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Design of a Guided Internet-Delivered Counseling Intervention for Test Anxiety

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Abstract

Test anxiety is a widespread challenge among university students. Online treatment facilitates a wider distribution and easier access to treatment. In a naturalistic study, a guided internet-delivered counseling program for test anxiety in university students was created and reviewed. Students suffering from self-reported test anxiety were recruited at a university counseling center (n = 40). Test anxiety and psychological distress were measured pre and post treatment. The test anxiety online treatment was administered in six modules over a period of 6 weeks. Therapist contact via written message in the online platform was included once a week. There were two personal contacts before and after treatment. A paired t-test showed a significant reduction of test anxiety (n = 32, $p < .01$). There was as well a significant reduction of general psychological distress and general anxiety (n = 31, $p < .05$). Participants were largely satisfied with the helpfulness and composition of the program. Thus, a guided internet-delivered treatment program is an effective treatment for reducing test anxiety in university students.

Keywords: test anxiety, online counseling, cognitive behavioral therapy, imagery

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In Germany, many university students state to be afraid of exams and tests. Surveys report numbers ranging from 14 to 50% (Fehm & Fydrich, 2011). Individuals with test anxiety often seek help at university counseling centers. In 2015, 26.1% of all students presenting at the Center for Student Counseling of Mainz University named test anxiety as a problem (Psychotherapeutische Beratungsstelle der Johannes Gutenberg-Universität Mainz, 2016). In the last 10 years, the number of students in Germany has increased substantially, about 39% more students were registered in 2015 compared to 2005 (destatis.de, 2016). As a result, the numbers of students asking for counseling are increasing as well (Psychotherapeutische Beratungsstelle der Johannes Gutenber-Universität Mainz, 2016). The large number of students asking for help in university counseling centers because of test anxiety presents a challenge to these institutions. Full-time students have difficulties attending treatment during office hours. A solution to these problems might be found online. The importance of internet interventions has increased recently (e.g. Andersson, 2009). Online formats could make it easier for counseling services to help a larger number of students to cope with their test anxiety in times of growing universities and shortage of human resources. The implementation of online counseling into study days appears

easier as there are no fixed times. This study relates to an applied research on online solutions facilitating the supply of counseling for test anxiety in times of increasing request in a naturalistic environment (university setting).

As test anxiety is frequently named as a cause for difficulties in academic performance (e.g. Cassady & Johnson, 2002; Chapell et al., 2005; Sommer & Arendasy, 2015), it is important that students can receive help in the respective counseling centers. Students with high test anxiety tend to perform worse than students with no anxiety (Sommer & Arendasy, 2015; von der Embse, Jester, Roy, & Post, 2018). Admittedly, it is not definite if test anxiety causes poor performance, or if the poor performance causes test anxiety (Cassady & Johnson, 2002; Seipp, 1991). However, there is evidence that many students believe that anxiety does impair test-taking (Hong & Karstensson, 2002), which could also affect their performance.

Test Anxiety

Test anxiety has been regarded as a continuous variable rather than a discrete category, present or absent (Zeidner, 2006). The term “test anxiety” describes extreme anxiety in test taking. Test anxiety was first seen as excessive arousal that interferes with performance (Zeidner, 2006). Subsequently, it was identified as a situation-specific trait in students, evident in a variety of situations in which they were evaluated (Zeidner, 2006). Symptoms of test anxiety become manifest on the emotional, cognitive, physiological, and behavioral level, for example strong fear up to panic, anxious thoughts (anticipated failure, embarrassment, negative future consequences), physiological symptoms (nausea, dizziness, sweating, trembling), and avoidance behavior (Fehm & Fydrich, 2011). Students seeking counseling because of test anxiety report different degrees of impairment. Analogous to psychological disorders, self-report measurements are typically quantifying test anxiety (e.g. Hodapp, Rohrmann, & Ringeisen, 2011; Spielberger, 2010). In line with the definition of test anxiety being a situation-specific trait (Zeidner, 2006), the questionnaires assessing test anxiety focus on test situation specific fears. They are also administered to measure treatment effectiveness, as they record the actual degree of test anxiety.

Current Treatments for Test Anxiety

Individuals with test anxiety have been treated with different interventions. Today, a variety of treatments is available and administered in individual or group settings (e.g. Reiss et al., 2017; Sapp, 2013; Spielberger & Vagg, 1995). According to a meta-analysis, treatments combining skill focused approaches with behavioral and cognitive interventions seem to be the most effective options in test anxiety treatment (Ergene, 2003). There is little research on effectiveness of single treatment components, for example relaxation training. Studies mostly concentrate on multimodal Cognitive Behavior Therapy (CBT) programs (e.g. Neuderth, Jabs, & Schmidtke, 2009; Orbach, Lindsay, & Grey, 2007). Only a few treatment programs for test anxiety in university contexts are published (e.g. Gaspar-Sottmann, 2002).

Internet Treatment

Internet therapy showed effectiveness in the treatment of a wide range of disorders, including anxiety and depression (e.g. Andersson et al., 2006; Berger, Boettcher, & Caspar, 2014; Dryman, McTeague, Olino, & Heimberg, 2017; Newman, Szkodny, Llera, & Przeworski, 2011; Reger & Gahm, 2009; Wagner, Horn, & Maercker, 2014). The effectiveness on anxiety disorders could be shown in standardized, as well as tailored

designs (Berger et al., 2014), in open access designs (Dryman et al., 2017), in clinical psychiatry settings (El Alaoui et al., 2015), as well as in comparison to regular face-to-face treatment (e.g. Andersson et al., 2006). Regarding test anxiety, a self-help intervention in a randomized placebo-controlled CBT trial was effective in reducing test anxiety, measured with self-report questionnaires (Orbach et al., 2007). Whereas internet treatment seems to be well accepted (Gun, Titov, & Andrews, 2011), many participants of internet interventions report substantial barriers to completing the program, such as time constraints. Hence, they tend not to persist in the interventions (Donkin & Glozier, 2012). Compliance seems to be lower when internet is used at home with little or no human contact (Newman et al., 2011). There is evidence that participants with more therapist support in online treatment progressed further through the program (Alfonsson, Olsson, Linderman, Winnerhed, & Hursti, 2016). In the only published study on online test anxiety self-help treatment (Orbach et al., 2007), 28% of the participants in the CBT group dropped out. To our knowledge, there has not yet been published research on therapist supported online CBT programs for test anxiety.

Purpose of the Study

The aim of this study was to design a therapist guided online program for individual counseling to improve the supply situation of students with test anxiety by determining if this program substantially reduces test anxiety measured by a self-report questionnaire and by gaining information about the program´s acceptance among the participants. Beside representative components like education on test anxiety, relaxation, cognitive restructuring and study skills, we included imagery as an additional component in CBT. Recently, research has shown a positive effect of imagery work in the treatment of anxiety disorders (e.g. Arntz, 2012; McEvoy, Erceg-Hurn, Saulsman, & Thibodeau, 2015; Stopa, 2011) and there is evidence that guided imagery reduces test anxiety (Ajithakumari, Suresh Babu, Nandhini, Mathini, & Hemavathi, 2015; Sapp, 1994). This study included a helpful image of the future exam situation, assuming that this could enhance the effectiveness of the program.

The program was specifically designed to reduce test anxiety. The CBT techniques included could also impact other general symptoms apart from test anxiety, thus it was examined if the treatment had an additional effect on reducing general psychological distress and anxiety symptoms.

Method

Participants

Recruitment took place between 2014 and 2015 at Mainz University, Germany. Participants were informed about the study either via individual counseling at the Center for Student Counseling, via homepage advertisement, or by distribution of flyers on the university campus. Interested students were contacted and seen for a personal pre-interview. All participating students gave their written informed consent, after being informed about the program and the procedure. The study was approved by the data protection officer of Mainz University.

During this pilot phase, 40 participants participated in the study (12 male, 28 female). Average age was 26.1 years (range 19 to 35). The students were enrolled in diverse fields of studies, for example medicine, languages, physics. Six participants (five females, one male) left the treatment program before completion, hence the drop-out rate was 15%. There was no specific pattern of drop-out. In a constant manner, up to two individuals left the program after every module. Mean age of the drop-outs was 27.8 years. There were no relevant differ-

ences in test anxiety scores before treatment between drop-outs and remaining participants. Two additional participants did not complete all parts of the program and could, therefore, not be included in the analysis. The remaining sample consisted of 32 students.

Instruments

The test anxiety questionnaire (Prüfungsangstfragebogen [PAF]; Hodapp et al., 2011), which is a German short version of the Test Anxiety Inventory (TAI) (Spielberger, 1980), measures differences in the degree of self-reported trait test anxiety. It comprises 20 items, which are answered on a four-point scale ranging from "hardly ever" (1) to "nearly always" (4). A multidimensional model of test anxiety allows defining four sub-scales with five items each: "excitement" ("I feel anxious."), "solicitude" ("I am worried about my results."), "interference" ("Suddenly thoughts that block me are crossing my mind."), and "lack of confidence" ("I have trust in my performance.", reverse scored item). Summing up the scores of these four sub-scales yields a total score that ranges from 20 (no test anxiety) to 80 (very strong test anxiety). In this study, only the more reliable PAF total score was used for analysis. According to the results of an analysis of a standardization sample, a PAF total score ≥ 60 (95th percentile rank) is often accompanied by clinical symptoms that may indicate counseling or therapy need (Hodapp et al., 2011). The internal consistency (Cronbach's alpha) of the PAF total score scale was .82 before treatment and .81 after treatment.

The Brief Symptom Inventory (BSI; Franke, 2002) is a short version of the Symptom-Checklist-90 (SCL-90-R; Derogatis, 1986) and measures psychological distress within the last 7 days. It comprises 53 items, which are answered on a five-point scale ranging from "not at all" (0) to "very strong" (4). Forty-nine items can be assigned to nine scales, one scale measures general symptoms of "anxiety" ("Feeling tense or keyed up.") In this study, the BSI overall score and the scale "anxiety" were tested. The internal consistency (Cronbach's alpha) of the BSI was .90 before treatment and .94 after treatment.

A feedback questionnaire, designed in the Center for Student Counseling, was used to assess the participants` opinion about the design and helpfulness of the program. On a five-point scale, (0) = not at all, (1) = only a little, (2) = halfway, (3) = almost accurate, (4) = accurate, the following statements were rated: "The length of the program overall is too long"; "The length of the program overall is adequate"; "The program helped me to overcome my test anxiety"; "The feedback of the counselor provided further assistance"; "The regular contact to the counselor was important to me"; "The information given was intelligible". The participants rated the perceived relevance of the different modules, using the same scale.

Online-Test Anxiety Program

The program was based on CBT including typical interventions used in the treatment of anxiety and test anxiety and consisted of six modules. We prescribed weekly tasks (homework) and implemented a weekly therapeutic contact via Internet. This was meant to enhance treatment efficacy and reduce attrition rates by motivating participants to remain in the program. The weekly contact consisted of one written message in form of an e-mail, which the therapist transmitted via the platform. The content of the message primarily comprised a feedback on the weekly homework of the participant. All contents, including the screen-casts and movies (with a duration of a few minutes), were created by the authors for this program.

Module 1: (Test)Anxiety

Module 1 included a screen-cast on anxiety in general, as well as informative texts about reasons for test anxiety, anxiety, and performance, as well as information on black-out. This module intends to provide information on psychological and physiological mechanisms accompanying anxiety in general, as well as test anxiety and black out in particular.

The weekly assignment consisted of a definition of the individual problem ("Which aspects of exam situations are problematic for you?") and aim for the program ("What are you aiming at? What is supposed to change? Define the three most important positive goals. By which means would you realize that you achieved your goal?"). Moreover, participants were asked to describe how they experience their test anxiety on the following dimensions: emotional, cognitive, physiological, and behavioral responses.

Module 2: Exam Preparation

Module 2 focused on time and self-management strategies, motivation, and learning, presented mostly in text form. There were two screen-casts on how to create a project schedule and how to use a weekly rota. Samples were offered, like a weekly rota in the form of a timetable to fill in appointments. The participant's task was to determine their own learning habits using the weekly rota for the actual situation and to analyze their behavior in the monitored week for a future change. Furthermore, they were asked to prepare a project schedule for their exam, by naming the different steps of the project and determining how much time they will need for every step.

Module 3: Changing Negative Thoughts

Module 3 included text information on negative thoughts and how to detect them. The inner critic and corresponding thinking errors (e.g. all-or-nothing thinking, exaggerated generalization, understatement and denial of positives, exaggeration of mistakes and errors, read minds, comparison with others who are always preceded, double standards) were explained and information was presented on how to develop alternative thinking patterns. A screen-cast showed which thoughts can arise in the context of test anxiety and how these can affect both emotion and behavior.

The weekly assignment aimed at detecting negative thoughts and developing more helpful thoughts, using a CBT-typical worksheet with five columns (situation, automatic thoughts, emotion, intensity of the emotion from 0-10, alternative and more appropriate thoughts, results on emotion, their intensity from 0-10, and behavioral reaction).

Module 4: Promoting Positive Thoughts

Module 4 focuses on techniques to reduce negative thinking (e.g. thought interruption) and to foster positive thinking (exercising positive thoughts, signaling, self-gratification, positive diary). As a weekly assignment, one of the presented techniques to foster positive thinking had to be practiced, using a documentation sheet measuring the subjective level of anxiety before and after the exercise. Furthermore, a weekly assignment was to imagine and to write a script about the successful accomplishment of the feared exam and to practice it by repetition. Furthermore, one of the presented techniques to promote positive thinking had to be practiced using a documentation sheet measuring the anxiety before and after exercise.

Module 5: Relaxation and Positive Imagery

Module 5 informed the participants about relaxation techniques, such as breath relaxation and progressive muscle relaxation (Jacobson, 1938). There was a screen-cast with a breath relaxation exercise. Furthermore, students were informed about the use and impact of positive imagination. A screen-cast was presented to help to create a positive image of their future exam. The weekly assignment was to use one of the mentioned relaxation techniques three times a week and to record the exercise on a working sheet including the subjective amount of strain experienced before and after it.

Module 6: Exam Coaching

The final module 6 focused on the behavior in the actual exam situation. A movie called "The exam coaching" showed the behavior of a student during an oral exam situation, which was commented by an expert (university professor for psychology), thus summing up the acquired knowledge of the participants. The expert gave advice on how to manage the critical situations visualized in the video (e.g. critical look of the examinant, black out).

The assignment of this week was to undertake an exam simulation with friends or fellow students. An instruction explaining how to conduct this simulation was presented in text form, as well as a reply sheet for all simulation-participants.

In addition, there was text material giving advice on how to increase one´s efficiency, how to best prepare for different types of exam (oral, written, multiple choice), how to handle difficult situations during an exam, and advice on how to behave on the exam day.

One last task was to rate one´s achievement on the three goals defined in module 1 ("Which of the goals formulated at the beginning of the program could be achieved and in which way?").

Procedure

The study was conducted at the Center for Student Counseling at Mainz University, Germany, between 2014 and 2015. After students were recruited (see *Participants*), an interview with a counseling psychologist took place. This interview aimed at providing the students with all necessary information about the program and to survey data on their test anxiety and psychological distress. Students, therefore, filled in the PAF (Hodapp et al., 2011) as well as the BSI (Franke, 2002). The participants then received an access code to enter the online platform (which featured the program) anonymously. The time-line to start the program and to receive the first written feedback from the counselor was determined. The regular schedule was one module per week. Therefore, the regular duration of the program was 6 weeks. It was possible to prolong the time for one module for severe reasons, for example sickness of the participant.

The program was implemented on the content management system Moodle, which is offered as an e-learning environment at Mainz University. The self-help contents presented via the platform were supported by counselors, being all clinical psychologists trained in CBT. The randomly assigned counselor could be contacted via the message-forum of the platform for organizational reasons, like technical difficulties (e.g. "The link to screencast is not working.") or personal barriers for program progressing (e.g. "I am sick.") through a written message. Furthermore, the counselor gave a regular written feedback regarding the content (homework) once a week on an appointed day. During the online program, there was no personal contact between counselor and client, nor

did the therapist provide information beyond the content of the online program. Participants had to plan their individual “training schedule” by naming two goals for the following week. This was meant to enhance treatment efficacy and motivate participants to proceed with the treatment.

The media applied were videos, screen-casts, texts, and work sheets, which could be filled in on the computer. The modules were static and all materials were printable. At the end of every module, the participant had to evaluate which part of the module was most helpful.

Finally, a second interview with the assigned counselor took place to gain feedback about the program, possible difficulties and to collect the evaluation with the PAF (Hodapp et al., 2011) and the BSI (Franke, 2002), as well as the self-designed feedback questionnaire.

Statistical Analysis

To test for the effectiveness of the test anxiety treatment, a paired t-test was computed with PAF and BSI scores for the two measurement points. The analysis included all those participants that attended the after-treatment assessment and had completed all modules. Participants with missing data in the relevant variable were excluded from the analysis. Normal distribution of residuals was met.

Results

Test Anxiety

A paired t-test for 32 participants with complete data in all six modules was computed without any corrections. The mean PAF total score was smaller than 60. There was a significant reduction of test anxiety (PAF total score) after participation in the online program in comparison to before treatment, $t(31) = 6.354$, $p < .01$. The effect size (after Borenstein, 2009) was large ($d = .96$). Means and standard deviations are displayed in Table 1.

Table 1

Results for Paired T-Tests and Effect Size

			M ± *SD*			
Questionnaire Score	***t***	***df***	**Before Treatment**	**After Treatment**	***p***	***d***
PAF total score	6.354	31	58.03 ± 6.89	49.16 ± 10.17	< .01	.96
BSI total score	2.459	30	53.45 ± 9.28	49.19 ± 12.62	< .05	.37
BSI anxiety	1.816	30	55.16 ± 10.49	51.48 ± 12.32	< .05	.32

Note. PAF = test anxiety questionnaire; BSI = Brief Symptom Inventory; Results are displayed for directed hypotheses.

Psychological Distress

A paired t-test could be computed without any corrections for 31 participants with complete data in all six modules. There was a significant effect in BSI total score, an index for psychological distress in the last 7 days, $t(30) = 2.459$, $p < .05$. The effect size was small ($d = 0.37$). There was also a significant effect on BSI anxiety scale, $t(30) = 1.816$, $p < .05$. The effect size was small ($d = 0.32$). Scores were not necessarily representing

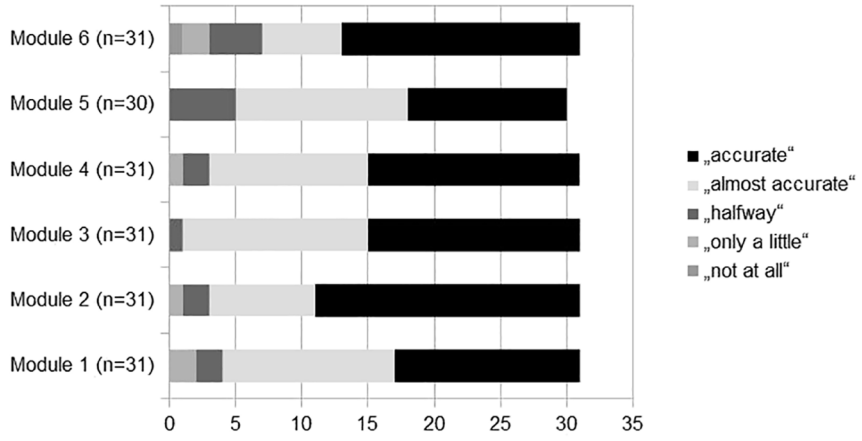

Figure 1. Relevance of the different modules for the participants.

clinical degrees of strain. The PAF total score was positively correlated to the BSI total score and the BSI anxiety score ($p < .05$). Means and standard deviations are displayed in Table 1.

Feedback Questionnaire

With a few exceptions all participants rated all modules as relevant (see Figure 1). They were also satisfied with the length of the program ("too long": $n = 30$; [not at all] = 67%; "adequate": $n = 31$; [accurate] = 45%). The feedback of the counselor was rated as helpful by all participants ($n = 31$; [accurate] = 55%). The regular contact to the counselor was rated as important ($n = 31$; [accurate] = 65%). Most of the participants rated the program as helpful in overcoming their test anxiety ($n = 31$; [almost accurate] = 39%, [accurate] = 29%). Table 2 displays all answers.

Table 2

Feedback Questionnaire Ratings

Statement to be rated	*n*	0	1	2	3	4
"The length of the program overall is too long"	29	23	3	3	0	0
"The length of the program overall is adequate"	31	0	2	5	10	14
"The program helped me to overcome my test anxiety"	31	0	1	9	12	9
"The feedback of the counselor provided further assistance"	31	0	0	2	12	17
"The regular contact to the counselor was important to me"	31	0	0	2	9	20
"The information given was intelligible"	31	0	0	0	0	31

Note. (0) = not at all; (1) = only a little; (2) = halfway; (3) = almost accurate; (4) = accurate. Results are expressed in numbers.

Discussion

The main goal of this study was to create a guided online intervention for students with test anxiety. As hypothesized and in line with former research results (e.g. Orbach et al., 2007), the newly designed online program showed a very strong effect in reducing test anxiety ($p < .01$; $d = 0.96$) in a naturalistic trial. The large

effect size is consistent with previously reported results on online self-help interventions for test anxiety (Orbach et al., 2007). Beyond that, students subjectively rated the program as helpful and the contents of the modules as relevant.

To enhance program effectiveness and reduce drop-out rates, a weekly counselor feedback via message was included. Most of the participants rated the message as helpful. The drop-out rate was 15%, which is lower than 28% for self-help without therapist support (Orbach et al., 2007). Regarding the treatment of anxiety disorders, a review indicated that motivated participants benefited especially from internet self-help programs (Newman et al., 2011). Thus, it would be interesting for future studies to include measurement of participant motivation. The importance of therapist support for the effectiveness of online treatment has been emphasized in several studies and reviews (e.g. Newman et al., 2011; Peñate & Fumero, 2016). At the same time, other studies did not find any marked differences between clinician-guided versus self-guided internet-delivered treatment, for example in social anxiety disorder (Dear et al., 2016). The responses to the feedback questionnaires in our study indicate that the support of the therapist is appreciated by the participants. We do not know, however, whether an unguided or even open course, which would be even more economical for universities, will also satisfy the participants and lead to a significant reduction in test anxiety.

Concerning the results for psychological distress and general anxiety, there was a significant reduction on BSI total score and BSI anxiety score, but only with a little effect size. The program, thus, seemed to have had a small impact on reducing general strain and general anxiety. It has to be pointed out that the participants' scores in these measures were not necessarily representing clinical severity. Thus, a more considerable reduction may not be expectable. Furthermore, the program was specifically designed to reduce test anxiety, which it did with a strong effect, even though the mean value on the test anxiety questionnaire was not representing a pathological degree. We know that test anxiety is regarded as a situation-specific trait (Zeidner, 2006), hence it is reasonable that the program not necessarily reduces other psychological strain. Accordingly, these results could be interpreted in favor of the programs specific effectiveness on test anxiety.

With respect to the use of the internet, concerns about the social isolation of internet users were expressed early on (e.g. Kraut et al., 1998). Particularly with regard to social anxiety components in persons with test anxiety in oral exams, the question arises as to whether a personal contact, in the sense of an anxiety confrontation, is necessary for the successful overcoming of anxiety. Studies on the online treatment of social anxiety consistently produce positive results even without real interaction with other people (e.g. Berger, Boettcher, & Caspar, 2014; Dryman et al., 2017; El Alaoui et al., 2015). These findings raise the question how and which parts of internet treatment lead to its effectiveness. In our program, an exam simulation was a homework assignment, which did not guarantee that participants would actually confront themselves with other people in a simulated exam situation. In further investigations, the individual components should be examined in detail with regard to their realization and effects. As the possibilities of the internet are now also being used to build community in social networking websites (Gowen, Deschaine, Gruttadara, & Markey, 2012), a consideration for future programs could be to implement online forums where program participants can exchange information on the content and their own experiences. The perceived social support could be measured with online specific questionnaires (e.g. Nick et al., 2018).

Limitations

This study has some limitations: First, no control group and no randomized design were included, as the aim was foremost to create and test a new approach and design. Therefore, other factors apart from the intervention could have had positive effects on post treatment measures. In general, the t-test appears to be a satisfactory method for measuring pre-post differences (e.g. Delucchi & Bostrom, 1999) and is often used in counseling and therapeutic research, in particular in pilot studies (e.g. Siu, Cooper, & Phillips, 2014). Furthermore, our results correspond to previous results on effectiveness regarding online treatment formats (e.g. Andersson et al., 2006; Berger et al., 2014; Dryman et al., 2017; Newman et al., 2011; Reger & Gahm, 2009; Wagner et al., 2014). For this reason, the reasonableness of the chosen method can be assumed. The presented online program was implemented as a new routine in the Center for Student Counseling at Mainz University. Succeeding studies should test the program's effectiveness in comparison to other treatment methods in a randomized controlled design. Second, it would have been interesting to assess the participants' actual test performance before and after treatment, but data protection regulations prevented us from obtaining these data. Furthermore, there was no follow-up measurement of test anxiety. Therefore, we can draw no conclusion about long-term effectiveness. Third, there was no measurement of differential effectiveness of the implemented interventions. Only subjective ratings of the participants indicated that all modules were helpful. Thus, it is, for example, not possible to answer if the implementation of imagery in this program resulted in an additional benefit compared to CBT as usual, as reported before (Reiss et al., 2017). Moreover, the mean PAF score before treatment was marginally lower than 60. A score greater or equal to 60 has been associated with a clinical degree of test anxiety (Hodapp et al., 2011). It would be interesting to see if a more severe score of test anxiety would lead to different results.

Furthermore, we have no information on the extent to which the expectations of the participants in our study influenced the results. Previous studies have shown that expectations of individuals can have a significant impact on outcome or effectiveness, for example concerning anxiety (e.g. Constantino, Vîslă, Coyne, & Boswell, 2018; Delgadillo, Moreea, & Lutz, 2016) and therapeutic involvement (Westra, Dozois, & Marcus, 2007). This was also found in social anxiety disorders (Price & Anderson, 2012). For future studies, it would be interesting to investigate the extent to which online treatment of test anxiety is influenced by this variable and whether participants are initially more in favor of online than face-to-face treatment due to its convenience. In summary, online programs are a convenient and effective option for addressing test anxiety at university counseling centers. It increases accessibility for the students concerned and enables wider dissemination, which may be of interest to many universities and counseling services. Contact with the therapist can be expected to reduce drop-out rates and perhaps even increase the effectiveness of treatment. Other ways to maintain the motivation of the participants could be additionally implemented, such as automatic feedback systems or reminder functions (also via smartphone). Given the high prevalence of test anxiety, future research is essential to determine which interventions are most effective. It would also be important to determine which components of the treatment lead to an amelioration of the symptoms. Structured group forums could be used to create interaction and networking among the participants, which might result in the experience of social support and reduce social fears. Open online courses for students with test anxiety across the country could provide another way to achieve quality care for all those affected.

Notes

1) Adapted from: Wager, E. & Kleinert, S. (2011, para 5.1ff.). Responsible research publication: International standards for authors; a position statement developed at the 2nd World Conference on Research Integrity, Singapore, July 22-24, 2010. In T. Mayer & N. Steneck (Eds.), *Promoting research integrity in a global environment* (pp. 309-16). Singapore, Republic of Singapore: World Scientific. Retrieved from http://publicationethics.org/files/International%20standards_authors_for%20website_11_Nov_2011.pdf

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Competing Interests

Sonja Rohrmann declares that she is an author of the PAF.

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References

Ajithakumari, G., Suresh Babu, S., Nandhini, K., Mathini, S. V., & Hemavathi, V. (2015). Effectiveness of guided imagery in reducing students examination anxiety. *IOSR Journal of Nursing and Health Science, 4*(3), 8-9. https://doi.org/10.9790/1959-04310809

Alfonsson, S., Olsson, E., Linderman, S., Winnerhed, S., & Hursti, T. (2016). Is online treatment adherence affected by presentation and therapist support? A randomized controlled trial. *Computers in Human Behavior, 60*, 550-558. https://doi.org/10.1016/j.chb.2016.01.035

Andersson, G. (2009). Using the internet to provide cognitive behaviour therapy. *Behaviour Research and Therapy, 47*(3), 175-180. https://doi.org/10.1016/j.brat.2009.01.010

Andersson, G., Carlbring, P., Holmström, A., Sparthan, E., Furmark, T., Nilsson-Ihrfelt, E., . . . Ekselius, L. (2006). Internet-based self-help with therapist feedback and in vivo group exposure for social phobia: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 74*(4), 677-686. https://doi.org/10.1037/0022-006X.74.4.677

Arntz, A. (2012). Imagery Rescripting as a therapeutic technique: Review of clinical trials, basic studies, and research agenda. *Journal of Experimental Psychopathology, 3*(2), 189-208. https://doi.org/10.5127/jep.024211

Berger, T., Boettcher, J., & Caspar, F. (2014). Internet-based guided self-help for several anxiety disorders: A randomized controlled trial comparing a tailored with a standardized disorder-specific approach. *Psychotherapy, 51*(2), 207-219. https://doi.org/10.1037/a0032527

Borenstein, M. (2009). Effect sizes for continuous data. In H. Cooper, L. V. Hedges, & J. C. Valentine (Eds.), *The handbook of research synthesis and meta analysis* (pp. 221- 237). New York, NY, USA: Russell Sage Foundation.

Cassady, J. C., & Johnson, R. E. (2002). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology, 27*(2), 270-295. https://doi.org/10.1006/ceps.2001.1094

Chapell, M. S., Blanding, Z. B., Silverstein, M. E., Takahashi, M., Newman, B., & Gubi, A. (2005). Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology, 97*(2), 268-274. https://doi.org/10.1037/0022-0663.97.2.268

Constantino, M. J., Vîslă, A., Coyne, A. E., & Boswell, J. F. (2018). A meta-analysis of the association between patients' early treatment outcome expectation and their posttreatment outcomes. *Psychotherapy, 55*(4), 473-485. https://doi.org/10.1037/pst0000169

Dear, B. F., Staples, L. G., Terides, M. D., Fogliati, V. J., Sheehan, J., Johnston, L., . . . Titov, N. (2016). Transdiagnostic versus disorder-specific and clinician-guided versus self-guided internet-delivered treatment for Social Anxiety Disorder and comorbid disorders: A randomized controlled trial. *Journal of Anxiety Disorders, 42*, 30-44. https://doi.org/10.1016/j.janxdis.2016.05.004

Delgadillo, J., Moreea, O., & Lutz, W. (2016). Different people respond differently to therapy: A demonstration using patient profiling and risk stratification. *Behaviour Research and Therapy, 79*, 15-22. https://doi.org/10.1016/j.brat.2016.02.003

Delucchi, K., & Bostrom, A. (1999). Small sample longitudinal clinical trial with missing data: A comparison of analytic methods. *Psychological Methods, 4*(2), 158-172. https://doi.org/10.1037/1082-989X.4.2.158

Derogatis, L. R. (1986). SCL-90-R. Self-Report Symptom Inventory. In Collegium Internationale Psychiatriae Scalarum (Ed.), *Internationale Skalen für Psychiatrie*. Weinheim, Germany: Beltz.

destatis.de. (2016). *Studierende* [students]. Retrieved from https://www.destatis.de/DE/ZahlenFakten/Indikatoren/LangeReihen/Bildung/lrbil01.html?cms_gtp=152374_list%253D1&https=1

Donkin, L., & Glozier, N. (2012). Motivators and motivations to persist with online psychological interventions: A qualitative study of treatment completers. *Journal of Medical Internet Research, 14*(3), Article e91. https://doi.org/10.2196/jmir.2100

Dryman, M. T., McTeague, L. M., Olino, T. M., & Heimberg, R. G. (2017). Evaluation of an open-access CBT-based Internet program for social anxiety: Patterns of use, retention, and outcomes. *Journal of Consulting and Clinical Psychology, 85*(10), 988-999. https://doi.org/10.1037/ccp0000232

El Alaoui, S., Hedman, E., Kaldo, V., Hesser, H., Kraepelien, M., Andersson, E., . . . Lindefors, N. (2015). Effectiveness of internet-based cognitive–behavior therapy for social anxiety disorder in clinical psychiatry. *Journal of Consulting and Clinical Psychology, 83*(5), 902-914. https://doi.org/10.1037/a0039198

Ergene, T. (2003). Effective interventions on test anxiety reduction: A meta-analysis. *School Psychology International, 24*, 313-328. https://doi.org/10.1177/01430343030243004

Fehm, L., & Fydrich, T. (2011). *Prüfungsangst* [Test anxiety]. Göttingen, Germany: Hogrefe.

Franke, G. H. (2002). *BSI. Brief Symptom Inventory - Deutsche Version. Manual*. Göttingen, Germany: Beltz.

Gaspar-Sottmann, S. (2002). *Ein Psychoedukatives Gruppenprogramm für hochprüfungsängstliche Studierende (PghS). Konzeption und Evaluation* [A psycho-educational group program for high test anxious students (PGHS). Design and Evaluation]. Göttingen, Germany: Cuvillier.

Gowen, K., Deschaine, M., Gruttadara, D., & Markey, D. (2012). Young adults with mental health conditions and social networking websites: Seeking tools to build community. *Psychiatric Rehabilitation Journal, 35*(3), 245-250. https://doi.org/10.2975/35.3.2012.245.250

Gun, S. Y., Titov, N., & Andrews, G. (2011). Acceptability of Internet treatment of anxiety and depression. *Australasian Psychiatry, 19*(3), 259-264. https://doi.org/10.3109/10398562.2011.562295

Hodapp, V., Rohrmann, S., & Ringeisen, T. (2011). *Prüfungsangstfragebogen: PAF* [Test anxiety questionnaire: PAF]. Göttingen, Germany: Hogrefe.

Hong, E., & Karstensson, L. (2002). Antecedents of state test anxiety. *Contemporary Educational Psychology, 27*(2), 348-367. https://doi.org/10.1006/ceps.2001.1095

Jacobson, E. (1938). *Progressive relaxation*. Chicago, IL, USA: University of Chicago Press.

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukophadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist, 53*(9), 1017-1031. https://doi.org/10.1037/0003-066X.53.9.1017

McEvoy, P. M., Erceg-Hurn, D. M., Saulsman, L. M., & Thibodeau, M. A. (2015). Imagery enhancements increase the effectiveness of cognitive behavioural group therapy for social anxiety disorders: A bench-marking study. *Behaviour Research and Therapy, 65*, 42-51. https://doi.org/10.1016/j.brat.2014.12.011

Neuderth, S., Jabs, B., & Schmidtke, A. (2009). Strategies for reducing test anxiety and optimizing exam preparation in German university students: A prevention-oriented pilot project of the University of Würzburg. *Journal of Neural Transmission, 116*(6), 785-790. https://doi.org/10.1007/s00702-008-0123-7

Newman, M. G., Szkodny, L. E., Llera, S. J., & Przeworski, A. (2011). A review of technology-assisted self-help and minimal contact therapies for anxiety and depression: Is human contact necessary for therapeutic efficacy? *Clinical Psychology Review, 31*, 89-103. https://doi.org/10.1016/j.cpr.2010.09.008

Nick, E. A., Cole, D. A., Cho, S.-J., Smith, D. K., Carter, T. G., & Zelkowitz, R. L. (2018). The Online Social Support Scale: Measure development and validation. *Psychological Assessment, 30*(9), 1127-1143. https://doi.org/10.1037/pas0000558

Orbach, G., Lindsay, S., & Grey, S. (2007). A randomised placebo-controlled trial of a self-help internet-based intervention for test anxiety. *Behaviour Research and Therapy, 45*, 483-496. https://doi.org/10.1016/j.brat.2006.04.002

Peñate, W., & Fumero, A. (2016). A meta-review of internet computer-based psychological treatments for anxiety disorders. *Journal of Telemedicine and Telecare, 22*(1), 3-11. https://doi.org/10.1177/1357633X15586491

Price, M., & Anderson, P. L. (2012). Outcome expectancy as a predictor of treatment response in cognitive behavioral therapy for public speaking fears within social anxiety disorder. *Psychotherapy, 49*(2), 173-179. https://doi.org/10.1037/a0024734

Psychotherapeutische Beratungsstelle der Johannes Gutenberg-Universität Mainz [Center for Student Counseling of the Johannes Gutenberg University Mainz]. (2016). *Jahresbericht 2015* [Annual report 2015]. Mainz, Germany: Author.

Reiss, N., Warnecke, I., Tolgou, T., Krampen, D., Luka-Krausgrill, U., & Rohrmann, S. (2017). Effects of cognitive behavioral therapy with relaxation vs. imagery rescripting on test anxiety: A randomized controlled trial. *Journal of Affective Disorders, 208*, 483-489. https://doi.org/10.1016/j.jad.2016.10.039

Reger, M. A., & Gahm, G. A. (2009). A meta-analysis of the effects of internet- and computer-based cognitive-behavioral treatments for anxiety. *Journal of Clinical Psychology, 65*, 53-75. https://doi.org/10.1002/jclp.20536

Sapp, M. (1994). The effects of guided imagery on reducing the worry and emotionality components of test anxiety. *Journal of Mental Imagery, 18*(3-4), 165-179.

Sapp, M. (2013). *Test anxiety: Applied research, assessment, and treatment interventions* (3rd ed.). Lanham, MD, USA: University Press of America.

Seipp, B. (1991). Anxiety and academic performance: A meta-analysis of findings. *Anxiety Research, 4*(1), 27-41. https://doi.org/10.1080/08917779108248762

Siu, O. L., Cooper, C. L., & Phillips, D. R. (2014). Intervention studies on enhancing work well-being, reducing burnout, and improving recovery experiences among Hong Kong health care workers and teachers. *International Journal of Stress Management, 21*(1), 69-84. https://doi.org/10.1037/a0033291

Sommer, M., & Arendasy, M. E. (2015). Further evidence for the deficit account of the test anxiety – test performance relationship from a high-stakes admission testing setting. *Intelligence, 53*, 72-80. https://doi.org/10.1016/j.intell.2015.08.007

Spielberger, C. D. (1980). *Preliminary professional manual for the Test Anxiety Inventory (TAI)*. Palo Alto, CA, USA: Consulting Psychologists Press.

Spielberger, C. D. (2010). *Test anxiety inventory*. New York, NY, USA: Wiley. https://doi.org/10.1002/9780470479216.corpsy0985

Spielberger, C. D., & Vagg, P. R. (1995). *Test anxiety: Theory, assessment, and treatment*. Washington, WA, USA: Taylor & Francis.

Stopa, L. (2011). Imagery Rescripting across disorders: A practical guide. *Cognitive and Behavioral Practice, 18*, 421-423. https://doi.org/10.1016/j.cbpra.2011.05.001

von der Embse, N., Jester, D., Roy, D., & Post, D. (2018). Test anxiety effects, predictors, and correlates: A 30-year meta-analytic review. *Journal of Affective Disorders, 227*, 483-493. https://doi.org/10.1016/j.jad.2017.11.048

Wagner, B., Horn, A. B., & Maercker, A. (2014). Internet-based versus face-to-face cognitive-behavioral intervention for depression: A randomized controlled non-inferiority trial. *Journal of Affective Disorders, 152-154*, 113-121. https://doi.org/10.1016/j.jad.2013.06.032

Westra, H. A., Dozois, D. J. A., & Marcus, M. (2007). Expectancy, homework compliance, and initial change in cognitive-behavioral therapy for anxiety. *Journal of Consulting and Clinical Psychology, 75*(3), 363-373. https://doi.org/10.1037/0022-006X.75.3.363

Zeidner, M. (2006). *Test anxiety: The state of the art (Perspectives on individual differences)*. New York, NY, USA: Springer.