behaviors, behavioral activation, bipolar disorder, inhibition systems

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## BACKGROUND

Mood disorders are one of the most common psychiatric disorders that are expressed as “diminished mood” during periods of depression and “elevated mood” during periods of mania.<sup>[1]</sup> Bipolar disorder is a complex chronic condition characterized by interactive periods of depression and mania or hypomania.<sup>[2]</sup> The incidence of recurrent periods of depression and mania may have a deep impact on different aspects of life quality, including social, occupational, functional, and emotional well-being.<sup>[3]</sup> The main features of these disorders are

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inability to cope with desire and power, interest and willingness to perform singular acts that are harmful to oneself or others, and feeling pleasure or relief during extreme behavioral tendencies such as excess in gambling, shopping, internet usage, romantic relationships, work, physical activities, and even eating.<sup>[2]</sup>

Recent studies have suggested that a large percentage of bipolar patients show a grave prognosis, high recurrence rate, residual symptoms, functional-cognitive deficits, psychosocial disabilities, and chronic addictive behaviors (overeating, extreme libido, watching television, gambling, impulsiveness, impulsive shopping, and work alcoholism, etc.).<sup>[5]</sup>

Many studies have emphasized the comorbidity of addictive behaviors in patients with bipolar disorders.<sup>[6]</sup> The relationships between smoking and alcohol consumption, being exposed to violence and alcohol consumption, or early sexual contact and substance abuse have been repeatedly studied. Among these high-risk behaviors, sexual behaviors because of their irreversible consequences such as pregnancy, infectious diseases, and human immunodeficiency virus infection has been overemphasized in recent years. Other risky behaviors such as smoking, alcohol consumption, and drug abuse are proposed predictors of sexual risk-taking.<sup>[7]</sup> Martinotti *et al.*<sup>[8]</sup> have shown that addictive behaviors in patients with mental disorders, such as schizophrenia and bipolar patients, are observed in a high level. Various researches have declared that the rate of drug-abuse, smoking, and addictive behavior in bipolar patients is higher than the other patients.<sup>[9,10]</sup>

Cerebrobehavioral systems are among the variables that probably play a role in the appearance of addictive behaviors. With the introduction of Gray's theory, many psychiatric disorders are described in terms of two "activation" systems. In response to environmental stimuli, the theory viewing personality through a psychophysiological approach basically considers two activation systems namely behavioral activation system (BAS) and behavioral inhibition system (BIS), which has a neurological basis.<sup>[13,14]</sup> BAS is responsible for the activation behaviors in response to reward (positive affection) and BIS is responsible for the inhibitory behaviors in response to the threat and punishment (negative affection). In other words, BAS makes individual potentially sensitive to the rewards, and creates incentives to explore them, whereas BIS impacts individual's sensitivity toward punishment and makes them potentially sensitive to the punishments and avoiding them.<sup>[15]</sup> Various findings have shown that an increase, decrease, or loss of balance in the operation

of these systems is associated with a reduced life quality and several psychiatric and psychosomatic disorders. For example, an increase in BAS activity influences substance abuse and antisocial behaviors,<sup>[16]</sup> reduction of BAS activity impacts depression,<sup>[17]</sup> and its imbalance effects bipolar disorders.<sup>[18]</sup> Studies have also shown that high BAS sensitivity is associated with admission to addictive behaviors. In a comparative study between students with internet addiction and alcoholism, it was shown that students with internet addiction had higher scores in BIS, whereas students with alcoholism had higher scores in response to stimulation and happiness and their scores were lower in BIS.<sup>[19]</sup> Meerkerk<sup>[20]</sup> showed that drug abuse is more associated with BIS rather than BAS, however, Yen *et al.*<sup>[19]</sup> reported contradictory results, that is, high BAS and "looking for entertainment" characteristic are concluded to be among the risk factors leading to addiction. Kim and Lee<sup>[21]</sup> showed that morbid gambling behaviors are related to low scores in BIS and high scores in BAS. It has also been suggested that sometimes BAS alongside low BIS plays an important role in other addictive behaviors such as morbid gambling, which has similar features with internet addiction. In addictive behaviors, the person becomes obsessed (constantly thinks of) the object, activity, or substance. They will seek it out or engage in a behavior even though it causes harm (physical problems, poor work or study performance, problems with friends, family, and fellow workers). In addition, the person does not appear to have control regarding when, how long, or how much he or she will continue the behavior (loss of control). Another problems that are possible as a result of addictive behaviors include denying the problems, low self-esteem, and depression.<sup>[12]</sup> In general, the present research is necessary considering the high prevalence of this disorder in our society, the role of BAS and BIS as key factors in generating success, promoting health, reducing psychological problems, and addictive behaviors, along with the lack of research in this field and the application of the results of the present study in the field of bipolar disorder patient's pathology. Therefore, the present study aimed to examine the role of BAS and BIS in predicting bipolar patients' addictive behaviors.

## MATERIALS AND METHODS

This research is a descriptive-correlative study. BAS and BIS are used as predictor variables and addictive behaviors as criterion variables. The population of this study consisted of all male patients with bipolar disorder who consulted psychiatrists or referred to the Roozbeh Psychiatric Hospital, Iran in 2014. The sample comprises 80 male patients with bipolar disorder selected by a convenience sampling method. Considering that the sample should consist of at least 30–50 participants in descriptive

(correlative) studies, to increase the external validity of the study, 80 participants were selected.<sup>[22]</sup> In addition, using the inclusion and exclusion criteria, the benchmark of participant's homogeneity was taken into consideration. Inclusion criteria for study participants were having at least junior high school education; having no cerebral palsy, mental retardation, or active hallucinations and delusions; being in partial remission period; being 22–45 years old; and taking medicine during diagnosis and study project periods. Exclusion criteria included having severe comorbid disorders and confusion, severe depression, drug intoxication, or being in withdrawal period.

### Comprehensive international diagnostic interview

This study recruited the Persian translated version of comprehensive international diagnostic interview (CIDI2.1) which provides the possibility of diagnosis of lifetime psychiatric disorders according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) and International Classification of Diseases (ICD-10). CIDI consists of 14 sections, each marked with a letter (from A to X) and covers 17 major diagnostic fields: Psychosis/mania module consists of F, G, and P, which is distinctively applied for the assessment of psychotic and bipolar disorders. In cases where psychosis/mania module was used alone, some schizophrenia diagnostic criteria for ruling out other mental disorders are not assessable. According to the CIDI guideline, CIDI's complete version or a special module can be applied.<sup>[23]</sup>

### Behavioral inhibition/activation systems scale

This self-report questionnaire developed by Carver and White (1994), includes 24 items. The subscale of BIS consists of seven items that measure the sensitivity of the BIS. The subscale of BAS includes 13 items measuring the sensitivity of BAS which includes the following three subscales: Response to drive containing four items, response to reward containing five items, and looking for entertainment containing four items. Four additional items are included in the scale having no effect on the assessment of BAS/BIS. Each item is rated on a four-point Likert-type rating scale ranging from<sup>[1]</sup> "strongly agree" to<sup>[4]</sup> "strongly disagree." Maximum and minimum score of this scale is 96 and 24, respectively. As reported by Carver and White,<sup>[24]</sup> the internal stability of BIS is 0.74 and the internal consistency of BAS is 0.71. Cronbach's alpha coefficients of BAS subscales have been reported to be 0.73, 0.76, and 0.66, respectively.<sup>[25]</sup> Abdolahi has also reported test-retest reliability for BAS scale to be 0.78 and for BIS scale to be 0.81.<sup>[26]</sup>

### Lesieur and Blume addictive behavior scale

To determine the frequency of addictive behaviors (e.g., eating addiction, drug and alcohol addiction, and

addiction to television and cell phone), Lesieur and Blume Questionnaire can be used.<sup>[11]</sup> This questionnaire had 28 items, each of which can be responded based on a Likert scale ("it does not describe me very well" to "it describes me very well"). Maximum and minimum score of this scale is 112 and 28, respectively. Validity of the questionnaire was confirmed by experts in the field. Thus, for each hypothesis, the questions were distributed among experts to consider their comments. After gathering their views and comments, the final questionnaire was prepared. To measure the internal consistency of the questionnaire, Cronbach's alpha coefficient was used on the sample data. Abolghasemi *et al.*<sup>[27]</sup> have reported the Cronbach's alpha coefficient of the questionnaire to be 0.68. In the present study, Cronbach's alpha for eating addiction was 0.72, alcoholism, 0.84, television addiction 0.72, smoking addiction 0.76, and phone addiction was 0.82.

### Procedure

After coordinating with the Roozbeh Psychiatric Hospital and gaining the satisfaction of the participants, as well as identifying men with bipolar disorder, the first aim of this study was explained to them. The participants were asked to read the questions carefully and choose the desired responses according to their own characteristics and answer as many questions as possible. Data were collected on an individual basis at related centers. Finally, the collected data were analyzed using Pearson correlation and multiple regression statistical techniques. Moreover, the ethical issues including ensuring the participants about the confidentiality of their information and freedom of choice for participation in the study project observed in this research were explained to the participants.

### Ethical considerations

Ethical issues including ensuring the participants about the confidentiality of their information and freedom of choice for participation in the study project observed in this research were explained to the participants.

### RESULTS

The results showed that, among patients with bipolar disorder, 43% had high school education, 19% had diploma education, and 38% had upper diploma education. In addition, 50% of patients were hospitalized for 1 to 15 days, 25% for 15 to 30 days, 17% for 1 month, and 8% were hospitalized for more than 1 month.

As it can be seen in Table 1, the mean [standard deviation (SD)] of the total score of behavioral activation was 41.83 (4.14), and the mean (SD) of the total score of addictive behavior was 14.55 (3.15).

The results of Table 2 show that there is a significant relationship between behavioral activation and addictive eating ( $r = 0.21$ ), addiction to alcohol ( $r = 0.32$ ), television addiction ( $r = 0.31$ ), cigarette addiction ( $r = 0.34$ ), mobile addiction ( $r = 0.34$ ), and the score of all addictive behaviors ( $r = 0.32$ ). In fact, the greater level of behavioral activation in patients with bipolar disorder is associated with more addictive behaviors. In addition, there is a significant relationship between behavioral inhibition with addictive eating ( $r = -0.28$ ), addiction to alcohol ( $r = -0.29$ ), television addiction ( $r = -0.90$ ), cigarette addiction ( $r = -0.38$ ), mobile addiction ( $r = -0.25$ ), and the score of all addictive behaviors ( $r = -0.31$ ). In fact, the greater level of behavioral inhibition in patients with bipolar disorder are associated with less addictive behaviors.

As it can be seen in Table 3, the observed  $F$  was significant and the results show that 47% of the variance of addictive behaviors in bipolar patients can be explained by reply to reward, derive, fun, BAS, and BIS. Given the amount of  $\beta$ , reply to reward ( $\beta = 0.38$ ), derive ( $\beta = 0.24$ ), fun ( $\beta = 0.24$ ), BAS ( $\beta = 0.27$ ), BIS ( $\beta = -0.21$ ) are the most powerful variables to predict addictive behaviors in bipolar patients. In addition, the summary results of the multivariate regression model showed that behavioral activation and

inhibition systems could predict 47% of the variance of addictive behaviors in patients with bipolar disorder. According to the results of the Durbin–Watson test, that is equal to 1.88, the assumptions of normality of data, has also been considered.

## DISCUSSION

This study aimed to assess the role of Gray's activation/inhibition system in predicting addictive behaviors of bipolar patients. According to the results, there is a negative relationship between the BIS and BAS in bipolar patients, i.e. the higher level of behavioral inhibition is, the lower are the addictive behaviors. These findings are consistent with the studies of Meerkerk *et al.*,<sup>[20]</sup> Kim and Lee,<sup>[21]</sup> and Park *et al.*,<sup>[13]</sup> whereas it is inconsistent with the studies of Taylor *et al.*<sup>[7]</sup> and Staiger *et al.*,<sup>[28]</sup> which showed that BIS activity in addicted smokers is more than that in the non-addicted ones; that is, in the absence of reward, avoidance of negative outcomes, and unpleasant and severe conditions, individuals grow a tendency toward drug and alcohol consumption. Furthermore, BIS is a neurological system which with its weakness, pleasure-feeling symptoms, becomes activated and creates a sense of euphoria and liberty. Low sensitivity of BIS may create an increasing euphoria feeling and a tendency toward lack of inhibition, and therefore readiness to experience drugs and other deviations.<sup>[29]</sup> Thus, there are two distinct motivational pathways to alcoholism and addiction. One of them is related to the sensitivity of the BAS and the uncontrollable desire for alcohol's rewarding. And the other is the uncontrollable desire for alcohol after leaving drug abuse, which is related to the sensitivity of the BIS.<sup>[30]</sup>

Bipolar disorder and its features such as hopelessness, impulsivity, emotional instability, and interpersonal disturbances are significantly correlated with addictive and self-injuring behaviors.<sup>[31]</sup> Considering that bipolar disorder is associated with negative emotions, the individual with the disorder when coping with adverse and stressful events is always looking for a way to escape from painful feelings. Such individuals may use different methods to minimize

**Table 1: Descriptive statistics of variables**

Variable	Components	Mean	SD
Behavioral activation	Reply to reward	4.87	16.02
	Derive	2.88	13.36
	Fun	2.68	12.45
	BAS	4.14	41.83
Behavioral inhibition	BIS	3.56	24.56
Addictive behaviors	Addictive eating	1.45	2.56
	Alcohol addiction	1.01	3.12
	TV addiction	1	2.10
	cigarette addiction	1.89	4.14
	mobile addiction	0.98	2.63
	Addictive behaviors	3.15	14.55

SD: Standard deviation, BAS: Behavioral activation system, BIS: Behavioral inhibition system, TV: Television

**Table 2: The correlation coefficient between behavioral activation and inhibition systems with addictive behaviors**

Variables	$r$ (P value)					
	Addictive behaviors					
	Addictive eating	Alcohol addiction	TV addiction	Cigarette addiction	Mobile addiction	All
Reply to reward	0.29 (0.006)	0.27 (0.001)	0.23 (0.002)	0.29 (0.001)	0.21 (0.009)	0.28 (0.001)
Drive	0.34 (0.001)	0.35 (0.001)	0.21 (0.001)	0.36 (0.001)	0.10 (0.059)	0.31 (0.001)
Fun	0.96 (0.001)	0.32 (0.001)	0.31 (0.001)	0.34 (0.001)	0.35 (0.001)	0.32 (0.001)
BAS	0.21 (0.008)	0.32 (0.001)	0.31 (0.001)	0.34 (0.001)	0.35 (0.001)	0.32 (0.001)
BIS	-0.28 (0.008)	-0.29 (0.001)	-0.90 (0.001)	-0.38 (0.001)	-0.25 (0.001)	-0.31 (0.001)

BAS: Behavioral activation system, BIS: Behavioral inhibition system, TV: Television



**Table 3: Summary results of standard and non-standard coefficients for the prediction of addictive behaviors based on behavioral activation and inhibition system**

Predictive variables	Non-standardized coefficients	Standardized coefficients	P
	B	$\beta$	
Constant	28.45		<0.001
Reply to reward	0.085	0.38	<0.001
Derive	0.077	0.24	<0.001
Fun	0.063	0.24	<0.001
BAS	0.055	0.27	<0.001
BIS	-0.048	-0.21	<0.001

BAS: Behavioral activation system, BIS: Behavioral inhibition system

their pain including addictive behaviors and self-injury.<sup>[32]</sup> A weak BIS and a tendency toward lack of inhibition, that prevents the inhibition of inappropriate behaviors in different situations, causes the individual to have intense attachment to an object, behavior, or addictive behavior as a defense against depression and low mood, when experiencing negative emotions and stressful events.

There is a positive relationship between BAS and addictive behaviors in bipolar patients. In other words, the higher the level of behavioral activation is, the more addictive behaviors will be experienced. These results are consistent with the studies of Newman *et al.*,<sup>[16]</sup> McFarland *et al.*,<sup>[17]</sup> Alloy *et al.*,<sup>[18]</sup> Mitchell and Nelson-Gray,<sup>[33]</sup> and Hundt *et al.*<sup>[34]</sup> In explaining the results, it can be said that the lack of behavioral inhibition, experience seeking, risk-taking, and sensibility to monotony are effective factors on addictive behaviors. The desire to experience increased levels of risk for joy, especially in manic phases, is of higher risk-taking levels so that individuals in order to seek more pleasure or to escape monotony take the risks of consuming drugs and alcohol or perform other risky behaviors. On the other hand, they estimate the activation of risks and negative consequences of such behaviors as low and insignificant and much lower than the actual rate for themselves; for example, despite their occasional use of alcohol or drugs or engaging in risky sexual behaviors, they consider the consequences and risks as negligible for themselves, and with irrational beliefs, such as “the recreational drug use is not harmful or addictive,” or “I use it only a few times” and consider themselves strong in the face of these risks.<sup>[25]</sup>

Moreover, with the examination of the BAS components, the results showed that there is a relationship between BAS drive, response to reward, entertainment seeking, and addictive behaviors of bipolar patients. These results are consistent with the studies of Park *et al.*<sup>[13]</sup> and Kim and Lee.<sup>[21]</sup> Bipolar patients, because of a lack of emotional awareness and cognitive capability of processing their emotions, have a limited ability to cope with stressful

situations. As a result, the psychological component of emotional expression and psychological distress systems, namely depression, mania, and anxiety increases, which can be expressed as BAS excitation.<sup>[31]</sup> Based on the outcome of BAS activity, the pleasure-seeking personality, which plays an important role in the development of addictive behavior,<sup>[29]</sup> it can be concluded that those bipolar patients have high levels of sensitivity toward BAS reward who have high enjoyable activities, looking for new experiences, are unable to control themselves, and make impulsive decisions as a result of the tendency toward high-risk and addictive behaviors. Therefore, because of high BAS sensitivity, bipolar patients are more vulnerable.<sup>[35]</sup>

## CONCLUSION

Finally, the small sample size and lack of a comparative study of women with bipolar disorder—because of their unavailability—were the main limitations of this study. It is hoped that future researchers may conduct a comparative study. It is recommended that the authorities with their emotional support provide proper conditions for these patients to express their feelings and emotions in a suitable manner, and facilitate the emotional, cognitive, and psychiatric compatibility of these patients.

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## Conflicts of interest

There are no conflicts of interest.

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