Int J High Risk Behav Addict. 2016 December; 5(4):e28329. doi: 10.5812/ijhrba.28329.

Published online 2016 October 8. **Research Article**

The Effectiveness of Group Acceptance and Commitment Therapy on Emotion Regulation in Methamphetamine-Dependent Individuals Undergoing Rehabilitation

Hamid Khakbaz,[1] Ali Farhoudian,[1] Manouchehr Azkhosh,[2] Behrouz Dolatshahi,[3] Hourieh Karami,[4] and Omid Massah[1,*]

[1]Substance Abuse and Dependence Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran
[2]Department of Counseling, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran
[3]Department of Clinical Psychology, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran
[4]Allameh Tabataba'i University, Tehran, IR Iran

[*]*Corresponding author*: Omid Massah, Substance Abuse and Dependence Research Center, University of Social Welfare and Rehabilitation Sciences, Koodakyar Alley, Daneshjoo Blv., Evin, Tehran, Iran. Tel/Fax: +98-2122180095, E-mail: omchomch@gmail.com

Received 2015 March 01; **Revised** 2016 April 17; **Accepted** 2016 June 09.

Abstract

Background: Emotion regulation is a major and important incentive for substance abuse; in fact, substance abusers associate their abuse with the substance's soothing nature. Emotion regulation can be defined as the process, which enables individuals to regulate experiences and express emotions.

Objectives: The goal of the current study was to evaluate the effectiveness of acceptance and commitment therapy (ACT) on emotion regulation in methamphetamine-dependent individuals undergoing rehabilitation.

Patients and Methods: This was a quasi-experimental study of pretest-posttest design with a control group (where follow-up was also done). The population under study consisted of Methamphetamine-dependent individuals undergoing rehabilitation (MDUR), who were inpatients and outpatients of Tehran's medical centers. First, 30 MDUR, who were in the withdrawal stage were selected. Then, based on interest to participate in group therapy and matching, they were assigned to the test and control group. Mindfulness-based acceptance and commitment therapy (ACT) in eight sessions (eight weeks) with 1.5-hour duration was done. The tool used for this project was Gratz and Roemer's difficulties in emotion regulation scale. Repeated measures Analysis of Variance (ANOVA) was used for analyzing the data.

Results: Group ACT caused a significant decrease in emotion regulation scores ($P < 0.001$) and its following dimensions, including non-acceptance ($P = 0.03$), difficulties engaging in goal directed behavior ($P = 0.002$), impulse control difficulties ($P = 0.027$), and limited access to emotion regulation strategies ($P = 0.038$). However, it could not significantly decrease the lack of emotional awareness and clarity dimensions.

Conclusions: Group acceptance and commitment therapy improved emotion regulation in methamphetamine-dependent individuals and enabled them to regulate experiences and express emotions that are very effective in controlling cravings and retention in treatment and prevention of recurrence.

Keywords: Acceptance and Commitment Therapy, Emotions, Methamphetamine

1. Background

Addiction to drugs and stimulants is a physical, psychological, social, and moral disease (1). The destructive psychological and physical effects of stimulants are far greater than that of drugs. Nowadays, the abuse of stimulants, especially methamphetamine (crystal meth), which is an extremely addictive substance, is on the rise (2). Amphetamines are the most potent of addictive substances and are more likely to cause addiction and mental health problems (3). The abuse of this substance causes deficiencies in psychological functions such as problem solving, abstract thinking, change of strategy and emotion regulation (2, 4-6).

Emotion regulation is a major and important incentive for substance abuse; in fact, substance abusers associate their abuse with the substance's soothing nature (7). Emotion regulation (ER) can therefore be defined as the physiological, behavioral, and cognitive process, which enables individuals to regulate experiences and express emotions (8).

Emotion regulation is an important part of our life. It is therefore not strange that disturbances in emotions and their regulation can lead to sadness and even mental trauma (9, 10). Doran's studies indicate that individuals incapable of controlling emotional excitation will most

likely become permanent substance abusers (11, 12). Another study by Parker et al. (2008) showed that having difficulties in emotional recognition and failure to connect emotionally with others results in addiction. The truth is that low levels of ER caused by the inability to effectively manage and confront emotions plays a role in the onset of addiction (13).

In addition to drug therapy, various psychological treatments have been developed to treat substance abuse disorders. The first generation of these psychological treatments was based upon behavioral processes, the second generation upon cognitive-behavioral therapy, and the third generation upon acceptance and commitment therapy (ACT). Acceptance and commitment therapy is committed to prevent the subject from avoiding unpleasant emotions to fully experiencing them (14). Instead of changing cognitions, ACT tries to improve the subjects' psychological relationship with their thoughts and feelings. Acceptance and Commitment Therapy's goal is to promote psychological acceptance and flexibility (15, 16).

Zarling et al.'s study showed that ACT-based psychotherapy reduces physical and psychological aggressive behavior significantly and this approach can be useful in emotion regulation and anger control (17).

Continuous substance abuse aimed at reducing negative emotional states could be because of the individuals' difficulty in tolerating negative emotions and regulating negative emotions in substance abusers helps them for treatment (18). Addicts face numerous problems when regulating their emotional states. Moreover, the problem with most addicts is that they avoid inner experiences and do not accept nor fully experience their feelings. Unless these individuals accept their emotions and fully experience them, a successful treatment cannot be expected. For example, they have more problems with emotional acceptance, searching for and following up purposeful behavior, impulse control, emotional awareness, access to ER strategies and clarity and clarification of emotions, as compared to other people (19).

2. Objectives

The goal of the current study was to evaluate the effectiveness of Acceptance and Commitment Therapy (ACT) on emotion regulation in methamphetamine-dependent individuals undergoing rehabilitation. Hence, this study focused mainly on emotion regulation, and whether ACT is effective in regulating emotions of Methamphetamine-Dependent Individuals Undergoing Rehabilitation (MDUR).

3. Patients and Methods

3.1. Study Design and Population

This was a quasi-experimental study of pretest-posttest design with a control group (including follow-up). In this applied study, MDUR's emotion regulation was examined before and after the intervention. The population under study consisted of all MDUR, who were inpatients and outpatients of Tehran's medical centers. Purposive and convenience sampling were applied to select volunteers among the participants. The size of the sample was determined as 20 patients in each group, using the following formula and similar researches (20, 21) with an error probability of 0.05 and test power of 0.8.

Equation 1.

$$n = \frac{2\sigma^2\left[Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right]^2}{\sigma^2} = \frac{2(0.109)^2 \times (1.96 + 0.84)^2}{(0.1)^2} \cong 20 \quad (1)$$

First, interested individuals completed the Gratz and Roemer's Difficulty in Emotion Regulation Scale (22). Before members' selection of both groups, all members gathered for an interview in the treatment room and information about the effects that may be results of their participation in group therapy was explained for them. Also, regulations and policies in the group, provision of group therapy and potential effects arising from treatment, type of group (treatment), and the authority and the freedom of members to participate in the group, were explained so that they could make wise decisions to participate in the groups. The patients' questions were answered by the therapist and they were informed about the therapist skills. Then patients announced their agreement to participate in any of the groups. Of the 30 individuals whose ER scores were higher (score > 50), based on interest to participate in group therapy sessions and matching of groups, they were allocated to the test (N = 15) and control (N = 15) group. The subjects of the control group were placed in a waiting list for group therapy.

3.2. Inclusion Criteria

male gender, rehabilitated methamphetamine dependent, having the power of speech to speak at meetings and the ability to read and write. Exclusion criteria: having acquired immune deficiency syndrome (AIDS) (or human immunodeficiency virus (HIV) positive) and hepatitis (based on the test and doctor's diagnosis), psychotic disorders

and comorbidity at the same time based on clinical interviews and diagnostic patient cases, and dominant dependence to other drugs (except methamphetamine).

We had a sample loss of three among the test group (who did not complete the sessions), bringing the final count of samples to 12. The time required to follow up the participants in group therapy was two months after completion of group therapy sessions. The control group was controlled at all stages of research and the research protocol after completion of the study was also carried out for the control group.

3.3. Data Collection Tool

Gratz and Roemer's 'Difficulty in Emotion Regulation Scale' (DERS): This questionnaire was created by Gratz and Roemer in 2001. The final version consists of 36 items, which evaluates the dimensions of emotion misregulation. Questions 1, 2, 6, 7, 8, 10, 17, 20, 22, 24 and 34 are reverse-scored items; the higher the score, the greater the difficulties with ER. This scale consists of the following six subscales: 1, Non-acceptance of emotional responses (NONACCEPT); 2, Difficulties engaging in goal-directed behavior (GOALS); 3, Impulse control difficulties (IMPULSE); 4, Lack of emotional awareness (AWARE); 5, Limited access to ER strategies (STRATEGIES); and 6, Lack of emotional clarity (CLARITY). The test's reliability was measured through internal consistency; the test's questions were shown to have high internal consistency ($\alpha = 0.93$) (22).

3.4. Psychotherapy Sessions

Therapy sessions consisted of eight sessions with each session being 1.5 hours long. The content for each session was designed based on studies by Hayes, Strohsahl and Wilson, 1996, and Hayes et al., 2006 (23, 24).

3.5. Data Analysis

Mean and SD were used for the descriptive analysis of data; repeated measures analysis of variance (ANOVA) was used for inferential statistics.

3.6. Ethical Consideration

Informed consent was obtained from participants and they were assured that their information will remain confidential.

4. Results

Demographic characteristics of each group member are shown in Table 2.

There were no significant differences between the two groups in emotion regulation before intervention (P = 0.757). Data in Table 3 indicate both test and control groups' mean pre-test scores. The mean post-test score of the test group (74.50) considerably decreased as compared to the control group (103.67). Table 3 illustrates the mean and standard deviations of the groups' ER scores and its dimensions in the pre-test, post-test and follow-up.

The results showed that the mean post-test and follow-up ER scores and sub-scales considerably decreased in the test group compared to the control group's results. We later tested to see whether this decrease was significant or not. However, before applying the repeated measures ANOVA, we first examined a number of assumptions associated with this kind of test.

4.1. First Assumption: Normality of Data (Emotion Regulation)

The Kolmogorov-Smirnov test was used to test the normal distribution of data.

According to Table 4, obtained P-values of the research variables are greater than 0.05. The null hypothesis is confirmed and therefore data distribution was normal. Hence testing the ER variable and each of its sub-scales can be done using parametric tests and sample volume is acceptable.

4.2. Second Assumption: Intragroup Variances Homogeneity Test (Mauchly's Sphericity Test)

Results of Table 5 indicate a significant difference between intragroup variance of the ER scores ($P < 0.01$). Therefore, the equivalence of intragroup variances has been violated.

4.3. Third Assumption: Intergroup Variances Homogeneity Test (Levene's Test)

Based on the results of Table 6 considering the lack of significance of all pre-test, post-test and follow-up scores' variances in both groups, it can be concluded that the equivalence of intergroup variances has not been violated.

After testing the relevant assumptions, we examined the results of the repeated measures ANOVA test.

Table 7 contains the most important results associated with the repeated measures ANOVA test. Table 7 illustrates that significant differences existed between the two test and control groups' means of ER and non-acceptance, goals, impulse and strategies sub-scales ($P < 0.05$). On the other hand, there were no significant differences between emotional awareness and clarity sub-scales in the two groups. Also, considering the obtained measure of effect (0.468) of the overall variable (ER), we can conclude that 50% of the changes in ER scores were due to the treatment method used.

Table 1. Summary of Mindfulness-Based Acceptance and Commitment Therapy Sessions (23, 24)

Sessions	Description
Week 1	Group members were welcomed; members were acquainted with the group leader; the group's rules and norms were explained; the problem's background and its references were reviewed and evaluated; the treatment's goals and the possibility of change was discussed; the philosophy of intervention based on acceptance and commitment was explained; and counseling contracts were signed, which included doing homework and being present on time.
Week 2	The interaction between thoughts, feelings and actions were examined; hopelessness was created through methods previously used by the individual; participants experienced the fact that any action taken to control or avoid unwanted mental experiences is ineffective; the subjects were helped in reaching creative hopelessness; and the subjects' values were clarified/identified.
Week 3	Exercises on clarification/identification of values-; emphasis on awareness and recognition; mindfulness exercises; and clarification of the subjects' values were continued.
Week 4	Awareness exercises about physical feelings followed by relevant discussions were held; discussions about barriers and exercises on the search for possible value-relevant activities were held; an introduction to effective value-oriented goal regulation was presented; and exercises associated with satisfactions and dissatisfactions with life's hardships were held.
Week 5	Awareness exercises about physical feelings followed by relevant discussions were held.
Week 6	Effective value-oriented goal regulation was continued; awareness exercises were performed (breathing or physical awareness); and less guidance was given by the therapist during the exercises.
Week 7	Discussions about the levels and cycle of activity; the discussion on satisfaction with hardships was continued; and mindfulness exercises while walking were done.
Week 8	Exercises on clarification/identification of values were held; and motivation was created i.e. a committed action along with the acceptance of subjective experiences.

5. Discussion

The goal of the current study was to evaluate the effectiveness of ACT on emotion regulation in methamphetamine-dependent individuals undergoing rehabilitation. Psychological problems and negative emotions such as stress, anxiety, depression, difficulty in recognition of emotions, low level of emotional regulation and failure to establish an emotional connection with others can lead to drug abuse relapse (25-27). The findings showed that ACT was effective in improving the test group's ER as compared to the control group. These results were consistent after the two-months follow up.

The current research's results were in line with Doran's studies (2007 and 2009) and Parker et al.'s (2008) study results (11-13). According to these researches, individuals incapable of controlling emotional excitation will most likely become permanent substance abusers. Acceptance and Commitment Therapy is based upon the assumption that the distortion of cognitive processes increases unpleasant emotions. This matter causes the subjects to engage in problematic behaviors and leads to either alleviation or avoidance of unpleasant emotions. One simple example of avoidance is alcohol consumption, substance abuse or risky sexual behavior (14). Furthermore, having difficulties with emotional recognition and the inability to establish an emotional relationship with others leads to substance abuse.

In general, individuals who actively accept and are aware of their inner experiences (thoughts, feelings, memories and bodily signs), let go of programs controlling inefficient signs. Knowing this, the patients realize they can experience extreme emotions without becoming harmed. They come to the conclusion that inner experiences can be accepted without the need for self-defense. Somehow the patients' focus on having a valuable life changes (15). According to Hayes et al. (1996), the opposite of acceptance is emotional avoidance. Emotional avoidance includes behavioral or cognitive strategies used to avoid emotional experiences (23).

Emotional disorders can be described by efforts to control or suppress negative and positive emotions. Individuals, who have difficulties in expressing and experiencing their emotions, apply maladaptive ER strategies, such as avoidance and suppression, and hiding and ignoring, all of which have negative outcomes (28, 29). Extreme efforts to control emotional experiences lead to an increase of the feelings the individual tries to regulate. This model can draw the individual into a vicious cycle of emotional and psychological excitations, resulting in further unsuccessful efforts, suppression and avoidance, all of which contribute to psychological morbidity.

Nowadays, ACT specifically emphasizes on the role of ER (30, 31). Studies indicate that emotional regulation de-

Table 2. Distribution of Demographic Characteristics of the Two Groups

Variable			Frequency	Percentile Frequency	Cumulative Frequency
Age	Experimental Group	20 - 30 years old	8	2/64	2/19
		31 - 40 years old	4	8/24	8/53
		41 - 50 years old	3	11	1/73
	Control Group	20 - 30 years old	6	36/3	25/8
		31 - 40 years old	5	34/7	49/3
		41 - 50 years old	4	29	67/7
Education	Experimental Group	Primary School	2	15/1	32/2
		Guidance School	3	25/2	43/3
		High School	4	28/4	48/3
		Bachelor	6	31/3	54/5
	Control Group	Primary School	3	18/2	36/2
		Guidance School	5	32/1	50/3
		High School	4	28/4	43/2
		Bachelor	3	22/3	38/4
Marital Status	Experimental Group	Married	9	54/6	34/6
		Single	6	46/4	73/1
	Control Group	Married	8	52/7	45/4
		Single	7	47/3	76/4
Occupation Status	Experimental Group	Self employed	8	59/5	80/0
		Employee	1	10/2	67/6
		Other	6	30/3	80/0
	Control Group	Self employed	6	63/2	80/0
		Employee	4	15/4	70/2
		Other	5	22/4	79/3

ficiencies lead to the occurrence or continuance of emotional disorders (32).

The sub-scale of 'Goals' may be explained as such, that individuals confronting negative emotions cannot concentrate on their goal-directed activities. That is, individuals experiencing negative emotions face greater problems such as losing concentration or effective problem solving. In ACT however, through the acceptance of inner experiences, the individual concentrates on having a valuable life rather than changing or solving the problem (15).

Methamphetamine-dependent individuals also had difficulty with impulse control. However, this did not result in a relapse of substance abuse. The impulse control and emotional awareness sub-scale results showed that although these individuals were in the treatment process and their awareness had improved, they still had problems with emotional awareness. Although they had considerably improved in the treatment process, these individuals still faced problems with identifying and describing their emotions. Impulse control improvement can lead to aggression reduction and its dimensions by ACT. This claim was made by Mohammadi et al. (20). Anger management and aggression reduction can be achieved through emotion regulation training (33) and ACT is one of the best approaches for those who have difficulty in tolerating negative emotions.

The lack of emotional clarity can be described as uncertainty in naming and differentiating between emotions and hidden motivational messages. Emotional ambiguity is a key characteristic of many disorders including substance abuse. In fact, ACT tries to direct the patients from unpleasant emotions to fully experiencing these emotions at the present time. It thrives to reach valuable personal goals. As a result, the subjects' emotional clarity and clarification increases. These models of avoidance behaviors prevent patients from moving towards values, and place them under distressing situations. Rather than cognitive change or alleviating emotional intensity, ACT encourages subjects to directly experience their unpleasant emotions (14).

Table 3. Mean and Standard Deviations of the Groups' Emotion Regulation Scores and its Dimensions in the Pre-Test, Post-Test and Follow-Up

Variables	Group	Pre-Test	Post-Test	Follow Up
Non-acceptance of emotional responses	Test	17.08 ± 4.18	9.66 ± 3.52	11 ± 2.52
	Control	19.06 ± 5.72	15.6 ± 4.46	15.26 ± 3.19
Difficulties engaging in goal directed behavior	Test	16.91 ± 3.17	8.5 ± 3.82	9.08 ± 3.44
	Control	16.33 ± 2.91	15.06 ± 3.65	14.86 ± 3.5
Impulsive control difficulties	Test	19.5 ± 6.28	10.5 ± 1.56	13 ± 3.19
	Control	20.26 ± 6.87	18.86 ± 6.96	18.6 ± 7.07
Lack of emotional awareness	Test	16.08 ± 4.23	19.08 ± 4.12	18.25 ± 5.17
	Control	18.46 ± 5.27	18.93 ± 3.84	18.53 ± 4.5
Limited access to emotion regulation strategies	Test	22.91 ± 3.44	15.83 ± 33.48	19.75 ± 3.07
	Control	22.66 ± 5.09	21.26 ± 4.46	23.6 ± 3.92
Lack of emotional clarity	Test	16.08 ± 1.88	10.91 ± 3.2	11.41 ± 2.27
	Control	13.4 ± 2.29	13.93 ± 2.34	14.13 ± 2.38
Emotion regulation	Test	108.58 ± 10.15	74.50 ± 11	85.5 ± 9.69
	Control	110.20 ± 15.38	103.67 ± 12.32	105 ± 10.90

Prior to treatment, the subjects used inefficient ER methods, such as rumination, avoidance and suppression. The study of Sher and Grekin (2007) revealed that having ER difficulties is associated with substance abuse disorder. As a result of these inefficient methods, instead of living their lives, the individuals focus on not experiencing and avoiding negative inner events. In fact, instead of wasting energy on avoidance, suppression or rumination, subjects are encouraged to feel negative inner events willingly and not escape from them. Instead of drowning in the past or future they are encouraged to live in the present and experience inner events (34).

Amongst the MDUR, substance abuse is a limited choice used as a response to hardships and problems. This matter is justified by the goal to increase positive while avoiding negative emotions. From ACT's point of view, limiting behavioral choices is the core of psychotherapy. Based on their values in life, the MDUR chose more flexible and sustainable behaviors (35).

Emotional irregularities lead to loss of control. They become susceptible to doing and saying things they normally would not (36). Therefore, it can be said that individuals, who report these states are drawn to substance abuse. Therefore, it can be expected for emotional regulation to prevent these individuals from substance abuse. Emotion regulation by ACT through the use of strategies that include mindfulness, acceptance and diffusion, can reduce substance use such as smoking and its cravings (37).

The main limitation of this project was its scarce literature. Moreover, self-administered questionnaires were used to collect data, and this type of data collection can be a source of unidimensional bias. Therefore, further methodological efforts must be made in future studies to measure aggression. Moreover, the current study was limited to male MDUR. There are many limitations in generalizing the current study's results to female MDUR and also other substance abusers. Limited access to samples and their loss during the study process was another limitation of our study.

We recommend investigating the effectiveness of this method on both male and female opioid and stimulant abusers alongside and in comparison with other treatments.

Group ACT caused a significant decrease in emotion regulation scores and its dimensions, including non-acceptance, difficulties engaging in goal-directed behavior, impulse control difficulties, and limited access to emotion regulation strategies. However, it could not significantly decrease the lack of emotional awareness and clarity dimension.

Acknowledgments

We thank all the individuals, who participated in this research. Also we thank the clinics that cooperated in the research.

Footnotes

Financial Disclosure: None declared.

Conflict of Interest: The authors had no conflict of interest.

Table 4. Results of the Kolmogorov-Smirnov Test of the Two Groups in Emotion Regulation and its Subscales

Subscale	Group	Test	Kolmogorov Test	P-Value
Non-acceptance of Emotional Responses	Experimental	Pre test	0.260	0.090
		Post test	0.296	0.075
		Follow up	0.167	0.200
	Control	Pre test	0.166	0.200
		Post test	0.177	0.200
		Follow up	0.180	0.200
Difficulties engaging in goal directed behavior	Experimental	Pre test	0.344	0.200
		Post test	0.264	0.020
		Follow up	0.312	0.197
	Control	Pre test	0.390	0.200
		Post test	0.267	0.075
		Follow up	0.294	0.001
Impulsive control difficulties	Experimental	Pre test	0.155	0.200
		Post test	0.292	0.006
		Follow up	0.243	0.048
	Control	Pre test	0.152	0.200
		Post test	0.200	0.109
		Follow up	0.186	0.175
Lack of emotional awareness	Experimental	Pre test	0.276	0.018
		Post test	0.270	0.016
		Follow up	0.186	0.200
	Control	Pre test	0.202	0.101
		Post test	0.196	0.126
		Follow up	0.220	0.049
Limited access to emotion regulation strategies	Experimental	Pre test	0.260	0.016
		Post test	0.231	0.077
		Follow up	0.215	0.131
	Control	Pre test	0.210	0.073
		Post test	0.251	0.012
		Follow up	0.207	0.082
Lack of emotional clarity	Experimental	Pre test	0.301	0.200
		Post test	0.156	0.200
		Follow up	0.150	0.200
	Control	Pre test	0.270	0.004
		Post test	0.275	0.003
		Follow up	0.308	0.200
Emotion regulation	Test	Pre-test	0.175	0.200
		Post-test	0.194	0.200
		Follow up	0.132	0.200
	Control	Pre-test	0.202	0.100
		Post-test	0.242	0.018
		Follow up	0.176	0.200

Table 5. Mauchly's Test Results of Intragroup Variances

Intragroup Variable	Mauchly's Test	df	P Value
	0.47	2	0.000

Table 6. Intergroup Variances of the Emotion Regulation Scores Based on Levene's Test Results

Sources of Change	F Value	P Value
Pre-Test	1.696	0.205
Post-Test	0.909	0.349
Follow Up	0.591	0.449

Table 7. Results of the Repeated Measures Analysis of Variance Test Associated With Emotion Regulation Variable and its Dimensions in the Test and Control Groups

Variable	Source	Total Square Roots	Degree of Freedom	Mean Square Roots	F Value	P Value	Measure of Effect
Non Acceptance	Intragroup	482.505	2	241.252	24.419	0.000	0.49
	Intergroup * Intragroup	52.431	2	26.215	2.653	0.080	0.096
	Intragroup error	493.989	50	9.880			
	Intergroup	329.852	1	329.852	10.477	0.003	0.295
	Intergroup error	787.061	25	31.482			
Goals	Intragroup	400.898	2	200.449	42.434	0.000	0.62
	Intergroup * Intragroup	205.046	2	102.523	21.704	0.000	
	Intragroup error	236.189	50	4.724			
	Intergroup	307.677	1	307.677		0.002	0.323
	Intergroup error	644.644	25	25.786			
Impulse	Intragroup	399.649	2	199.825	22.918	0.000	0.47
	Intergroup * Intragroup	197.279	2	98.640	11.313	0.000	
	Intragroup error	435.956	50	8.719			
	Intergroup	482.380	1	482.380	5.531	0.027	0.181
	Intergroup error	2180.311	25	87.212			
Emotional Awareness	Intragroup	41.170	2	20.585	2.322	0.109	0.08
	Intergroup * Intragroup	24.479	2	12.240	1.381	0.261	0.052
	Intragroup error	433.200	50	8.864			
	Intergroup	14.075	1	14.075	0.315	0.579	0.012
	Intergroup error	1115.283	25	44.611			
Strategies	Intragroup	27.816	2	128.908	23.147	0.000	0.481
	Intergroup * Intragroup	114.705	2	57.352	10.298	0.000	0.292
	Intragroup error	278.456	50	5.569			
	Intergroup	181.336	1	181.336	4.781	0.038	0.161
	Intergroup error	948.244	25	37.930			
Clarity	Intragroup	83.175	2	41.588	19.470	0.000	0.438
	Intergroup * Intragroup	137.200	2	68.600	32.1116	0.000	0.562
	Intragroup error	106.800	5	2.136			
	Intergroup	20.672	1	20.672	1.556	0.224	0.059
	Intergroup error	332.217	25	13.289			
Emotion Regulation	Intragroup	6034.381	2	3017.191	44.183	0.000	0.639
	Intergroup * Intragroup	2754.579	2	1377.290	20.169	0.000	0.447
	Intragroup error	3414.433	50	68.289			
	Intergroup	6309.141	1	6309.141	21.949	0.000	0.468
	Intergroup error	7186.217	25	21.449			

References

1. Galanter M. Innovations: alcohol & drug abuse: spirituality in Alcoholics Anonymous: a valuable adjunct to psychiatric services. *Psychiatr Serv.* 2006;**57**(3):307–9. doi: 10.1176/appi.ps.57.3.307. [PubMed: 16524986].
2. Parsegian A, Glen WJ, Lavin A, See RE. Methamphetamine self-administration produces attentional set-shifting deficits and alters prefrontal cortical neurophysiology in rats. *Biol Psychiatry.* 2011;**69**(3):253–9. doi: 10.1016/j.biopsych.2010.09.003. [PubMed: 21051037].
3. Topp L, Degenhardt L, Kaye S, Darke S. The emergence of potent forms of methamphetamine in Sydney, Australia: a case study of the IDRS as a strategic early warning system. *Drug Alcohol Rev.* 2002;**21**(4):341–8. doi: 10.1080/0959523021000023199. [PubMed: 12537703].
4. Ersche KD, Jones PS, Williams GB, Turton AJ, Robbins TW, Bullmore ET. Abnormal brain structure implicated in stimulant drug addiction. *Science.* 2012;**335**(6068):601–4. doi: 10.1126/science.1214463. [PubMed: 22301321].
5. Smith DG, Jones PS, Bullmore ET, Robbins TW, Ersche KD. Cognitive control dysfunction and abnormal frontal cortex activation in stimulant drug users and their biological siblings. *Transl Psychiatry.* 2013;**3**:257. doi: 10.1038/tp.2013.32. [PubMed: 23673468].
6. Konova AB, Moeller SJ, Tomasi D, Volkow ND, Goldstein RZ. Effects of methylphenidate on resting-state functional connectivity of the mesocorticolimbic dopamine pathways in cocaine addiction. *JAMA Psychiatry.* 2013;**70**(8):857–68. doi: 10.1001/jamapsychiatry.2013.1129. [PubMed: 23803700].
7. Frith CD. Smoking behaviour and its relation to the smoker's immediate experience. *Br J Soc Clin Psychol.* 1971;**10**(1):73–8. [PubMed: 5542387].
8. Gross J, Thompson R. In: Emotional Regulation; Conceptual Foundations. first ed. Gross J, editor. Guilford; 2011.
9. Amstadter A. Emotion regulation and anxiety disorders. *J Anxiety Disord.* 2008;**22**(2):211–21. doi: 10.1016/j.janxdis.2007.02.004. [PubMed: 17349775].
10. Cisler JM, Olatunji BO. Emotion regulation and anxiety disorders. *Curr Psychiatry Rep.* 2012;**14**(3):182–7. doi: 10.1007/s11920-012-0262-2. [PubMed: 22392595].
11. Doran N, Cook J, McChargue D, Spring B. Impulsivity and cigarette craving: differences across subtypes. *Psychopharmacology (Berl).* 2009;**207**(3):365–73. doi: 10.1007/s00213-009-1661-x. [PubMed: 19756522].
12. Doran N, McChargue D, Cohen L. Impulsivity and the reinforcing value of cigarette smoking. *Addict Behav.* 2007;**32**(1):90–8. doi: 10.1016/j.addbeh.2006.03.023. [PubMed: 16675149].
13. Parker JD, Taylor RN, Eastabrook JM, Schell SL, Wood LM. Problem gambling in adolescence: Relationships with internet misuse, gaming abuse and emotional intelligence. *Pers Individ Diff.* 2008;**45**(2):174–80.
14. Blackledge JT, Hayes SC. Emotion regulation in acceptance and commitment therapy. *J Clin Psychol.* 2001;**57**(2):243–55. [PubMed: 11180150].
15. Hayes SC, Strosahl KD. A practical guide to acceptance and commitment therapy. second ed. Springer; 2010.
16. Batten S. Essentials of acceptance and commitment therapy. Sage Publications; 2011.
17. Zarling A, Lawrence E, Marchman J. A randomized controlled trial of acceptance and commitment therapy for aggressive behavior. *J Consult Clin Psychol.* 2015;**83**(1):199–212. doi: 10.1037/a0037946. [PubMed: 25265545].
18. Hopwood CJ, Schade N, Matusiewicz A, Daughters SB, Lejuez CW. Emotion regulation promotes persistence in a residential substance abuse treatment. *Subst Use Misuse.* 2015;**50**(2):251–6. doi: 10.3109/10826084.2014.977393. [PubMed: 25404467].
19. Koob GF. The dark side of emotion: the addiction perspective. *Eur J Pharmacol.* 2015;**753**:73–87. doi: 10.1016/j.ejphar.2014.11.044. [PubMed: 25583178].
20. Mohammadi M, Farhoudian A, Shoaee F, Younesi SJ, Dolatshahi B. Aggression in juvenile delinquents and mental rehabilitation group therapy based on acceptance and commitment. *Iranian Rehabil J.* 2015;**13**(2):5–9.
21. Massah O, Farmani F, Karimi R, Karami H, Hoseini F, Farhoudian A. Group reality therapy in addicts rehabilitation process to reduce depression, anxiety and stress. *Iranian Rehabil J.* 2015;**13**(1):44–50.
22. Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *J Psychopathol Behav Assess.* 2004;**26**(1):41–54.
23. Hayes SC, Wilson KG, Gifford EV, Follette VM, Strosahl K. Experimental avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. *J Consult Clin Psychol.* 1996;**64**(6):1152–68. [PubMed: 8991302].
24. Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J. Acceptance and commitment therapy: model, processes and outcomes. *Behav Res Ther.* 2006;**44**(1):1–25. doi: 10.1016/j.brat.2005.06.006. [PubMed: 16300724].
25. Sinha R. How does stress increase risk of drug abuse and relapse?. *Psychopharmacology (Berl).* 2001;**158**(4):343–59. doi: 10.1007/s002130100917. [PubMed: 11797055].
26. Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clin Psychol Rev.* 2010;**30**(2):217–37. doi: 10.1016/j.cpr.2009.11.004. [PubMed: 20015584].
27. Witkiewitz K, Marlatt GA, Walker D. Mindfulness-based relapse prevention for alcohol and substance use disorders. *Cognitive Psychother.* 2005;**19**(3):211–28.
28. Campbell-Sills L, Barlow D. In: Incorporating emotion regulation into conceptualizations and treatments of anxiety and mood disorders. first ed. Gross J, editor. Guilford; 2011.
29. Mullin B, Hinshaw S. Emotion Regulation and Externalizing Disorders. first ed. Guilford; 2011.
30. Hayes SC, Strosahl KD, Wilson KG. Acceptance and commitment therapy: An experiential approach to behavior change. first ed. Guilford; 1999.
31. Hayes SC, Wilson KG. Acceptance and commitment therapy: Altering the verbal support for experiential avoidance. *Behav Anal.* 1994;**17**(2):289–303. [PubMed: 22478193].
32. Gross JJ, John OP. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *J Pers Soc Psychol.* 2003;**85**(2):348–62. [PubMed: 12916575].
33. Massah O, Sohrabi F, A'azami Y, Doostian Y, Chopan H, Farhoudian A. Effectiveness of gross model-based emotion regulation training on anger reduction in drug-dependent individuals and its sustainability in follow-up. *Int J High Risk Behav Addict.* 2016;**5**(1).
34. Sher K, Grekin E. In: Alcohol and affect regulation. first ed. Gross JJ, editor. Guilford; 2011.
35. Eifert GH, Forsyth JP. The application of acceptance and commitment therapy to problem anger. *Cognitive Behav Practice.* 2011;**18**(2):241–50.
36. Hwang J. A processing model of emotion regulation: Insights from the attachment system. *Psych Diss.* 2006;**14**.
37. Beadman M, Das RK, Freeman TP, Scragg P, West R, Kamboj SK. A comparison of emotion regulation strategies in response to craving cognitions: Effects on smoking behaviour, craving and affect in dependent smokers. *Behav Res Ther.* 2015;**69**:29–39. doi: 10.1016/j.brat.2015.03.013. [PubMed: 25863600].