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## **The effects of brief internet-based cognitive behavioral therapy intervention for senior students with health anxiety during the COVID-19 pandemic**

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**Abstract**---This study aimed to assess the efficiency of a brief online, self-guided cognitive behavioral therapy for general and health anxiety of high school senior students. 286 students (aged 18-19) in eight high schools of Mashhad were selected randomly and assessed with the short form of Health Anxiety Inventory and Beck Anxiety Inventory were selected. Participants in the intervention group (n = 143) received a 4-week iCBT worksheets, while the control group (n= 143) did not receive any interventions. After post-assessment, the total score of SHAI is decreased by 6.6(26%); for general anxiety, which was assessed with BAI, ANCOVA analysis indicated  $f(77)$ ,  $p < 0.001$ , partial  $\eta^2 = .23$ . in the health anxiety, analysis of the values in the total score indicated a significant difference between two groups  $f(10.76)$ ,  $p < 0.001$ , partial  $\eta^2 = .61$ . online self-guided CBT could be efficient for students to reduce their general and health anxiety during the COVID-19 pandemic.

**Keywords**---iCBT, health anxiety, anxiety, COVID-19, student, SHAI

## Introduction

Since the WHO pandemic announcement on March 11, 2020, many people have been infected, and even more than those have been influenced by the pandemic. People have been faced with many socio-economic consequences of this worldwide phenomenon. Those consequences increase the level of mood disorders, anxiety, sleep problems, and alcohol consumption (Czeisler, Howard & Rajaratnam, 2021). Under these circumstances, worry about health, belongings, and financial issues would be inevitable among lots of people, even can cause increases in health anxiety levels (Wahlund et al., 2020).

It has been shown that psychological distress in the current pandemic identified young adults aged 18–23 as the most vulnerable group, reporting the highest levels of stress and most significant prevalence of depressive symptoms among all ages surveyed (American Psychological Association, 2020). Many students have encountered more issues compared to other groups of societies during school closures (Esposito et al., 2021). Among those, senior students face more stressors, two of which are the national universities entrance exam and their national final exam. The stress of these has a lot of pressure on them, especially during the COVID-19 pandemic. (Guessoum et al., 2020). It was indicated that senior students' anxiety and worrying have been increased during the pandemic (Giannopoulou et al., 2021).

The *DSM-5* diagnostic criteria for illness anxiety disorder (previously known as health anxiety) specifies that the following symptoms need to be present for at least six months: pre-occupation with illness, absence of somatic symptoms, hypervigilance of own health, self-monitoring for signs of illness, complete avoidance of medical care or the conversely frequent seeking of medical care (APA, 2013). Diagnosis data about health anxiety prevalence are quite meager because it is relatively recent (Tyrer, 2018). A recent Australian national survey indicated a lifetime prevalence of health anxiety of 5.7% and a current prevalence of 3.4%, which is higher than previous studies (Sunderland, Newby, & Andrews., 2013). Another study indicated that approximately half of the undergraduate students in their sample reported clinically elevated psychological distress: health anxiety was most commonly elevated (30.3%), followed by depression (25.4%) and general anxiety (22.3%) (Kibbey, Fedorenko, & Farris., 2021).

During this unorthodox circumstance a brief psychological intervention for worrying about COVID-19 and health anxiety could be effective; it would also be time-saving and cost-effective (Wahlund et al., 2020). Also, internet-based CBT could have effectively decreased depression and anxiety symptoms (Aminoff et al., 2021). In another recent study, college students who received app-based CBT showed decreases in stress, anxiety, depression, and risky behaviors such as alcohol and tobacco abuse and sexual knowledge (Oliveira et al., 2021).

In the current situation, students need more psychological help and support; online and self-guided intervention could provide those for more considerable proportion of the students. Therefore, the aim of this study was designing then assessing the efficiency of a brief online, self-guided cognitive behavioral therapy for students.

## Method

### Participants

Participants were all boy senior high school students and unpaid volunteers (aged 18-19). We used cluster random sampling to select eight high schools with a population of 1181 senior students among eight educational districts in Mashhad. 188 students did not participate in the study; thus 993 participants were assessed with Health Anxiety Inventory (SHAI) and Beck Anxiety Inventory (BAI). The students with moderate (BAI=16-25) and severe anxiety (BAI=26-63) in the Beck Anxiety Inventory and anxious (SHAI=18-37) and hypochondriac (SHAI=38-54) in the short form of Health Anxiety Inventory were interred the study sample. Exclusion criteria were: (a) got a score in SHAI 17 or less (n=658), (b) got a score in BAI 15 or less (n=707), (c) non-responders to assessments (n=194). Eventually, 286 students with SHAI>17 and BAI>15 were selected.

### Materials

#### *Short form of Health Anxiety Inventory (Salkovskis et al., 2002)*

SHAI is a self-report scale developed by (Salkovskis et al., 2002) and has 18 questions. The first 14 ones have four options, out of which individuals should select the one that best describes their mental state. Questions 15-18 are intended to measure mental state in the event of influential and severe conditions, so it has three scores; main section, negative consequences, & total score. All questions are scored 0-3, with higher scores illustrating more health anxiety. The total score ranges from 0 to 54, below 0-17 for control patients, above 18-37 is anxious patients, and 37-54 is hypersonic patients (Salkovskis et al., 2002). The Persian validity and reliability were studied by Nargesi (Nargesi et al., 2017).

#### *Beck Anxiety Inventory (Beck, & Steer., 1993)*

The Beck Anxiety Inventory (BAI) is a 21-item self-report measure used to assess anxiety severity. It has strong psychometric properties related to internal consistency, validity, and reliability. The BAI is sufficiently capable of identifying anxiety symptoms in clinical populations and healthy ones (Rafiee & serif, 2013). It was suggested that score the inventory as 0-7: minimal anxiety; 8-15: mild anxiety; 16-25: moderate anxiety; and 26-63: severe anxiety (Beck, & Steer., 1993). It has been normalized by Rafiee (Rafiee & serif, 2013) in Iran.

### Procedure

Data collection and participation in the study were entirely online. SHAI and BAI were uploaded on Porsline (<https://porsline.ir>). Then the link of inventories and study advertisement with adequate information about the study was sent via Shad app to all senior students in those eight high schools (N= 1181). Out of 993 volunteers who completed the inventories via the link, 286 got SHAI 18 or more scores, and BAI 16 or more were interred to the study. All of the procedures took place anonymously, and there was no need for volunteers to disclose any information about themselves except their Shad app links and ages. The participants were included in the trial When the baseline assessment was completed.

## **Randomizing**

participants were randomized to an intervention group (n= 143) & control group (n= 143) on a 1:1 ratio. Randomizing was done on a protected website ([www.randomize.net](http://www.randomize.net)) and helped us ensure that each of the participants had an equal chance to be in either group and no influence by researchers on the group allocation.

Figure 1.

## **Intervention group**

Participants (n= 143) received the 4-week intervention which was a totally self-guided program. It consisted of cognitive-behavioral worksheets for health anxiety and general anxiety, specifically to reduce COVID-19 distress. Each one included a written part (maximum two pages) and some tasks for the participants to practice during that week sent on a weekly basis.

In the first worksheet relationship between anxiety, genetics, personality, neurochemicals of anxiety, and our experience of being anxious was clarified. Participants should have identified their terms for anxiety definition and changed them with more helpful thoughts. The participants are encouraged to write about their worry thoughts and show their anxiety symptoms. After that, they should have answered some questions about their experience during the week; how helpful those changed thoughts could be? Moreover, how much knowledge about symptoms of anxiety could be effective? The first week aimed to give the participants more understanding of anxiety and its causes and effects.

In the second module, first thoughts, feelings, and actions were evaluated for participants. They should have identified their feelings and thoughts on an ordinary day on a table. They had another table where they should put their actions that led to anxiety during the week and have scored and evaluated their amount of anxiety in the table properly. Having a brighter point of view about the relationship between thoughts, feelings, and actions was the primary goal of this module.

In the following worksheet, participants were given information about cognitive distortions. Those related to anxiety and health anxiety, mainly related to COVID-19, had been defined, and participants were being studied to challenge them and transform those negative thinking patterns with more helpful thoughts. They could study the mechanisms and consequences of cognitive distortions on their general and health anxiety.

Module four covered writing exercises about anxiety. They should have written about their feelings when they feel anxious and their symptoms. They have been encouraged to name their feelings as sharp as possible, but they have also been supposed to clarify their similarities and differences. Afterward, a deep breathing technique was taught to the participants to manage worrisome thoughts better. This module aims to illuminate feelings, discriminate anxiety from others, and give a coping strategy to participants.

## **Control Group**

Participants who were randomized to the control group (n= 143) were not given access to any interventions. It has been told that they feel free to contact their regular healthcare providers if their anxiety symptoms worsen significantly. After four weeks, the online assessments link was sent to all participants(n=286).

## **Data protection and confidentiality**

All of the participants had to approve they agreed to use their data in the study. The website (Porsline) anonymously gathered their responses to inventories in both phases. Each particular IP address contained the website to prevent attendance more than once. The website allocated a particular code to participants, and during the study, all the data were not personally identifiable to anyone.

## **Statistical Analyses**

This study aimed to elaborate the effects of the online self-guided CBT on health anxiety and general anxiety during COVID- 19 pandemic and compare the outcomes with a control group. To measure the effects of the self-guided CBT, scores of assessments from Porsline were examined. Data from participants that completed on Porsline at both phases (i.e., the pre & post-assessment) were included in the corresponding analyses. After that, four ANCOVAs were conducted to determine the statistically significant between online self-guided CBT and the control group on health and general anxiety. The pre-assessment measures were covaried to separate the influence of any differences in the pre-assessment measures between the intervention and control groups. The statistical procedures were performed using the Statistical Package for Social Sciences 26.0.

## **Results**

Table 1 indicates the number and average proportion of the Beck Anxiety Inventory and Health Anxiety Inventory in two groups. As the data displays, all of the proportions were decreased in the post-assessment in the intervention group compared to the baselines. However, any decline is not reflected in the control group in the post-assessment. The total score of SHAI is decreased by 6.6(26%) after a 4-week self-guided CBT program, although in this variable, we can see a minor increase in the control group after 4-week.

Table 1.

There was a significant difference between the CBT intervention group and the control group in the values of post-assessments. For general anxiety, which was assessed with BAI, ANCOVA analysis indicated  $f(77)$ ,  $p < 0.001$ , partial  $\eta^2 = .23$ . in the health anxiety, analysis of the values in the total score indicated a significant difference between two groups  $f(10.76)$ ,  $p < 0.001$ , partial  $\eta^2 = .61$ . Furthermore, there were significant differences in the two subscales of SHAI main section  $f(308.39)$ ,  $p < 0.001$ , partial  $\eta^2 = .55$  and negative consequences  $f(101.11)$ ,  $p$

<0.001, partial  $\eta^2 = .29$  in the post-assessments of the intervention in comparison with the control group. These data display that after the intervention, the mean of the anxiety and health anxiety assessments decreased significantly compared with the control group (see Table 2).

Table 2.

## Discussion

Our study assessed whether a brief online, self-guided cognitive behavioral therapy intervention could significantly decrease general anxiety and health anxiety during the sixth COVID-19 wave in high school senior students. While the control group values increased over time, the intervention group had significant reductions in general anxiety and health anxiety with medium between-group effect sizes MANCOVAs analysis. Also, the intervention caused a significant reduction in two sub-scales of the SHAI (the main section and the negative consequences) compared to the control group. The dropout rate in the intervention group indicated that the intervention was highly acceptable among senior students. Consequently, this brief online, self-guided CBT intervention effectively reduced general anxiety and health anxiety during the COVID-19 pandemic and helped enhance the high school students' health.

Although in most of the previous studies, treatments were longer (almost ten weeks) than ours (Anderson et al., 2017 & Anderson et al., 2020), one of the other ones was one week briefer (Wahlund et al., 2020) all of the results were in the same line as previous studies (Anderson et al., 2017 & Anderson et al., 2020, Wahlund et al., 2020, Aminoff et al., 2021, Ying et al., 2021). however, the current study is the first to assess the psychological intervention for general and health anxiety during the COVID-19 pandemic for senior high school students. This effectiveness of the brief online, self-guided CBT means that in extraordinary conditions like the COVID-19 pandemic, we are able to alter this intervention to the mainstreamed ones to access the treatments for a larger proportion of the students. Online interventions are also more flexible and more economical. The students can access an effective intervention for their anxiety via digital platforms. It means we are able to use these kinds of online interventions and supports for other parts of society as well, and it was successful in the general population (Wahlund et al., 2020). Moreover, the usage of the online therapies and interventions for distress and health anxiety has been increased (Mahoney et al., 2021, Staples et al., 2020, Titov et al., 2020, Li et al., 2020)

The fast altering of the COVID-19 pandemic made controlling a study difficult, and the circumnstances were very fluctuated. We started at the sixth wave of the pandemic when the high schools were closed in Iran. At the same time, the intervention we developed for the senior students was significantly effective. Although, it showed that the effect size was more significant than the brief online, self-guided (Cuijpers et al., 2014 & Wahlund et al., 2020). General anxiety between-group effect size was not very large but more significant than the most recent study (Brog et al., 2022), and it was significantly effective in the same line of results for increasing worry and anxiety during the COVID-19 pandemic (Wahlund et al., 2020 & Aminoff et al., 2021). Also, internet-based CBT effectively

reduced general anxiety and distress of adults during the COVID-19 pandemic (Ying et al., 2021).

Although health-related anxiety and distress are common in children and young people, with 15.7% of a sample of 14- to 19-year-olds reporting clinically significant hypochondriacal symptoms during the COVID-19 pandemic, it has been increased (Haig-Ferguson et al., 2020). To decrease the HA, the intervention was effective, and the largest between-group effect size was seen in the HA (total score of SHAI); this reduction was in the same line as another study in which iCBT helped to significantly decrease health anxiety in this pandemic (Sharrock et al., 2021).

There was a significant reduction in all four aspects of anxiety, all of which capered with the control group after a 4-week online self-guided CBT in eight high schools in Mashhad. This program was scalable, accessible, and effective for managing health anxiety general anxiety as well. A reduction in all aspects of anxiety assessed in this study may indicate that a specific self-guided iCBT program can target both general and health anxiety among students. Therefore, this kind of easily scalable intervention would be beneficial for students. We foresee the impact of this program on the other students and then on general society in future research. Moreover, comparing this program to regular CBT psychotherapy would illuminate the effectiveness. Also, what would be the follow-up analyses after one year? These are some suggestions for further examination and studies.

### **Statement of Ethics**

The authors declare that all of the procedures of this study comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

### **Disclosure statement**

We have no known conflict of interest to disclose.

### **Data availability statement**

The data that support the findings are available from the corresponding author upon reasonable request.

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Table 1. Baseline and post-assessment scores were averaged, and their standard deviation was in the intervention and control groups

|                             | Intervention group |       |      | Control group |       |      |
|-----------------------------|--------------------|-------|------|---------------|-------|------|
|                             | n                  | M     | SD   | n             | M     | SD   |
| Baseline Variable           |                    |       |      |               |       |      |
| BAI                         | 143                | 23.87 | 5.69 | 143           | 22.34 | 4.43 |
| HAI main section            | 143                | 19.41 | 4.95 | 143           | 21.77 | 4.63 |
| HAI negative consequences   | 143                | 5.69  | 1.74 | 143           | 5.93  | 1.78 |
| HAI total score             | 143                | 25.1  | 6.04 | 143           | 27.7  | 5.39 |
| Variable of post-assessment |                    |       |      |               |       |      |
| BAI                         | 126                | 20.27 | 4.1  | 125           | 22.68 | 4.35 |
| HAI main section            | 126                | 14.31 | 3.01 | 125           | 28.04 | 5.01 |
| HAI negative consequences   | 126                | 4.19  | 1.53 | 125           | 6.03  | 1.86 |
| HAI total score             | 126                | 18.5  | 3.52 | 125           | 22.01 | 3.79 |

Table 2. Findings from the ANCOVAs analysis indicate group post-assessment differences in SHAI and BAI outcome variables

| Source group              | Type III Sum of squares | df | F      | Sig. | Partial Eta Squared |
|---------------------------|-------------------------|----|--------|------|---------------------|
| BAI                       | 724.63                  | 1  | 77     | .000 | .23                 |
| HAI main section          | 2570.33                 | 1  | 308.39 | .000 | .55                 |
| HAI negative consequences | 192.11                  | 1  | 101.11 | .000 | .29                 |
| HAI total score           | 4178.73                 | 1  | 10.76  | .000 | .61                 |

Figure 1. Flow diagram of the number of participants who were retained in each condition for each phase of the study, of the n=286 who completed the baseline measures

