



Development of depression intervention software and its effectiveness on depressive symptoms

Ali. Fathi¹, Roya. Koochak Entezar^{2*}, Fatemeh. Golshani³

1. PhD Student, Department of Psychology, Central Tehran Branch, Islamic Azad University, Tehran, Iran.
2. Assistant Professor, Department of Psychology, Central Tehran Branch, Islamic Azad University, Tehran, Iran.
3. Assistant Professor, Department of Psychology, Central Tehran Branch, Islamic Azad University, Tehran, Iran.

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Corresponding Author's Info

Email: Royakentezar@yahoo.com

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ABSTRACT

Background and purpose: Web-based treatments are expanding rapidly. The aim of the present study was to compile a web-based treatment package and evaluate its effectiveness on the severity of depression symptoms. **Methods:** in the first stage, based on the themes extracted around the treatment of depression, four main themes (behavioral, cognitive, emotional and communication) and eighteen secondary themes (behavior modification and adjustment, reward, behavioral activation and promotion of health and sleep quality, problem-solving skills problem, correcting ineffective schemas, reducing rumination, correcting negative beliefs, decision-making skills, reducing self-criticism, challenging cognitive errors and mindfulness skills, strengthening internal motivation, self-compassion and emotion regulation skills, empathy skills, effective communication skills and Dare skill) to develop an intervention application in depression. This 13-session application consists of 46 educational videos and their related exercises, which have been approved by experts with an agreement coefficient of 0.89. This research is of a quantitative type and to achieve the objective of the sample research, 40 people between twenty-five and forty years of age with moderate depression were randomly divided into two experimental and control groups. **Results:** The research results indicate the effectiveness of the researcher's software on the severity of depression symptoms ($F=44.66$, $P<0.001$). Also, the results of the follow-up after two months indicated the stability of the effectiveness of the researcher's software on the severity of depression symptoms ($F=56.82$, $P<0.001$). Besides, the evaluation indicated that the changes were not significant according to gender ($F=0.57$, $P=0.46$). **Conclusion:** It can be concluded that the researcher's software was effective on the severity of depression symptoms and these results were permanent until the follow-up period.



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Introduction

Depression is the most important cause of disability for people aged 15 to 44 worldwide (Leahy, 2012). The cause of this situation can almost be seen in the chronicity and reversibility of this disease. Depression refers to a wide range of mental health problems associated with a lack of positive affect (loss of interest and enjoyment in everyday things and experiences), low mood, and a range of emotional, cognitive, physical, and behavioral symptoms. (Colton Thaler, 2008). The most common bias described in depression is the tendency to over-process negative emotional information over positive information. These negative cognitive biases have been described using scales of memory, attention, and interpretation (Browning et al., 2012). Depression can create problems for people in their work and social life, prevent them from doing the best work and tasks in the work environment, and prevent a person from enjoying his personal and social life. Therefore, its treatment is necessary and vital for a person (Demirbatir, 2012).

The web-based intervention has advantages for clients and therapists compared to traditional cognitive-behavioral therapy (Wright, 2005). This form of treatment can be implemented at any time, place, and speed, and topics can be revised whenever necessary (Giga, 2004). As Norcross and Prochaska predicted in a 2013 study using the opinions of 70 experts in the field of psychotherapy, internet-based programs and therapy using mobile phones will grow exponentially, and technology and economics undoubtedly provide a wide area for expansion. They provide a telepsychological trap. Web-based and software-based interventions have many potential benefits for individuals. Users can enter their desired program 24 hours a day and 365 days a year from the comfort of their homes. This may help increase accessibility, reduce long wait times, and address privacy concerns. In addition, it is potentially cost-effective and convenient, allowing users to seek treatment if desired. In any case, smartphones are a growing phenomenon with many advantages, including availability, portability, ease of use, and reduced usage costs (Michael, 2011). In this research, we have tried to find a practical, systematic, and step-by-step program to treat depressed patients so that these people can take a strong step to improve their condition by accessing its content through the Internet.

According to the report presented in 2015, there were more than 165,000 mental health software on Google Play and iTunes, about one-third of them emphasize diet, well-being, and exercise, and one-fourth of them focus on psychotherapy (Inal et al., 2020). Drubis (2019) examined the role of mobile health applications in depression treatment. This research aimed to determine the ethical applications of structure-based therapy for depression. The meta-analysis showed that such programs bring patients independence and are readily available and affordable. Nygren et al. (2019) investigated the effectiveness of Internet-based cognitive behavioral therapy on fifty Kurdish immigrants in Sweden. The results after an 8-week treatment period showed that the symptoms of depression were significantly reduced and the effects of the treatment remained after the 11-month follow-up. In the research conducted by Bricker et al. (2020), the effectiveness of the software was confirmed. They stated that 89% of the people under study used the software and were satisfied.

In sum, Examining the role of mobile health applications in treating depression showed that these applications bring independence to patients and are easily available and affordable. Considering the existence of a suitable platform for the use of the Internet and mobile phones in our country, this study is intended to prepare software in the Persian language that fits the conditions and needs of Iranian society and examine its effectiveness.

Method

The research method was quasi-experimental with a pre-test-post-test and follow-up design with a control group. Table 1 shows the design of the research. The statistical population consisted of all men and women in Tehran, aged between 25 and 40 years, with mild to moderate depression (score 14 to 28 based on the Beck Depression Test II) who have not yet undergone psychotherapy, did not abuse drugs, did not take psychiatric drugs, did not attempt suicide, did not meet the criteria for personality disorders, adjustment disorders, and trauma-related disorders, substance abuse, depression and bipolar disorder, and could work with the mobile phone software. Sampling from this statistical population included two groups of 20 people (each group includes ten men and ten women) and was available (through a call for voluntary participation).

Tools

1. Demographic Information Questionnaire. A demographic information questionnaire was created by the researcher, which was used to collect demographic information such as age, gender, etc., of the participants. This data was collected along with the information related to the severity of depression through the online software.

2. Beck Depression Inventory-II: To measure the level of depression of the participants, the standard Beck Inventory (BDI-II) was used. Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) has 21 items based on the Likert scale. Four grades are scored from zero to three, and the higher score indicates the severity of depression. In this questionnaire, 21 questions are asked about the person's feelings in the past two weeks until now. The range of scores is from 0 to 63. This questionnaire can be used in the population of 13 years and older, and as a general rule, a score of 14-19 is defined as mild depression, 20-28 as moderate depression, and 29-63 as severe depression. Anna O, Meagher, Neris, and Bramson (2001) reported internal consistency of 0.89 to 0.94.

3. Darmind Application. Darmind is a web-based application whose server-side software or so-called backend is written in Java language and uses the SpringBoot framework on the client side, and ReactJS is used to implement the web app. The reason for implementing the web app was its rapid development and easy availability for Android and iOS users, especially considering the sanctions' conditions and the App Store's unavailability. The database is based on PostgreSQL, and Redis is used for fast memory or cache. The Darmind application is implemented in Iran on Arvan's cloud servers, and the application host is implemented on a virtual server or Virtual Private Server. Its operating system is Linux, along with a dual-core CPU and 4 GB of RAM, as well as an SSD with a capacity of 50 GB of storage space at the Internet address: www.app.darmind.ir, which can be easily accessed by connecting to the Internet and using mobile phones or personal computers. It was available to people.

According to 4 main themes (behavioral, cognitive, emotional, and communication); and 18 sub-themes (behavior modification and adjustment, reward, behavioral activation and improvement of health and sleep quality,

behavior modification and adjustment (behavioral deficits and excesses), reward, behavioral activation and improving health and sleep quality, strengthening internal motivation, self-compassion and emotion regulation skills, empathy skills, effective communication skills, and daring skills) identified in the treatment of depression (resulting from Fathi et al.'s research), technique Interventions and exercises in depression and skill training were extracted from reliable and relevant sources. The techniques and interventions prepared in 13 sessions were designed in the depression intervention software. Each session included educational video clips and related exercises. Since we see less energy and activity levels in depressed patients, as a result, in the initial sessions, the main emphasis was on behavioral components, and the exercises were gradually developed from easy to difficult so that the patient could advance himself in the path of treatment. A name was chosen for the researcher-made software to facilitate and validate the work, and the name "Darmind" was used during the interventions. Darmind software, after being used by experts in the field of informatics, for the possibility of rapid development, the ability to edit by researchers, and its convenient availability for users of Android and iOS operating systems (especially because due to the conditions of App Store sanctions in It is not available for iOS users) it is designed as a web application. This application is implemented with the internet address www.app.darmind.ir.

Results

There were 20 participants in each group, and the number of men and women was equal. The average age of the experimental and control groups is 31.25 and 32.70, respectively, and the independent t-test results also show no significant difference in the average age between the two research groups ($P=0.31$ and $t=1.02$). At first, the severity of participants' depression was measured as a pre-test. After a thirteen-session therapeutic intervention with the help of Darmind application, the intensity of depression of people was measured again in the form of a post-test and follow-up (two months after the post-test). The average pre-test, post-test, and follow-up depression scores of the experimental group were 20.5, 20, and 19.95, respectively, and the control group was 22.25, 13.75, and 12.85, respectively.

Table 1. Descriptive indicators of the research variable

Variable	Stage	Control		Experiment	
		Mean	SD	Mean	SD
Depression	Pre-test	20.50	4.25	22.25	3.86
	Post-test	20.00	4.38	13.75	4.09
	Follow-up	19.95	4.36	12.85	4.28

In the above table, the descriptive indexes of the mean and standard deviation of the primary variable of the research are presented separately by the research groups. In order to analyze the obtained results, a univariable analysis of the covariance test was used. The results from the Shapiro-Wilk test show that the normality of the data for depression is established in all three stages of the test and for both groups ($P < 0.05$). The results in Table 4 show that the source of group membership changes is significant by controlling the pre-test results of depression ($F = 44.66$ and $P = 0.001$). This finding indicates the effectiveness of the researcher's software on the severity of depression symptoms. Also, the results show that the source of changes according to gender is not significant ($F = 0.57$ and $P = 0.46$). The results in Table 5 show that the source of group membership changes in the follow-up phase is significant by controlling the pre-test results of depression ($F = 56.82$ and $P = 0.001$). This finding indicates the stability of the effectiveness of the researcher's software on the severity of depression symptoms. Also, the results show that the source of changes according to gender is not significant ($F = 0.15$ and $P = 0.69$).

Conclusion

The present study aimed to compile a web-based treatment package and evaluate its effectiveness on the severity of depression symptoms. The research results indicate the effectiveness of the researcher's software on the severity of depression symptoms. Also, the results show that the source of changes according to gender is not significant. Also, the findings indicate the stability of the effectiveness of the researcher's software on the severity of depression symptoms. These findings were consistent with the research results of Burt-Schneider et al. (2015) and Didi et al (2014).

In explaining the findings of the present research, it can be said that in line with behavioral skills training, familiarity with the cognitive and emotional structure of the human mind and the way of cognitive reconstruction and challenge with inefficient thoughts, as well as the identification and regulation of emotions.

Knowledge that can lead to creating or promoting a sense of self-control and self-regulation in those seeking treatment. This information covers various behavioral, cognitive, emotional, and communication fields, such as daring, problem-solving, empathy, effective communication, mindfulness, improving health and sleep quality, decision-making, awareness of behavioral excesses and deficiencies, and behavior modification. Activating effective and rewarding behaviors, identifying distorted self-thoughts, dysfunctional beliefs, assumptions, maladaptive schemas, cognitive restructuring, recognizing and classifying emotions, and preventing self-criticism and self-compassion are included (Dunker et al., 2013). In the explanation of the obtained findings, it can be said that the behavioral tasks used in the depression treatment program, such as activity planning, providing graded tasks, teaching daring skills, etc., are not only to increase the reward to patients but also to help them evaluate and Challenges with their negative schemas were used. For example, a patient who has believed that he has nothing to say or that no one enjoys listening to his words, by being forced to talk to others, not only his ineffective beliefs are challenged but also learns that the lack of positive reaction from others is not a disaster. In fact, this exercise is a combination of behavioral activation, daring, facing, and challenging negative thoughts (Lipshitz et al., 2019).

Among the limitations of the research, we can mention the age range of the participants (25-40 years old), the impossibility of closely monitoring people's learning and exercises, the impossibility of extending the results to patients with severe depression, and the lack of attention to the background of people's depression and their personality type. In conclusion, it is suggested, considering the waiting periods of clients in psychological centers and social service organizations, which are sometimes very long, in order to fill the gap between the initial contact and the start of psychotherapy, it is possible to use web-based depression intervention as the primary treatment or supplementary treatment

during waiting periods. At the same time, in deprived and remote areas where mental health services are unavailable, using such software can be very effective, and with its development in other areas of mental health and treatment of other disorders such as anxiety, obsession, etc. A wider range of treatment seekers is covered. Another important point that, based on the survey of the participants, seemed necessary was the possibility of using 24-hour support services and a space for exchanging experiences in the application environment so that people with depression can go through the treatment process with higher motivation and create a dynamic space by sharing their positive experiences. Create positive and effective for themselves and others.

Conflict of Interest

The authors of this article have no conflict of interest in conducting and writing it.

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