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**Title: A Comparative Effectiveness of Behavioral Activation Therapy and ACT Matrix on Depression of College Students**

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## **Abstract**

**Background:** Depression is a serious and debilitating mental disorder that afflicts a large number of human beings worldwide. This study was tried to compare the effectiveness of behavioral activation therapy and act matrix on the depression of College Students.

**Materials and Methods:** The present study is an experimental design by using pre and posttest with a control group. Therapeutic intervention in the experimental group implemented 8 sixty-minute sessions weekly for female students between 18-35 years' old who have depression symptoms. During these time participants in the experimental and control group responded to Beck Depression Inventory-Second Edition, before, after an intervention, and in follow-up (4 weeks after the end of intervention).

**Results:** The findings of covariance analysis showed that the ACT matrix and BATD reduced symptoms of depression. There was no significant difference in depression between the two experimental groups (acceptance and commitment-based therapy (ACT) by matrix method and behavioral activation therapy ( $p = 0.999$ )). This indicates the effect of almost identical acceptance and commitment (ACT) therapy by matrix method and behavioral education training to reduce depression. Eta coefficient shows that matrix and BATD explain 0.64 of depression and these results have been maintained in the follow-up stage.

**Conclusion:** The results of this study showed that the ACT matrix and BATD have significantly reduced symptoms of depression. This approach seeks to teach how to break up from thought content by taking viewpoints, instead of stuck the past and conceptualizing on future live sort their life story, recognizing values and important individuals of their lives and ultimately taking step to achieve these goals and values without getting stuck in trap of their attention and with compassion for themselves and others.

**Keywords:** Matrix; ACT; Behavioral Activation Therapy Depression

## **Introduction**

Depression disorder with a prevalence of 17% is the most common psychiatric disorder in the world. Therefore, according to psychiatric conditions, it is called "common cold" (1, 2). In recent years, students' depression and anxiety have been alarmed on the border. According to Adams, Nejat et al quoted that, depression and anxiety caused by student life and the effects on students' mental health have been highly respected in recent years. Students' stresses as well as biological and psychological readiness of students lead to increased rates of mental disorders in students (3). Many students can easily adapt to the new environment, while others, in terms of science or psychology, hardly adapt to new conditions (4). Due to such challenges, a high proportion of students are at risk of developing psychological illnesses, including depression (5).

There are many psychological therapies for depression and its dependent variables, but few have been able to prove their effectiveness in clinical trials (6). Of the third-generation therapies, behavioral activation (BA) and acceptance and commitment therapy (ACT), due to the emphasis they place on eliminating avoidance and encouraging activation (7, 8), may be particularly useful in the treatment of emotional difficulties in depressive disorders. The goals of these therapies comply with the previously described situation, characterized by the avoidance of unpleasant private events related to the disease and a reduction in involvement in relevant activities. Both therapies have shown good results in the psychological treatment of cancer survivors (7, 8).

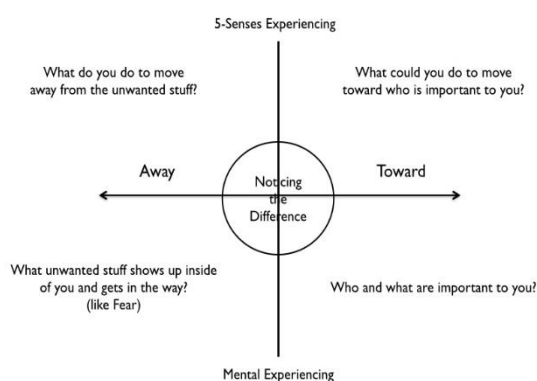
Behavioral activation interventions largely have been used to treat depressive disorders and symptoms, efficacy such that behavioral activation is now considered an empirically validated treatment for depression (6, 9-10). In one of the more compelling studies, behavioral activation was comparable to antidepressant medication and superior to cognitive therapy in treating severe depression (11), results that were maintained at 2-year follow-up (12).

Acceptance and commitment therapy (ACT) has been shown to be extremely effective in helping clients who are "sticking" to unhealthy thinking patterns by giving support or confidence to align their values with their thoughts and actions and their effectiveness in many studies (13-15). However, the ACT model is complex, and it is not always easy to use. Enter the ACT Matrix, an unseam fusion of the six core ACT hexaflex processes cognitive-defusion, acceptance, present-day contact, self-observation, values, and committed action in a simplified, easy-to-use approach (16). The matrix is an application that emphasizes the importance of the context of inquiry in a particular, approach designed to identify what works in specific contexts.

A functional contextual perspective condition — one in which people interact with their life situations determines the consequences of their behavior and whether their behaviors are workable in moving them toward what is important to them. Trying to change one's feelings or thoughts may or, more often, may not work to move a person toward what's important (17). ACT matrix is an approach based on route selection and upgrading the ability of individuals to approach valuable goals, despite the problems in life. Therefore, in the matrix model getting viewpoints of clients considered as the basis of treatment and by examining actions of getting away and getting close to values and compassion in commitment and change strategies helps them achieve a live, purposeful and meaningful life (18).

Until now there is a little study about act matrix, Mirsharifa et al (2019), have shown that using ACT matrix is a useful way to improve depression and psychological capital among patients (19). In another study, the results showed that the ACT matrix has significantly reduced symptoms of self-injury and improved quality of life in adolescents with borderline personality disorder symptoms (18).

The Psychological Flexibility Model Matrix  
Kevin L. Polk, Ph.D.



So according above-mentioned the aim of the present study is to analyze the effectiveness of ACT (matrix) and BA, implemented on a group, in the treatment of depression symptoms in college students. The importance of occurring such a study lies, firstly, in the fact that only ACT (matrix) has been studied in depression symptoms on a group basis, and secondly, as far as we know, it has never been compared to BA. The first perspective is important with respect to improving the efficiency of psychological treatments. The second is especially relevant with regard to the purpose of identifying responsible factors for the clinical change.

## Materials and methods

This study was a trial with a control group that used the quasi-experimental design. The statistical population of the study consisted of all depressed students of Payame Noor University of Imam Khomeini who volunteered to participate in the study during the months of October to November 2018.

For this purpose, first notices at university and cyberspace were shared. Then, Beck depression questionnaire and determining the cutoff point of depressed students were determined. Subjects with depressive disorder were selected by random cluster sampling method. Then 45 of them were selected randomly and divided into three groups of 15 people. Of the three groups, the two groups under the BATD intervention were based on a brief guide to behavioral activation therapy for depression (20) and acceptance and commitment-based treatment by Matrix method (16) and one-month follow-up.

Inclusion criteria for the study sample were: 1) aged between 18 and 35 years; 2) Having depression according to Beck depression inventory second edition and cut-off point (score 17 and above in depression inventory II); 3) Failure to receive psychological or medicinal treatment 6 months before entering the research; 4) Girl Students. Exclusion criteria were as follows: 1) Unwilling to participate in research; 2) having history of psychotic disorders, bipolar disorder, severe personality disorders; 3) The subject has a physical condition where depression is

attributable to its complications; 3) lack of psychoactive substance use, addiction to drugs or alcohol; 4) Two session's absence from treatment sessions

**Study instrument**

**Beck Depression Inventory-Second Edition (BDI-II):** This questionnaire contains 21 questions that are designed to measure the feedback and symptoms of depressed patients. The test subjects consist of a total of 21 materials related to different symptoms that subjects must answer on a four-degree scale from zero to three. The scores in this questionnaire range from 0 to 13 with no or minimum depression, from 14 to 20 mild depression, from 20 to 28 moderate to depression, and from 28 to 63 severe depression. In this study, the cut-off point of  $BDI-II \geq 17$  is considered. In the study of Dobson and Mohammad Khani (21), the total credit score was reported as 0.91. The internal consistency of the test for Iranian students was 0/87 and its re-test validity was reported to be 73 /. In this study, the reliability coefficients of the depression questionnaire were calculated using Cronbach's alpha method, which is 0.91 for the whole scale, which indicates the desired reliability coefficients of the questionnaire.

The collected data were analyzed using the SPSS-23. Descriptive statistics including mean and standard deviation and analytical statistical tests, including Levene’s test for homogeneity of variances and analysis of covariance (ANCOVA) were used. P values less than 0.05 were considered significant. To evaluate the effectiveness of ACT Matrix and Behavioral Activation on depression of depressed students, after calculating the scores of pretest and posttest in three groups, Levene’s test for homogeneity of variances and analysis of covariance (ANCOVA) were performed.

Table1: The content of treatment sessions for acceptance and commitment by the matrix method

Sessions	Practice the six steps approach to using the ACT matrix and integrate a relationship-focused approach to ACT.
first	Present the ACT matrix point of view to clients and prompt clients to evaluate the workability of moving away behavior.
the second	Help clients notice and name their stuck loops and notice the difference between what can be controlled (five senses experience) and what gets more sticky as one attempts to control it (inner experience).
Third	Learn how to use the Hooks Worksheet and metaphor to promote defusion.
The fourth	Practice validation skills through the art of Yessing and learn how to engage clients in the skills of verbal aikido using the Verbal Aikido Worksheet.
the fifth	Learn how to promote self-compassion and practice prompting behavior change through the perspective-taking interview exercise.
the sixth	Practice using the bridging questions to get precise and actionable feedback from clients. Learn how to hold a consistent functional contextual stance in your clinical work.

Table2: The content of behavioral activation therapy sessions

Sessions	Meeting titles
first	An explanation of depression, an explanation of the behavioral activation model, the introduction of a daily review form
the second	"Reviewing the task of the previous session, training "self-examination

Third	Homework, Relationship of Behavior, Thoughts and Emotions and Functional Analysis of Patient Activities
The fourth	Task review, functional analysis, reinforcement of effective coping practices, values
the fifth	Homework review, functional analysis, strengthening effective coping practices
the sixth	Reviewing homework, reviewing and summarizing, teaching how to deal with depression in the future

## Results

In this study, in the ACT matrix group, the subjects in the age group of 18 to 20 and 21 to 25 years of age were the most frequent with about 40 percent. In the behavioral activation-training group, the subjects of the age group of 31 to 35 years of age were the most frequent (33.3%) and subjects in the age group of 21 to 25, respectively, with the lowest frequency (6.7%). In the ACT matrix group, single subjects were about 86.7% and married subjects accounted for 13.3% of the sample, in the behavioral activation training group, Single subjects were about 73.3% and married subjects accounted for 26.7% of the sample, and in the control group, single subjects were 86.7% and married subjects accounted for 13.3% of the sample assigned.

**Table 3: Mean and standard deviation of depression, of the experimental and control groups in the pre-test, post-test and follow-up stages**

Variable	stage	indexes	M& SD	number
<i>depression</i>	<i>pre-test</i>	(ACT)Matrix	22.60 ±5.84	15
		BAT	26.93 ±7.22	15
		<i>control</i>	28.53 ±7.21	15
	<i>post-test</i>	(ACT)Matrix	11.67 ±6.41	15
		BAT	11.87 ±10.08	15
		<i>control</i>	28.60 ±10.94	15
	<i>follow-up</i>	(ACT)Matrix	8.73 ±6.36	15
		BAT	7.73 ±7.89	15
		<i>control</i>	26.60 ±8.69	15

Table 3 shows that the mean and deviation of depression in each of the groups, (ACT) matrix method and behavioral activation therapy respectively, (22.60 ±5.84), (26.93 ±7.22) and the control group were (28.53 ±7.21), in the post-test the mean and standard deviation, and commitment (ACT) by matrix method and behavioral activation therapy respectively, (11.67 ±6.41), (11.87 ±10.08), and the control group was (28.60 ±10.94), in the follow-up phase, (ACT) by matrix method and behavioral activation therapy respectively, (8.73 ±6.36), (7.73 ±7.89) and the control group was (26.60 ±8.69).

**Table 4: Levine's Test on the Default of Equation of Variance in three groups**

variable	F	F1	F2	sig
depression	1.40	2	42	0.257

As shown in Table 4, the homogeneity of variances in three groups is significant for all variables in the research. In other words, considering the lack of significance of F (Levin test), the zero assumption for the homogeneity of the variances of the three groups in the variables of the research is confirmed. However, when the size of the samples is equal, the significance of the Levin test does not have a significant effect on the alpha level.

**Table 5: The Kolmogorov-Smirnov test on the presumption of the normal distribution of depression scores**

normalization	groups	Kolmogorov-Smirnov			groups	Kolmogorov-Smirnov			groups	Kolmogorov-Smirnov		
		p	df	statistic		p	df	statistic		p	df	statistic
depression	ACT)Matrix	0.208	15	0.187	BAT	0.081	15	0.208	control	0.200	15	0.155

As presented in Table 5, the zero assumption for the normal distribution of the scores of the three groups in the depression variables is confirmed. That is the assumption of the normal distribution of the scores in the pre-test and in all three groups is confirmed.

**Table 6: Homogeneity of regression slopes of the variables of the three groups**

variable	the source changes	stage: Pre-test - Post-test		the source changes	stage: Pre-test - Follow-up	
		(Interactions) F	p		(Interactions) F	p
Depression	Group * Pre-test Interaction	1.01	0.372	Group * Pre-test Interaction	0.334	0.718

As shown in Table 6, the F value of the interaction for all the variables in the research is not significant. Therefore, the homogeneous assumption of regression is confirmed.

**Table 7: Multivariate covariance analysis (MANCOVA) on the post-test depression in experimental and control groups with pre-test control**

Presumptions	Size	F	Df hypothesis	Df error	Eta	P-Value	Statistical power
Pillai's trace	0.66	4.46	8	72	0.33	0.001	<b>0.993</b>
Wilk's Lambda	0.36	5.68	8	70	0.39	0.001	<b>0.999</b>
Hotelling's trace	1.63	6.96	8	68	0.45	0.001	<b>1.00</b>
Roy's greatest root	1.58	14.28	4	36	0.61	0.001	<b>1.00</b>

As shown in Table 7, by means of pre-test control, there is a significant difference between the depressed students of the experimental and control groups in terms of the dependent



variable of depression ( $p < 0.0001$ ) and  $F = 5.68$ ). Eta is equal to 0.39. In other words, 39% of the individual differences in post-test depression scores relate to the effect of acceptance and commitment (ACT) therapy by the matrix and behavioral activation (group membership). The statistical power is equal to 0.999, that is, if this research is repeated 1000 times, only one factor may be confirmed by the wrong hypothesis

**Table 8: One-way covariance analysis (ANCOVA) of post-test depression, on experimental and control groups with pre-test control**

variable	Source of change	Sum of squares	Degrees of freedom	Average squares	F	p	Eta	Statistical power
Depression	pre-exam	17.46	1	17.46	0.231	0.634	0.01	0.076
	group	2669.82	2	1334.91	17.65	0.0001	0.64	1.00
	Error	2872.67	38	75.59				

As seen in Table 8, there is a significant difference between depressed students in pre-test control ( $p < 0.0001$  and  $F = 17.65$ ). The effect or difference is equal to 0.48. In other words, 48% of individual differences in the post-test scores of depression are related to the effect of acceptance and commitment (ACT) therapy by matrix and behavioral activation (group membership). Statistical power is equal to 1.00, in other words, there was no possibility of a second type error.

**Table 9: Bonferroni post hoc test between mean scores of post-test depression in experimental and control groups with pre-test control**

groups	M	Matrix (ACT)	BATD	Control
1 matrix (ACT)	11.67		NS( $p = 0.999$ )	* ( $p = 0.0001$ )
2 BATD	11.87			* ( $p = 0.0001$ )
3 Control	28.60			

As shown in Table 9, there is a significant difference between the mean post-test depression of depressed students in the acceptance-based treatment group and the ACT commitment to the control group ( $p = 0.0001$ ). In other words, acceptance and commitment (ACT) therapy based on the matrix method regarding the mean depression of depressed students in the experimental group compared to the mean of the control group reduced the depression of the experimental group.

In addition, there is a significant difference between the mean post-test depression of depressed students of behavioral activation group and the control group ( $p = 0.0001$ ). In other



words, behavioral activation training, with respect to the mean depression of depressed students in the experimental group, decreased the depression of the experimental group compared with the mean of the control group.

There was no significant difference in depression between the two experimental groups (acceptance and commitment based therapy (ACT) by matrix method and behavioral activation training) ( $p = 0.999$ ). This indicates the effect of almost identical acceptance and commitment (ACT) therapy by matrix method and behavioral education training to reduce depression.

**Table 10: Multivariate covariance analysis (MANCOVA) on experimental and control groups with pre-test control**

Presumptions	Size	F	Df hypothesis	Df error	Eta	P-Value	Statistical power
Pillai's trace	0.77	5.63	8	72	0.38	0.001	0.999
Wilk's Lambda	0.29	7.41	8	70	0.46	0.001	1.00
Hotelling's trace	2.19	9.34	8	68	0.52	0.001	1.00
Roy's greatest root	2.09	18.85	4	36	0.67	0.001	1.00

As shown in Table 10, in the follow-up phase with pre-test control, the significant levels of all tests indicate that there is a significant difference between the depressed students of the experimental and control groups in terms of the dependent variable of depression ( $p < 0.001$   $F = 7.41$ ). The Eta is 0.46. In other words, 46 percent of the individual differences in depression scores related to the continuation of the effect of acceptance and commitment (ACT) therapy by method Matrix and behavioral activation (group membership). Statistical power is equal to 1.00, in other words, there was no possibility of a second type error.

**Table 11: One Way Covariance Analysis (ANCOVA) on experimental and Control Groups with Pre-test Control**

variable	Source of change	Sum of squares	Degrees of freedom	Average squares	F	p	Eta	Statistical power
Depression	pre-test	30.56	1	30.56	0.697	0.409	0.02	0.129
	group	3071.08	2	1534.54	35.04	0.0001	0.64	1.00
	Error	1665.19	38	43.82				

As seen in Table 11, there is a significant difference in depression in follow-up test with pre-test control among depressed students in the experimental and control groups ( $P < 0.0001$  and  $F = 35.04$ ). Eta is 0.44. In other words, 64% of individual differences in depression scores are related to the continuation of the effect of acceptance and commitment (ACT) therapy by matrix and behavioral activation (group membership). Statistical power is equal to 1.00, in other words, there was no possibility of a second type error.

**Table 12: Bonferroni test follow-up in experimental and control groups with pre-test control**

groups	M	Matrix (ACT)	BATD	Control
1 matrix (ACT)	8.73		NS(p=0/411)	* (p= 0.0001)
2 BATD	7.73			* (p= 0.0001)
3 Control	26.60			

As shown in Table 12, in the follow-up phase, there is a significant difference between the mean of depressed students in the acceptance-based treatment group and the ACT commitment in the matrix with the control group ( $p = 0.0001$ ). In other words, acceptance and commitment (ACT) therapy based on the matrix method regarding the mean depression of depressed students in the experimental group compared with the mean of the control group, has led to continued depression reduction in the experimental group.

In addition, there was a significant difference between the mean of depressed students in the behavioral activation training group with the control group ( $p = 0.0001$ ). In other words, behavioral activation training with respect to the mean depression of depressed students in the experimental group compared with the mean of the control group, has led to continued depression reduction in the experimental group.

There was no significant difference between the two groups (acceptance therapy and ACT commitment and behavioral activation training) in terms of depression ( $p = 0.411$ ). This suggests continuity of almost the same effect of acceptance and commitment (ACT) therapy by matrix and behavioral activation in the continuation of depression reduction.

## Discussion

Results showed a significance difference between experiment group and control group in the mean of pretest, post-test and follow-up of depression. According to the findings, we can conclude that acceptance and commitment therapy by matrix and BADT leads to decreasing in depression among college students. The research background shows that the obtained results in this study are consistent with results of (6, 9, 10, 11, 13-15).

Fernandez and Barakamarial (2017) reviewed the comparison of the effect of behavioral activation (BA) and cognitive therapy (CT) on reducing negative thoughts in anxiety conditions in students. The analysis of the measurements before and after treatment showed that both conditions were effective in reducing the severity of anxiety response. However, according what they observed, the effect of behavioral activation showed a significant decrease (22). In a study by Saman et al. (2016) about the efficacy of behavioral activation therapy, participants agreed that behavioral activation is necessary to develop positive behaviors and strategies for the treatment of depression. Patients agreed that the program was sustainable and emphasized the potential of improving symptoms of depression (6).

Behavioral activation is designed to gradually increase positive activity in order to achieve long-term goals based on values (23). To explain its effectiveness, therapeutic additions outside the BA model should be consciously selected based on the sustainability of their benefits. Both clinicians and patients appreciated a variety of activities in the program structure, especially those that provide increased stimulation and exposure. This was found to be a line with other research on the effectiveness of behavioral activation (23). Depression is one of the psychological factors that are characterized by a loss of sense of control over emotion and behavior, and the person is suffering a lot (24).

These changes usually cause the patient's experience of negative feelings, disruption of interpersonal, social and occupational functions, and are followed by continuous nervous system physiological stimulation (25). To explain the effectiveness of the ACT matrix in reducing depression, several possibilities can be considered. ACT can target the avoidance pattern. During the interventions, the reduction of the experimental avoidances is considered as a mediator of change in the symptoms of depression (26).

To explain the effectiveness of the ACT matrix in reducing depression, several possibilities can be considered. ACT can target the avoidance pattern. During the interventions, the reduction of the experimental avoidances is considered as a mediator of change in the symptoms of depression (26). Avoidance is defined as an effort to escape the depressing thoughts and memories that are brought to the awareness of the depressed person (27). In this treatment, accepted practices and discussions about the person's values and goals causes depression reduction in depressed college students. This treatment teaches people how to let go of their beliefs of avoidance and accept them instead of trying to control them (28).

The effectiveness of group therapy on depression, cognitive-behavioral avoidance and quality of life of students (6) has proven its efficacy. Although acceptance and commitment therapy was established as an inferiority-based approach, however, the first randomized, controlled clinical trial evaluated the effectiveness of this treatment on depression. The clinical results obtained by Zettle and Hayes indicated that treatment of admission and commitment was effective in treating depression and resulted in a more rapid decrease in depressed thoughts (29).

Gonzales Fernandez et al. (2018), in a behavioral activation (BA) and acceptance and commitment therapy (ACT) study, considered emotional problems for cancer patients as appropriate and useful treatment. The effectiveness of these two treatments was evaluated and compared with the treatment approaches of the two treatments in one group. Findings indicated that both treatments were superior to all evaluated variables. However, there was a significant difference between the two methods in acceptance and commitment treatment in the treatment of social defect and avoidance / rumination. Behavioral activation and treatment of adherence

and commitment, which are applied collectively, are effective in the treatment of common emotional problems, such as anxiety and depression in cancer survivors (30).

Thus, it seems in this study that the ACT matrix helped depressed college students to happily reflect their experiences and gain mental stability. Hope is another psychological capital component. Hope is a cognitive process, but it has emotional consequences. Thus, hope is not a passive emotion that only appears in dark moments of life; but it's a cognitive process that people actively seek through it to reach their goals. Therefore, hope is a process through, which the person determines his/her goal, makes approaches to them, creates and maintains the motivation necessary to carry out these approaches (31).

There are several limitations to the present study, and results should be interpreted with caution. First of all, our sample size is relatively small. Second, we did not use male. These data must be replicated in larger samples of both genders of patients. Also, we have only used the Beck Depression Inventory-II (BDI-II), so, it is needed to use of some questionnaires such as Hamilton Inventory. In summary, based on our results, depressed patients may have different activities than normal population.

## **Conclusion**

Depression is linked in many ways and has similar confounding variables, such as anxiety and stress (32); such variables can be exacerbated by the socioeconomic status, living situation, education level, and home life of an individual (33). Because of combined risk factors, college students often have an increased risk of treatment and intervention (34). Although there is research on depression and treatment outcomes among college students, it is scarce and inconsistent with varying criteria for inclusion and exclusion and depression severity measurement and treatment. Future work needs to focus on developing reasonable benchmark of depression and treatment outcomes in the college population and integrating such outcome data into college mental health practice (35).

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### **Contribution**

Study design: AKhN, BM

Data collection and analysis: AKhN

Manuscript preparation: AKhN, BM, PA, RP

## **Conflict of Interest**

The authors declare that they have no competing interests.

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