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**RESEARCH ARTICLE**

# The effect of cognitive-behavioral therapy on reducing the anxiety and depression of children with hearing loss

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## Abstract

**Background and Aim:** Mental health in children is a major key to success in their life. For children of any age, anxiety can strike without warning. This study was conducted to investigate the effects of cognitive-behavioral therapy (CBT) on reducing anxiety and depression of children with hearing impairment.

**Methods:** Thirty 7-11-year-old children with hearing impairment were randomly assigned to experimental (n=15) and control (n=15) groups. The intervention in the experimental group included identifying cognitions and incentives appraisal and correction of cognitions, assessing automated thoughts and cognitive distortions, teaching and tracking cognitive distortion, teaching and recognizing illogical beliefs, and assigning tasks. To collected data needed, interview and hospital anxiety and depression scale (HADS) were applied.

**Results:** There was a significant difference between control and experimental group after the intervention so that in the experimental group, a low score on depression and anxiety showed a significant reduction after the intervention ($p<0.05$). However, no significant change was observed in the score of the control group ($p>0.05$).

**Conclusion:** The results suggest that CBT is one of the effective methods in the field of treatment of depression and anxiety disorders of children with hearing loss. Overall, CBT can be applied to prevent negative effects of anxiety and depression on children with hearing loss.

**Keywords:** Cognitive-behavioral therapy; children with hearing loss; anxiety; depression

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## Introduction

Depression and anxiety are two important psychological issues with associated complications. Depression may cause inability to concentrate, significant weight loss or gain, insomnia or excessive sleeping, low energy, feelings of worthlessness or guilt, and thoughts of death or suicide. On the other hand, anxiety is characterized by feelings of tension, worried thoughts, and physical changes [1]. The mental effects of hearing loss are significantly stronger in patients with some other disorders. Suicide in hearing-impaired people is higher than other individuals. Since these children believe that they can never hear and, when observing a behavioral change in people around them they ascribe them to themselves, which can pave the way for the advent of mental disorders [2].

In general, the effects of hearing disorders could appear in form of different reactions in

individual, educational, and social domains. In an individual domain, it can cause a delay in speech and language delays, isolationism, pessimism, and spontaneity. In the field of education, it can cause unrealistic laziness and false educational backwardness and in social terms, it can cause non-social and antisocial disorders and reactions and even revenge. Mental disorders in people with hearing loss may appear in form of psychotic reactions (delusions and illusions), neurotic reactions of depression, and anxiety and behavioral disorders like theft, lying, escape, opposition, and sedition [3].

Pastor et al. reported that emotional and behavioral impairments are prevalent in childhood and most of the time can have negative effects on educational performance, social relations, and growth of children. Children and adolescents with hearing loss are exposed to behavioral problems more than normal population [4].

Behavioral disorders usually refer to behaviors without required consistency due to the age of people with norms and expectations and culture of the society. Also, the intensity or durability of these behaviors can make the risk for the safety of individual and others. Majority of relevant works have classified behavioral disorders in groups of intrinsic and extrinsic behaviors [5]

Guttmannova et al. believe that intrinsic behavioral disorders are under the control of emotions and include social isolation, depression, anxiety and mental complaints and extrinsic behavioral disorders; which refer to those behaviors out of control of emotions and encompass antisocial behavior, aggression, hyperactivity, bad temper, and violation of rules [6]. The findings show that why the emotional traits of hearing impaired children should be emphasized. Other investigations show that children and adolescents with hearing loss prefer to make a relationship with the people of the same impairment. The behavioral disorders of these children are among the most underlying issues in the field of exceptional child psychology. For more than one century, the experts in the field of medication medical and paramedical sciences, psychology specialists, speech therapists, and audiologists have attempted to diagnose and treat children with hearing loss [7].

To obtain an exact picture of the innate world of children with hearing impairment, a way should be selected to prevent unconscious resistance and defenses. One of most efficient methods to treat anxiety disorder is cognitive behavioral therapy (CBT). CBT as a type of psychotherapy technique has shown high efficiency in treating depression in adults with mild to moderate depression. However, a number of barriers, including cost, availability, and stigma prevent accessing these services [8].

Pirani et al. in a study on the effectiveness of CBT on social phobia of the hearing-impaired individual in the age-range of 20 to 30 years old found that social phobia scores decreased in the experimental group compared to the control group. Also, mean scores of social phobia components (fear, avoidance, and physiology) were less in the experimental group than in the control group [9]. Williams et al. conducted a cognitive therapy program for hearing-impaired employees suffering from mental distress and found that mean depression score was identical at pre- and post-intervention in the intervention group while it was increased in the treatment as usual (TAU) group. Symptoms of anxiety and avoidant communication decreased significantly in the intervention group [10].

The aim of this study was to investigate the effect of the cognitive-behavioral method on reducing the anxiety and depression of children with hearing loss.

## Methods

The present study was conducted using a semi-experimented method with pre- and post-test with control groups. Among those referring to Imam Reza rehabilitation center in Tabriz, Iran, 30 children with inclusion criteria were selected randomly in two experimental and control groups. The inclusion criteria were having hearing loss, being within the age range of 7-11 years, the presence of both parents in the family, willingness to participate in the research, regular attendance in sessions, written consent of

**Table 1. Treatment protocol**

| Treatment protocol | | |
|---|---|---|
| **Session** | **Explanation** | **Duration (**minutes) |
| **1 and 2** | performing pretest and determining the framework of sessions and general goals | two 60 |
| **3 and 4** | Identify cognitions and incentives; appraisal and correction of cognitions | two 60 |
| **5 and 6** | review of previous session and tasks, creation of vision among members and effective role of beliefs | two 60 |
| **7 and 8** | Assessment of automated thoughts and cognitive distortions | two 60 |
| **9 and 10** | Teaching and tracking cognitive distortions | two 60 |
| **11 and 12** | Teaching and recognizing illogical beliefs and assigning tasks | two 60 |
| **13 and 14** | checking previous tasks, identifying challenge and illogical belief | two 60 |
| **15 and 16** | pluralizing previous teachings and performing post-test | two 60 |

parents. On the other hand, exclusion criteria included being absent for more than one session and receiving other psychotherapy courses beside this semi-empirical research. Disability level of the children was evaluated before and after the intervention. Based on a purposeful sampling strategy, 30 hearing impairment children in the age range of 7-11 years participated in this study. Next, 15 children received cognitive-behavioral intervention as the experimental group and the other 15 hearing-impaired children were assigned to the control group, where no intervention was applied. During the time that experimental group was exposed to CBT, both groups received no medication. The instrument used in this study was a questionnaire set based on the hospital anxiety and depression scale (HADS). According to this scale, 7 items of the questionnaire are related to depression and 7 items are in the field of anxiety.

The experimental group received CBT for eight weeks with 2 h per week (totally 16 h). The treatment protocol (Table 1) was derived from Sahebi's work [11].

Since some hearing-impaired children lacked the ability to percept some phrases and concepts, the researcher used simple language and examples to complete the questionnaire. Techniques of CBT pattern in this research consist of eight sessions of group training; however, due to the presence of hearing-impaired children in the research content of each session, we performed them in two sessions. In general, a total of sixteen training sessions (Table 1) is required to address anxiety symptoms. We reviewed published descriptions of anxiety and CBT interventions for people with hearing impairment [9,10]. Elements of these impairments were incorporated into an intervention manual, developed by group facilitators.

The intervention comprised 8 two-hour sessions run on a weekly basis on the following topics: 1) performing pretest and determining the framework of sessions and general goals; 2) identifying cognitions, incentives, appraisal, and correction of cognitions; 3) reviewing previous session and tasks, creation of vision among members and effective role of beliefs; 4) assessing automated thoughts and cognitive distortions; 5) teaching and tracking cognitive distortions; 6) teaching and recognizing illogical beliefs and assigning tasks; 7) checking previous tasks and identifying challenge and illogical belief; and 8) pluralizing previous teachings and performing post-test.

Initial sessions focused on general topics so as to normalize experiences, identify commonalities between participants, and set goals. In our clinical experience, goal-setting can prove challenging for individuals with hearing impairment,

**Table 2. Demographic characteristics of hearing-impaired children in the experimental and control groups**

| | Experimental group | Control group |
|---|---|---|
| **Sex** | | |
| **Male/Female** | 8/7 | 9/6 |
| **Age** | | |
| **Mean (SD)** | 9.65 (2.15) | 10.30 (2.45) |
| **Hearing loss (dB)** | | |
| **Moderate (n)** | 12 | 10 |
| **Mean (SD)** | 49.80 (6.80) | 50.50 (5.10) |
| **Severe** | 3 | 5 |
| **Mean (SD)** | 76.05 (0.60) | 72.93 (7.25) |

perhaps either due to inherent difficulties with abstract thought and a tendency toward perseveration, or anxiety about change. As a result, we deliberately set personal goals several in sessions. This setting involved problem-solving over-arching difficulties (e.g. with managing change) and more specific problems (e.g. the impact of anxiety or previous experiences of failure). Later sessions focused on particular aspects of individual skills in order to enhance social understanding, reduce anxiety, and increase coping strategies.

The intervention was informed by a CBT framework and based on the premise that there are interdependent relationships between thoughts, emotions and physical feelings, behavioral responses, and coping strategies. Of note, CBT principles have underpinned how more neutral thoughts about social situations and alternative ways of thinking and responding can positively reduce anxiety.

We incorporated both behavioral and cognitive interventions yet, overall, more emphasis was placed on those interventions derived from cognitive principles; e.g. identifying and challenging negative automatic thoughts. Behavioral strategies including exposure were used less often during sessions. Each session was divided into two standard parts. In the early hour, patients provided some reports of their status and what they had to do. Implementation of the intervention was based on the plan.

As the statistical population in this study consists of 7-11-year-old children, the questionnaires were filled with the help of a therapist and mother of children. It is noteworthy that all the children were using hearing aid during the research. The experimental group was evaluated before and after the intervention and the results were compared with control group.

To measure the level of depression and anxiety, HADS was used. HADS space is a valid instrument to evaluate general depression and to estimate the severity of the emotional disorder. Each part of the test was scored on a 0-3 scale. Hence, the scores of subscales of depression and anxiety of HADS questionnaire were within the range of 0-21. The scores in range 0-7 are considered to be normal, 8-10 as mild, 11-14 as moderate, and 15-21 as severe. Estimation of Cronbach's alpha for 7 items of depression in HADS shows the internal consistency of this measurement scale (alpha=0.070). Estimation of Cronbach's alpha for the 7 items of anxiety in HADS shows the high internal consistency of the subscale (Alpha=0.85) [12]. The level of hearing loss was graded based on universal standards. The evaluation scores for the hearing level of both groups are presented in Table 2 [13].

To perform the statistical analysis, descriptive statistics and analysis of covariance (ANCOVA) were used. SPSS 20.0 was used for data analysis.

In this research, pretest scores were identified as synchronous variables and their effect on posttest scores was controlled by covariance analysis. Given that the ANCOVA is a parametric test, the assumptions of normal distribution and equality of variances were investigated. The results of the statistical assumptions showed both the precondition, the equality of variances (using Levene test), and normal distribution (using the Shapiro-Wilk test) ($p>0.05$).

## Results

The mean and standard deviation (SD) of scores

**Table 3. Mean and standard deviation of anxiety and depression in the pretest and post-test stages in both the experimental and control groups**

| Variables | Group | Mean (SD) | |
|---|---|---|---|
| | | Pretest | Post-test |
| **Anxiety** | | | |
| | **Experimental** | 7.45 (2.39) | 4.90 (1.26) |
| | **Control** | 6.90 (1.61) | 6.69 (2.41) |
| **Depression** | | | |
| | **Experimental** | 7.80 (2.60) | 4.20 (2.30) |
| | **Control** | 7.25 (3.10) | 7.40 (1.51) |

of age and hearing impairment are reported in Table 2. The mean (SD) age of the experimental group was 9.69 (2.15) and 10.30 (2.45) for the control group. The mean (SD) of hearing impairment in the experimental group for moderate and severe was 49.80 (6.80) dB) and 76 (0.60) dB, respectively. The mean (SD) of hearing impairment in control group for moderate and severe was 50.50 (5.10) dB and 72.90 (7.25) dB, respectively. Mean score of anxiety disorder in the experimental group in pretest was equal to 7.45 and it was equal to 6.90 in the control group. Mean score of depression disorder in the test and control groups in the pretest was 7.80 and 7.25, respectively (Table 3). As can be seen from Table 4, there was no significant difference between the mean scores of anxiety pretest and depression in the two experimental and control groups but when comparing scores pre- and post-intervention, significant improvements were seen in anxiety and depression. Mean score of anxiety disorder in experimental group after the intervention was reduced from 7.45 to 4.90. Moreover, the mean score of depression in the experimental group as a result of intervention was reduced from 7.80 to 4.20. Therefore, after intervention in the experimental group, the scores of depression and anxiety were significantly reduced. However, no significant variance was observed in scores of depression and anxiety in control group.

**Table 4. Results of covariance analysis on the effect of cognitive-behavioral therapy on anxiety and depression in hearing impaired children in post-test phase**

| Variables | p | Effect size | F |
|---|---|---|---|
| **Anxiety** | | | |
| **Pretest** | 0.002 | 0.38 | 6.10 |
| **Post-test** | 0.001 | 0.66 | 9.41 |
| **Depression** | | | |
| **Pretest** | 0.003 | 0.35 | 5.92 |
| **Post-test** | 0.001 | 0.64 | 8.38 |

## Discussion

This study aimed at investigating the effect of CBT on anxiety and depression in hearing-impaired children. Results obtained from this study showed a significant reduction in depression among test group members after intervention compared to the control group ($p<0.05$). Results of this research are in line with findings obtained by Gharashi et al. [14], Gourley et al. [15], and Movaleli et al. [16] that proved the effect of hearing impairment on stress and behavioral problems. Moreover, Edwards and Crocker [17] indicated that group meetings might increase parents' awareness of strategies and behaviors of the child. Therefore, it cannot be denied that hearing impairment has significant effects on the cognitive and social evolution of individuals so that behavioral and mental disorders can be observed clearly in people with hearing loss [3]. Parents of hearing-impaired children should be taught how to help hearing-impaired children, how to pay attention to educational and rehabilitation programs' follow-up, and how to use rehabilitation equipment in order to increase mental health of these children; because emotional, behavioral, social stability and mental health of children are affected by the relationships between child, parents and other people. In case of lack of attention to the relationship with children, anxiety and depression may be seen in them. Considering the

mentioned findings and significant effect of CBT on reducing depression symptoms among hearing-impaired children, it is essential to treat mental and moral problems among such children. Moreover, anxiety rate among hearing-impaired children was significantly reduced after CBT intervention compared to children in control group, suggesting the effect of CBT on reducing the anxiety of hearing-impaired children. However, there was not any significant change in depression and anxiety in control group since they received no intervention. Our results were matched with studies conducted by Movaleli et al. [16], Suárez [18], and Gourley et al. [15] about the effect of teaching social skills and life skills on changing beliefs and information of individuals as well as increasing their cognitive capabilities and reducing psychological concerns. To explain these findings, it can be stated that CBT is based on an open knowledge system in which some new facts, experiences, needs, and preferences may occur based on persons' need at any time. Therefore, cognitive methods consist of identifying and challenging negative thoughts to find alternatives for thinking; in this case, change and transformation in the intellectual and cognitive system lead to changes in person's reactions using cognitive factors that help the person to understand and interpret the fact. Hearing loss with anxiety and depression is as an important factor for the advent of a wide range of psychological disorders such as attachment disorder, Schizophrenia, and behavioral problems, which are reported in people with hearing loss more than normal people due to cognitive-emotional growth. Some reasons for this difficulty could be lack of adequate means for diagnosis and survey and lack of mental health specialists with required skill to communicate hearing impaired people [5].

However, it was rather difficult to use some concepts such as cognitive distortions within the process of teaching and treating sessions for hearing-impaired children because of their young age and cognitive and understanding problems caused by hearing loss, but using children literature and stories these concepts easier for children to understand. Moreover, examples and stories made children more satisfied with teaching method leading to the simple rememrance of cognitive distortions and illogical beliefs in children.

There were some limitations in this research such as a small sample size, impatience of children during training sessions, and difficulty to fill out questionnaires because of their young age and limited cognition due to their hearing impairment. In this regard, it is recommended conducting another study on children below 7 as respondents of this research were children in the age range of 7-11 years.

## Conclusion

It has been concluded that CBT can be effective in the treatment of behavioral disorders such as anxiety and depression. The CBT approach can be considered among the effective methods for the treatment of depression and anxiety disorders of children with hearing impairment. Thus, this technique can be applied to prevent negative effects of anxiety and depression on children with hearing loss, the cognitive-behavioral method.

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## Conflict of interest

The authors declared no conflicts of interest.

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