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An Unguided Computerized Cognitive Behavioral Therapy Program for Test Anxiety

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Abstract

Test anxiety, a particular manifestation of performance anxiety similar to sports anxiety or the anxiety experienced during public speaking, is characterized by emotional, behavioral, and physiological responses that lead to diminished performance and academic attainment. The primary objective of this paper is to scrutinize the effectiveness of the "No More Test Anxiety" program, an Unguided Computerized Cognitive Behavioural Therapy (cCBT) for Test Anxiety, an intervention not yet implemented in Turkey. The study was conducted in two phases: a pilot study and the main study. The pilot study examined the accessibility and feasibility of the program with 11 participants, while the main study evaluated the efficacy of the program with 34 participants using a pre-test post-test control group design. Participants were assigned to groups via convenience sampling, and the Test Anxiety Inventory (TAI) and the State and Trait Anxiety Inventory (STAI) were used for analysis. The results demonstrated significant reductions in TAI, STAI-State, and STAI-Trait scores in the treatment group at the end of the intervention (respectively, $p < 0.001$). Power analysis revealed that the study achieved sufficient power to detect these effects, and effect size calculations highlighted the clinical significance of the findings. The unguided cCBT program for test anxiety was determined to be both feasible and effective, offering insights into the innovative and evolving field of digital psychotherapy.

Keywords: test anxiety, computerized cognitive behavioral therapy, self-help

Öz

Sınav Kaygısına Yönelik Rehbersiz Bilgisayarlı Bilişsel Davranışçı Terapi Programı

Spor kaygısı ya da topluluk önünde konuşma kaygısına benzer bir performans kaygısı türü olan sınav kaygısı, bireyin bilişsel süreçleri tarafından ortaya çıkarılan duygusal, davranışsal ve fizyolojik tepkiler sebebiyle performansının ve akademik başarının düşmesine neden olan bir kaygıdır. Bu makalenin ana amacı, Türkiye'de henüz uygulanmaya başlanmamış olan Rehbersiz Bilgisayarlı Bilişsel Davranışçı Terapi (bBDT) programı olan "Sınav Kaygısına Son" programının etkililiğini değerlendirmektir. Çalışma iki aşamadan oluşmaktadır: pilot çalışma ve ana çalışma. Pilot çalışma, 11 katılımcı ile programın erişilebilirliği ve uygulanabilirliğini değerlendirmiştir. Ana çalışma ise 34 katılımcı ile gerçekleşmiş, ön-test son-test kontrol gruplu deneysel desen kullanılmıştır. Katılımcılar gruplara basit sıralı örnekleme yöntemi ile atanmış, Sınav Kaygısı Envanteri (SKE) ve Durumluk ve Sürekli Kaygı Envanteri (DSKE) analiz için kullanılmıştır. Tedavi grubundaki sınav kaygısı, durumluk ve sürekli kaygı puanları tedavi sonunda anlamlı derecede düşmüştür (sırasıyla, $p < 0{,}001$). Güç analizi, bu etkileri saptamak için çalışmanın yeterli güce sahip olduğunu göstermiş, etki büyüklüğü hesaplamaları bulguların klinik önemini vurgulamıştır. Sınav kaygısı için rehbersiz bBDT programı, dijital psikoterapinin yenilikçi ve gelişmekte olan alanına içgörü sağlayarak, hem uygulanabilir hem de etkili bulunmuştur.

Anahtar Kelimeler: sınav kaygısı, bilgisayarlı bilişsel davranışçı terapi, kendi kendine yardım

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INTRODUCTION

Test anxiety, a type of performance anxiety similar to sports anxiety or public speaking anxiety, is anxiety experienced during the exam preparation process or the exam itself, resulting in a decrease in performance and academic success due to emotional, behavioral,

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and physiological responses elicited by individuals' cognitive processes (Spielberger & Vagg, 1995; Zeidner, 2014). According to epidemiological studies, the prevalence of test anxiety in Western societies ranges between 25% and 40% (Alghamdi, 2016; Thomas, Cassady, & Finch, 2018), and the prevalence rate is quite similar for Turkish students (Kavakci, Semiz, Kartal, Dikici, & Kugu, 2014; Yildirim, 2008).

Test anxiety, according to Zeidner, has three components: cognition, emotion, and behavior. While the cognition component is having intrusive thoughts focusing on one's own performance, the emotional component is physiological symptoms such as tenseness, trembling, and sweating. When an individual with test anxiety's studying skills are inadequate and that anxiety keeps the individual from responsibilities related to studying, the behavioral component emerges (Zeidner, 2014). These three components, however, are classified into two broad categories: anxiety and emotionality. While anxiety is defined as persistent worrying about the personal and social consequences of failing to meet performance goals, emotionality is defined as emotional and physiological arousal perception when performance is being evaluated (Spielberger, 1980). Furthermore, focusing on negative evaluations has a negative impact on executive functions. In accordance with this statement, students with test anxiety have a variety of impairments in information coding, processing, and recall. There was also a decline in executive functions associated with the prefrontal cortex, such as attention, reasoning, and problem-solving (Zeidner, 2014).

For test anxiety, various methods have been proposed, developed, and researched. Nonetheless, cognitive-behavioral therapy (CBT) is at the forefront of test anxiety interventions (Larson A, El Ramahi, Conn, Estes A, & Ghibellini, 2010; Ramirez & Beilock, 2011). In their meta-analysis of randomized-controlled trials, Neuderth, Jabs, & Schmidtke (2009) highlighted the effectiveness of CBT for test anxiety. Another meta-analysis of experimental studies on test anxiety discovered that behavioral and cognitive approaches were effective (Ergene, 2003). The most effective CBT techniques are systematic desensitization and cognitive reconstruction. This meta-analysis found that CBT combined with interventions aimed at improving study skills is the most effective method for treating test anxiety (Ergene, 2003). According to a recent meta-analysis, behavioral therapy has the most reliable evidence; however, the authors stated that while CBT, studying skill education, and combined interventions are promising methods, their long-term effectiveness has not been well-established (Huntley, Young, Temple, Longworth, Smith, Jha, & Fisher, 2019).

Technological advancements not only improve people's daily lives, but they also have an impact on medicine (WHO, 2018). Because of these advancements, a person can use a palm-sized machine to communicate with someone thousands of kilometers away, allowing a clinician to evaluate his or her patient or client (Chouvarda, Goulis, Lambrinoudaki, & Maglaveras, 2015). Unsurprisingly, psychotherapies have joined these advancements. Cognitive-behavioral therapy and other therapies were practiced in the days before the internet and mobile devices, with face-to-face sessions (except self-help books) (Andersson & Cuijpers, 2009). Online therapies and consulting services are increasingly finding a place in the mental health field (Andersson, Titov, Dear, Rozental, & Carlbring, 2019).

To define CBT using computer technology, several terms have been coined, including "computerized" CBT (cCBT), "computer-based" CBT, "internet-based" CBT (iCBT), and "computer-assisted" CBT (Richardson, Stallard, & Velleman, 2010). cCBT facilitates use by presenting structured content from face-to-face psychotherapy sessions, teaches cognitive-behavioral techniques to overcome psychological problems by presenting interactive content via computer, smartphones, or tablets, and promotes users' performance of these presented techniques (Andersson, 2016).

There are two types of cCBT programs: guided and unguided (Baumeister, Reichler, Munzinger, & Lin, 2014). The therapist contacts the client through video sessions, phone calls, and texts in guided cCBT, and the therapist takes the lead, but the computer program takes on some missions, such as teaching new CBT techniques and practicing exercises. Unguided cCBT, on the other hand, is more akin to a self-help program. cCBT has been shown to be effective in treating depression (Clarke et al., 2005; Cuijpers, Donker, van Straten, Li, & Andersson, 2010a; Jakobsen, Andersson, Havik, & Nordgreen, 2017; Melling & Houguet-Pincham, 2011); anxiety (Dryman, McTeague, Olino, & Heimberg, 2017; Nordgren et al., 2014); social anxiety (Kampmann, Emmelkamp, & Morina, 2016); and post-traumatic stress disorder (Klein et al., 2010).

Buglione, Devito, & Mulloy (1990) conducted the first study to evaluate the efficacy of unguided cCBT for test anxiety. Unguided cCBT was compared to conventional group therapy in this study, and both modalities used cognitive-behavioral techniques such as systematically desensitizing and relaxation techniques. In the results of the study, both group therapy and cCBT reduced the scores of test anxiety, and there was no statistically significant difference between the two treatment modalities. Orbach, Lindsay, & Grey (2007) also reported that unguided cCBT is a reliable and effective method for test anxiety. Research related to unguided cCBT and test anxiety is limited in these two studies mentioned above. However, cCBT with limited therapist intervention (once a week texting) was found to be effective for both test anxiety and general psychological distress (Warnecke, Haffinger, Konradi, Reiss, Luka-Krausgrill, & Rohrmann, 2020). Recent research has indicated that guidance is indeed a beneficial feature in Internet-based interventions, yet its comparative effect to unguided interventions may be more modest than previously reported. Furthermore, while the findings might be constrained to depression and social phobia, limiting the generalizability of the results, they underscore the notion that unguided cCBT programs can retain effectiveness, complemented by the added advantages of accessibility and ease of use across diverse populations (Baumeister et al., 2014). The focus on the efficacy of an unguided program in this study underscores the importance of this research, as it aligns with the current needs and preferences of a population increasingly reliant on flexible and easily accessible mental health resources.

The decision to investigate the unguided cCBT for test anxiety stems from the growing necessity to address mental health concerns in a way that is both accessible and efficient. Given the prevalence of test anxiety, which adversely impacts performance and academic success, there is an acute need for timely and scalable interventions. Unguided cCBT offers a promising solution, allowing for self-directed therapy without the constraints of location or therapist availability. This approach not only aligns with the contemporary trends in digital mental health care but also fits the need for interventions that can be easily adapted to different cultural contexts such as Turkey. The utilization of unguided cCBT, if proven effective, may significantly contribute to both academic and practical fields by democratizing access to therapeutic support, reducing the barriers of traditional face-to-face therapy, and providing a culturally adaptable tool. Furthermore, the choice of an unguided format in this study specifically aims to investigate whether similar therapeutic gains can be achieved without the direct guidance, thus possibly setting the stage for a new era in mental health care where quality interventions can be more widely and economically disseminated. The present research is not only poised to add to the scientific understanding of cCBT but also to demonstrate how such an approach can be practically harnessed to confront a pervasive and often neglected challenge in the educational domain.

Given the evidence presented, it is reasonable to believe that cCBT could be a viable treatment option in addition to traditional, face-to-face individual or group CBT. As a consequence, one of the researchers developed an unguided cCBT for test anxiety program (detailed information about the program is presented in Method). The primary goal of this paper is to assess the efficacy of this novel program, which has yet to be implemented in Turkey. Our main hypothesis is that the researchers' treatment procedure is effective in treating test anxiety. The procedure is effective on both state and trait anxiety, according to the secondary hypothesis.

The research was divided into two stages. The first step was to conduct a pilot study to evaluate the procedure in terms of software and user experience. The first step's scale scores (from the pilot study) were not included in the final analysis. The main study was the second step.

Ethical approval was granted by the Üsküdar University Non-Interventional Research Ethical Committee (date: 23.09.2019; no: 613511342/2019-411).

METHOD

This research is designed as an experimental study aiming to develop and evaluate the effectiveness of an unguided computerized cognitive-behavioral therapy (cCBT) program for test anxiety, and to compare it with a control group. The study consists of two primary phases: a pilot study and the main experimental investigation.

The main experimental design employed a 2×2 factorial design encompassing a pilot study group, an experimental group, and a control group, along with pre-test and post-test measurements. Participants were assigned to either the experimental or control groups based on their order of entry into the study, excluding the pilot study group. The first factor in the design represents the independent

treatment groups (experimental and control), while the second factor indicates the repeated measures related to the dependent variable (pre-test and post-test).

In this study, test anxiety has been identified as the dependent variable, and the implementation of the cCBT-based test anxiety program constitutes the independent variable. The pilot study serves as an initial phase to evaluate the accessibility, feasibility, and initial effectiveness of the program, guiding the subsequent experimental procedures.

Pilot Study

Participants

For the pilot study, participants were recruited among individuals who applied to a medical center in Antalya for test anxiety, did not have another psychiatric disorder, did not use psychiatric medicine, were preparing for a central exam, which means an exam arranged by the Measurement, Selection, and Placement Center (in Turkish abbreviation: OSYM), and volunteered to participate in the pilot study. Informed consent was obtained from at least one parent for participants under the age of 18. The pilot study included 11 participants (8 females and 3 males).

Measurement Tools

Sociodemographic Data Form: The form was created by researchers to gather information about age, gender, the name of the exam, and information about schools.

Test Anxiety Inventory (TAI): Spielberger (1980) created the inventory, and Oner and Albayrak-Kaymak (1990) conducted the Turkish validity and reliability study. The inventory has 20 items and a Likert type scale with four options. The total score of the inventory was analyzed in both the pilot and main studies. This inventory could yield anywhere between 20 and 80 points.

Treatment Procedure

The procedure (No More Test Anxiety, in Turkish: Sınav Kaygısına Son) is a web-based, 21-day program that consists primarily of online videos, online tests, and exercises aimed at changing thoughts. The program includes psychoeducation, cognitive reconstruction, planning and establishing study habits, cognitive and behavioral exercises to increase and maintain motivation, exercises to change attention and thinking focus, breathing and relaxation exercises, and imaginary exposure content for test anxiety. Individuals could access the program via smartphones, tablets, or computers and complete the daily content in about 15 minutes. Supplementary 1 detailed the program's daily content and flow.

The program was presented to the participants via email, with brief instructions on how to use it attached. One of the researchers held a face-to-face session once a week to assess usage experience and feasibility.

Statistical Analysis

Participants in the pilot study were interviewed about their user experiences, focusing on specific aspects of the program's use and accessibility. They were asked about any issues they encountered with accessing the program, their ability to easily navigate to videos and other content, and the clarity of the audio and visual components. Feedback on these elements was used to make adjustments, such as reducing the music volume and increasing the volume of voiceovers.

The completion percentage was computed, and the paired-samples T-test was used to evaluate the program's effectiveness in the pilot study. The level of statistical significance was set at $p < 0.05$. For statistical analysis, IBM Statistical Package for Social Sciences (SPSS) program version 22.0 was used.

Pilot Study Results

The average age of the participants was 18.18±3.73, with 72.7% being female. Feedback indicated that none of the participants reported any issues with the program's use or accessibility. Specific modifications were made based on user comments, such as adjusting audio levels in the videos. The average percentage of completion was 83.72±18.44. The pre-program and post-program TAI mean scores were 48.18±10.66 and 37.27±7.22, respectively. The TAI score decreased significantly after using the program ($p=0.001$, $t=4.498$).

Main Study

Participants

The main study sample was gathered from individuals who responded to announcements made through the researchers' official social media accounts on Twitter and Instagram between 2021 and 2022. Inclusion criteria for this study were preparation for a central exam, a willingness to participate, not receiving psychiatric medication or

psychotherapy, and a score of over 40 points on the Test Anxiety Inventory (TAI). A total of 40 individuals were initially recruited.

The assignment of participants to the groups was done based on the order in which they applied. The first 20 applicants were assigned to the experimental group, followed by the next 20 to the control group. After the first measurement, three participants from both the treatment and control groups withdrew from the study (their scale scores were not included in the analysis). As a result, the main study included 34 participants, with 17 in the treatment group and 17 in the control group.

Participants in the control group were offered the opportunity to use the program after the final measurement, but their post-program data were not included in the study.

Measurement Tools

The Sociodemographic Data Form, TAI, and the State and Trait Anxiety Inventory were all used. The same sociodemographic data form and TAI were used in the pilot study. All of the measurement tools were made available to participants online.

State and Trait Anxiety Inventory (STAI): Gaudry, Vagg, & Spielberger (1975) created the inventory, and Le Compte and Oner conducted the Turkish reliability and validity study in Turkey (1976). The inventory is divided into two subscales: state and trait. Both have 20 items and a four-option Likert-type scale. Both subscales may produce results in the 20–80 range.

Procedure

Shortly after all participants completed the sociodemographic data form, TAI, and STAI, the No More Test Anxiety program's website link (www. sinavkaygisinason. com) was forwarded to the treatment group participants' e-mail addresses. A brief description of the program and a suggested use plan were attached to that email. The program consisted of 21 modules, intended to be completed over 21 days, with each daily task taking approximately 15 minutes. Participants were initially informed to complete one module per day.

It was observed that participants in the treatment group completed the program either partially or entirely between 14 and 30 days. Therefore, a second measurement based on their completion time was requested. However, since the program is only 21 days long, participants in the control group were asked to complete TAI and STAI after 21 days. After the second measurement, the program's website link was forwarded to the control group, along with the same informative email.

During the procedure, participants in the treatment group received no other psychological support and were not guided via face-to-face, online, email, or text messaging. They were instructed to use the program entirely on their own, without therapist intervention or any reminders. Their progress and adherence to the program were solely monitored through the software's admin panel. Furthermore, no other psychological support was provided to participants in the control group. The detailed user statistics were described in the results section.

Statistical Analysis

Frequency analysis for categorical variables and calculating means and medians of continuous variables were conducted. In-group-effectiveness of the program was analyzed with Paired Sample-T test and the between-groups-effectiveness of the program was analyzed with the Student-T test due to normal distributions of TAI and STAI subscales. Correlation analyzes were used to compare at least two continuous variables.

RESULTS

The study initially commenced with 40 participants. Three participants from the experimental group were excluded from the study as they did not commence using the program after the initial measurement, and likewise, three participants from the control group were excluded as they did not partake in the post-test application. Consequently, 34 participants were included in the analyses, with 17 in the treatment group and 17 in the control group. The average age for the treatment group was 17.41±3.02, and for the control group, it was 17.29±2.05, with no significant age difference between the groups (t=-0.133, p=0.895). All participants were female. In the first measurement, no significant differences were observed between the treatment and control groups in TAI, STAI-State, and STAI-Trate scores (p=0.145, p=0.902, and p=0.867, respectively). Age and the first measurement scale scores had no significant correlation. Table 1 presents the sociodemographic variables along with a comparison of the scores from the first and second measurements across the different scales.

Table 1: Sociodemographic variables and comparison of group measurements

	Treatment Group (n=17)	*Control Group (n=17)*	*p*					
Gender								
Male	0	0	1.000					
Female	17	17						
	Mean ± SD	Mean ± SD	t	p				
Age	17.41±3.02	17.29±2.05	-0.133	0.895				
							95% CI for Cohen's d	
First Measurement	Mean ± SD	Mean ± SD	t	p	Cohens' d	SE Cohens' d	Lower	Upper
TAI	60.23±12.21	54.64±9.41	-1.494	0.145	-0.512	0.354	-1.192	0.175
STAI-State	49.24±12.44	48.71±12.53	-0.124	0.902	-0.042	0.343	-0.714	630
STAI-Trate	53.47±11.95	52.88±7.91	-0.169	0.867	-0.058	0.343	-0.730	615
Second Measurement								
TAI	38.94±9.25	56.41±9.64	5.389	**<0.001**	**1.848**	0.467	1.029	2.648
STAI-State	37.65±10.98	50.41±10.8	3.415	**0.002**	**1.171**	0.397	0.433	1.894
STAI-Trate	42±9.70	53.65±8.26	3.767	**<0.001**	**1.292**	0.408	0.541	2.026

TAI: Test Anxiety Inventory, **STAI:** State and Trait Anxiety Inventory, Statistical Significance p<0.05

Table 2: Differences between first and second measurement scores of TAI and STAI subscales

	Treatment Group (n=17)							
	First Measurement (Pre-Procedure)	*Second Measurement (Post-Procedure)*					*95% CI for Cohen's d*	
	Mean ± SD	Mean ± SD	t	p	Cohen's d	SE Cohen's d	Lower	Upper
TAI	60.23±12.21	38.94±9.25	6.230	**<0.001**	**1.511**	0.460	0.796	2.204
STAI-State	49.24±12.44	37.65±10.98	4.769	**<0.001**	**1.157**	0.266	0.526	1.766
STAI-Trate	53.47±11.95	42±9.70	5.617	**<0.001**	**1.362**	0.254	0.684	2.019
	Control Group (n=17)							
	First Measurement (Pre-Procedure)	Second Measurement (Post-Procedure)					95% CI for Cohen's d	
	Mean ± SD	Mean ± SD	t	p	Cohen's d	SE Cohen's d	Lower	Upper
TAI	54.64±9.41	56.41±9.64	-1.104	0.286	-0.268	0.171	-0.748	0.220
STAI-State	48.71±12.53	50.41±10.8	-0.792	0.440	-0.192	0.183	-0.669	0.291
STAI-Trate	52.88±7.91	53.65±8.26	-0.563	0.581	-0.137	0.168	-0.612	0.343

TAI: Test Anxiety Inventory, **STAI:** State and Trait Anxiety Inventory, Statistical Significance p<0.05

In the treatment group, significant reductions were observed in the second measurement for TAI (t=6.230, p<0.001, d=1.511, 95% CI: 0.796–2.204), STAI-State (t=4.769, p<0.001, d=1.157, 95% CI: 0.526–1.766), and STAI-Trate scores (t=5.617, p<0.001, d=1.362, 95% CI: 0.684–2.019). These large effect sizes, particularly for TAI, imply that the treatment had a strong and significant effect (Table 2, Figure 1).

In the control group, no significant differences were found between the first and second measurements in TAI (t=-1.104, p=0.286, d=-0.268, 95% CI: -0.748–0.220), STAI-State (t=-0.792, p=0.440, d=-0.192, 95% CI: -0.669–0.291), or STAI-Trate (t=-0.563, p=0.581, d=-0.137, 95% CI: -0.612–0.343) (Table 2 & Figure 2).

In comparing the treatment and control groups in the second measurement, the treatment group's scores were

significantly lower for TAI (t=5.389, p<0.001, d=1.848, 95% CI: 1.029–2.648), STAI-State (t=3.415, p=0.002, d=1.171, 95% CI: 0.433–1.894), and STAI-Trate (t=3.767, p<0.001, d=1.292, 95% CI: 0.541–2.026) (Table 1). The large effect sizes, indicated by Cohen's d values exceeding 0.8, underscore the power and reliability of the treatment's impact. The substantial effect sizes likely reflect the strong alignment of the treatment intervention with the specific needs and characteristics of the participants, resulting in meaningful change in anxiety levels.

The average usage percentage was 79.11±17.97. 11.8% (n=2) of participants completed the procedure completely, and 64.7% (n=11) completed 80% or more of the procedure. A statistically significant negative correlation was found between program usage percentage and the second TAI measurement in the treatment group (r=-0.653, p=0.05) (Figure 3).

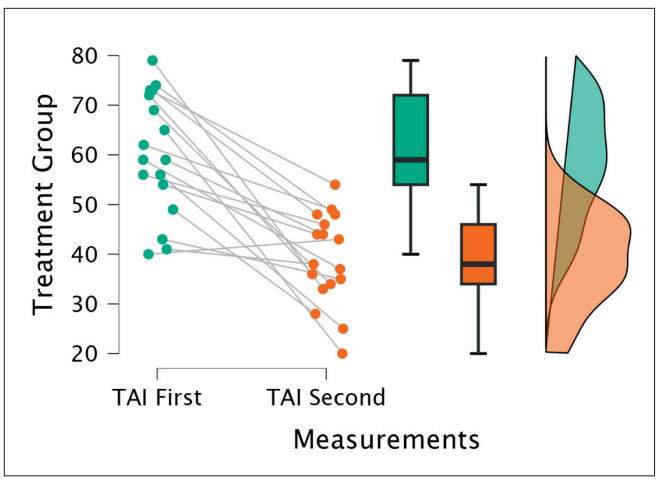

Figure 1. Raincloud Plots of TAI Measurements for the Treatment Group

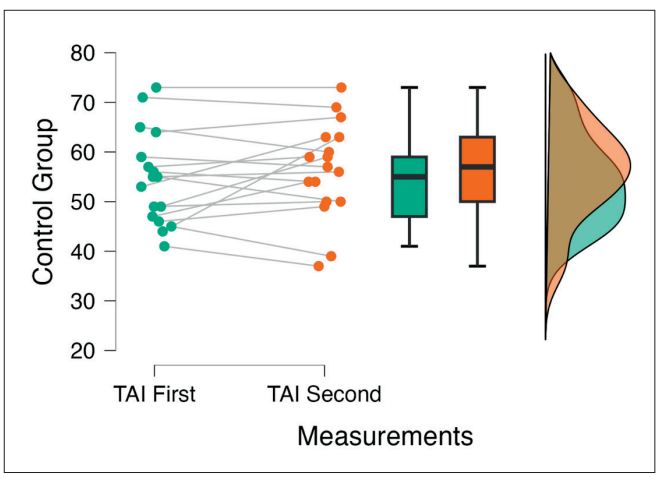

Figure 2. Raincloud Plots of TAI Measurements for the Control Group

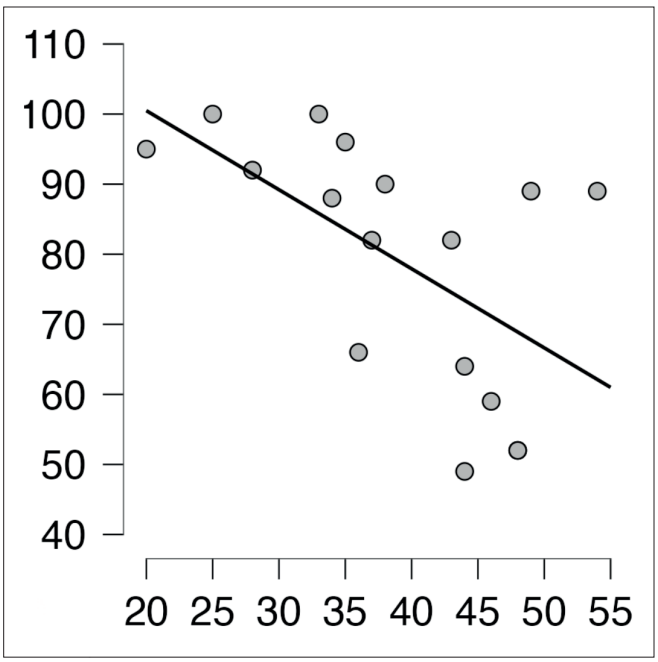

Figure 3. Correlation Plots between Program Usage Percentage and the Second TAI Measurement in the Treatment Group

GENERAL DISCUSSION

The effectiveness and applicability of a novel unguided cCBT program for test anxiety were evaluated in this paper. According to our findings, individuals who used this program experienced a significant reduction in test anxiety. Attendees' test anxiety levels, as well as their state and trait anxiety levels, all decreased statistically, with large effect sizes (e.g., Cohen's d=1.2 for TAI). These large effect sizes underscore the power and reliability of the treatment's impact, reflecting not only the statistical significance but also the practical significance of the findings.

Furthermore, there was a negative correlation between program progress and post-procedure test anxiety levels, indicating a robust relationship between these variables (r=-0.653). The pilot study, which evaluated user experiences and program accessibility, revealed that users had no complaints about program usage or accessibility issues.

This unguided cCBT program was effective for test anxiety, according to our findings. These findings were consistent with other studies that assessed the effectiveness of self-help-based CBT and cCBT on test anxiety (Allen, 1973; Buglione et al., 1990; Donner & Guerney, 1969; Orbach et al., 2007). The most recent of these studies, however, was conducted in 2007. Given the incredible advances

in computer, internet, and communication technology over the last decade, creating more complex content such as animation, video, and easily traceable and interactive quizzes or exercises has become much easier. The large effect sizes found in our study may also be attributed to these advancements, enhancing the user engagement and effectiveness of the program. The consequences of these developments could be noticeable in the literature. Before and after 2010 there is a discrepancy. While studies before 2010 indicated that using cCBT with the guidance of a therapist increased efficacy (Cuijpers, Donker, van Straten, Li, & Andersson, 2010b; Perini, Titov, & Andrews, 2008; Spek, Cuijpers, NykIíček, Riper, Keyzer, & Pop, 2007; Wright, Wright, Albano, Basco, Goldsmith, Raffield, & Otto, 2005), after 2010, it was suggested that cCBT programs without guidance could be equally effective (Brown, Jones, & Cazauvieilh, 2020; Dear et al., 2015; Fischer et al., 2020; Morin, Harris, & Conrod, 2017; Newman, Szkodny, Llera, & Przeworski, 2011). So the disparity could be due to the use of less appealing, feasible software and content prior to 2010, which was mostly manuscripts, pictures, and voice recordings rather than video and animations. New generations are more open and enthusiastic about computer and communication technology, and they adapt quickly to new developments. Given that test anxiety is more of a nuisance for students, developing more appealing self-help-based programs is critical. Our novel program has the potential to be a more appealing, feasible, and accessible self-help-based program for students suffering from test anxiety, with strong empirical support as evidenced by the observed large effect sizes.

A statistically significant decrease in state and trait anxiety levels in the treatment group supported the study's secondary hypotheses. In their paper, Orbach et al. (2007) reported the same findings for state anxiety, in which a self-help-based cCBT program was used to relieve test anxiety. To our knowledge, no one has previously reported a decrease in trait anxiety as a result of self-help-based cCBT for test anxiety. However, there have been studies that show that cCBT protocols are effective for trait anxiety (Dear et al., 2015; Fischer et al., 2020). Given that there is a positive correlation between test anxiety, state anxiety, and trait anxiety levels (Jung, Hong, Shin, Seong, & Cho, 2001), it would not be unreasonable to expect a decrease in one to affect the other.

As expected, the study found that the more progress made in the program, the lower the post-treatment test anxiety levels. Although not for test anxiety, similar findings for other mental disorders have been reported (Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010; Karyotaki et al., 2017; Kumar, Sattar, Bseiso, Khan, & Rutkofsky, 2017). These self-help-based cCBT protocols were developed using proven face-to-face CBT protocols. As a result, just as completing the face-to-face CBT protocols increases the benefit of treatment, completing the unguided cCBT protocols would have the same effect.

There are several limitations to this study. The first is the small sample size. The main reason for this restricted number of samples was the COVID-19 pandemic. The pandemic made it harder to reach individuals who suffered from test anxiety. The second, whose main cause was again the pandemic, involves evaluating both test anxiety and state-trait anxiety via online forms, not a face-to-face interview. Another limitation is that the whole sample was female in the main study. This issue decreases the generalizability of our findings. More research with a larger sample size and including both genders is required. Fourth, the length of sessions is both a limitation and a strength of this paper. A typical face-to-face CBT session lasts 45–50 minutes, but a session of our protocol lasts about 15 minutes. "Is this enough time for a CBT session?" one might ask. It should be noted that both the therapist and the client are active participants in a face-to-face session. So, if the therapist's active time is removed, the remaining time could be equal to the duration of our protocol's one session. Furthermore, despite the 15-minute session, our participants' test anxiety levels were significantly reduced. It should be noted that a shorter duration may also have advantages. Finally, for the time being, our protocol is only in Turkish. Translation into other languages and studies in different countries are required to determine the efficacy of our protocol.

CONCLUSION

The "No More Test Anxiety" program represents a significant stride in the application of computerized Cognitive Behavioral Therapy (cCBT) for the reduction of test anxiety among Turkish students. The findings of this study offer substantial evidence regarding the program's effectiveness and reliability.

This study discovered a statistically significant decrease in test anxiety levels among the treatment group, aligning

with the broader literature on the efficacy of cCBT for various anxiety disorders and reflecting the contemporary trend towards self-help interventions. The integration of sophisticated technologies such as animations, videos, and interactive quizzes enhances the program's appeal and applicability. Such technological advancements not only mirror the evolution of therapeutic interventions but also respond to the rising digital literacy and expectations of newer generations.

The accessibility of the self-help-based cCBT program offers a promising solution for reaching a wider audience, especially in environments where traditional therapy resources may be limited. The ability to engage with the program without therapist guidance adds to its accessibility, a feature supported by recent studies demonstrating the effectiveness of self-guided cCBT interventions.

Moreover, the program demonstrated a significant reduction in situational and trait anxiety levels as well, adding depth to our understanding of the interwoven nature of various anxiety dimensions. The negative correlation between program progression and post-treatment test anxiety levels provides insight into the importance of commitment to the program.

In a world increasingly shaped by technology and where test anxiety continues to be a common concern for students, the "No More Test Anxiety" program holds the potential to transform the way mental health support is delivered within education. It offers a scalable, evidence-based solution consistent with the changing dynamics of learning and well-being.

Furthermore, the researchers of this study plan future work comparing guided and unguided cCBT interventions for test anxiety. This direction aligns with an emerging field that recognizes the utility of both forms of interventions and seeks to understand how they might best be deployed in diverse contexts.

In conclusion, the "No More Test Anxiety" program presents an effective, accessible, and appealing solution, empowered by technological advancements and grounded in Cognitive Behavioral Therapy principles. Its success in the Turkish context lays the groundwork for further research and adaptation globally, contributing to the ever-changing landscape of mental health care in the digital age.

Ethics Committee Approval: The study was approved by the Ethics Committee of Üsküdar University Non-Interventional Research (date and number of approval: 23.09.2019 / 613511342/2019-41).

Informed Consent: Informed consent was obtained from all individual participants included in the study.

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