

Original Article

Effectiveness of Compassionate Mind-Based Cognitive Therapy on Adolescents' Behavioral Activation-Inhibition Systems and Theory of Mind

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Abstract

Background and Aim: High-risk behaviors have devastating physical, psychological, and social consequences for the adolescents. This study aimed to investigate the effectiveness of compassionate mind-based cognitive therapy on behavioral inhibition-activation systems and the theory of mind of adolescents with high-risk behaviors.

Materials and Methods: The study design was quasi-experimental with control and intervention groups and a follow-up phase. The statistical population included all high school boys with high-risk behaviors in Tabriz. The sample consisted of 30 students who were purposefully selected, and randomly allocated into experimental and control groups. High-Risk Behaviors Questionnaire, Brain-Behavioral Systems Scale, and the Theory of Mind Questionnaire were used to collect data. Data were analyzed using multivariate analysis of variance test and employing SPSS-24 software.

Results: Compassion-focused cognitive therapy decreased activation, increased inhibition, and improved theory of mind among adolescents with high-risk behaviors ($P < 0.01$).

Conclusion: Based on the findings of this study, it can be concluded that cognitive therapy based on compassionate mind through the component of mindfulness by reducing rumination, leads to a reduction of negative emotions and thus reduces high-risk behaviors in adolescents. Thus, it can be said that treatment based on Compassion can be used as an effective treatment to improve adolescent psychological problems with high-risk behaviors.

Keywords: Compassionate mind-based cognitive therapy, Behavioral activation-inhibition systems, Theory of mind, High-risk behaviors, Adolescents

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Introduction

High-risk behaviors have devastating physical, psychological, and social consequences for adolescents (1). The most common high-risk behaviors are physical abuse, substance abuse, violence, alcoholism, smoking cessation, high-risk sexual behaviors, and eating disorders (2). A high prevalence of risky behaviors has been reported among adolescents globally, which outcomes adverse effects individuals health and wellbeing. In a study conducted in Nepal, the rate of tobacco use, alcohol, and drug were reported to be 15.9%, 1.17%, and 1.4%, respectively (3). Hendershot study (4) on high-risk behaviors of American high school students showed that during the 30 days before the survey, 9.9% were consuming alcohol, 18.5% were carrying weapons, 8.4% committed suicide. In addition, during the last 12 months, 35.9% of physical conflicts were involved (4). In Iran, worrying values has been reported for high-risk behaviors such as drug use (4%), alcohol consumption (10%), smoking (9%), smoking hookah (20%), and unsafe sex (20%) (5).

It is crucial to examine the bio-neurological dimension of personality that can underlie emotion and behavior in examining personality factors affecting high-risk behaviors. Gray's theory of "sensitivity to reinforcement" is a biological approach to personality that has been used to explain the uncontrollable desire of individuals to engage in risky behaviors (6). Gray believes that behaviors are dually determined by their sensitivity to cues related to the onset of positive reinforcement and their sensitivity to cues related to punishment (7). These sensitivities are governed, respectively, by two different brain systems, explaining responses in the face of positive or negative stimuli. The Behavioral Arousal System (BAS) "Let's go for it" is the brain system responsible for responding to conditioned and unconditioned stimuli that cue reward (appetitive) or the absence of punishment (8). BAS helps to identify cues associated with positive reinforcement (and absence of punishment) and allows assigning value to the reinforcing stimuli present. BAS arousal leads to the experience of hopeful excitement. It drives

persistence to achieve the desired goals and a sense of joy when they are attained. On the other hand, the Behavioral Inhibition System (BIS), which helps the organism to identify cues associated with punishment or the onset of negative events, assigns value to aversive events (9). Following the presentation of the theory, various researchers hypothesized that dysfunction of the brain-behavioral systems causes psychiatric disorders; For example, the Behavioral Inhibition System (BIS) responds to signs of punishment with anxiety, ringing, and resentment, thus increasing the risk of anxiety disorders and C-type personality disorders in individuals (10-11). However, when the sensitivity of the BIS system is low, the individual does not respond to the symptoms of punishment, and this increases the likelihood of antisocial behaviors (12). In contrast, dysfunction (hyperactivity and inactivity) of the BAS system will also lead to mental disorders. For example, overactivity of the BAS system is associated with a lack of foresight, an increased risk of developing mania symptoms, or impaired impulse control such as gambling and decreased BAS activity (13). They are unattractive and not rewarding, making them vulnerable to depressive symptoms (14). Behavioral inhibition and activation systems seem to be separate and biologically derived structures that can predict the occurrence of high-risk behaviors. In this regard research shows that seeking high rewards and low deterrence are factors that are directly related to high-risk behaviors (15, 16).

Another variable that seems to be closely related to high-risk behaviors is social cognition (15). Social cognition refers to how people think about others' thoughts, feelings, motivations, and behaviors (16). Social cognition as an important issue in interpersonal relationships has an important place in transformational psychology (17). A key component of social cognition is the theory of mind, which broadly refers to the ability to perceive emotions, motivations, thoughts, and subsequently to understand the behaviors of others (18). In other words, the ability to attribute mental states, intentions, feelings, desires, and beliefs to oneself and others, and to understand that the mental states of others can be different from one's own mental states, is called the theory of mind

(TOM) (19). Theory of mind refers to a specific cognitive capacity that is based on the growth of this cognitive capacity that makes the behavior of others meaningful and understandable. An essential element in the theory of mind is the understanding of the purposeful factors of behavior and the directional perception of others. Theory enables our minds to explain, predict, and manipulate the behavior of others (20). Numerous studies have found defects in the theory of mind in autism spectrum disorders, a wide range of symptoms of developmental disorders, psychosis, bipolar disorder, some types of dementia, including Parkinson's and anorexia nervosa in numerous studies by weakness in the theory. Adolescents with high-risk behaviors are deficient in inferring and interpreting the thoughts, intentions, intentions, and feelings of others correctly (21). Due to a lack of theory of mind, these adolescents often seem to misinterpret social cues and are unable to express their negative emotions in an appropriate manner. Social cognition requires cognitive skills and careful processing of social information (22). These deficiencies in social information processing can be considered as factors that play a role in perpetuating aggressive behavior and maintaining high-risk behaviors (23).

One of the therapies that can help improve adolescents' problems with high-risk behaviors is Cognitive therapy based on a compassionate mind (24). Cognitive therapy based on the compassionate mind is a way to help people move through a domineering relationship and further develop a loving relationship with themselves (25). Self-compassion was first defined by Neff as a three-component construct involving self-compassion versus self-judgment of human commonalities versus isolation and mindfulness versus increasing cloning (26). The combination of these three related components is the characteristic of a person who has compassion for himself. Being kind to oneself and understanding oneself is instead of judging or criticizing one's own shortcomings and inadequacies. Acknowledging that all human beings are flawed is wrong and engaging in unhealthy behaviors is a hallmark of human communion. Consciousness in the face of increasing imitation leads to a balanced and clear awareness of the experiences of the present

and causes the painful aspects not to be ignored and at the same time not to occupy the mind frequently (27). It is important to study the influencing factors and variables involved in high-risk behaviors; Also, conducting intervention-oriented experimental research is one of the most important research activities of researchers, psychologists, and physicians (28). A review of the research literature shows that the high risk and prognosis of some disorders and the lack of necessary facilities and psychological research during the treatment of these disorders are very important (28-29). The success of psychotherapy will also be able to provide important information on the preventive planning of specialists; Because recognizing the important psychological variables of these disorders and considering them from the very beginning of the treatment path, can not only affect the course of treatment; Rather, it will have the potential to protect adolescents from experiencing a variety of traumas and psychological disorders in the future. In addition, given the severity of these disorders, it seems likely that interventions that target the entire existential structure of the disorders will be successful. In this study, based on the previous research literature, the probability of success of compassionate mind-based cognitive therapy will be tested (30). It is hoped that the results of this study can clarify the intervention path of this disorder and pave the way for more effective and sustainable treatments. Also, since timely interventions can be effective in preventing high-risk behaviors, conducting such research will be able to improve the quality of related interventions. Also, from a practical point of view, the results of this research can provide useful information for physicians, clinicians, counselors, and psychiatrists. In general, based on what was presented, the aim of this study was to investigate the effectiveness of compassionate mind-based cognitive therapy on behavioral activation-inhibition systems and the theory of mind adolescents with high-risk behaviors.

Methods

The study design was quasi-experimental with control and intervention groups and a follow-up phase. The statistical population included all high school boys

Table 1: A summary of the content of Cognitive therapy based on a compassionate mind sessions.

sessions	Aim	Content of sessions
First	Familiarity with the general principles of treatment	Performing pre-test, familiarizing the therapist and group members with each other, discussing the purpose of the sessions and its overall structure, reviewing the expectations of the treatment plan, grouping, reviewing the structure of the sessions, familiarity with the general principles of compassion-focused therapy; Evaluate and evaluate the level of shame, self-criticism, and self-efficacy of members, conceptualize self-efficacy education.
Second	Understanding the components of self-critical compassion	Identifying and introducing the components of compassion, examining each component of compassion in members, and identifying its characteristics, getting acquainted with the characteristics of people with compassion and reviewing the self-compassion of members.
Third	Self-education of members	A review of the tasks of the previous session, cultivating a feeling of warmth and kindness towards oneself, cultivating and understanding that others also have flaws and problems (cultivating a sense of human commonalities) in the face of self-destructive feelings and shame, teaching self-compassion, forming and creating more emotions, and more diverse in relation to people's issues and reducing the incidence of high-risk behaviors.
Fourth	Self-knowledge and identification of self-critical factors	Reviewing the previous session's exercises, encouraging subjects to self-knowledge and examining their personality as a "compassionate" or "non-compassionate" person, identifying and applying "cultivating a compassionate mind" exercise (self-compassion value, empathy and sympathy for Self and others, teaching physiotherapist metaphor), accepting mistakes and forgiving oneself for mistakes to accelerate change.
Fifth	Correction and expansion of compassion	Review the exercises of the previous session, familiarity and application of "exercises for cultivating compassionate mind" (forgiveness, acceptance without judgment, teaching the metaphor of the flu and training of tolerance), training to accept problems, Accepting the changes ahead and enduring difficult and challenging conditions due to the changing nature of life and people facing different challenges
Sixth	Teach styles and methods of expressing compassion.	Review of the previous session, practical practice of creating compassionate images, teaching styles and methods of expressing compassion (verbal compassion, practical compassion, intermittent compassion and continuous compassion), applying these methods in daily life and for family and friends, teaching the development of valuable emotions and transcendent.
Seventh	Techniques for expressing compassion	Reviewing the practice of the previous session, learning to write compassionate letters to oneself and others, teaching the method of "recording and taking notes daily of real situations based on compassion and one's performance in that situation."
Eighth	Evaluation and application	Training and practice skills; Review and practice the skills presented in previous sessions to help subjects to cope with different ways of high-risk behaviors and different life situations. Strategies to maintain and apply this treatment in daily life, summarize and conclude and answering the questions of the members and evaluating the whole sessions, thanking and appreciating the members for participating in the sessions, conducting the post-test, coordinating the holding of the follow-up session in the next month

with high-risk behaviors in Tabriz. The study was conducted in the 2019-2020 academic year. The sample consisted of 30 students who were purposefully selected, and randomly allocated into experimental and control groups. The sample size was adopted relying on statistical experts' points of view, i.e., 15 subjects for each comparison group (31). Inclusion criteria for this study were: a) having high-risk behaviors based on screening questionnaire; B) willingness to participate in the study; and c) not suffering from other mental

disorders or substance use, etc. Exclusion criteria were: a) Absence in more than one intervention session; B) Simultaneous participation in other intervention programs; And c) unwillingness to continue collaborating in the study were considered.

The information of this research has been registered in the ethics code number: IR.IAU.TABRIZ.REC.1399.146 in the medical school of Tabriz University of Medical Sciences. Also registered in the clinical trial system with specifications: IRCT20200209046441N1.

Materials

The following tools were used to collect data:

Iranian Adolescents Risk-taking Scale (IARS)

This questionnaire was created with the help of valid tools in the field of adolescents such as the Adolescents Vulnerability Questionnaire and considering the cultural conditions and social constraints of Iranian society, the Iranian Adolescents Vulnerability Scale (32). This 38-item scale measures adolescents' vulnerability to 7 categories of high-risk behaviors (violence, smoking, drug use, alcohol consumption, sexual intercourse, and sexual orientation and the opposite sex). Respondent agrees or disagrees with the items in a Scale 5 and expresses a choice from strongly agree (=5) to strongly disagree (=1). Higher scores indicate more high-risk behaviors. Cronbach's questionnaire was standardized in Mohammadzadeh *et al.*'s research (32). Cronbach's alpha for dangerous driving was 0.74, smoking 0.93, drugs and psychotropic 0.90, violence 0.78, alcohol 0.90, friendship with the opposite sex 0.83, and sexual relationship and behavior was 0.87 (32).

Behavioral Inhibition/ Activation Systems Scale

The Behavioral Inhibition/ Activation Systems Scale (33) was built in 1994 and included 20 self-report questions and two subscales: The Systems subscale. Behavioral inhibition and subscale of behavior activation system. The following two subscales are described below: The Behavioral Deterrence Systems subscale in this questionnaire consists of seven items that measure the sensitivity of the behavioral deterrence system or response to the threat and the feeling of anxiety when confronted with threatening symptoms. The Behavior Activation System subscale also has thirteen items. Items are rated on a four-point scale by the subject. To earn points for each dimension, add up the total points for the questions related to that dimension. Of course, it should be noted that options 1, 6, 11, 17 have no effect on scoring and have been added to the questionnaire only to coordinate with other items. The Behavioral Inhibition subscale consists of seven items. The minimum score on this scale is 7, and the maximum is 28. The Behavioral Activation subscale is 13 items. The minimum score in this subscale is 13, and

the maximum is 52. High scores on the Behavioral Activation Scale increase the likelihood of aggressive, high-risk, and inflammatory behaviors (34). Carver and White (33) reported internal stability of the Behavioral Inhibition System subscale as 0.74 and internal stability of the Behavioral Activation System as 0.71 (33). The validity of the Behavioral Inhibition/ Activation Systems scale by retesting was reported to be 0.68 for the Behavioral Activation System scale and 0.71 for the Behavioral Inhibition Systems subscale (28). AbdollahiMajarneshin reported the validity of this questionnaire as a retest method for the Behavior Activation System scale of 0.78 and for the Behavioral Inhibition Systems subscales (29).

Mind Reading Test

The Theory of Mind Test is a neuropsychological test, the original version of which was introduced by Professor Baron Cohen at the University of Cambridge and is one of the most authoritative tests in the study theory of mind (35). In this test, 36 images of different people's eyes are shown to the participants, and they are asked to determine the mental state of the person who owns the photo. The maximum score in this test is 36. A score between 20 and 30 shows a normal score of more than 30, a high ability to recognize facial emotions and a score of less than 20 indicates difficulty in recognizing facial emotions (35). In most studies to evaluate the mind reading ability of healthy and sick people, this neuropsychological test has been used, In order to translate the Persian, Wang and Wang words used in this test, guidance and the supervision of several linguists was also used. In the present study, a paper-pencil version of this test was used (36). The alpha coefficient of this test was reported as 0.72, and the reliability coefficient of the retest in a sample of 30 students weeks was 0.61 (37). In this study, in order to obtain the satisfaction of the study subjects, the Helsinki Declaration, which is a fundamental supporter of the rules of research ethics, was used. The Helsinki Declaration was issued in 1964 by the World Medical Association in Finland. The World Medical Association has compiled this statement as the most authoritative declaration of ethical principles in medical research on the human subject, including identifiable human data and samples, which were reviewed eight times, most recently in 2008. Among the provisions of the

Helsinki Declaration can be explained the objectives of the research and the informed consent of the units under study, the option to participate in the research, the right to leave the study, to respond to the results without harming the intervention, Pointed to desire (38).

Intervention

The content of Cognitive therapy based on a compassionate mind sessions and treatment plan based on the concepts of compassion kneading Gilbert in 8 sessions of 90 minutes was set (39). A summary of the content of compassion-focused treatment sessions is provided in Table 1.

Results

The mean and standard deviation of age in the experimental group was $16/466 \pm 1.167$ and the mean and standard deviation of age in the control group was $17/000 \pm 1.191$.

In addition to the demographic findings and descriptions in this section, with the aim of inferential analysis of research data, first the assumptions related to parametric statistics and analysis of variance were tested; As can be seen in Table 3, the output of the Shapiro- wilk test indicates a significance level of more than 5%, which indicates that the distribution of variables is normal. Also, significant levels ($p > 0.05$) of Levene's test indicate homogeneity of variance in dependent variables.

Examination of the assumption of homogeneity of the covariance matrix in the form of Mbox test output also showed that the covariance matrices of the independent variable are the same in different groups, so the present default was confirmed (Box's $M = 87.69$, $p = 0.116$). The assumption of variance-covariance homogeneity was also tested using the mauchly's test of sphericity (Bartlett).The assumption of variance-covariance homogeneity was also tested using Bartlett test. It also indicates the confirmation of the implementation of repeated measures analysis with the aim of testing research hypotheses, the results of which are reported in the relevant tables.

The results of multivariate analysis of variance showed that all tests were significant at both intergroup and intragroup factor levels; That is, there is a significant difference between at least one level of factor within the control group and the treatment of compassion. However, a separate study of the variables by repeated measures in the table below shows more accurate results of the effects of the factor.

Subjects' scores were analyzed into brain-behavioral systems and theory of mind questionnaires using two-way mixed variance statistical test, in which two groups (control and experiment) as intergroup factor and time (pre-test, After the test, follow-up) was used as an intragroup factor. Based on the above table, it can be said that the effect of time factor on the components of inhibition ($F = 10.35$; $P < 0.001$), activation ($F = 8.66$; $P < 0.001$) and theory of mind

Table 2:Mean and standard deviation of research variables.

Variable	Group	Control		Experimental		Shapiro-Wilk	
		M	SD	M	SD	P	
Behavioral Inhibition System	Pre- test	11.93	3.45	13.06	3.12	0.96	0.138
	Post-test	12.13	3.52	16.66	2.74	0.94	0.144
	Follow up	13.66	3.55	18.73	1.94	0.95	0.190
Behavioral Activation System	Pre- test	37.60	9.00	35.86	8.90	0.97	0.516
	Post-test	35.13	7.93	24.13	5.55	0.96	0.784
	Follow up	34.73	8.63	23.20	6.21	0.94	0.127
Theory of Mind	Pre- test	8.06	3.31	8.46	3.31	0.96	0.373
	Post-test	8.33	5.27	14.40	4.40	0.94	0.116
	Follow up	9.46	4.67	17.26	4.97	0.98	0.943

Table 3:Results from multivariate analysis of variance (Wilks' Lambda) for intergroup and intragroup effects.

Effect		Value	F	Hypothesis df	Error df	P	Partial Eta Squared
Group	Wilks' Lambda	0.342	16.99	3.00	26.00	0.001	0.65
Factor*group		0.416	5.38	6.00	23.00	0.001	0.58

Table 4:Results of repeated measures analysis of variance for research variables.

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Behavioral Inhibition System	205.40	2	102.70	10.35	0.001	0.270
Behavioral Inhibition System* Group	68.28	2	34.14	10.67	0.039	0.109
Behavioral Activation System	1111.75	2	555.87	8.66	0.001	0.236
Behavioral Activation System* Group	455.48	2	227.74	3.54	0.035	0.112
Theory of Mind	396.20	2	198.10	10.84	0.001	0.279
Behavioral Activation System* Group	224.68	2	112.34	6.65	0.004	0.180

($F=10.84$; $P<0.001$) was significant. In other words, their rate has changed significantly from pre-test to follow-up. The effect of time and group interaction also indicates that between inhibition scores (partial $\eta^2=0.10$; $F=10.67$; $P<0.001$), activation (partial $\eta^2=0.11$; $F=8.59$; $P<0.001$) There is a difference between the two groups and the theory of mind (partial $\eta^2=0.18$; $F=10.67$; $P<0.001$). This means that the effect of cognitive intervention based on compassionate mind has had significant changes on the components of inhibition, activation, and theory of mind, however, a pairwise comparison of variables in the table below provides a more accurate inference of the effectiveness of each intervention. And show their stability.

As can be seen in the table above, a pairwise comparison between the dependent variables' "inhibition" ($I-J=-3.60$; $P<0.017$), "activation" ($I-J=11.73$; $P<0.017$) and mindfulness ($I-J=-5.93$; $P<0.001$) from pre-test to post-test in the group therapy, unlike the control group, is significantly different. Also, the evaluation of therapeutic stability from post-test to follow-up shows that there is no significant difference between the means of post-test

to follow-up; That is, the therapeutic effect was not different from post-test and follow-up, so the treatment was stable. However, pairwise comparisons in the control group indicate that the intervention was not significant.

Discussion

The aim of this study was to investigate the effectiveness of Cognitive therapy based on the compassionate mind on behavioral inhibition-activation systems and the theory of mind adolescents with high-risk behaviors. Based on the first finding of this study, it was found that cognitive therapy based on compassionate mind was effective on behavioral activation-inhibition systems of adolescents with high-risk behaviors. This finding was consistent with the results of Bahramian et al. (40) and Barghandan et al. (41). In their study, found that compassion-based therapy reduced risky behaviors in adolescents.

Explaining these findings, it can be stated that high activity of the activation system puts people at risk of performing high-risk behaviors. This result has been strongly confirmed in various studies (42-43). High

Table 5:Summary of Bonferroni Multiple Comparison Test for Groups.

variable	Group	Evaluation (I)	Evaluation (J)	Mean difference (I_J)	standard error	Sig.
Behavioral Inhibition System	Experimental	Pre- test	Post-test	-3.60	1.09	0.017
		Follow up		-5.66	0.59	0.001
		Post-test-	Pre- test	3.60	1.09	0.001
		Follow up		1.46	0.96	0.153
	Control	Pre- test	Post-test	-0.200	1.14	1.000
		Follow up		1.73	1.54	0.845
		Post-test	Pre- test	0.200	1.14	1.000
		Follow up		-1.53	1.31	0.790
Behavioral Activation System	Experimental	Pre- test	Post-test	11.73	2.45	0.001
		Follow up		12.66	2.91	0.002
		Post-test	Pre- test	11.73	2.45	0.001
		Follow up		0.93	2.12	1.000
	Control	Pre- test	Post-test	2.46	3.47	1.000
		Follow up		2.86	3.23	1.000
		Post-test	Pre- test	-2.46	3.47	10.000
		Follow up		0.400	3.13	1.000
Theory of Mind	Experimental	Pre- test	Post-test	-5.93	1.22	0.001
		Follow up		-8.00	1.30	0.001
		Post-test	Pre- test	5.93	1.22	0.001
		Follow up		-2.86	1.72	0.355
	Control	Pre- test	Post-test	-0.26	1.59	1.000
		Follow up		-1.40	1.97	1.000
		Post-test	Pre- test	0.26	1.59	1.000
		Follow up		-1.13	1.75	1.000

levels of activity High levels of components of activation systems such as the pursuit of entertainment, and the response to rewards in adolescents are associated with characteristics such as impulsivity, risk-taking, hedonism, innovation, and diversity; Characteristics that can make them prone to the occurrence and experience of high-risk behaviors (44). In other words, the activity and high sensitivity of BAS in the individual, leads to actions that in order to earn a reward, most likely lead to negative consequences for them. Accordingly, research shows that the pursuit of high rewards and low inhibition are factors that are associated with high-risk behaviors (15).

It can be said that compassion-focused therapy primarily targets emotions and ultimately thoughts. Compassion-based therapy is fundamentally interested in changing emotions and cognitions, and actively seeks to change them. In compassion-based therapy, emotions such as anger, depressed mood, and anxiety are the same as those caused by criticism, blame, and unkindness of the mind. Anger turns to regret, depression to short-term frustration, and anxiety to constructive and non-annoying

anxiety. Compassion-based therapy chooses regardless of any excesses and according to the evolutionary approach to psychological functions. According to this approach, motivations and compassion capabilities are related to evolved brain systems that underlie attachment, altruism, and affection behaviors. The natural function of compassion is to create loving behaviors, to provide opportunities for cohesion, security, comfort, participation, encouragement, and support (39). It therefore teaches people to refrain from over-expressing their emotions and to choose and take a moderate position. On the other hand, considering the use of self-efficacy as an effective strategy for regulating emotion to deal with negative emotional states, the person is taught to face a kind, empathetic attitude when confronted with failure or suffering instead of self-criticism and adversity; and be supportive of himself (44). Therefore, when faced with adversity, the person tries to moderate his emotions and behaviors instead of resorting to high-risk behaviors.

Based on another finding of this study, it was found that cognitive therapy based on compassionate mind was effective on the theory of mind adolescents with

high-risk behaviors, and this effectiveness remained stable in the follow-up phase. This finding is consistent with the results of Shamay-Tsoory and Harari (45).

Defects in the theory of mind include people who have difficulty seeing. This defect is also sometimes referred to as "mental blindness" (46). The term means that people with mental disorders have difficulty understanding the interpretation of others' intentions towards themselves (47). Theory of mind is involved in many disorders and is associated with problems related to social interaction, including problems in recognizing and explaining the behavior of others from a mental state. People who experience theory of mind deficits have difficulty explaining the intentions of others; they also do not understand how their behavior affects others and have problems with social interaction. People with high-risk and aggressive behaviors seem to have a defect in the theory of mind, they do not have the ability to understand the feelings and thoughts of others, and they cannot understand the intentions and mental states of others and have severe problems in predicting other people's thoughts. They may perceive the normal situations of others with hostility and suspicion, which can lead to aggressive and risky behavior on their part (48).

Explaining the effectiveness of compassion-focused therapy in improving the theory of mind, it can be said that increasing compassion in mental interpretations and general behaviors leads to a deeper understanding of the visual and emotional effects of others and try to make any phenomenon. Although some ugliness is not accepted, but it is perceived with more understanding and empathy, and therefore negative emotions such as anger, depressed mood, anxiety in such situations are reduced and controlled. In compassionate mind training, our negative emotions are controlled by compassionate skills, and positive emotions such as compassion, a desire to support and alleviate the suffering of others, and a view away from criticism and judgment are replaced (39). Compassion-based therapy helps a person avoid the selective attention activated by the threat and defense system, and as a result becomes aware of other and sometimes positive aspects of life, which improves the theory of mind in adolescents

(49). Improving the Theory of mind increases the ability to understand the thoughts and feelings of others, better predicts situations and behaviors, and promotes social interactions and communication skills (50); Therefore, adaptation increases in the person and in different situations, the person responds more appropriately, and as a result, their aggressive and high-risk behaviors decrease. In a similar study, Liu et al. showed that improving the theory of mind has reduced bullying behaviors in adolescents with autism (51).

Another explanation is that improving the ability of theory of mind allows people to perform much better in situations that require a correct and realistic interpretation and explanation in order to adopt an appropriate reaction and prevent ill-considered and inappropriate reactions. Improving the theory of mind also causes a person to pay attention to incorrect and irrational situations and try to have the best explanation for a certain situation. People should explain and predict their situations and behaviors correctly and have the most appropriate reaction and avoid inappropriate reactions. As a result, it is clear from the above that improving the theory of mind can reduce aggression in adolescents with high-risk behaviors.

Conclusion

Considering the fact that adolescents with high-risk behaviors often have been humiliated, insulted, severely criticized, and sometimes even rejected, they mainly experience a series of complex emotions such as: nostalgia, despair, anxiety, depression, guilt and shame, which in turn cause them to re-engage in a variety of high-risk and troublesome emotions and behaviors (51). They learn through mindfulness during compassion therapy sessions to be aware of the thoughts, behaviors, and emotions. This self-awareness causes them to control their emotions and behaviors when faced with problems. In addition, taking a compassionate attitude towards oneself acts as a protection against the problems of life in adolescence, and can be said that the component of mindfulness will reduce negative emotions and thus reduce high-risk behaviors in adolescents by reducing

the rumination of individuals.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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