

Summary

Combined Cognitive Bias Modification for Social Anxiety Symptoms: A Randomized Controlled Trial

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Social anxiety, which is characterized by experiences of uneasiness, fear, and anxiety along with the fear of being watched and assessed by others in social settings (Watson & Friend, 1969), is a mental health issue quite common (Kessler et al., 2005; Kessler, Chiu, Demler, & Walters, 2005) and one that severely affects quality of life (Aderka et al., 2012; Fehm, Pelissolo, Furmark, & Wittchen, 2005). Lifetime prevalence of social anxiety is between 7% and 13% (Furmark, 2002). Although psychopharmacotherapy and psychotherapy are used as primary intervention methods in treating social anxiety (Heimberg, 2001; Rodebaugh, Holaway, & Heimberg, 2004; Sareen & Stein, 2000), cognitive bias modification studies, which have risen from approaches within the framework of information processing, have brought some new perspectives.

From an information processing perspective, Beck, Emery, and Greenberg (1985) emphasized attention, interpretation, and memory biases to have a central role in social anxiety disorders. Attentional bias observed in social anxiety is observed not to be generalized for threatening stimuli but rather directed at socially threatening stimuli (Amir, Freshman, & Foa, 2002; Becker, Rinck, Margraf, & Roth, 2001; Hope, Rapee, Heimberg, & Dombeck, 1990; Lundh & Öst, 1996). In addition, a tendency to interpret social situations as negative, or slightly negative social situations as disastrous, can be observed in individuals with social anxiety (Amir, Foa, & Coles, 1998; Clark & McManus, 2002; Stopa & Clark, 2000).

Although various social anxiety-oriented attentional bias modification studies have been found to yield positive results, some studies have failed to show the same effect. Some single-session studies have yielded positive results (Amir, Weber, Beard, Bomyea & Taylor, 2008) whereas some others fail to show similar effects, indicating that multi-sessions might be required (Ever-

aert, Mogoase, David, & Koster, 2015; Julian, Beard, Schmidt, Powers & Smits, 2012). Considering the results from multi-session studies, Li, Tan, Qian, and Liu (2008) reported a decrease in anxiety towards social interaction while Amir et al. (2009) reported 50% of the participants in the treatment group and 14% in the control group to no longer fit the diagnosis of social anxiety disorder according to DSM-4 criteria; Schmidt, Richey, Buckner, and Timpano (2009) also obtained similar results. Along with studies focusing on only one type of cognitive bias, combined cognitive bias modifications, though limited in number, exist and have also indicated positive results (Beard et al., 2011; Brosnan, Hoppitt, Shelfer, Sillence, & Mackintosh, 2011; Naim, Kivity, Bar-Haim, & Huppert, 2018).

The primary purpose of the current study, being one of the first studies in this field conducted on a Turkish sample, is to test the effectivity of a combined cognitive bias modification study aimed at diminishing social anxiety, anxiety, depression, and dysfunctional cognitive thoughts, as well as the attentional and interpretational bias levels among university students who display social anxiety symptoms. With this purpose in mind and hoping to contribute to the literature by answering some unsolved issues, a combined intervention was conducted consisting of two weekly sessions, eight sessions in total.

Method

Participants

Participants are composed of 84 university students (61% female) who display high social anxiety symptoms. The mean age of the sample is 21.49 and the age range is 18-28. The condition of participants not having any psychiatric disorder nor receiving psychiatric treatment has been satisfied. However, taking Dilbaz and Güz's (2002) study into consideration for a Turkish sam-

ple, students scoring 68 or more on the Liebowitz Social Anxiety Scale were considered at risk in regards to social anxiety, and this has been determined as a criterion for participation. Individuals who satisfied the participation criteria were randomly assigned to two main groups: the manipulation group (Group E) and attention-placebo control group (Group C). Through randomization, 46 individuals were assigned to group E and 38 individuals were assigned to group C, out of which 65 individuals, 33 being from group E and 32 being from group C, completed the study, 13 participants from group E and 6 participants from group C dropping out of the study. Lastly, 57 participants, 29 being from group E and 29 being from group C, completed the follow up study.

Materials

Primary outcome measure. Social anxiety, being the primary outcome variable of this study, was measured with the Liebowitz Social Anxiety Scale (LSAS), developed by Liebowitz (1987) in order to assess the level of fear and avoidance in social environments and situations that require social performance. The scale was adapted to Turkey by Dilbaz (2001) and Soykan, Özgüven, and Gençöz (2003). The Turkish version has been proved to have high retest reliability, a high Cronbach's alpha, and high correlation with the State-Trait Anxiety Inventory (Soykan et al., 2003).

Secondary outcome measures. In addition to primary outcome measurements, severity of anxiety was measured using the Beck Anxiety Inventory (BAI) consisting of 21 items (Beck, Epstein, Brown, & Steer, 1988), which was adapted to Turkey by Ulusoy, Şahin, and Erkmen (1998); severity of depression was measured by the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), which consists of 21 items and whose standardization in Turkey was conducted by Hisli (1988). Dysfunctional beliefs and attitudes related to depression were measured with the Dysfunctional Attitude Scale (DAS) developed by Weissman and Beck (1978) and adapted to Turkey by Şahin and Şahin (1992a), and negative automatic thoughts related to depression were assessed through the Automatic Thoughts Questionnaire (ATQ) developed by Hollan and Kendall (1980) and adapted to Turkey by Şahin and Şahin (1992b).

Assessment of attentional bias. The Posner paradigm, frequently employed in assessing attentional bias, has been used for this purpose (see Amir et al., 2008; Amir et al., 2009; Julian et al., 2012). Within the current study, 192 trials were conducted, and in each trial one word out of eight threat cue words and eight neutral cue words appeared on either the left or right part of the screen for 600 ms. After the word disappeared, the sign

“•” appeared either on the left or right part of the screen, and participants were asked to indicate which side it is on pressing certain keys on the keyboard. After their responses, the next trial started. In 128 of these trials, the sign “•” and the cue word appeared on the same side of the screen (valid) and in 32 trials, they appeared on opposite sides (invalid). In the remaining 32 trials, the sign “•” was shown without being accompanied by any cue words. Response times towards threatening invalid trials was accepted as a measure of attentional bias.

Assessment of interpretational bias. Assessing interpretational bias was performed by employing the word-sentence association paradigm also with computers (see Beard & Amir, 2008). In each trial, a threat (e.g., shame) or positive (e.g., funny) word appeared on the screen for 500 ms. After the word disappeared, a relevant sentence with ambiguous meaning appeared on the screen (e.g., people laughed at something you said). Then participants were asked to press the space button to confirm that they had read the sentence and press the relevant button (right or left) on the keyboard to indicate whether the sentence and word were relevant or not. The next trial started upon responding. In total, 76 trials were realized. The percentage of threat interpretations was accepted as a measurement of interpretational bias.

Procedure

The study was approved by Hacettepe University Ethics Board. All participants were informed before the study and their written consent was obtained. All participants were presented with an informed consent form beforehand and also verbally informed about the procedure. They were assigned to experimental or control groups for two sessions per week, eight sessions in total. Before the first session (pretest) and after the last session (posttest), participants were asked to answer the questionnaires (LSAS, BAI, BDI, DAS and ATQ), and their attentional and interpretational biases were assessed. Lastly, participants were asked after just two months to answer the same questionnaires for the follow-up measurements.

Cognitive-bias modification group: Experimental Group (E). Combined attentional and interpretational bias modifications were implemented with participants in this group. Implementations lasted for 4 weeks, with two sessions per week on different days, eight sessions in total. Participants were subjected to attentional bias modifications and interpretational bias modifications successively in each session.

During the attentional bias modification, eight pairs of photographs of neutral or threatening faces (4 female, 4 male) were used. Pairs of photographs were obtained from Lundqvist, Flykt, and Öhman's (1998) set of pho-

tos. As threatening stimuli, faces with a disgusted expression were preferred. In each trial, a fixation cross (+) appeared for 500 ms and a pair of photographs, one on the left and the other on the right of the screen, was shown for 500 ms after the fixation cross disappeared. Then an arrow pointing either right or left (< or >) appeared either on the right or left part of the screen. Participants were asked to indicate the direction of the arrow using the direction keys (right or left) on the keyboard. In 128 trials, one neutral and one threatening photograph appeared; the arrow (< or >) was in the same area as the neutral photograph in 80% of the trials (see Schmidt et al., 2009; Amir et al., 2009). The aim of this manipulation is to enhance attention disengagement from socially threatening stimuli. After attentional bias modification was completed, interpretational bias modification started.

Interpretational bias modification resembles the word-sentence association paradigm (see Beard & Amir, 2008) that had been employed in the assessment; however, participants were given feedback regarding their reactions here. In addition, to prevent participants from being subjected to the same stimuli in the assessment and modification processes, different word-sentence sets were used for the two processes. During the process of modification, a fixation cross (+) appeared for 500 ms, then a threatening or positive word appeared for 500 ms as an interpretation of a sentence. Next a relevant sentence with ambiguous meaning appeared, after which participants were asked to indicate if the word and sentence were related using the keyboard. When participants confirmed the relation between the positive word and the sentence or denied the relation between the threatening word and the sentence, they were provided feedback on whether they had given the right or wrong answer. After the feedback, the next phase was started. In each manipulation, 76 randomly ordered trials were conducted.

Attention-placebo control group (C). Participants in this group were subjected to the same procedure as the experimental group. However, during the attentional bias modification process, the arrows appeared at even rates (50% - 50%) after neutral and disgusted facial impressions; during the interpretational bias modification, sentences (e.g., you are playing on the beach) and relevant words (e.g., sand) are superficially related or not related at all.

Results

In order to see whether the effect of the eight modification sessions on attentional and interpretational bias (independent variable) created a significant difference between the experimental and control groups, 2 (group: experimental [E] and control [C]) \times 3 (time: pre [t1] /

post [t2] / follow-up [t3]) repeated measures ANOVA was conducted for each dependent variable in self-report measurements with 29 participants from group E and 29 participants from group C, and 2 (group: experimental [E] and control [C]) \times 2 (time: pre [t1] / post [t2]) repeated measures ANOVAs were conducted for attentional and interpretational biases with 33 participants from group E and 32 participants from group C. Also a Pearson correlation analysis was conducted for the relationship between variables (see Table 1).

Statistical Analysis Results for Social Anxiety Level

The results of the repeated measures ANOVA on the effect of the variables of group and time on social anxiety (LSAS) measurements revealed an interaction effect to exist (Wilk's $\lambda = 0.88$, $F_{(2, 52)} = 3.60$, $p = .034$, $\eta_p^2 = 0.34$). In order to determine the source of the observed difference, post-hoc analysis along with Bonferroni correction was conducted. According to the results, comparing the mean values obtained by three distinct measurements in two groups showed no significant difference in the control group, whereas the experimental group showed the mean value of the posttest (t2) measurement to be significantly lower than the mean value of the pretest (t1) measurement; however, this decline was not preserved in follow-up measurements. Comparison of groups based on time revealed no significant difference between the pretest (t1) and follow-up (t3) measurements, whereas the mean value of the posttest (t2) measurement in the experimental group was significantly lower than in the control group. The values obtained from the three distinct measurements are presented in Table 2.

Statistical Analysis Results for Anxiety, Depression, and Dysfunctional Thoughts

Results from the repeated measures ANOVA on the effect of the variables of group and time on anxiety (BAI), depression (BDI), automatic thoughts (ATQ), and dysfunctional attitudes (DAS) measurements revealed no significant interaction effect of group and time on the measurement of any dependent variable. The scores obtained from the three separate measurements are presented in Table 2.

Statistical Analysis Results for Attentional and Interpretational Biases

The results from the repeated measures ANOVA analysis on the effect of the variables of group and time on attentional and interpretational biases revealed no significant interaction effect for attentional bias (Wilk's $\lambda = 0.99$, $F_{(1,57)} = 0.06$, $p = 0.81$, $\eta_p^2 = 0.00$), whereas a significant interaction effect was found for interpretational bias (Wilk's $\lambda = 0.70$, $F_{(1,45)} = 3.60$, $p = 0.00$,

$\eta_p^2 = 0.30$). In addition, time has no main effect. As the mean scores for distinct measurements on attentional bias have been compared, the outcome of the posttest measurement (t2) was significantly lower than from the pretest measurement (t1) in the control group; similarly, the outcome of the posttest measurement (t2) was significantly lower than from the pretest measurement (t1) in the experimental group (Wilk's $\lambda = 0.55$, $F_{(1,57)} = 47.64$, $p = 0.00$, $\eta_p^2 = 0.45$). In order to determine the source of the difference in the interaction effect, post-hoc analysis along with Bonferroni correction was conducted. According to the results, when comparing the mean scores obtained by distinct measurements in two groups, the mean score from the posttest (t2) measurement was significantly lower than the pretest (t1) measurement in the control group, and the mean score from the posttest (t2) measurement was similarly significantly lower than the pretest (t1) measurement in the experimental group. The values obtained from two distinct measurements have been presented in Table 3.

Discussion

The main purpose of this study has been to test the effectiveness of combined cognitive bias modification in decreasing the levels of social anxiety, anxiety, depression, and dysfunctional thoughts as well as the attentional and interpretational bias in university students who display social anxiety symptoms. Results from the current study imply that combined cognitive bias modification has a partial effect on social anxiety; however, this is not a permanent effect. Results show the social anxiety level, which has been the main subject of measurements in this study, to significantly decrease in posttest measurements in the experimental group compared to the control group. However, this effect was not preserved in follow-up measurements. In addition, interpretational bias in the experimental group was significantly decreased in the posttest compared to the control group. In the case of attentional bias, on the other hand, when comparing the outcomes of pretest and posttest measurements, a decrease was observed both in the control and experimental groups. No significant difference was observed between the two groups in regards to measurements of other clinical symptoms.

The findings related to the effect of cognitive bias on social anxiety symptoms indicate that cognitive bias modification decreases social anxiety symptoms, but this effect is not permanent. Numerous studies aiming to decrease cognitive bias in social anxiety, and thus reduce social anxiety symptoms, have found modifications to be generally effective, with follow-up measurements showing this effect to have been maintained (e.g., Amir et al.,

2009; Amir & Taylor, 2012; Beard & Amir, 2008; Beard et al., 2011; Schmidt et al., 2009); however, studies are also found with inconsistent results (e.g., Bunnell et al., 2013). In addition, the results of a similar study on teenagers with a somewhat different research design showed that differences between the control and experimental groups were diminished in the follow-up measurements even after 12 months (see Sportel, de Hullu, de Jong, & Nauta, 2013).

Considering also the information obtained through the literature review, this study points out the clinical value of cognitive bias modification, especially those interventions addressing interpretational bias. The current study gives us the impression that interventions addressing interpretational bias are effective; however, these results should not be handled apart from those related to attentional bias. In this regard, combined and separate bias modification studies need to be conducted. Another important issue is the number of sessions. Within the framework of the current study, participants were subjected to eight intervention sessions; however, considering that empirically supported standardized short-term psychotherapies include longer intervention periods, eight sessions might not be sufficient. Studies are also found implying that increasing the number of sessions can result in improved outcomes (e.g., Beard et al., 2011). In this regard, implementing studies that include more sessions is needed. Session frequency is another point that should be taken into consideration. Though two sessions a week seems like a standard frequency, session duration and intensity should be altered and tested.

Though the results of the current study can provide some guidance to future research on the subject, it has certain limitations. Firstly, even though the size of the sample seems sufficient compared to other studies in the literature, a larger sample could have provided more credible results. In addition, the number of male participants could have been higher, though the balance between two sexes seems to be within an acceptable range. The study was conducted on university students, keeping the results from being generalizable. Another limitation is that the biases were assessed only using one method. Criticisms have been found against the standardized measurement tools used in assessing cognitive biases; under these circumstances, including more than one method (e.g., behavioral and physiological measurements) could have provided us with more credible results. In this regard, behavioral assessments in particular will be helpful for understanding if the learning has been realized or not. Lastly, the follow-up measurements could have covered a longer period of time and also included interpretational bias modification in order to shed light on the follow-up results that had somehow been left in the dark in the current case.