



**Research Paper: Comparison of the Effectiveness of Face-to-face and Internet-based Cognitive Behavioral Therapy on Cognitive Distortions and Emotion Regulation in Adolescents with Social Anxiety Disorder**



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**Abstract**

People with social anxiety face barriers to treatment under the pretext of avoiding interaction and the discomfort of self-disclosure. Using remote health services may be an alternative, but there has been no strong research evidence on the effectiveness of Internet-based methods in dealing with social anxiety. Therefore, this study aimed to compare the effectiveness of face-to-face and Internet-based Cognitive Behavioral Therapy on cognitive distortions and emotion regulation in adolescents with social anxiety disorder. The present study was a field experiment. A total of 51 adolescents with social anxiety were selected by cluster sampling method and randomly assigned to three face-to-face, Internet-based, and control therapy groups. Three groups were interviewed at the beginning and the end of the study and completed the social anxiety disorder screening questionnaire (SASA), cognitive distortion questionnaire (CDQ) and emotion regulation questionnaire (ERQ). The two experimental groups underwent therapeutic intervention during ten weekly sessions. The results of ANKOVA analysis showed that both forms of intervention effectively reduced cognitive distortions, improved emotion regulation, and reduced symptoms of social anxiety. Moreover, the results of MANKOVA analysis revealed that in the components of the need to please others and repression, face-to-face intervention was only effective. None of the intervention methods affected the two components of success and perfectionism significantly. In general, in all variables, the impact of the face-to-face intervention was greater than the Internet-based intervention. These results can support the use of Internet-based Cognitive Behavioral Therapy for adolescents with social anxiety disorder who, due to some circumstances, are unable to benefit from face-to-face treatment.

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## 1. Introduction

Social Anxiety Disorder (SAD) is one of the most common types of anxiety disorders and is recognized as the third major mental health problem globally (Davis et al., 2014). According to the DSM-5, social anxiety disorder is characterized by severe avoidance or distress in social situations and, on the other hand, by a significant and persistent fear of negative social evaluation (American Psychiatric Association, 2013) that includes academic achievement, job performance, and quality, significantly reducing social relationships (Beidel et al., 2021). People with this disorder are isolated in society and have difficulty building friendship and close relationship with others (Voncken et al., 2021). In these individuals, paying more attention to negative and threatening information and focusing more on oneself (Tolbert & Pinquart, 2015) cause physiological arousal and make an individual avoids social situations (American Psychiatric Association, 2013).

The average age of onset of social anxiety disorder in the United States is 13 years old, and 75% of people with this disorder are between 8 and 15 years of age. The onset of the occurrence of this disorder can be early childhood or after a stressful or embarrassing experience. The 12-month prevalence of social anxiety disorder is reported to be about 7% (American Psychiatric Association, 2013). In Iran, the prevalence of this disorder is reported to be between 3 to 10% (Qalandari, 2015; Ghazanfari & Nadri, 2019). Correspondingly, according to epidemiological studies of cultures, the lifetime prevalence of social anxiety disorder is 13% (Hoffart & Johnson, 2020), which is reported to be 5.67% in women

and 4.20% in men (Barnett et al., 2021). Therefore, women show more anxiety symptoms than men (Asher et al., 2017) and have a lower level of psychosocial function than men (Barnett et al., 2021). In general, among anxiety disorders, social anxiety disorder accounts for about 9% of all young people's psychological issues (Beidel et al., 2021).

Various factors can play a role in developing social anxiety disorder. These include biological factors, mood, social skills deficits, social cognition and information processing, parenting, negative life events, and adverse social experiences (Rapee & Spence, 2004). One of the factors involved in social anxiety is cognitive distortions. Cognitive distortions are thoughts, beliefs, and natural ways of thinking that cause us to have a wrong view of reality (Beck, 1963). In order to protect the previous false beliefs, they act to eliminate, generalize or distort internal and external stimuli (Schluter et al., 2019). Cognitive distortions are seen in relatively all mental disorders and even in healthy individuals (Beck et al., 1979). In social anxiety disorder, various types of cognitive distortions such as catastrophizing, overgeneralization, and mental filtering have been observed. In fact, the main characteristic of people with social anxiety disorder is a strong tendency to show themselves as incapacitated. Thus, they have flawed judgments and inefficient beliefs about their behavior and that of others (Clark et al., 1995).

This way of interpreting and distorting experiences leads to cognitive distortions (Beck, 2005). People who have negative expectations and beliefs about themselves and those around them pay close attention to the negative side of events and look to

the future with a negative outlook. As a result, these negative perceptions lead to poor performance and reduce a person's motivation to interact in the community drastically (Tolbert & Pinguart, 2015). It is also observed that patients with social anxiety disorder are more likely to cause catastrophic adverse events than other patients with other anxiety disorders (Huppert et al., 2007). In general, fear of evaluation in people with social anxiety disorder and cognitive distortions distort information in a way that exacerbates and perpetuates the disorder, SAD Cognitive-Behavioral Model (Heimberg et al., 1997; Heimberg et al., 2010).

Another influential factor in social anxiety disorder is emotion regulation. Emotion regulation is a process that controls a person's emotions and how they are expressed (Gross, 1998). In fact, emotion regulation is the process of initiating, maintaining, modifying, or changing the expression, intensity, or continuity of inner feelings and emotions involved in socio-psychological-physical functions in pursuit of goals (Thompson, 1994). Emotion regulation problems are seen in people with emotional distress and traumatic experiences and various mental disorders (Blasczyk-Schiep et al., 2019; Henschel et al., 2019; Uhl et al., 2019), including social anxiety disorder (Goodman et al., 2021).

The inflexibility of emotion regulation predisposes people to emotional disorders (Coifman & Summers, 2019; Hofmann et al., 2012). In social anxiety disorder, as an emotional disorder, there is a lack of flexibility in emotion regulation (Goodman et al., 2021) which manifests itself in great concern about social evaluation and rejection (Moscovitch et al., 2013;

Moscovitch, 2009). People with social anxiety also spend great amount energy managing their emotions to avoid adverse social consequences, characterized by over-reliance on avoidance and alternative methods (Kashdan et al., 2011). Based on whatever said, these people value controlling their emotions for fear of rejection and prefer to avoid distressing emotions and limit emotional expressions (Goodman & Kashdan, 2021; Kashdan et al., 2011).

Due to the relatively high prevalence of social anxiety disorder, several effective pharmacological and psychotherapeutic interventions have been proposed for its treatment (Bandelow & Michaelis, 2015; Bandelow et al., 2015). Among these interventions, Cognitive Behavioral Therapy can be mentioned (CBT). CBT, like pharmacotherapy, is a first-line treatment for a variety of anxiety disorders (Hofmann et al., 2012) and has specifically been proposed as a standard treatment for social anxiety disorder (Barkowski et al., 2016; Wersebe et al., 2013). CBT models have proven that avoidance plays a key role in developing and maintaining social anxiety (Hofmann, 2007; Clark, 2005; Clark et al., 1995; Heimberg et al., 1997) and coping techniques can target this behavioral, cognitive, and emotional avoidance (Clark, 2005). These techniques force the patient to repeatedly approach the stimuli he or she fears and become accustomed to or tolerate fear reactions (Eckman & Shean, 1997). However, research has shown that only 35% of people with social anxiety disorder are treated (Ruscio et al., 2008), and many sufferers remain untreated or seek treatment late (Kasper, 2006).

Treatment of people with a social anxiety disorder is hampered by their reluctance to socialize and their reluctance to self-disclose (Griffiths, 2013). For this reason, using remote mental health services can be an alternative. One of these services is Internet-based Cognitive Behavioral Therapy (iCBT). It has been proposed that the most commonly used method for treating anxiety disorders, with benefits such as cost-effectiveness is iCBT (Musiat & Tarrier, 2014; Apolinário-Hagen et al., 2010; Craske et al., 2009) which is accessed remotely (Mojtabaei et al., 2011). Research evidence shows that the usefulness of this treatment is promising, so adherence to iCBT is similar to face-to-face CBT (Van Ballegooijen et al., 2014). Nevertheless, there is still no strong and sufficient research evidence concerning the effectiveness of these methods compared to their traditional and face-to-face form especially in social anxiety disorder (Griffiths, 2013; Andrews et al., 2010; Craske et al., 2009). In general, due to the high prevalence of social anxiety disorder, especially in adolescents and the increase in its negative consequences for individuals and society, the lack of public access to face-to-face treatment services and the lack of sufficient evidence concerning the effectiveness of Internet-based treatment, research in this area is important and necessary. Therefore, this study aimed to compare the effectiveness of traditional and Internet-based Cognitive Behavioral Therapy on cognitive distortions and emotion regulation in adolescents with social anxiety disorder.

## 2. Methods

### 2.1. Participants

The present study was a field experiment, and in its implementation, a multi-group

pretest-post-test design with a control group was used. The population of this study included all female students in the first and second year of high school in Boroujerd in the academic year of 2021-2022. Fifty-one adolescent female students were selected and divided into three groups, namely face-to-face CBT intervention, online CBT intervention, and Controls which were randomly assigned by using a multi-stage cluster sampling method for choosing girls among schools in the city using social anxiety disorder screening questionnaire and structured clinical interview based on DSM-5 criteria. The criteria for selecting individuals among the students were being over 12 years old, being at first and second secondary school, not having other physical or mental illness, not taking medication or undergoing psychotherapy, and granting consent. Finally, according to the number of subjects, the pre-and post-test data of 47 subjects were analyzed and compared in three groups.

### 2.2. Materials

Adolescent Social Anxiety Disorder Questionnaire (SASA)

The SASA (Levpušček & Videc, 2008) consists of 28 items that measure adolescents' concerns, fears, and avoidant behaviors in social situations. Items are scored on a 5-point Likert scale (very low = 1 to very high = 5) with a minimum score of 28 and a maximum score of 140. Higher scores indicate symptoms of social anxiety. In the present study, a cut-off score of 96 was considered for initial screening. This questionnaire has two components: cognitive dimension and behavioral dimension. The validity and reliability of this questionnaire was confirmed in various studies (Xu et al., 2012). The confirmatory



factor analysis results illustrated that the two-factor structure fits well with the data. The alpha coefficients for the cognitive, behavioral, and overall scores of social anxiety subscales were reported to be 0.84, 0.68, and 0.83, respectively (Khodai et al., 2011). In the present study, Cronbach's alpha coefficient of this questionnaire was 0.91.

#### SCID-5-CV, Structured Clinical Interview for DSM-5

For a better and definitive diagnosis and rejection of other psychiatric disorders, a structured clinical interview for psychiatric disorders was used in the DSM-5, including a variety of disorders, consisting of social anxiety disorder. For most diagnoses, the level of agreement (kappa) above 0.70 was reported (Osório et al., 2019).

#### Cognitive Distortion Questionnaire (CDQ)

The 40-item CDQ (Beck & Wissman, 1978) is based on Beck's cognitive theory of depression. Items are scored on a 5-point Likert scale (strongly disagree = 1 to strongly agree = 5) with a minimum score of 40 and a maximum score of 200. Higher scores indicate cognitive distortion. This questionnaire has five subscales: the need to be approved, success, perfectionism, the need to please others, and the need to influence others. The internal reliability of this test was 0.9, and its reliability in 6 weeks' intervals was 0.73 (Rezaei, 2003). In the present study, Cronbach's alpha coefficient of this questionnaire was 0.88.

#### Emotional Regulation Questionnaire (ERQ)

ERQ (Gross & John, 2003) is designed in 10 items, including two re-evaluation components with six items and suppression with four items. Subjects on a 7-point Likert scale from strongly disagree (1) to

strongly agree (7); the lowest score for completing this questionnaire is 10 and the highest score 70. Higher scores reveal a setting in which participants experience a higher excitement. The internal correlation was 0.79 for the reassessment component and 0.73 for the suppression component (Gross & John, 2003). Cronbach's alpha coefficient of this questionnaire was reported as 0.83 for the reassessment component and 0.79 for the suppression component (Bigdeli et al., 2013). In the present study, Cronbach's alpha coefficient of this questionnaire was 0.86.

#### 2.3. Procedure

By observing ethical considerations and stating the objectives of the research and obtaining permission from Roshdiah Higher Education Institute, and receiving a letter of introduction from it, the researcher was referred to the General Department of Education of Boroujerd to conduct the present research. With the received permission, the research objectives were expressed to the management of the General Directorate of Education, information was obtained about the number of middle schools and high schools in Boroujerd. To form a cluster, three schools were randomly selected with the permission of the management and teachers considering the objectives of the research. By referring to the selected schools, the Social Anxiety Disorder Screening Questionnaire (SASA) was uploaded as an online file in the virtual classrooms of schools (Shaad Program) with a detailed explanation of the instructions. The completed questionnaires were displayed on the main site immediately after responding. After reviewing the preliminary results of the questionnaires (589 students), individuals with a score

higher than the cut-off score (85 people) were identified. These individuals were interviewed clinically structured according to DSM-5 criteria for reliability and accuracy of diagnosis. Then, according to the inclusion criteria and considering the probability of the participants' decline among the 57 diagnosed individuals, 51 students were selected; after ensuring their consent to participating in the study; as a participant, they were randomly assigned in three CBT interventions and control groups (17 people in each group). Pre-test data were collected from all three groups by explaining the instructions and ensuring confidentiality.

Regarding the location of the CBT intervention in person, the counseling room was set in one of the educational institutions in the city center, where everyone could attend quickly and easily, and the WhatsApp social media was used for the Internet-based intervention. Similarly, the considerations of ethics, confidentiality, and the right to leave the experiment for the experimental groups were fully explained. In order to prevent the participants from experiencing distress, giving prior notification, hiring special taxis for women for the CBT intervention group members to travel to the educational institution, applying provision of the Internet for the CBT intervention group members, and providing material and spiritual incentives were considered. However, there were two participants in the CBT intervention group, one participant in the iCBT intervention group, and one participant in the control group who dropped out. Finally, post-test data were collected from all three groups ( $n = 47$ ). After collecting the post-test data, approximately 14 people, for the control

group to benefit from the treatment services, the full CBT Internet intervention was held.

#### 2.4. Treatment

An integrated protocol based on two applied methods was used for the intervention program; that is, Cognitive Behavioral Therapy for social anxiety disorder (Hofmann & Otto, 2017) and Cognitive Behavioral Therapy for anxiety (Kendall & Hedtke, 2006) were employed. This protocol was similarly prepared in both face-to-face and Internet-based forms. The intervention protocol was presented in person and based on the Internet in 10 sessions of 1.5 hours per week for both experimental groups. In general, the regular schedule of each session was as follows: First, the current session began by reviewing the assignments of the previous session. Then the treatment steps were performed, and at the end, homework was presented. In Table 1, the general strategies of this intervention are similarly introduced in both face-to-face and online forms during the sessions.

In the present study, one week after the pre-test, Cognitive Behavioral Therapy intervention was performed both in person and online with the same protocol for both face-to-face and online experimental groups for ten sessions once a week, each session had 90 minutes treatment intervention, Cognitive Behavioral Therapy. However, the control group did not receive any intervention until post-test data collection. Post-test was performed in all three groups one week after the end of the treatment intervention. Cognitive Behavioral Therapy intervention, in person and online, were as independent variables and variables of cognitive distortions and emotion regulation were as dependent

variables. Age, physical illness, and pre-test values were considered to be control variables.

Table 1 *Therapeutic protocol*

sessions	Steps	Contents of sessions
1	Introducing and establishing a therapeutic relationship	In this session, the principles of confidentiality, the conceptualization of the disorder, the basis of Cognitive Behavioral Therapy, clients' goals of treatment, and creation of a scale of confrontation (list of fears and situations that cause it in order of intensity) were discussed.
2	Examining thoughts, emotions and behaviors	Explaining the relationship between thoughts, emotions, and behaviors in social anxiety disorder and recognize them.
3	Physical reaction to emotions	Explaining how to recognize emotions from the face and body; Implementing the first phase of the FEAR plan (identify the disorder's symptoms and learn how to deal with it).
4	Meditation	Applying relaxation technique with abdominal breathing training and focusing on body muscles was presented in the form of gradual muscle relaxation.
5	Listening to thoughts	Explaining mind reading and recognizing thinking traps; Implementing the second phase of the FEAR plan (identification of automatic negative thoughts and their adjustment).
6	Problem solving and rewards	Making a list of things to do and grading their ability to do them; Implementing the third and fourth stages of the FEAR plan (problem solving and countermeasures; review the results and reward yourself).
7	Exposure (First level)	Practicing an anxious social situation (low anxiety situation) based on scale exposure.
8	Exposure (second level)	Practicing an anxious social situation (moderate anxiety situation) based on scale exposure.
9	Exposure (Third level)	Practicing an anxious social situation (situation with more anxiety) based on scale exposure.
10	Real exposure and termination of treatment	Practicing an anxious social situation (real situation) in everyday life; Summarizing the progress and make the final decision to complete the treatment.

### 2.5. Data Analysis

SPSS software version 24 was run for statistical analysis. Mean, and standard deviation were used to report descriptive data indices. Univariate and Multivariate analyses of covariance were employed to examine the treatment effect. The accepted

significance level was considered equal to 0.05 ( $p \leq 0.05$ ).

### 3. Results

The participants' mean (and standard deviation) age was 14 (1.42) in the age range of 12 to 17 years. About 55% of participants were the first child of the

family. Most of them lived in a family of 4 to 5 people (.81). The education levels of their parents were mostly at primary or secondary school level (67%). Nevertheless, most participants' fathers were self-employed (74%), and their mothers were

housewives (100%).

**Table 2** highlights the mean and standard deviation of the three groups in cognitive distortion, emotion regulation, social anxiety, and their components. (**Table 2**).

Table 2  
Descriptive indices (n = 47)

Variables	Situation	fCBT	iCBT	CG
		M (S)	M (S)	M (S)
Cognitive Distortions	Pre-test	154.13 (10.35)	150.56 (9.32)	150.81 (9.01)
	Post-test	130.13 (8.52)	141.81 (8.44)	148.93 (6.16)
The need to be approved	Pre-test	32.46 (2.79)	31.25 (3.54)	31.50 (2.78)
	Post-test	24.40 (2.22)	28.56 (2.12)	31.25 (3.04)
Success	Pre-test	28.53 (5.42)	30.93 (5.28)	27.78 (5.65)
	Post-test	26.93 (3.71)	29.43 (5.22)	27.62 (3.72)
Perfectionism	Pre-test	28.73 (3.45)	29.43 (2.73)	30.50 (3.44)
	Post-test	27.86 (2.61)	28.81 (3.18)	29.93 (3.43)
The need to please others	Pre-test	31.53 (2.89)	28.18 (3.72)	29.56 (3.03)
	Post-test	25.60 (3.29)	26.87 (3.48)	29.37 (2.57)
The need to influence others	Pre-test	32.86 (4.50)	30.75 (2.67)	31.37 (4.41)
	Post-test	25.33 (3.84)	28.12 (2.89)	30.75 (3.51)
Emotion Regulation	Pre-test	37.33 (5.44)	37.18 (4.00)	37.68 (6.00)
	Post-test	49.80 (4.11)	43.75 (3.54)	39.87 (4.42)
Re-evaluation	Pre-test	21.60 (3.75)	20.78 (3.36)	22.00 (3.96)
	Post-test	30.06 (3.47)	26.31 (3.00)	23.68 (3.21)
Suppression	Pre-test	15.73 (2.60)	16.50 (2.36)	15.68 (3.43)
	Post-test	19.73 (1.79)	17.43 (1.82)	16.18 (2.40)
Social Anxiety	Pre-test	108.26 (5.86)	108.50 (4.93)	106.62 (6.43)
	Post-test	85.53 (7.86)	96.50 (4.83)	104.37 (7.64)
Cognitive dimension	Pre-test	57.06 (4.53)	55.75 (4.83)	56.37 (4.60)
	Post-test	45.86 (5.05)	49.56 (3.30)	54.78 (4.64)
Behavioral dimension	Pre-test	51.20 (3.91)	52.75 (4.41)	50.25 (3.69)
	Post-test	39.66 (5.56)	46.93 (3.94)	49.50 (5.09)

Note. fCBT = Face-to-face Group; iCBT = Internet-based Group; CG = Control Group

All of these variables had a normal distribution. To compare the effectiveness of face-to-face and Online Cognitive Behavioral Therapy on cognitive distortions, emotion regulation, and social anxiety, univariate analysis of covariance

was hired to examine overall scores, and multivariate analysis of covariance was used to examine their components (with pre-test scores as covariates). The results of ANCOVAs reported in **Table 3** examine group differences in overall scores of



cognitive distortions, emotion regulation, and social anxiety.

Table 3  
ANCOVAs results

Variables	SS	Df	MS	F	$\eta_p^2$	OP
Cognitive Distortions	3522.189	2	1761.094	170.701***	0.888	1
Emotion Regulation	800.633	2	400.316	59.196***	0.734	1
Social Anxiety	3138.313	2	1569.157	68.663***	0.762	1

Note. SS = Sum of Squares; MS = Mean Square.  $\eta_p^2$  = Partial Eta Squared; OP = Observed power.

\*\*\*  $p < 0.001$ .

According to Table 3, the results showed that between the three groups in the overall score of cognitive distortions ( $F= 170.701$ ;  $p < 0.05$ ;  $\eta_p^2=0.888$ ), emotion regulation ( $F= 59.196$ ;  $p < 0.05$ ;  $\eta_p^2= 0.734$ ) and social anxiety ( $F= 68.6631$ ;  $p < 0.05$ ;  $\eta_p^2= 0.762$ ) there was a significant difference. Eta-squared revealed that the difference between the three groups in these variables was significant in total, and these differences were 0.888, 0.734, and 0.762, respectively. Each variable explained 88.8%, 73.4%, and 76.2% of the variance related to the difference between the three groups, respectively. This means that experimental conditions affected these variables (reducing cognitive distortions, increasing emotion regulation, and reducing social anxiety) and had significant therapeutic effects.

The results related to the credit indicators of MANCOVAs for the components of each of the variables indicated that the effect of the group on the composition of the components of cognitive distortions ( $Wilks's\ lambda= 0.095$ ;  $F= 15.702$ ,  $p < 0.05$ ,  $\eta_p^2= 0.692$ ,  $OP=$

1), components of emotion regulation ( $Wilks's\ lambda= 0.219$ ;  $F= 23.344$ ,  $p < 0.05$ ,  $\eta_p^2= 0.532$ ,  $OP= 1$ ) and components of social anxiety ( $Wilks's\ lambda= 0.177$ ;  $F= 28.164$ ,  $p < 0.05$ ,  $\eta_p^2= 0.579$ ,  $OP= 1$ ) were significant. Eta-squared revealed that the difference between the three groups was significant considering the components of each of the dependent variables and the amount of this difference; based on the Eta-squared, the components of cognitive distortion, emotion regulation, and social anxiety were 0.692, 0.532 and 0.579, respectively. That is, 69.2%, 53.2%, and 57.9% of the variance related to the difference between the three groups in the post-test components of cognitive distortions, emotion regulation, and social anxiety with statistical control of the pre-test were due to experimental conditions.

To examine the differences between groups in each of the components of cognitive distortion, emotion regulation, and social anxiety MANCOVAs was run the results of which is reported in Table 4. perfectionism.

Table 4.  
MANCOVAs results

Variables	SS	df	MS	F	$\eta_p^2$	OP
The need to be approved	365.167	2	182.583	47.642***	0.709	1
Success	11.484	2	5.742	2.503	0.114	.472
Perfectionism	.419	2	.209	.099	0.005	.064
The need to please others	205.720	2	102.860	34.191***	0.637	1
The need to influence others	288.508	2	144.254	49.103***	0.716	1
Re-evaluation	342.889	2	171.444	38.312***	0.646	1
Suppression	105.152	2	52.576	39.594***	0.653	1
Cognitive dimension	658.591	2	329.295	23.954***	0.533	1
Behavioral dimension	930.326	2	465.163	88.935***	0.809	1

Note. SS = Sum of Squares; MS = Mean Square.  $\eta_p^2$  = Partial Eta Squared; OP = Observed power.

\*\*\*  $p < 0.001$ .

According to Table 4, there was a significant difference between the three groups in the 2-component of emotion regulation includes re-appraisal ( $F= 38.312$ ;  $p < 0.05$ ;  $\eta_p^2 = 0.646$ ) and suppression ( $F= 39.594$ ;  $p < 0.05$ ;  $\eta_p^2 = 0.653$ ). Eta-squared demonstrated that the difference between the three groups in these two components were 0.646 and 0.653, respectively. Each component explained about 63.6% and 65.3% of the variance related to the differences between the three groups, respectively. That is to say, the experimental conditions were effective in improving these components (increasing re-appraisal and reducing repression). Additionally based on Table 4, there was a significant difference between the three groups in the 2-component of social

anxiety, including the cognitive dimension ( $F= 23.954$ ;  $p < 0.05$ ;  $\eta_p^2 = 0.533$ ) and behavioral dimension ( $F= 88.935$ ;  $p < 0.05$ ;  $\eta_p^2 = 0.809$ ). Eta-squared showed that the difference between the three groups in these two components were 533 and 0.809, respectively. Each component explained about 53.3% and 80.9% of the variance related to the differences between the three groups, respectively. In other words, experimental conditions effectively improved these components (reducing fear of negative evaluation and reducing stress and inhibition in social interaction). In order to investigate which one had the higher mean among the groups in the post-test after being modified by the Bonferroni test, the adjusted means are reported in Tables 5 and 6.

Table 5  
Adjusted Means Difference results in Cognitive Distortions

Variables	Group (I)	Group (J)	MD (I-J)	Std. Error	95% CI	
					LB	UB
Cognitive Distortions	fCBT	iCBT	-14.300***	1.168	-17.210	-11.389
	fCBT	CG	-21.241***	1.166	-24.147	-18.336
	iCBT	CG	-6.942***	1.136	-9.771	-4.112
The need to be approved	fCBT	iCBT	-4.543***	0.845	-6.656	-2.430
	fCBT	CG	-7.463***	0.766	-9.379	-5.547
	iCBT	CG	-2.920**	0.760	-4.821	-1.019
Success	fCBT	iCBT	-1.023	0.652	-2.655	0.608
	fCBT	CG	-1.301	0.591	-2.781	0.179
	iCBT	CG	-0.278	0.587	-1.745	1.190
Perfectionism	fCBT	iCBT	-0.134	0.625	-1.698	1.430
	fCBT	CG	-0.252	0.567	-1.670	1.167
	iCBT	CG	-0.118	0.563	-1.525	1.290
The need to please others	fCBT	iCBT	-4.204***	0.747	-6.073	-2.336
	fCBT	CG	-5.533***	0.677	-7.228	-3.839
	iCBT	CG	-1.329	0.672	-3.010	0.352
The need to influence others	fCBT	iCBT	-4.408***	0.738	-6.254	-2.561
	fCBT	CG	-6.624***	0.669	-8.298	-4.949
	iCBT	CG	-2.216*	0.664	-3.877	-0.555

Note. fCBT = Face-to-face Group; iCBT = Internet-based Group; CG = Control Group; MD = Mean Difference; CI = Confidence Interval for Difference; LB = Lower Bound; UB = Upper Bound.

\*  $p < 0.05$ . \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$ .

According to Table 5, there was a significant difference between the three groups in the total score of cognitive distortions and the two components of the need to be approved and influence others. In other words, each of the face-to-face and online intervention methods was effective in reducing these components. However,

the effect of the face-to-face intervention was greater than the online intervention. In the component of the need to please others, the face-to-face intervention was only effective, while online intervention had no significant effect. None of the intervention methods significantly affected the two components of success and perfectionism.

Table 6.

*Adjusted Means Difference results in Emotion Regulation and Social Anxiety*

Variables	Group (I)	Group (J)	MD (I-J)	Std. Error	95% CI	
					LB	UB
Emotion Regulation	fCBT	iCBT	5.963***	0.935	3.634	8.291
	fCBT	CG	10.137***	0.935	7.808	12.466
	iCBT	CG	4.174***	0.920	1.882	6.466
Re-evaluation	fCBT	iCBT	3.085**	0.772	1.159	5.010
	fCBT	CG	6.655***	0.761	4.757	8.553
	iCBT	CG	3.570***	0.767	1.659	5.481
Suppression	fCBT	iCBT	2.806***	0.421	1.757	3.855
	fCBT	CG	3.498***	0.415	2.464	4.532
	iCBT	CG	0.693	0.418	-0.348	1.734
Social Anxiety	fCBT	iCBT	-10.764***	1.718	-15.045	-6.483
	fCBT	CG	-20.268***	1.730	-24.579	-15.958
	iCBT	CG	-9.504***	1.706	-13.755	-5.253
Cognitive dimension	fCBT	iCBT	-4.497*	1.356	-7.879	-1.115
	fCBT	CG	-9.292***	1.343	-12.641	-5.944
	iCBT	CG	-4.795*	1.356	-8.178	-1.413
Behavioral dimension	fCBT	iCBT	-5.937***	0.837	-8.024	-3.851
	fCBT	CG	-11.036***	0.828	-13.101	-8.970
	iCBT	CG	-5.098***	0.837	-7.185	-3.012

Note. fCBT = Face-to-face Group; iCBT = Internet-based Group; CG = Control Group; MD = Mean Difference; CI = Confidence Interval for Difference; LB = Lower Bound; UB = Upper Bound.

\*  $p < 0.05$ . \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$ .

According to Table 6, there was a significant difference between the three groups in the total score of emotion regulation and only in its re-appraisal component. That is to say, each of the methods of face-to-face and Internet intervention was effective in reducing this component. Nevertheless, the effect of the face-to-face intervention was greater than the online intervention. The face-to-face intervention was only effective in the suppression component; whereas, online intervention had no significant effect. Correspondingly, there was a significant difference between the three groups in the total social anxiety score and its two components. In other words, each of the face-to-face and online intervention

methods was effective in reducing these two components. On the other hand, the effect of the face-to-face intervention was greater than the online intervention.

#### 4. Discussion

This study aimed to compare the effectiveness of face-to-face and Internet-based Cognitive Behavioral Therapy on cognitive distortions and emotion regulation in adolescents with social anxiety disorder. In general, the results showed that both face-to-face and Internet-based forms of Cognitive Behavioral Therapy had a significant effect on reducing cognitive distortions, increasing emotion regulation, and reducing anxiety symptoms in adolescents with social



anxiety disorder. Accordingly, a significant difference was observed between the two groups of Cognitive Behavioral Therapy and the control group in the post-test of these variables. The size of the effect was also large. Therefore, Cognitive Behavioral Therapy seems to be effective in reducing cognitive distortions, increasing emotion regulation, and reducing the symptoms of social anxiety disorder in adolescents with this disorder. This substantiates previous findings in the literature (Rukmimi et al., 2021; Asbrand et al., 2019; McEvoy et al., 2018; Hearn et al., 2018). Khodaei et al. (2020) stressed that Cognitive Behavioral Therapy can reduce social anxiety. Therefore, it can be said that Cognitive Behavioral Therapy can reduce social anxiety. However, in all variables, the impact of the face-to-face intervention was greater than the Internet-based intervention. Our results share similarities with some previous findings (Nauphal et al., 2021; Peros et al., 2021; Kampmann et al., 2016). Seydavi (2018) expressed that Internet-based intervention can reduce social anxiety. Therefore, it can be said that Internet-based intervention can reduce social anxiety.

Based on the present study's results, adolescents in the two groups of face-to-face and Internet-based Cognitive Behavioral Therapy compared to adolescents in the control group revealed a significant decrease in scores after the cognitive distortion test. This concurs with the results of research by Kuru et al. (2017) and Morrison et al. (2015). Naderzadeh et al. (2019) expressed that Cognitive Behavioral Therapy could reduce cognitive distortions. Therefore, it can be said that Cognitive Behavioral Therapy can reduce cognitive distortions. Based on the

cognitive model of threat response (Beck et al., 1985), anxious individuals have defective cognitive processing when faced with potentially dangerous situations. They focus on the limited position dimensions, lost information, and distorted image creation. Their anxiety is maintained by these distortions and their poor evaluation of performance in various situations. They make systematic errors or cognitive distortions in the interpretation of their experiences. These cognitive distortions filter their minds and rarely challenge them, leading to psychological distress. Consequently, the need for approval, judgment, perfectionism, thinking all or nothing, without flaws, negative predictions are activated in them and, accordingly, they avoid establishing relationships with others and good performance in society, leading to social anxiety. In fact, the characteristic feature of these people is the fear of being seen and evaluated by others and not being approved. They think that if they are not perfect, others will think negatively about them and, therefore, predict negative consequences for their performance. Hence, cognitive information processing is important and vital, both from a causal point of view and in the maintenance and treatment of anxiety disorders. From a therapeutic point of view, learning the measures of identifying and improving defective thinking and behavior and learning to deal with the traps of thinking and controlling thoughts is important for having appropriate and adaptive relationships. It reduces cognitive distortions, improves interpersonal relationships, and promotes social relationships by removing mental filters and generating confrontational thoughts (Naderzadeh et al., 2019).

Accordingly, it can be explained why in the present study, both face-to-face and Internet-based forms of Cognitive Behavioral Therapy were effective in reducing cognitive distortions in the two experimental groups compared to the control group and also, they were associated with fewer symptoms of social anxiety disorder. Adolescents in the two experimental groups learned through traditional Internet-based Cognitive Behavioral Therapy intervention to be sensitive to their thoughts on various situations and their behavioral and emotional consequences. They learned to monitor their spontaneous thoughts in their particular situation, identify defective thoughts, and consider other intellectual content by interpreting stimuli and social contexts properly. For example, when explaining something in the classroom, instead of thinking that everyone is aware that I am anxious and my voice is trembling, and I might be doing something wrong, consider thoughts like everyone might be anxious, and my friends are enjoying my explanation. In addition, they should pay attention to their traps, which can lead to signs of distortions, and try to identify and get rid of them. For example, they monitor their thoughts about which ones are traps of thought leading to an increase in anxiety and find that these thoughts prevent them from being in the community and consequently cause symptoms of social anxiety disorder.

Based on the present study results, adolescents in the two experimental groups showed a significant increase in the emotion regulation post-test scores compared to adolescents in the control group. This is in good agreement with the results of research by [Goodman et al.](#)

(2021), [Hiekkaranta et al. \(2021\)](#) and [Dixon et al. \(2019\)](#). [Imani et al. \(2018\)](#) highlighted that Cognitive Behavioral Therapy could increase emotion regulation. Therefore, it can be said that Cognitive Behavioral Therapy can increase emotion regulation. Considering the fact that Cognitive Behavioral Therapy is a therapy based on emotion control, awareness, and processing without distortion and efficient emotions and based on reducing cognitive errors, leading to problems in emotion regulation, can improve excitement regulation. Research revealed that there have been many cognitive errors in emotion regulation problems that lead to emotional problems in individuals. These errors include mind reading, prediction, catastrophe, selective abstraction, over-generalization and emotional reasoning ([Imani, Al-Khalil & Shukri, 2018](#)); moreover, controlling and modifying each of them through Cognitive Behavioral Therapy can have a significant effect on reducing and improving emotional regulation problems. In fact, dysfunctional attitudes and beliefs confuse people ([Ellis, 1991](#)) in a way that the more these dysfunctional attitudes and irrational beliefs of individuals, the more emotional turmoil it will cause ([Smith & Houstonkent, 1983](#); [Watson et al., 1998](#)). Thus, identifying and modifying these attitudes and beliefs can effectively reduce confusion and increase emotional regulation. In general, cognitive reconstruction plays an important role in breaking the cycle of social anxiety and helps individuals change their dysfunctional negative beliefs through challenges between therapist and client during group sessions. It also reduces clients' anticipated avoidance and anxiety. It increases their ability to reinforce others

positively and think adaptively about their own experiences (Himberg & Beck, 2002).

Based on the present study results, adolescents in the two experimental groups suggested a significant decrease in social anxiety post-test scores compared to adolescents in the control group. This finding is consistent with the results of research by Thurston et al. (2017), Hullu et al. (2017) and Bahari et al. (2020). Heydarianfard et al. (2015) revealed that Cognitive Behavioral Therapy can affect social anxiety. Therefore, it can be said that Cognitive Behavioral Therapy can reduce symptoms of social anxiety. In general, Cognitive Behavioral Therapy reduces social anxiety through cognitive and behavioral reconstruction. Cognitive reconstruction plays an important role in breaking the cycle of social anxiety (Himberg & Becker, 2002) and helps individuals change their dysfunctional negative beliefs through challenges between therapist and client during sessions. It also reduces clients' predictive avoidance and anxiety through behavioral reconstruction. It increases their ability to communicate effectively with others and think adaptively about their own experiences (Heydarian-Fard et al., 2015). On the other hand, Cognitive Behavioral Therapy can reduce social anxiety disorder by reducing cognitive distortions and increasing emotional regulation, as observed in the present study. Examining social anxiety components showed that adolescents in the two experimental groups had a significant decrease in scores compared to the control group in social anxiety cognitive and behavioral components. In these two components, face-to-face and Internet-based intervention methods effectively reduced

them. There was a significant difference between the two experimental groups and the control group in these two components. Since the cognitive component includes fear of negative evaluation, and the behavioral component includes stress and inhibition in dealing with others, both of which were considered during treatment sessions and addressed through cognitive and behavioral reconstruction. Therefore, Cognitive Behavioral Therapy was expected to be effective in improving these two components.

In comparing the two experimental groups, the results suggested that the face-to-face Cognitive Behavioral Therapy group was more effective than the Internet-based group in reducing cognitive distortions, increasing emotion regulation, and reducing social anxiety and its components. There was a significant difference between these two experimental groups in the post-test of these variables. The first line of problems of socially anxious people is the fear of being in the community and the weakness of social skills. Therefore, their presence in public is a kind of confrontation, and their absence is a kind of avoidance. Similarly, in the face-to-face group, people with a physical presence in the meetings were able to see and recognize the moods and emotional feedback of others' faces, followed by being aware of their emotions, recognizing them and establishing real communication with other members. However, the Internet-based group did not have these privileges. Alternatively, in face-to-face sessions, threatening stimuli, such as being in a group, were present in a real situation. The necessary measures were performed frequently to secure the thoughts and related emotions. However, in online

sessions, such stimuli were not objective, and the virtual model was less effective than the real model in reducing coercive behavior. Therefore, due to the main presence of people in the group and doing group exercises, it can be said that face-to-face meetings have reduced people's avoidance and, in turn, have reduced the symptoms of anxiety further.

## 5. Conclusions

Overall, the present study aimed to compare the effectiveness of traditional and Internet-based Cognitive Behavioral Therapy to expand and supplement previous works and increase the richness of the literature about Internet-based cognitive-behavioral intervention in social anxiety. The results revealed that both forms of cognitive-behavioral intervention effectively reduced cognitive distortions, increased self-regulation, and reduced social anxiety. Moreover, these results can be due to the reasons above, including cognitive and behavioral reconstruction by accepting and changing mental filters and applying confrontational thoughts, recognizing emotions correctly, and learning how to moderate them and deal with stressors. Therefore, traditional and Internet-based cognitive-behavioral interventions seem to have positive benefits for adolescents with social anxiety disorder. However, the face-to-face form was more effective than the Internet-based one, which could be due to the reasons mentioned above, especially the benefit of face-to-face exposure, participation in real social situations, participation in group discussions, and coping with fear in real life.

The limitation of the study included considering girls only and the lack of generalizability to other populations due to

age, sex, education, and geographical boundaries among others. Additionally, the lack of additional facilities for holding Internet intervention sessions was one of the limitations of an Internet intervention. Generally speaking, this study should be repeated with larger and more controlled participants to re-evaluate the results. In addition, it is suggested that efforts be made with appropriate and continuous training in raising awareness about virtual meetings, increasing social self-efficacy, reducing rumination and social anxiety in individuals, and developing and implementing programs to reduce adolescent social anxiety. It created a more successful and healthy future for people, especially adolescents.

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## Conflict of Interest

The Authors declare that there is no conflict of interest with any organization. Likewise, this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.



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