The Mediating Role of Pleasant Activities in Cognitive Behavioral Therapy for Depressed Adolescents

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Abstract

Introduction: The purpose of this study was to investigate the effectiveness of cognitive-behavioral therapy in the depression of adolescents by an increase in pleasurable activities as a mediation.
Method: The statistical population included all adolescent girls (ages14to17) in Isfahan. In the form of an empirical study with a control and an experimental group and by evaluation of pre-test and post-test, 60girls which had been diagnosed with depression were selected and randomly assigned into two groups. Subjects, using Beck Depression Inventory (BDI-II) and Pleasant Events Schedule (PES).Data were analyzed for mediation analysis by R software and ANCOVA by SPSS-24.
Results: Findings show that cognitive-behavioral therapy is effective in increasing pleasurable activities (path coefficient: 0.19). The increase of pleasurable activities is effective in reducing depression (path coefficient: 0.35) and the cognitive-behavioral therapy by the mediation of pleasurable activities (path coefficient: 0.28) is effective. The entire effect of cognitive-behavioral therapy was on depression (β=0.28). Actually, 22%direct and 0.06%indirect effects was applied through the effect of pleasurable activities on depression.
Conclusion: Mediation analysis showed that pleasant events can play a mediating role in the relationship between depression and cognitive-behavioral therapy and can be used in short-term treatments.

Keywords: Adolescence, Cognitive-Behavioral Therapy, Depression, Pleasurable Activities

Introduction

Depression is one of the most common mental problems in adolescents [1]. Clinical depression means morbid depression diagnosed by DSM-5 official criteria. Clinical depression causes the person to have problems in doing daily living tasks [2]. Unipolar depressive episodes are usually caused by a stressful events [3].Kamer [3] introduced depression as a grief specified by high levels of discomfort, lack of energy, low self-worth and guilt [4]. The prevalence of major depression in four to eighteen year old people is between 8 and 2 percent [5].Emotional experiences of depressed people are negative [6]. Actually, depressed people are usually without passion and should be placed under external stimulation to do things (such as pressure from others or life tasks) [6]. A number of motivational symptoms in adolescence are isolation from family and friends, loss of academic skills and the increase of negative thoughts and suicidal actions. Moreover, such adolescence are less likely to engage in pleasurable activities [7]. A lot of emotional problems are associated with drawl behaviors and inactivation [8]. Positive emotions help people to "undo" effects of negative emotions. Moreover, they are helpful for returning to

a normal state immediately after terrible experiences [9]. Fun activities make people feel happy and joyful [10] and as a result help the adolescences mind to focus on positive alternatives [10]. Pleasant activity technique focuses on increasing pleasant activities and developing action plans that include methods for overcoming limitations [11]. Behavioral activation is relatively simple but needs an effective method to lift a person's energy level and increase the number of positive events in the adolescence life, leading to greater positive effects while diminishing negative affect [8]. Increasing pleasant activities often includes several stages such as: identifying a list of pleasant activities, engaging in at least 4 pleasant activities per day for a week and keeping them in a diary and finally increasing pleasant activities as a strategy for the purpose of improving psychological well-being [12].

Among the treatment methods of major depressive disorder in adolescence, cognitive behavioral therapy has attracted major attention [13-15].According to studies done by Rush et al., change in despair, mood and self-concept occur in cognitive behavioral therapy for depression while such changes may not occur in medication therapy [16]. The theoretical importance of this study is that the mediator model was done for the test which is an important attempt for the validation of mediator variables. This test can even have more important roles than the investigation of efficiency or inefficiency of the treatment. As a matter of a fact, in Rush at al.'s study it has been found that cognitive behavioral therapy is effective on depression but it is not clear which component is causing this effect [17]. In cognitive behavioral therapy, both relaxation and mind control techniques are used and the person's social relationship is strived. According to various studies, pleasurable social interactions improves depression. It also causes the person to find solutions to overcome problems. Each of these techniques are taught in the training sessions or are run during the whole sessions (such as social relations). These effective factors are mediator variables which their effectiveness can be determined with statistical techniques [18].

Understanding the mediator variables is important for many reasons [19]. The first reason is the recognition of the underlying processes of the effectiveness of the intervention which is thought to play a role in the accomplishment of treatment methods. If the effects of interventions are even observed in the absence of changes in mediator variables, in this case, it can be concluded that underlying theories have done false explanations. Mediator variables also indicate that which treatment component is more important and therefore have a big role in developing short-term treatments [20]. There is much debate about methods of studying the role of mediator in the effectiveness of treatments [21]. Methods of studying mediator analysis are largely known in Iran [22]. Despite the numerous articles about mediator analysis, all of them are usually originated from one source [23]. Mediator analysis leads to deeper thinking about treatments in Iran as well. This is due to the fact that the effect of treatment on disorder is the classical behaviorism that is Stimulus-Response (S-R); while mediator analysis is cognitive behaviorism which is Stimulus-Organism-Response (S_O_R). This recent event is more appropriate for cognitive behavioral treatment and takes into account the organism and whatsoever occurs in it. The importance of this study is that after the personalization of the role of mediator variables, the less effective elements in treatments (those which are not complete or partial mediators) can be removed and make the treatment easier and focus on the main elements. The possibility of making a theory about treatment and comparing them with each other through the recognition of effective mediator analysis also increases.

Pleasurable activities are an important mediator in depression [24]. Veehover considers pleasure as a way of life in which enjoyment plays an important role [25]. There is a causative relationship between depression and loss of pleasurable activities so that one of the important components in cognitive behavioral therapy is the increase of pleasurable activities. The meaning of this component is a series of positive events that are particularly important in depression. An important point in pleasurable activities is the feeling of competence and worthiness in people (for example: the successful experience of learning new things and doing a task efficiently) while this sense of competence is usually very low in depressed people. As a result, therapists must strengthen inconsistent responses with the feeling of depression. Inconsistent responses means suitable activities for dealing with depression (for example: getting in touch with a good friend, having a good sleep, laughing and relaxing) [24]. An increase in the amount of enjoyment in life can lead to an increase in positive emotions and a decrease in negative emotions [26]. The result of the study of Diener et al. showed that there is a significant relationship between the frequency of daily positive events and positive emotions [27]. Berenbaum also recognized that pleasurable activities is associated with positive emotions such as joy and satisfaction [28-29].There is a positive relationship between pleasurable activities and temper [29]. Emmons found that daily events coordinated with purpose cause stronger emotional reactions in people than events which are inconsistent with purpose [30]. Involvement in pleasurable activities is a function of age in people. There is also a direct relationship between pleasurable activities and the individual's lifecycle [29]. In the method of increasing pleasurable activities based on the existing treatment protocols, the therapist selects ten activities such as shopping, photographing etc., that are pleasurable for clients. They actually suggest their clients to develop a weekly program that includes such activities [31]. From the beginning of the therapy, a plan of activities for increasing the number of pleasurable situations or the possibility of developing abilities would be presented to the patient. At the end of each session, special assignments based on "reality testing" would be offered to them in order to prove the disutility of their desperate postulates. Also, "Role Play "and other behavioral techniques are used to prepare the patient to face reality [32]. To strengthen the non-depressive behaviors, therapists must neglect clients' depressive behaviors and reinforce their constructed

remarks and behaviors. Therapists can also ask family members and friends of patients for help in order to achieve this goal [31]. Hops et al., noted that the adolescents, however, are more likely to pay attention to depressed mood, concentration disorders, appetite problems and lack of interest in pleasurable activities [32]. Some teenagers may show a combination of sadness, anxiety, anger, aggression and irritability [7]. The main purpose of this study was too investigate the role and effectiveness of cognitive behavioral therapy in the depression of adolescents through possible mediator variables. The theoretical importance of this study is due to the findings which for the first time showed that through cognitive behavioral therapy of depression syndrome, some changes occur in despair and self-concept and the impact of each variable is measured by mediation analysis. It is clear that the testing of the mediation model is an important attempt which its validation can even have a more important role compared to studying the efficiency or inefficiency of the treatment.

Method

This research was a quasi-experimental research with pretest, post-test and control group. The statistical population of the present study included all adolescent girls (ages 14 to 17) in Isfahan. The sample of the study included 60 adolescents from depressed girls studying in high schools. In the first stage, the participants were screened from 649 students from two schools located in area four in Isfahan based on Beck Depression Inventory and Hamilton Depression Scale. In the first stage based on the Beck Inventory, 212 students had average scores higher than the average (the score of 29 and higher) and in the second screening, two groups of 33 (66 students due to the probability of sample loss) were assigned to control and experimental groups. After therapy sessions, the participants were re-evaluated in terms of depression scores and pleasurable activities.

Beck Depression Inventory BDI-II Second Edition

This questionnaire is composed of 21 clauses of which the subject selects one of the four options that indicate the severity of the symptoms of depression in them. Each clause gets a score between 0 and 3 and thus the total score is between 0 and 63. The Beck Depression Inventory (BDI) has been used in more than 7,000 studies so far. The BDI has undergone two major revisions: in 1978 as the BDI-IA7 and in 1996 as the Beck Depression Inventory-II (BDI-II) [14]. In a research carried out on 354 subjects with major depression in Iran, the Cronbach's alpha was 0.91 for 21 items. In general, the results indicate this instrument as a valid and reliable questionnaire [33].

Pleasant Event Schedule (PES)

This schedule was first introduced by Mac Phillamy & Lewinsohn in 1982. Two samples of 66 and 70 subjects were asked to make a list of positive events. This questionnaire was selected to assess the behavioral activities that people are involved in. The vague and subjective items with high variance were removed. The Positive Event Schedule (PES) measures each event twice. The frequency of doing it and its pleasure is the reason of calling it "positive events". Ultimately, a rational and empirical scale of pleasurable activities is developed [34]. The reliability of the questionnaire was evaluated by using test-retest method and was studied in three separate samples (N=48 and N=48, N=85) which were re-evaluated during 1-3 months and each one was reported to have a good reliability. The reliability of the scale was obtained from 0.49 to 0.88 over consecutive days. To study the validity of this questionnaire, 66 volunteers with an average age of 30 years old and an equal number of men and women were selected and referred to the University of Oregon. The questionnaire was applied to them and the reliable validity coefficients for the subscales of the questionnaire (Kuder-Richardson coefficient of reliability, 0.90) was obtained [33]. In the present study, with a population of 150, the Cronbach's alpha coefficient was calculated to be 0.81 for this questionnaire. The research hypothesis were analyzed by analysis of covariance (ANCOVA) and SPSS-24 software. For mediation analysis, the R software was used which responds to the research objectives.

Results

The participants of this study included 30 teenagers. They were between 14 and 17 years old. The median age in the control group was 15/96 and in the experimental group was 16/00; therefore, age distribution in the groups were in range. The subjects' level of education was between the first year and the third year of high school. In the control group, the highest frequency belonged to first grade high school students (17 students) and the lowest frequency belonged to third grade high school students (1 student). In the experimental group, the highest frequency belonged to first grade high school students (13 students) and the lowest frequency belonged to third grade high school students (8 students). Table 1 shows the descriptive characteristics and Cronbach's Alpha for the research tool.

As it is shown in Table1, the depression scores of the treatment group dropped 9/29 scores after intervention while this difference score in the control group is only 4/24. The scores of increasing pleasurable activities after intervention in the treatment group increased 23/27 scores while this score in the control group increases 0/21 scores. Also according to Table 1, the Alpha coefficient of the questionnaire indicates a high correlation between the questions of the questionnaire.

Table 1. Descriptive characteristics and Cronbach's Alpha research tool

Variable	The difference between the scores of the treatment group				The difference between the scores of the control group			
	Average	Variance	Cronbach's Alpha		Average	Variance	Cronbach's Alpha	
			Pre-test	Post-test			Pre-test	Post-test
Beck Depression	-9.29	6.52	0.64	0.54	-4.24	7.28	0.58	0.56
Pleasurable Activities	23.27	2.72	0.94	0.93	0.21	13.17	0.91	0.91

Table 2. Average, minimum, maximum and standard deviation of scores of pleasurable activities

Group	Variable	Number	Minimum	Maximum	Average	Standard
Control	Pleasurable Activities (Pre-test)	30	59	131	87.54	22.54
Experimental	Pleasurable Activities (Pre-test)	30	60	148	91.17	26.27
Control	Pleasurable Activities (Post-test)	30	51	129	87.75	24.02
Experimental	Pleasurable Activities (Post-test)	30	65	166	144.44	24.82

Table 2 shows the descriptive measures of central tendency in pleasurable activities variable by separating steps and groups. It is observed that there is a difference between median scores of both groups in pretest and post-test and its significance is studied in the inferential statistics section.

Table 3. Covariance analysis of the difference between groups in the scale of pleasant events subscale of pleasurable activities

Change Sources	Total Squares	df	F	Sig	Shared Variance	Cohen's d	Statistical Power
Revised Model	19211.835	2	24.948	0.001	0.609		1.00
Intercept	3618.616	1	9.398	0.004	0.227		0.844
Pretest	11779.334	1	30.593	0.001	0.489		1.00
Group	5780.064	1	15.012	0.001	0.319	1.36	0.964
Error Effect	12321.137	32					

Covariance analysis was used to evaluate the hypothesis. According to Table 4, cognitive-behavioral therapy is effective in the amount of pleasurable activities ($P<0.05$). The shared variance is 0.31 or 31 percent which shows that 31 percent of the differences between the control and experimental group is due to treatment effect. The effect size (Cohen's d) of the component of increasing pleasurable activities in cognitive behavioral therapy is also 1.36. This is a strong effect in statistical researches and shows that the component of teaching the increase of pleasurable activities has a strong effect in reducing depression symptoms in adolescents.

As noted, one of the objectives of this study was to investigate the mediators of the treatment. Figure 1 shows the process of checking the mediator variable (increase of pleasurable activities) in cognitive behavioral therapy.

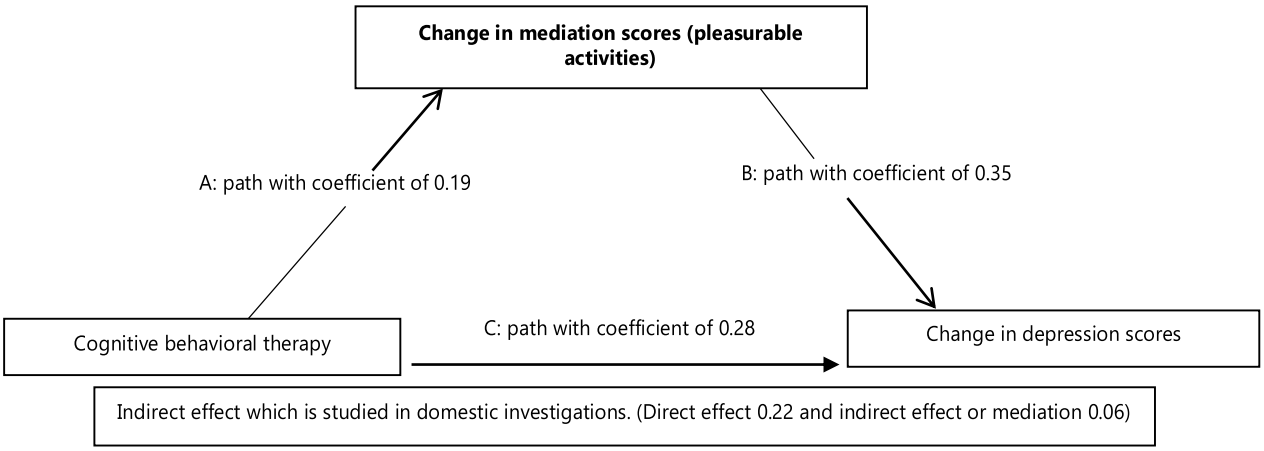

Figure 1. The concept of the mediation model and the determination of mediation paths in cognitive behavioral therapy for depression with the mediation of pleasurable activities

For the purpose of mediation analysis, 2 models of regression were compared. These models included a complete model and a restricted model in which 2 functions were introduced for grouping subjects in control and experimental groups. The data was analyzed by R software. For studying the effect of the indirect mediation model, the table of regression analysis was used in which the reduced model is in accordance with relation 1:

Relation (1): $Y= (E (|X1, ..., ,*=0 ,G=0) = B0 + B1X1 + \cdots + BPXP)$

The complete model is in accordance with relation 2:

Relation (2): $Y=(E (|X1,...,XP ,M*=0 ,G=1)= B0+B1X1+\cdots+BPXP+\theta0+\theta1X1+\cdots\theta PXP+ϒM)$

M shows the mediation variable.

In fact, the mediation is a third variable which is responsible for all or part of the relationship between a predictor and an outcome. The nature of the relationship with mediation variable is such that a predictor variable (X) has a casual effect on the third variable called mediation (M) and the mediation analysis has a casual effect on the outcome (Y) [23].

Table 4. Direct and indirect effects of Mediation

Variable	Mediation Effect (B path)	The effect of intervention on Mediation (A path)	C path	Direct effect	Indirect effect	The Explained Variance
Pleasurable Activities	0.35	0.19	0.28	0.22	0.06	0.21

According to Figure 1 in which the research design (as mediator model in cognitive-behavioral therapy of depression) is shown and by considering Table 4 in which A, B and C paths are specified, the mediation and intervention on mediation effects and the direct and indirect effects (mediation) are reported. The results show that cognitive behavioral therapy is effective in increasing pleasurable activities (path coefficient: 0.19). The increase of pleasurable activities is effective in reducing depression scores (path coefficient: 0.35). Also, cognitive behavioral therapy with the mediation of pleasurable activities is effective on the scores of depressed teenagers (path coefficient: 0.28). In general, the entire effect of cognitive behavioral therapy was on depression (β= 0.28). In other words, 22% of direct effect and 0.06% of indirect effect is applied through the effect of pleasurable activities on depression.

Table 5. Mediation regression analysis (pleasurable activities) on depression

Variable	Coefficient β	Complete Model With Mediator (Standard Error)	Coefficient β	A Reduced Model Without a Mediator (Standard Error)
Intercept	0.284	0.111	0.251	0.097
Group Effect	0.28	0.069	0.22	0.061
Pleasurable Activities	0.19	0.005		

Table 5 shows mediation regression analysis for the impact of pleasurable activities on depression. It also illustrates the regression which was required by Barron & Kenny for determining the mediation effect of mediator variable. As it is noticed, the group effect in the complete model for standard coefficient is 0.28 and is 0.22 in the confined model which is significant for both models (refer to relations 1 & 2).By considering Barron and Kenny's method, the difference between these two numbers is 0.6 (indirect effect) which shows the effect of mediator analysis. Direct effect + indirect effect = the total The SEM for group effect in complete and mediation models are 0.069 and 0.061 respectively which indicates that the test can precisely make a difference between experimental and control groups. The results show that all of the intended patterns for the role of mediation of pleasurable activities variable are confirmed because after entering the mediation variable (pleasurable activities), the significance of the effect of cognitive behavioral therapy on depression is completely removed or reduced and causes medium or complete effects of this mediation variable. For studying the significance of indirect effects, Bootstrap test is used which is shown in Table 6.

Table 6. Estimating confidence interval for indirect effect of pleasurable activities on depression in cognitive behavioral therapy

Method	Estimation	SEM	Confidence Interval 0.95	Confidence Interval 0.99
Sobel	0.063	0.025	(0.014,0.112)	(-0.001,0.127)
GEE	0.063	0.022	(0.20,0.106)	(0.006,0.120)
Bootstrap Percent (0.009,0.131)	0.063		(0.027,0.124)	

According to Table 6, the SEM of the measurement in sobel test and the Generalized Estimations (GEE) are 0.025 and 0.022 respectively. Table 5 shows the mediation role of pleasurable activities variable in the pattern of analyzing path. For determining the significance of indirect paths of independent variable over dependent variable by means of mediator analysis, the Bootstrap method in SedPricher and Hyes program [34] were used. In the introduced method, Bootstrap and its confidence interval was used which directly evaluates the role of mediation. If the confidence interval of the upper and lower bound of indirect effect is not zero, the researcher's hypothesis based on the indirect effect of independent variable through mediation on dependent variable can be confirmed [35]. By considering Table 5, the statistical hypothesis based on the role of mediation of pleasurable activities in the relationship between cognitive behavioral therapy and depression by Bootstrap method is significant because the upper and lower bound of indirect effect is not zero (P,0.05). Also, the analysis by sobel test is shown in Table 6. The 0.95 confidence interval does not include zero so the statistical hypothesis based on the role of mediation of pleasurable activities in relation between cognitive behavioral therapy of depression is significant ($P<0.05$). This is while, in the assessment of pleasurable activities, relating to sobel test in the level of 0.99, the confidence interval is zero and in this case the indirect effect is rejected.

Discussion

A Mediation analysis has only been utilized in the research studies conducted by [23-36] who developed mediation analysis and believed that its primary use is in experimental studies. In this research results show that there is a significant difference between the average scores of pleasurable activities in experimental and control groups in the post-test. In other words and due to the significance of these differences of average scores, it can be concluded that the increase in pleasurable activities cause adolescents' depression scores to decrease in the post-test. These results are consistent with the findings of other studies [29-37,38]. The findings also show that gaining pleasure is beyond physiological needs satisfaction and is especially important as the pleasure gained after pleasant non-physical activities are more durable. Accordingly, in developing public education programs and therapeutic interventions, it is recommendable to lead people to activities such as music

which do not solely involve in physical needs satisfaction. Moreover, due to age requirements, teenagers are more likely to suffer from psychiatric disorders including depression [5]. It seems that the increase in pleasurable and social activities can help teenagers join social groups [1]. Social and other pleasurable activities can also foster a sense of self-esteem and destroy the psychological trauma caused by depression .Depressed patients often feel they are incapable of taking care of themselves and taking responsibility [5]. They have low self-confidence in controlling themselves and their depressed mood. By achieving physical activity goals, no matter how small they are, the sense of self-confidence and feeling of success can increase which as a result helps to take next positive steps. When people are depressed, they get less motivated to participate in positive events (generally activities). When positive events eventually stop occurring, the individual is at the risk of depression [7]. Studies show that there is an inverse relationship between positive events and depression. It seems that positive events are powerful tools for controlling depression [39-40]. This case is consistent with the results of the present research because after the intervention and the reduction of symptoms of depression, the level of pleasurable activities was at good level.

Conclusion

In this study, pleasurable activities was a mediator variable in cognitive behavioral therapy for depression. In test analysis, mediator means "revealing the secret of clinical therapeutic effects". For example, the combination of pleasurable activities, problem solving, relaxation, coping with dysfunctional attitudes are effective in the treatment in cognitive behavioral therapy of depression in teenagers [7]. Is the researcher ever able to recognize the role of each one of these factors in the effectiveness of treatment without mediator analysis? If some of these factors are not effective in the treatment, it can only be tracked by mediator analysis. On the other hand, the relative role of these variables in the mediator analysis is specified. Today, for determining the effective variables in treatment, those variables that appear to be involved in the intervention are taken into notice. Another main function of mediator analysis is examining psychological treatments in the development of eclectic and short-term treatments; which is obtained based on quantitative and experimental research. Strong treatment components can be achieved by mediator analysis and can be compared with each other. It is suggested that researchers deal with the investigation of clinical treatments based on the present study and to recognize the available elements and their effects in the treatment.The present study faced some limitations. Given that the population of this research was female high school students, generalization of the results therefore must be made extremely cautiously. According to the theoretical framework of cognitive approach and the results of previous studies and the results of the present study, the following suggestions are given: 1- More research to be done in this field for more samples and other age groups. 2- Carrying out this study is recommended for other mediator variables in cognitive behavioral therapy. 3- One of the important examinations in this research was to study the role of mediator variable in the therapy. This means, a large sample size of patients is required. This study, which is a combination of clinical trials and new statistical methods, faced limitations. It required a large sample size for getting results from the mediation analysis. This can be in conflict with the assumptions of the therapy in which small sample sizes are usually selected for therapy. As a result, the researcher overcame this problem to a large extent by using appropriate therapeutic relationships and proper grouping.

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