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European Association of Clinical Psychology and Psychological Treatment

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Editorial

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Missed Opportunities in Clinical Psychology: What About Running Factorial Design Internet Trials and Using Other Outcomes Than Self-Report?

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Clinical psychology and in particular research on and implementation of psychological treatments can be regarded as a success story (Hofmann et al., 2012). Many treatment guidelines and recommendations now acknowledge that psychological treatments can serve as adjuncts to pharmacological treatments, and they are also described as stand-alone and first-line recommended treatments for mild to moderate psychological problems and diagnoses like major depression and the anxiety disorders. The reason for this is not based on opinion and consensus (which used to be the case in medicine and psychiatry 100 years ago), but increasingly well conducted research studies inform health care and the practice of clinical psychology. Not only controlled intervention studies change practice but also research on mechanisms and processes including self-report measures, brain-imaging and tests of information processing, to give a few examples. In particular, when it comes to cognitive-behavioural treatments (CBT), it can rightfully be argued that there is less need for new studies repeating the same finding that getting CBT is often better than not getting it (there might still be a need to study different psychotherapy orientations like psychodynamic psychotherapy). One way to bring intervention research forward is to use factorial designs in order to discern effective components (Watkins & Newbold, 2020). As I will return to it has not been possible to obtain large enough sample sizes in regular clinical research to run factorial design trials but the use of the internet and modern information technology has changed this (Andersson et al., 2019).

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Are There Any Problems?

But there are problems. Being an intervention researcher having done many controlled trials I am aware of the fact that almost all outcome studies in clinical psychology ONLY rely on self-report measures. These are relevant, valid, and sensitive to change and should not be removed from research. A treatment study on say major depression should definitely include a validated measure of symptoms of depression (like for example the Beck Depression Inventory). Trials also benefit from adding measures of other constructs like quality of life, health care consumption and sometimes also repeated administration of self-report measures to capture change processes and study mediation. However, what happened to actual behaviour? In my PhD I had a trial on older adults with hearing loss including a behavioural test of communication skills (Andersson et al., 1995). Later when we began doing trials on the internet we included a behavioural approach test in studies on specific phobia (e.g., Andersson et al., 2013). More recently I was part of a trial on virtual reality exposure for spider phobia using the standard behavioural approach task (Miloff et al., 2019). But with those and a few other exceptions most of the trials I have been involved with have not included any direct observation of behaviour. It is important to note the ecological momentary assessment (EMA) very often is just another format for self-report of behaviour. There are exceptions, for example sleep and activity monitoring, but overall modern information technology and smartphones have not been used often as ways to collect behavioural outcomes, in spite of calls for such research (Mohr et al., 2017).

Modern Information Technology as a Way to Speed Up the Process

Clinical psychology and psychotherapy research overall has benefitted much from technological innovations and in particular computerized assessments and treatment delivery over the internet. Now internet intervention trials can be larger, less costly, reach more people and also suffer less from data loss compared to traditional studies (Schuster et al., 2021). As I mentioned it is now also possible to run factorial design trials with better power than used to be the case in traditional face-to-face studies. I will use an example of a factorial design trial in which we both measured and manipulated one crucial aspect of most psychological treatments namely knowledge and the role of learning support. We began studying knowledge acquisition more than 10 years back (Andersson et al., 2012), but returned to the topic and were also inspired by Harvey and co-workers (2014). In Berg et al. (2020) we included 120 adolescents who suffered from mixed anxiety/depression. They were randomised to one of four treatment groups, in a 2×2 design with two factors: with or without learning support and/or chat-sessions. We did not have a waitlist control group. Interestingly and in addition to large improvements overall we found

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that adding learning support (different ways to boost learning of treatment material) lead to larger effects on the Beck Anxiety Inventory (d = 0.38), and also increased knowledge gain (d = 0.42), when compared against the group who did not receive this boost of learning. To our surprise chat-sessions did not have any additional effects. The point here is that knowledge has not been the focus of much research in spite of the fact that in particular CBT focus on psychoeducation and that clients both understand and remember the rationale behind the treatment techniques. My second point is that internet intervention research can speed up our understanding of what works for whom and more rapidly test new ideas by for example adding behavioural outcomes.

Future Hopes for Psychologists

I hope future research can inform us more about actual behavioural change including cognitive aspects of everyday function. There is so much more to do. To take one example, prospective cognition is something we use on a daily basis. Examples of prospective cognition can be for example to remember to take medication, call a friend or pick up milk at the grocery store when passing the dairy section in the store. Prospective cognition is most likely crucial for a client who has been in therapy when confronted with an unexpected trigger for anxiety (with avoidance being a likely reaction). The former client then needs to recall and practice what was learned and rehearsed in therapy (which can be years back). Surprisingly, this has not been studied much and we basically do not know how important it is for long term outcome following therapy.

In conclusion, I hope we can move our field forward by having larger samples, using factorial design and focus more on outcomes that have either been forgotten (behavioural change) or not even studied much (prospective cognition and knowledge).

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References

Andersson, G., Carlbring, P., Furmark, T., & SOFIE Research Group. (2012). Therapist experience and knowledge acquisition in internet-delivered CBT for social anxiety disorder: A randomized controlled trial. *PLOS ONE, 7*(5), Article e37411. https://doi.org/10.1371/journal.pone.0037411

PsychOpen GOLD

Andersson, G., Melin, L., Scott, B., & Lindberg, P. (1995). An evaluation of a behavioural treatment approach to hearing impairment. *Behaviour Research and Therapy, 33*(3), 283–292. https://doi.org/10.1016/0005-7967(94)00040-Q

Andersson, G., Titov, N., Dear, B. F., Rozental, A., & Carlbring, P. (2019). Internet-delivered psychological treatments: From innovation to implementation. *World Psychiatry, 18*(1), 20–28. https://doi.org/10.1002/wps.20610

Andersson, G., Waara, J., Jonsson, U., Malmaeus, F., Carlbring, P., & Öst, L.-G. (2013). Internet-based vs. one-session exposure treatment of snake phobia: A randomized controlled trial. *Cognitive Behaviour Therapy, 42*(4), 284–291. https://doi.org/10.1080/16506073.2013.844202

Berg, M., Rozental, A., de Brun Mangs, J., Näsman, M., Strömberg, K., Viberg, L., Wallner, E., Öhman, H., Silfvernagel, K., Zetterqvist, M., Topooco, N., Capusan, A., & Andersson, G. (2020). The role of learning support and chat-sessions in guided internet-based cognitive behavioural therapy for adolescents with anxiety: A factorial design study. *Frontiers in Psychiatry, 11*, Article 503. https://doi.org/10.3389/fpsyt.2020.00503

Harvey, A. G., Lee, J., Williams, J., Hollon, S. D., Walker, M. P., Thompson, M. A., & Smith, R. (2014). Improving outcome of psychosocial treatments by enhancing memory and learning. *Perspectives on Psychological Science, 9*(2), 161–179. https://doi.org/10.1177/1745691614521781

Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research, 36*(5), 427–440. https://doi.org/10.1007/s10608-012-9476-1

Miloff, A., Lindner, P., Dafgård, P., Deak, S., Garke, M., Hamilton, W., Heinsoo, J., Kristoffersson, G., Rafi, J., Sindermark, K., Sjölund, J., Zenger, M., Reuterskiöld, L., Andersson, G., & Carlbring, P. (2019). Automated virtual reality exposure therapy for spider phobia vs. in-vivo one-session treatment: A randomized non-inferiority trial. *Behaviour Research and Therapy, 118*, 130–140. https://doi.org/10.1016/j.brat.2019.04.004

Mohr, D. C., Zhang, M., & Schueller, S. M. (2017). Personal sensing: Understanding mental health using ubiquitous sensors and machine learning. *Annual Review of Clinical Psychology, 13*, 23–47. https://doi.org/10.1146/annurev-clinpsy-032816-044949

Schuster, R., Kaiser, T., Terhorst, Y., Messner, E. M., Strohmeier, L.-M., & Laireiter, A.-R. (2021). Sample size, sample size planning, and the impact of study context: Systematic review and recommendations by the example of psychological depression treatment. *Psychological Medicine, 51*(6), 902–908. https://doi.org/10.1017/S003329172100129X

Watkins, E. R., & Newbold, A. (2020). Factorial designs help to understand how psychological therapy works. *Frontiers in Psychiatry, 11*, Article 429. https://doi.org/10.3389/fpsyt.2020.00429

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Research Articles

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The Role of Expectancy Violation in Extinction Learning: A Two-Day Online Fear Conditioning Study

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Supplementary Materials: Data, Materials, Preregistration [see Index of Supplementary Materials]

Abstract

Background: Exposure therapy is at the core of the treatment of pathological anxiety. While the inhibitory learning model proposes a framework for the mechanisms underlying exposure therapy, in particular expectancy violation, causal evidence for its assumptions remains elusive. Therefore, the aim of the current study was to provide evidence for the influence of expectancy violation on extinction retention by manipulating the magnitude of expectancy violation during extinction learning.

Method: In total, 101 individuals completed a web-based fear conditioning protocol, consisting of a fear acquisition and extinction phase, as well as a spontaneous recovery and fear reinstatement test 24h later. To experimentally manipulate expectancy violation, participants were presented only with states of the conditioned stimulus that either weakly or strongly predicted the aversive outcome. Consequently, the absence of any aversive outcomes in the extinction phase resulted in low or high expectancy violation, respectively.

Results: We found successful fear acquisition and manipulation of expectancy violation, which was associated with reduced threat ratings for the high compared to the low expectancy violation group directly after extinction learning. On Day 2, inhibitory CS-noUS associations could be retrieved for expectancy ratings, whereas there were no substantial group differences for threat ratings.

Conclusion: These findings indicate that the magnitude of expectancy violation is related to the retrieval of conscious threat expectancies, but it is unclear how these changes translate to affective components (i.e., threat ratings) of the fear response and to symptoms of pathological anxiety.

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Keywords

fear, anxiety, exposure therapy, inhibitory learning, expectancy violation, fear conditioning

Highlights

- Causal evidence for expectancy violation as a key mechanism of exposure therapy is sparse.
- The current study experimentally manipulates the magnitude of expectancy violation.
- High expectancy violation promotes extinction retention for threat expectancy ratings.
- Affective components of the fear response were not affected by expectancy violation.

Exposure therapy is considered the gold standard for the treatment of a variety of mental disorders, particularly anxiety disorders (Hofmann & Smits, 2008; Norton & Price, 2007). Exposure-based interventions focus on repeated confrontations with the fearful object or situation, which typically results in fear extinction characterized as the reduction in fear responses (e.g., behavioral avoidance, physiological arousal, subjective feelings of fear) over time. There is unanimous evidence for the effectiveness of exposure therapy for the treatment of anxiety disorders (Butler et al., 2006; Carpenter et al., 2018; Hofmann & Smits, 2008; Norton & Price, 2007). Yet, there is a considerable amount of patients, who do not profit from treatment, which is reflected in high rates of nonresponding and relapse (Ali et al., 2017; Arch & Craske, 2009, 2011; Taylor et al., 2012). The main obstacle to increasing the effectiveness of exposure-based interventions is that the underlying mechanisms are not yet fully understood (Cooper et al., 2017; Craske et al., 2008; Craske et al., 2014).

The inhibitory learning model suggests extinction learning as a key mechanism underlying exposure-based interventions resulting from a discrepancy between the conscious expectancy of an aversive event and its omission (Craske et al., 2014; Craske et al., 2022; Rescorla & Wagner, 1972). Instead of erasing the original stimulus-harm association, the omission of the expected aversive outcome (expectancy violation) is assumed to generate a new associative memory trace between the stimulus and the absence of harm, which is thought to exert an inhibitory influence on the original stimulus-harm association (Bouton, 1993; Bouton & King, 1983; Quirk & Mueller, 2008). See Figure 1 for a graphical summary of the processes underlying the inhibitory learning model. To take advantage of inhibitory learning and expectancy violation during therapy, patients should become aware of their expectations for the upcoming exposure session and focus on the discrepancy between the expected and the actual outcome during exposure. In summary, the inhibitory learning model predicts that the strength of expectancy violation is positively related to symptom reduction and thus to the outcome of exposure therapy (Craske et al., 2014; Craske et al., 2022).

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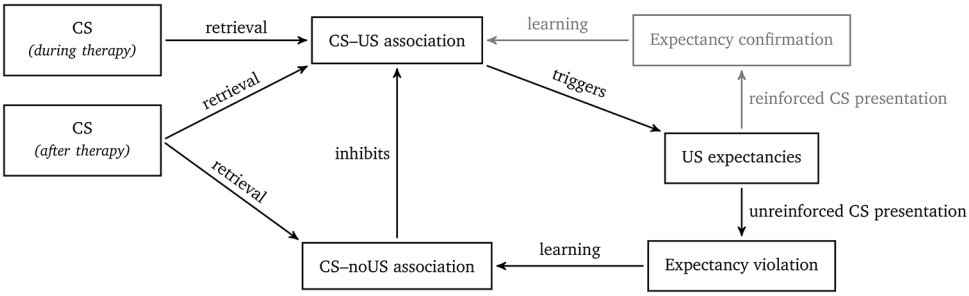
Figure 1

Overview of the Inhibitory Learning Model



Note. The exposure to a conditioned stimulus (CS, e.g., a dog), associated with an unconditioned stimulus (CS-US association, e.g., getting bitten), triggers the expectation of an aversive outcome (US-expectancy, e.g., getting bitten again). During therapy, patients are exposed to the CS, while the expected aversive outcome is omitted (expectancy violation, e.g., the patient was not attacked by the dog), giving rise to a new CS-noUS memory trace, which is able to inhibit the original CS-US association.

Until now, although the inhibitory learning model provides a plausible mechanistic explanation for extinction, studies demonstrating unanimous evidence in support of the role of expectancy violation for positive treatment outcomes are sparse (Craske et al., 2022). While recent models provide a comprehensive framework for studying the mechanisms underlying expectancy violation (Panitz et al., 2021), more research is needed that specifically tests the key mechanisms of the inhibitory learning model. To address this issue, Pavlovian fear conditioning protocols are well suited to examine changes in threat expectancy and thus allow to experimentally test the prediction of the inhibitory learning model that expectancy violation leads to enhanced fear extinction. In fear conditioning paradigms, one conditioned stimulus (CS+) is repeatedly paired with an aversive event (US), resulting in a CS-US association (Pavlov, 1927). During the following extinction phase, US delivery is usually omitted to generate a second CS-noUS association. At a later timepoint, the spontaneous recovery of the CS-US and CS-noUS associations can be tested by re-presenting the CS, while reinstatement of conditioned fear is usually tested by repeating the CS after an US presentation. Using fear conditioning paradigms, extinction learning has been associated with the activation of inhibitory circuits including the ventromedial prefrontal cortex (vmPFC), potentially reflecting the neural correlate of the inhibitory influence of the CS-noUS association on the original CS-US association (Milad & Quirk, 2012). However, how the extent of expectancy violation relates to the inhibitory influence of the CS-noUS association is less well understood. For example, Brown et al. (2017) investigated the relationship between expectancy violation and extinction retention, i.e., the persistent extinction at a follow-up reinstatement test. The authors demonstrated that the variation in US-expectancy during extinction learning, rather than

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the decline in subjective or psychophysiological fear responding, predicted extinction retention at a follow-up test. These results provide correlational evidence for the role of expectancy violation in extinction learning. Importantly, variation in US-expectancy during extinction as an index for expectancy violation only predicted US-expectancy ratings but not subjective fear or facial EMG at the reinstatement test. In another fear conditioning study by Scheveneels, Boddez, Vervliet, et al. (2019) a hierarchical extinction (i.e., presenting stimuli that increasingly signal the US with an incrementally increasing probability) was compared to a random extinction. Although random extinction led to more expectancy violation during extinction, this did not result in improved CS-discrimination at a follow-up test. However, across groups, the amount of expectancy violation and the variability in US-expectancy during extinction were both positively associated with CS-discrimination at the follow-up test.

In addition, findings of clinical (analogue) studies testing the relevance of expectancy violation are also mixed. While some studies support the role of expectancy violation during exposure therapy (Guzick et al., 2020; Salkovskis et al., 2007) others report no association between expectancy violation and therapy outcome (Blakey et al., 2019; de Kleine et al., 2017; Raes et al., 2011; Scheveneels, Boddez, Van Daele, et al., 2019). Most of these studies, however, used correlational designs: Expectancy violation was measured by asking participants for their subjective ratings. While these correlational designs can be useful for detecting relationships, correlation does not imply causation – which is a prerequisite to interpret these relationships mechanistically. To demonstrate its impact on extinction learning, it is thus necessary to manipulate expectancy violation systematically. Therefore, the goal of the current study is to experimentally test the influence of expectancy violation on extinction retention. Specifically, we expected that increased expectancy violation during fear extinction leads to a) lower threat ratings towards the conditioned stimulus directly after extinction, and lower threat ratings and lower US-expectancy b) at a spontaneous recovery test as well as c) at a reinstatement test on the day following fear extinction.

We used a web-based fear conditioning protocol in which participants are divided into two groups. During extinction, the high expectancy violation (HE) group sees only the states of the CS that are strongly associated with an US. Thus, a strong expectancy violation is possible. In contrast, the low expectancy violation (LE) group is presented only with the CS states that are weakly related to the US. Therefore, the magnitude of expectancy violation is minimized. Furthermore, in the current study, we exploit the benefits of conducting a fear conditioning paradigm remotely. Recent evidence suggests that fear conditioning data can be economically collected outside of the laboratory context (McGregor et al., 2021; Purves et al., 2019; Stegmann et al., 2021; Wise & Dolan, 2020), providing a unique opportunity to draw on a larger and more diverse participant pool.

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Method

All hypotheses and methods of this study were preregistered at https://osf.io/7bgtv

Subjects

In total, 127 individuals completed the web-based paradigm. Participants had to be at least 18 years and were excluded if they were classified as non-learners (i.e., if they reported higher US-expectancy ratings for the least reinforced conditioned size compared to the most reinforced conditioned size; $n = 22$) or if they admitted to having muted their computer audio during the main task ($n = 1$) or rated the volume of the US with zero (i.e., total silence, $n = 3$). After exclusion, complete datasets of 101 participants (77 females) with a mean age of 21.8 ± 4.3 years remained for analyses. All experimental procedures were approved by the ethics committee of the Department of Psychology at the University of Würzburg. Procedures were in agreement with the Declaration of Helsinki. All participants provided informed consent online. They received either course credits or could join a lottery for one of five 50€ coupons as compensation.

Stimuli and Materials

The CS consisted of a light grey sphere, which was centrally presented on a dark grey background. To manipulate threat imminence, the size of the CS varied between the baseline size of either 1.25% or 26.25% and eight potential final sizes (5%, 7.5%, 10%, 12.5%, 15%, 17.5%, 20%, and 22.5%) relative to the participant's screen size. The stimulus size in- or decreased from the baseline to the final size, resulting in a visual 3D effect of an approaching/receding sphere. To enhance this effect, two circular lines with a radius of 15% and 22.5% were displayed.

The US was a female scream with a duration of 2.5 s (MaderaDelEste Films, 2011). At the beginning of the experiment, participants had to adjust the volume of their computer using a pleasant example melody (Frei, 2020) so that it was perceived as 5 on a scale from 0 (absolute silence) to 10 (unbearable volume). The setting was to be maintained during the experiment. After the main experiment, participants were asked to rate the loudness of the scream using the same scale. There was no difference in perceived loudness among groups, $F(3, 97) = 1.26$, $p = .292$ (see Figure 2).

Design and Procedure

Day 1: After giving informed consent, participants completed German versions of a demographic questionnaire and the Anxiety Sensitivity Index-3 (ASI-3; Kemper et al., 2009; Taylor et al., 2007), using an online survey platform (www.formr.org, Arslan et al., 2020). They were then redirected to www.pavlovia.org, where the main experiment took place (Peirce, 2007). The conditioning protocol on Day 1 consisted of a habituation,

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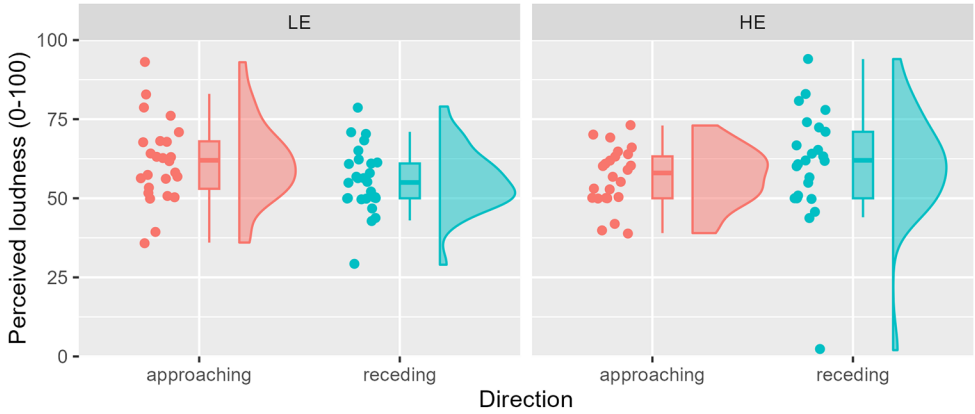
Figure 2

Rain Cloud Plot of the Perceived Volume of the US Asked at the End of Day 2



Note. Code based on Allen et al. (2021). It should be noted that one participant in the HE group gave a loudness rating of 2. In order to avoid arbitrary post-hoc cut-offs, we decided not to exclude this outlier from the analyses. However, in exploratory re-analyses, excluding this participant did not change our results.

acquisition, and extinction phase (see Figure 3). During habituation, each CS level was presented once. Each trial started with the presentation of the baseline-sized CS (either 1.25% or 26.25% relative to the participant's screen). After 0.8 – 1.3 s, the CS started to become larger/smaller (with a median rate of 6.8% per s) until it reached one of the 8 final sizes (5%, 7.5%, 10%, 12.5%, 15%, 17.5%, 20%, and 22.5%). Once reaching its final size, the CS returned to its baseline size with the same velocity. Since we expected that larger, approaching stimuli are perceived as inherently more threatening (Coker-Appiah et al., 2013), the CS for one half of the participants started at its smallest size and became larger (baseline size: 1.25%; CS level 1: 5% – CS level 8: 22.5%; approaching CS group), whereas the CS for the other half started at its largest size and became smaller (baseline size: 26.25%; CS level 1: 22.5% – CS level 8: 5%; receding CS group).

During acquisition, each CS level was presented five times (40 total trials) in a randomized order with the following conditions: no CS level should be presented three times in a row and the US should not be presented three times in a row. In each trial, when the stimulus had reached its final size, participants were asked to rate how much they expected the US on a visual analog scale from 0 ("very unlikely") to 100 ("very likely"). Subsequently, the US were presented according to the following pattern: no US were presented at CS level 1 (0% reinforcement rate; RR), one US was presented at CS Levels 2 and 3 (20% RR), two US were presented at CS Levels 4 and 5 (40% RR), three US

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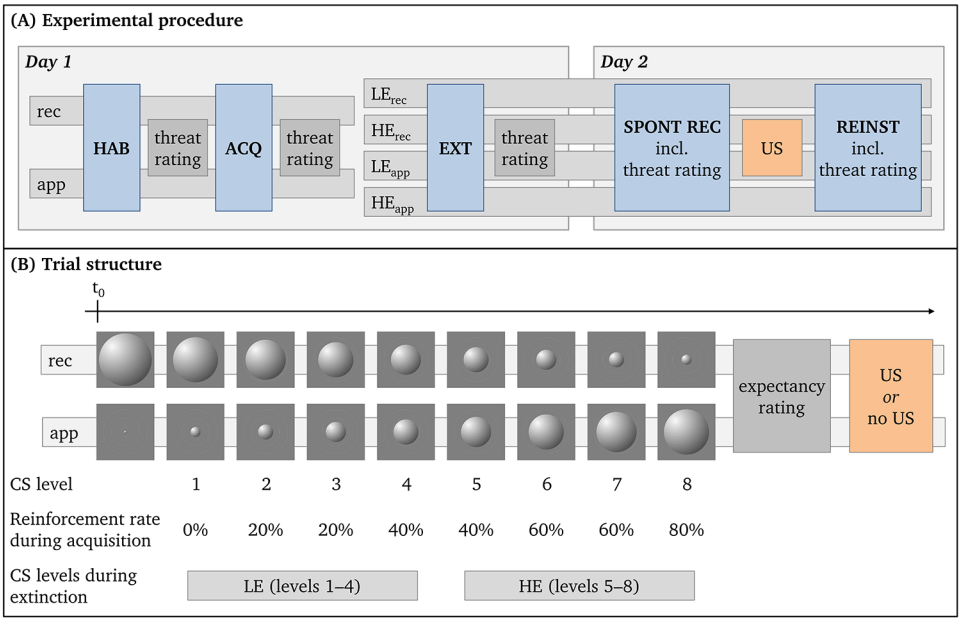
Figure 3

(A) Summary of the Experimental Procedure and (B) Description of the Trial Structure



Note. (A) On Day 1, participants were divided into the receding (rec) and approaching (app) CS groups, before undergoing a habituation (HAB) and fear acquisition phase (ACQ). In the subsequent extinction phase (EXT), participants were again divided into two groups. To experimentally manipulate the extent of expectancy violation, one group (low expectancy violation; LE group) was presented only with the CS levels associated with low US likelihoods (CS Levels 1 – 4), whereas the other group (high expectancy violation; HE group) saw only the CS levels associated with high US likelihoods (CS Levels 5 – 8). On Day 2, all participants completed a spontaneous recovery (SPONT REC) and reinstatement (REINST) test. Threat ratings were collected for each CS level after each phase on Day 1. On Day 2, threat ratings for each CS level in each phase were collected directly after the expectancy rating for the respective CS level. (B) Each trial started with the presentation of the baseline-sized CS (smallest size for the approaching groups or largest size for the receding groups). After 0.8 – 1.3 s, the CS started to become larger/smaller until it reached one of the 8 final sizes. Once reaching its final size, participants were asked to rate the likelihood of being presented with an US (US expectancy rating). During acquisition, US were then presented according to the specific reinforcement rate related to the CS level before the CS returned to its baseline size. Note, that no US expectancy ratings were collected during habituation. In the habituation, spontaneous recovery, and reinstatement phases, the CS reached each final size once, while in acquisition it reached each final size five times. In extinction, each of the group's four final sizes were reached ten times.

were presented at CS Levels 6 and 7 (60% RR), and four US were presented at CS level 8 (80% RR). The trial ended with the CS returning to its baseline size.

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In the subsequent extinction phase, participants were again divided into two groups. To experimentally manipulate the extent of expectancy violation, one group (low expectancy violation; LE group) was presented only with the CS levels associated with low US likelihoods (CS Levels 1 – 4), whereas the other group (high expectancy violation; HE group) saw only the CS levels associated with high US likelihoods (CS Levels 5 – 8). Each respective CS level was presented 10 times (40 trials in total). Importantly, no US was administered during the extinction phase and participants received no instruction about the CS-US contingencies.

Day 2: In the morning of the following day, participants received an email containing the hyperlink for the second part of the main experiment, consisting of spontaneous recovery and reinstatement test. At the beginning, participants were asked to re-adjust the volume of their computer. To test for spontaneous recovery, each CS level was presented once while online US-expectancy ratings were collected as described above. For the subsequent reinstatement test, a single US was delivered before each CS level was presented again.

In addition to the online US-expectancy ratings, participants were asked to rate the perceived threat ("How threatening do you perceive this stimulus?") for each CS level on a visual analogue scale from 0 ("very harmless") to 100 ("very threatening") after each phase (i.e., habituation, acquisition, extinction) and for spontaneous recovery and reinstatement.

Statistical Analysis

All statistical analyses were conducted with R 4.1.2 (R Development Core Team, 2021). The afex package (Singmann et al., 2020) was used for ANOVA with type 3 sum of squares, the effectsize package (Ben-Shachar et al., 2020) was used to calculate omega squared (ω^2), and the emmeans package (Lenth, 2023) was used for simple contrasts. For acquisition, spontaneous recovery, and reinstatement, mean differences in threat and US-expectancy ratings were analyzed separately using 2 (expectancy violation: HE vs LE; between-subject factor) x 2 (CS direction: approaching vs receding; between-subject factor) x 8 (CS level: CS Levels 1 – 8; within-subject factor) mixed ANOVAs. Threat ratings after habituation were analyzed using the identical procedure. Significant main and interaction effects were followed-up with simple contrasts. To quantify the extent of expectancy violation, US-expectancy ratings obtained during the extinction phase were summarized analogous to Scheveneels, Boddez, Vervliet, et al. (2019) and compared between groups using a 2 (expectancy violation: HE vs LE) x 2 (CS direction: approaching vs receding) ANOVA. Since the true probability of an US-occurrence during extinction was always zero, expectancy violation can be calculated as the trial-wise US-expectancy ratings minus zero. Thus, the sum of the US-expectancy ratings across individual trials yields the total value of expectancy violation. A significance level of .05 was used for all analyses and Greenhouse–Geisser correction was applied where appropriate

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(Greenhouse & Geisser, 1959). Throughout this manuscript, we report corrected degrees of freedom, corrected p values and the omega squared (ω^2). Data and code for the reported analyses are available at https://osf.io/tg2fb/.

Results

Online Expectancy Ratings

All results for US-expectancy ratings are illustrated in Figure 4. The analysis of the last presentation of each stimulus in the acquisition phase demonstrated successful fear conditioning as indexed by a significant main effect of CS level, $F(5.73, 555.56) = 112.90$, $p < .001$, $\omega^2 = .44$, indicating that participants expected the US more strongly with increasing threat imminence (larger physical sizes in the approaching CS groups, smaller physical sizes in the receding CS groups). In addition, there was a main effect of CS direction, $F(1, 97) = 8.10$, $p = .005$, $\omega^2 = .07$, which was further qualified by a significant interaction between CS level and CS direction, $F(5.73, 555.56) = 2.57$, $p = .020$, $\omega^2 = .01$. Together, these results indicate higher US-expectancy ratings in the approaching compared to the receding CS groups, particularly, for the 6th, $t(97) = 2.72$, $p = .008$, and 7th level, $t(97) = 3.84$, $p < .001$, of CS level (all other levels, p's > .050), suggesting that physical size interfered with acquisition learning, i.e., that larger physical sizes of an approaching CS are more readily associated with the occurrence of the US than smaller physical CS levels in the receding group. Importantly, there were no differences between HE and LE groups, p's > .259.

During extinction training, the HE group showed higher summarized US-expectancy ratings and thus stronger expectancy violation than the LE group, $F(1, 97) = 25.08$, $p < .001$, $\omega^2 = .19$, implying a successful experimental manipulation of expectancy violation.

On Day 2 at the spontaneous recovery test, there was a main effect of CS level, $F(2.97, 287.72) = 96.82$, $p < .001$, $\omega^2 = .35$, demonstrating higher expectancy ratings with increasing threat imminence in all groups, while a significant CS level x expectancy violation interaction, $F(2.97, 287.72) = 6.73$, $p < .001$, $\omega^2 = .03$, indicates higher US-expectancy ratings and thus a stronger recovery of conditioned fear for LE compared to HE groups at the 7th: $t(97) = 3.03$, $p = .003$, and 8th: $t(97) = 2.66$, $p = .009$, CS levels (all other levels, p's > .078). No effect of direction reached significance, p's > .366.

The US presentation at reinstatement did not substantially change these results. The main effect of CS level, $F(3.08, 298.44) = 76.64$, $p < .001$, $\omega^2 = .29$, and the CS level x expectancy violation interaction, $F(3.08, 298.44) = 4.05$, $p = .007$, $\omega^2 = .02$, remained significant. Again, LE compared to HE groups reported higher expectancy ratings at the 6th: $t(97) = 2.17$, $p = .032$, 7th: $t(97) = 2.47$, $p = .015$, and 8th: $t(97) = 2.05$, $p = .044$, CS levels (all other levels, p's > .167). No effect of direction reached significance, p's > .161.

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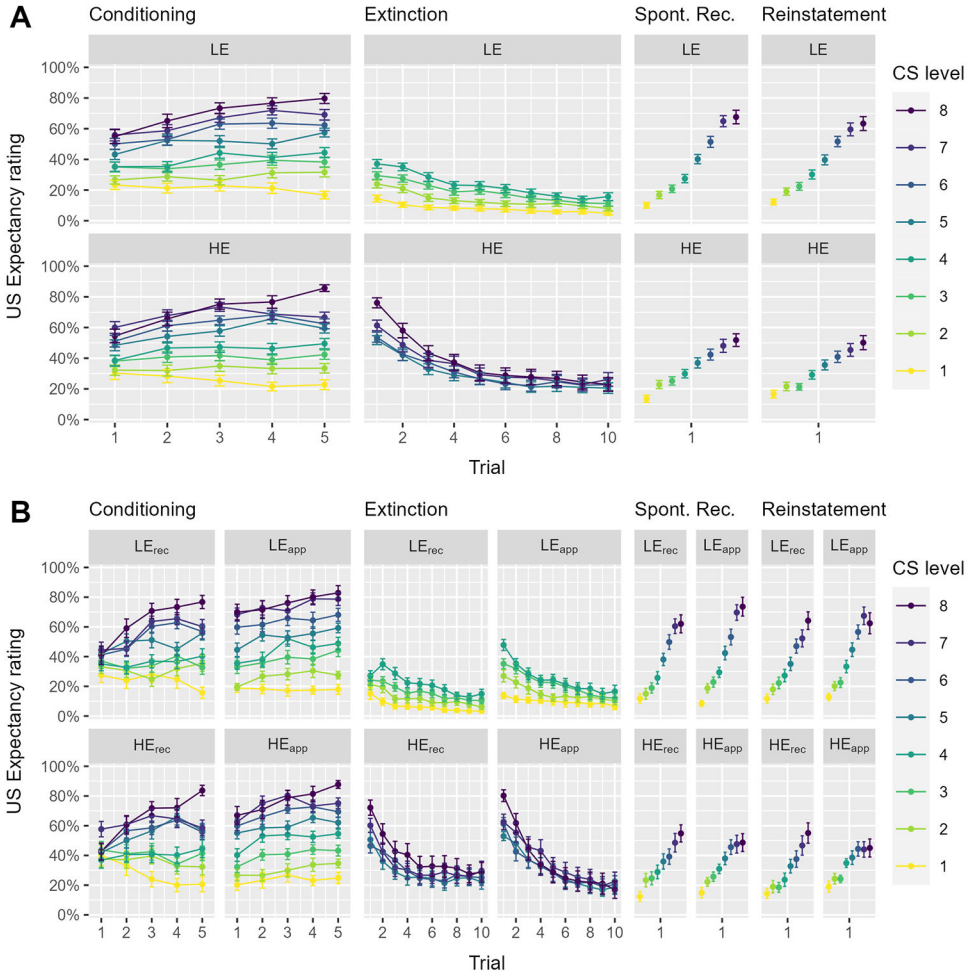
Figure 4

US-Expectancy Ratings



Note. (A) Summary of the US-expectancy ratings on single trial level for low (LE) and high (HE) expectancy violation groups, and each experimental phase (error bars indicate the standard error of the mean). (B) Shows the same results separately for the approaching (app) and receding (rec) CS groups. Conditioned stimulus level (CS level) corresponds to threat imminence, i.e., larger physical sizes for approaching CS groups and smaller physical sizes for receding CS groups.

Threat Ratings

After habituation, the 2x2x8 ANOVA for subjective threat ratings revealed a significant main effect of CS level, $F(2.08, 201.70) = 10.10$, $p < .001$, $\omega^2 = .03$. Crucially, there was

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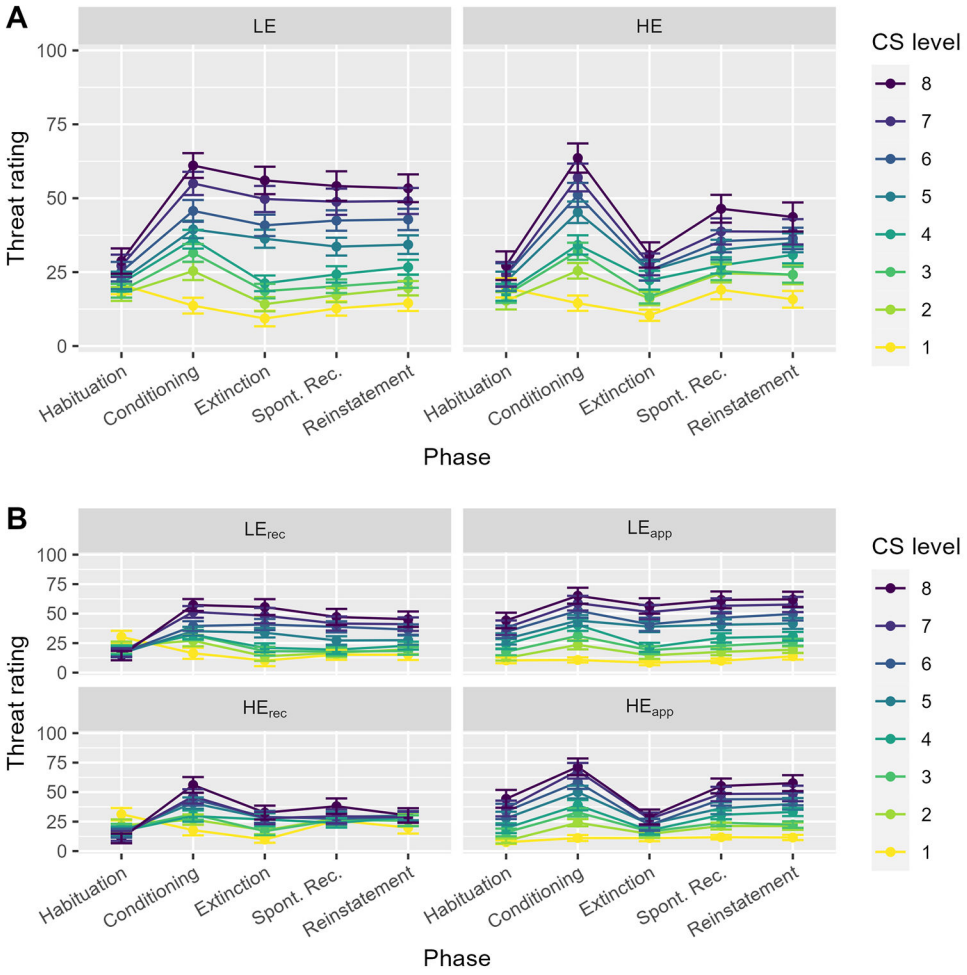
also a significant interaction between CS level and CS direction, $F(2.08, 201.70) = 46.15$, $p < .001$, $\omega^2 = .12$, indicating higher threat ratings for increasing CS levels (i.e., increasing sizes) in the approaching CS groups and higher threat ratings for decreasing CS levels (i.e., increasing sizes) in the receding CS groups (see Figure 5).

Figure 5

Threat Ratings



Note. (A) Summary of the threat ratings for low (LE) and high (HE) expectancy violation groups, and each experimental phase (error bars indicate the standard error of the mean). (B) Shows the same results separately for the approaching (app) and receding (rec) CS groups. Conditioned stimulus level (CS level) corresponds to threat imminence, i.e., larger physical sizes for approaching CS groups and smaller physical sizes for receding CS groups.

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This result is in line with the notion that visual stimuli appear inherently more threatening with increasing physical size, i.e., lower CS levels in receding CS groups and higher CS levels in approaching CS groups.

At the end of the acquisition phase, successful conditioning was indexed by a significant main effect of CS level, $F(2.91, 282.23) = 92.07$, $p < .001$, $\omega^2 = .27$. In addition, there was a CS direction x CS level interaction, $F(2.91, 282.23) = 5.58$, $p = .001$, $\omega^2 = .02$. Taken together, these results demonstrate that participants perceived more threat with increasing threat imminence. Yet, physical size of the CS still influenced threat ratings as indexed by slightly higher threat ratings in the approaching CS compared to the receding CS groups at the 4th: $t(97) = 1.95$, $p = .055$, 5th: $t(97) = 1.98$, $p = .050$, 6th: $t(97) = 2.56$, $p = .012$, 7th: $t(97) = 2.45$, $p = .016$, and 8th: $t(97) = 1.81$, $p = .074$, CS level. Please note, that the 8th CS level was the largest physical size in the approaching CS group but the smallest physical size in the receding CS group. Importantly, no differences between LE and HE groups were found, p's > .610.

Directly after extinction, the effect of the expectancy violation manipulation was evident in a significant CS level x expectancy violation interaction, $F(2.53, 245.24) = 12.42$, $p < .001$, $\omega^2 = .04$, which could be retrieved in addition to main effects of expectancy violation, $F(1, 97) = 6.18$, $p = .015$,, $\omega^2 = .05$, and CS level, $F(2.53, 245.24) = 58.70$, $p < .001$, $\omega^2 = .19$. As illustrated in Figure 5, the HE groups reported lower threat ratings compared to the LE groups at the 5th: $t(97) = 2.45$, $p = .016$, 6th: $t(97) = 2.98$, $p = .004$, 7th: $t(97) = 3.78$, $p < .001$, and 8th: $t(97) = 3.95$, $p < .001$, CS level, while there were no differences for smaller CS levels, p's > .579. Furthermore, we found no effect of CS direction, p's > .521. To further analyze the effect of expectancy violation on threat ratings, we tested the differences between groups from acquisition to extinction. Indeed, for the HE group, we found a decrease in threat ratings for all CS levels, p's < .003, except for the lowest level, $t(48) = 1.62$, $p = .112$, while threat ratings in the LE groups decreased only for the four lowest (CS Levels 1 – 4), p's < .015, but not for the four highest levels (CS Levels 5 – 8), p's > .184, suggesting that participants in the LE groups still perceived higher CS levels as threatening.

For threat ratings at spontaneous recovery on Day 2, the main effect of CS level, $F(2.36, 229.23) = 54.61$, $p < .001$, $\omega^2 = .18$, and the interaction between CS level and expectancy violation, $F(2.36, 229.23) = 4.38$, $p = .009$, $\omega^2 = .01$, remained significant. Yet, simple contrasts revealed no significant differences between LE and HE groups at the individual CS levels, all p's > .063. In addition, there was a CS level x CS direction interaction, $F(2.36, 229.23) = 8.10$, $p < .001$, $\omega^2 = .03$, indicating spontaneous recovery of the effect of physical size on threat ratings similar to the results of the habituation phase. Together, these results suggest that the differential effect of expectancy violation on threat ratings did not persist until the second day of the study. To substantiate this finding, we also analyzed change scores between the end of acquisition and spontaneous recovery at the individual CS levels separately for the HE and LE groups. Student's

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t-tests revealed decreased threat ratings for CS Levels 3 to 8 in the HE groups, *p*'s < .029, and decreased threat ratings for CS Levels 2 to 5 in the LE groups, *p*'s < .018.

A similar pattern of results could be obtained for threat ratings at the reinstatement test. Main effects of CS direction, $F(1, 97) = 5.31$, $p = .023$, $\omega^2 = .04$, and CS level, $F(2.08, 201.73) = 54.39$, $p < .001$, $\omega^2 = .18$, were qualified by significant interactions between CS direction and CS level, $F(2.08, 201.73) = 9.54$, $p < .001$, $\omega^2 = .03$, as well as between CS level and expectancy violation, $F(2.08, 201.73) = 3.68$, $p = .025$, $\omega^2 = .01$. Higher CS levels were generally associated with higher threat ratings, while physical size interfered with actual threat imminence similarly to the description above. Again, simple contrasts revealed no significant differences between LE and HE groups at the individual CS levels, *p*'s > .079.

Discussion

The main goal of our study was to provide causal evidence for the influence of expectancy violation on extinction retention. To this end, we employed a web-based fear conditioning protocol, in which we manipulated the magnitude of expectancy violation during the extinction learning phase. Subjective threat and US-expectancy ratings were obtained throughout the acquisition and extinction phase on Day 1, as well as during a spontaneous recovery and reinstatement test on Day 2.

In line with previous fear conditioning studies, our results showed successful fear acquisition and extinction for US-expectancy and threat ratings, indicating that participants learned the CS-US and CS-noUS associations. Consistent with our manipulation of expectancy violation, however, the HE groups reported higher expectancy ratings than the LE groups. Because no US was presented during extinction, higher US-expectancy ratings also imply stronger expectancy violation, and according to the inhibitory learning model, stronger expectancy violation should have led to a stronger formation of the CS-noUS association (Craske et al., 2014; Craske et al., 2022; Scheveneels, Boddez, Vervliet, et al., 2019). As predicted by the inhibitory learning model, the HE groups indeed reported lower subjective threat compared to the LE groups at the end of the extinction phase on Day 1, providing causal evidence for the notion that the strength of expectancy violation is related to the decline of subjective threat during fear extinction.

On the second day, results for US-expectancy and threat ratings during the spontaneous recovery and reinstatement test were less conclusive. Whereas reduced expectancy ratings, and thus, a stronger retrieval of the CS-noUS association could be retrieved for the HE compared to LE groups, we found no substantial group differences for threat ratings. These findings indicate that the strength of expectancy violation did influence the extent of extinction retention, however, the effect was not as large as would have been expected according to the inhibitory learning model. This small effect might be due to extinction learning took place directly after fear acquisition and, therefore, might be

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influenced by the immediate extinction deficit. The immediate extinction deficit refers to the phenomenon that extinction retrieval is impaired for shorter intervals compared to longer intervals (e.g., 24 hours) between initial fear acquisition and subsequent extinction training and has been previously demonstrated in rodent and human studies (Chang et al., 2010; Huff et al., 2009; Maren, 2014; Merz et al., 2016). However, it is important to mention that on Day 2 we could retrieve the expected results for US-expectancy ratings, i.e., reduced US-expectancy ratings and thus a stronger retrieval of the CS-noUS association for the high compared to low expectancy violation groups, as predicted by the inhibitory learning model. Yet, the CS-noUS association did not appear to inhibit the perceived threat. Recently, it has been suggested that US-expectancy ratings are more likely to represent the conscious, cognitive component (Boddez et al., 2013), whereas threat ratings are more likely to capture the affective component of the fear response (Constantinou et al., 2021; Lonsdorf et al., 2017). Taken together, our results suggest that expectancy violation plays an important role in fear extinction, but it is unclear how it translates to changes in the affective component of the fear response.

Crucially, this finding is consistent with experience from clinical psychology and previous empirical findings. Patients with anxiety disorders usually know that their fears are irrational and are aware that the probability of their feared event occurring is low (Zimmerman et al., 2010). Yet, they report intense affective reactions. In a similar line of thought, Buchholz et al. (2022) compared treatment outcomes after exposure therapy following cognitive restructuring and vice versa. According to the inhibitory learning theory cognitive restructuring prior to exposure exercises should reduce threat expectancies and thus hinder expectancy violation. Indeed, patients who received cognitive restructuring before exposure showed a trend toward reduced expectancy ratings. However, contrary to the predictions of the inhibitory learning theory, the cognitive intervention did not attenuate the magnitude of change of expectancies due to exposure. In addition, the treatment outcomes of both groups were similar after treatment and at follow-up. In an analogous fear conditioning paradigm, Scheveneels, Boddez, De Ceulaer, et al. (2019) instructed half of the participants before extinction that the probability of the US will be small, whereas the control group did not receive this information. According to the inhibitory learning theory, this safety information should attenuate inhibitory learning and thus lead to an increased return of fear. Although participants in the informed group had a less pronounced decrease in US expectancies during extinction (which is consistent with the assumptions of the inhibitory learning model), it did not promote return of fear. On the contrary, the safety information reduced the return of fear compared to the control group. Combined with the results of our current study, these findings underscore that the violation of conscious expectancies does not directly translate to the outcome of exposure therapy. In line with this, a recent therapy study (Pittig et al., 2023) showed that not expectancy violation per se but rather how patients changed their threat expectancies after exposure exercises, calculated as pre-minus-post-

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exposure expectancy, i.e., "Imagine repeating the same exposure practice. How likely is it that the aversive outcome will occur this time?" (Craske et al., 2022), predicted treatment outcome.

There are also some limitations that need to be discussed in the context of the current study. First, we found strong effects of CS direction. As expected, threat ratings after habituation revealed that CS physical size was associated with higher threat ratings, such that closer CS appeared generally more threatening. In line with preparedness theories of fear learning (Coker-Appiah et al., 2013; Mineka & Öhman, 2002; Öhman & Mineka, 2001), we also found that the CS direction interfered with fear conditioning, i.e., larger physical CS sizes were more readily associated with the occurrence of the US than smaller sizes during fear acquisition. Importantly, the effect of CS direction on US-expectancy and threat ratings diminished during extinction learning. However, we found a strong return of this inherent fear in threat ratings during the spontaneous recovery and reinstatement test, suggesting that despite participants in the receding groups had learned that larger physical sizes indicated relative safety, they almost reverted to pre-acquisition threat levels, paralleling the difficulties in treating pathological forms of fear, as most anxiety disorders are rooted in evolutionarily prepared fears (e.g., fear of heights, spiders, snakes).

It is also important to mention that this study was conducted remotely only, and therefore, we were not able to record physiological measures of the fear response. Even though ratings are a valid and important measure of subjective threat perception (Boddez et al., 2013), future studies should seek complementary evidence from physiological indices of defense system activation, such as cardiovascular or electrodermal activity (Ojala & Bach, 2020). In contrast to laboratory studies, we were not able to standardize US-intensities and had to rely on participants' self-reported perceived loudness, which was collected at the end of Day 2. Based on these ratings and in combination with the US-expectancy ratings, we excluded participants who turned off their volume. Nevertheless, the average US-intensity could be lower than in laboratory studies, and replications with offline samples are needed to ensure that effects remain consistent across different methods of stimulus delivery. Importantly, when using a human scream as US, successful fear conditioning was already reported at US-intensities below 80 dB (Beaurenaut et al., 2020).

In summary, the present web-based fear conditioning study demonstrated that experimentally increasing the magnitude of expectancy violation increased extinction retention for US-expectancy ratings, but this did not affect subjective threat ratings on Day 2. Future studies need to further test the predictions of the inhibitory learning model, particularly how violation of conscious expectancies may translate to subjective feelings and symptoms of anxiety. This study provided a paradigm to experimentally target these processes.

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Competing Interests: The authors have declared that no competing interests exist.

Ethics Statement: All experimental procedures were approved by the ethics committee of the Department of Psychology at the University of Würzburg. Procedures were in agreement with the Declaration of Helsinki.

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Data Availability: Data and code for the analyses reported in this article are freely available (Gromer, Hildebrandt, & Stegmann, 2023)

Supplementary Materials

The Supplementary Materials contain the following items (for access see Index of Supplementary Materials below):

- Pre-registration protocol for all hypotheses and methods of the study
- Data and code for the analyses reported in this article

Index of Supplementary Materials

Gromer, D., Hildebrandt, L. K., & Stegmann, Y. (2021). *Supplementary materials to "The role of expectancy violation in extinction learning: A two-day online fear conditioning study"* [Pre-registration protocol]. OSF Registries. https://osf.io/7bgtv

Gromer, D., Hildebrandt, L. K., & Stegmann, Y. (2023). *Supplementary materials to "The role of expectancy violation in extinction learning: A two-day online fear conditioning study"* [Research data and code]. OSF. https://osf.io/tg2fb/

References

Ali, S., Rhodes, L., Moreea, O., McMillan, D., Gilbody, S., Leach, C., Lucock, M., Lutz, W., & Delgadillo, J. (2017). How durable is the effect of low intensity CBT for depression and anxiety? Remission and relapse in a longitudinal cohort study. *Behaviour Research and Therapy, 94*, 1–8. https://doi.org/10.1016/j.brat.2017.04.006

Allen, M., Poggiali, D., Whitaker, K., Marshall, T., van Langen, J., & Kievit, R. (2021). Raincloud plots: A multi-platform tool for robust data visualization [version 2; peer review: 2 approved]. *Wellcome Open Research, 4*(63). https://doi.org/10.12688/wellcomeopenres.15191.2

PsychOpen GOLD

Arch, J. J., & Craske, M. G. (2009). First-line treatment: A critical appraisal of cognitive behavioral therapy developments and alternatives. *Psychiatric Clinics of North America, 32*(3), 525–547. https://doi.org/10.1016/j.psc.2009.05.001

Arch, J. J., & Craske, M. G. (2011). Addressing relapse in cognitive behavioral therapy for panic disorder: Methods for optimizing long-term treatment outcomes. *Cognitive and Behavioral Practice, 18*(3), 306–315. https://doi.org/10.1016/j.cbpra.2010.05.006

Arslan, R. C., Walther, M. P., & Tata, C. S. (2020). formr: A study framework allowing for automated feedback generation and complex longitudinal experience-sampling studies using R. *Behavior Research Methods, 52*(1), 376–387. https://doi.org/10.3758/s13428-019-01236-y

Beaurenaut, M., Tokarski, E., Dezecache, G., & Grèzes, J. (2020). The 'Threat of Scream' paradigm: A tool for studying sustained physiological and subjective anxiety. *Scientific Reports, 10*(1), Article 12496. https://doi.org/10.1038/s41598-020-68889-0

Ben-Shachar, M. S., Makowski, D., Lüdecke, D., Patil, I., Wiernik, B., Kelley, K., Stanley, D., Burnett, J., & Karreth, J. (2020). Effectsize: Indices of effect size and standardized parameters. *Journal of Open Source Software, 5*(56), Article 2815. https://doi.org/10.21105/joss.02815

Blakey, S. M., Abramowitz, J. S., Buchholz, J. L., Jessup, S. C., Jacoby, R. J., Reuman, L., & Pentel, K. Z. (2019). A randomized controlled trial of the judicious use of safety behaviors during exposure therapy. *Behaviour Research and Therapy, 112*, 28–35. https://doi.org/10.1016/j.brat.2018.11.010

Boddez, Y., Baeyens, F., Luyten, L., Vansteenwegen, D., Hermans, D., & Beckers, T. (2013). Rating data are underrated: Validity of US expectancy in human fear conditioning. *Journal of Behavior Therapy and Experimental Psychiatry, 44*(2), 201–206. https://doi.org/10.1016/j.jbtep.2012.08.003

Bouton, M. E. (1993). Context, time, and memory retrieval in the interference paradigms of Pavlovian learning. *Psychological Bulletin, 114*(1), 80–99. https://doi.org/10.1037/0033-2909.114.1.80

Bouton, M. E., & King, D. A. (1983). Contextual control of the extinction of conditioned fear: Tests for the associative value of the context. *Journal of Experimental Psychology: Animal Behavior Processes, 9*(3), 248–265. https://doi.org/10.1037/0097-7403.9.3.248

Brown, L. A., LeBeau, R. T., Chat, K. Y., & Craske, M. G. (2017). Associative learning versus fear habituation as predictors of long-term extinction retention. *Cognition and Emotion, 31*(4), 687–698. https://doi.org/10.1080/02699931.2016.1158695

Buchholz, J. L., Blakey, S. M., Hellberg, S. N., Massing-Schaffer, M., Reuman, L., Ojalehto, H., Friedman, J., & Abramowitz, J. S. (2022). Expectancy violation during exposure therapy: A pilot randomized controlled trial. *Journal of Behavioral and Cognitive Therapy, 32*(1), 13–24. https://doi.org/10.1016/j.jbct.2021.12.004

Butler, A. C., Chapman, J. E., Forman, E. M., & Beck, A. T. (2006). The empirical status of cognitive-behavioral therapy: A review of meta-analyses. *Clinical Psychology Review, 26*(1), 17–31. https://doi.org/10.1016/j.cpr.2005.07.003

Carpenter, J. K., Andrews, L. A., Witcraft, S. M., Powers, M. B., Smits, J. A. J., & Hofmann, S. G. (2018). Cognitive behavioral therapy for anxiety and related disorders: A meta-analysis of

PsychOpen GOLD

randomized placebo-controlled trials. *Depression and Anxiety, 35*(6), 502–514. https://doi.org/10.1002/da.22728

Chang, C.-h., Berke, J. D., & Maren, S. (2010). Single-unit activity in the medial prefrontal cortex during immediate and delayed extinction of fear in rats. *PLoS ONE, 5*(8), Article e11971. https://doi.org/10.1371/journal.pone.0011971

Coker-Appiah, D. S., White, S. F., Clanton, R., Yang, J., Martin, A., & Blair, R. J. R. (2013). Looming animate and inanimate threats: The response of the amygdala and periaqueductal gray. *Social Neuroscience, 8*(6), 621–630. https://doi.org/10.1080/17470919.2013.839480

Constantinou, E., Purves, K. L., McGregor, T., Lester, K. J., Barry, T. J., Treanor, M., Craske, M. G., & Eley, T. C. (2021). Measuring fear: Association among different measures of fear learning. *Journal of Behavior Therapy and Experimental Psychiatry, 70*, Article 101618. https://doi.org/10.1016/j.jbtep.2020.101618

Cooper, A. A., Clifton, E. G., & Feeny, N. C. (2017). An empirical review of potential mediators and mechanisms of prolonged exposure therapy. *Clinical Psychology Review, 56*, 106–121. https://doi.org/10.1016/j.cpr.2017.07.003

Craske, M. G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., & Baker, A. (2008). Optimizing inhibitory learning during exposure therapy. *Behaviour Research and Therapy, 46*(1), 5–27. https://doi.org/10.1016/j.brat.2007.10.003

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach. *Behaviour Research and Therapy, 58*, 10–23. https://doi.org/10.1016/j.brat.2014.04.006

Craske, M. G., Treanor, M., Zbozinek, T. D., & Vervliet, B. (2022). Optimizing exposure therapy with an inhibitory retrieval approach and the OptEx Nexus. *Behaviour Research and Therapy, 152*, Article 104069. https://doi.org/10.1016/j.brat.2022.104069

de Kleine, R. A., Hendriks, L., Becker, E. S., Broekman, T. G., & van Minnen, A. (2017). Harm expectancy violation during exposure therapy for posttraumatic stress disorder. *Journal of Anxiety Disorders, 49*, 48–52. https://doi.org/10.1016/j.janxdis.2017.03.008

Frei, T. (2020). https://commons.wikimedia.org/wiki/File:03may2020-tobefree.mp3

Greenhouse, S., & Geisser, S. (1959). On methods in the analysis of profile data. *Psychometrika, 24*(2), 95–112. https://doi.org/10.1007/BF02289823

Guzick, A. G., Reid, A. M., Balkhi, A. M., Geffken, G. R., & McNamara, J. P. H. (2020). That was easy! Expectancy violations during exposure and response prevention for childhood obsessive-compulsive disorder. *Behavior Modification, 44*(3), 319–342. https://doi.org/10.1177/0145445518813624

Hofmann, S. G., & Smits, J. A. J. (2008). Cognitive-behavioral therapy for adult anxiety disorders: A meta-analysis of randomized placebo-controlled trials. *The Journal of Clinical Psychiatry, 69*(4), 621–632. https://doi.org/10.4088/JCP.v69n0415

Huff, N. C., Hernandez, J. A., Blanding, N. Q., & LaBar, K. S. (2009). Delayed extinction attenuates conditioned fear renewal and spontaneous recovery in humans. *Behavioral Neuroscience, 123*(4), 834–843. https://doi.org/10.1037/a0016511

PsychOpen GOLD

Kemper, C. J., Ziegler, M., & Taylor, S. (2009). Überprüfung der psychometrischen Qualität der deutschen Version des Angstsensitivitätsindex-3. *Diagnostica, 55*(4), 223–233. https://doi.org/10.1026/0012-1924.55.4.223

Lenth, R. (2023). *emmeans: Estimated Marginal Means, aka Least-Squares Means* (R package version 1.8.4-1) [Computer software]. https://CRAN.R-project.org/package=emmeans

Lonsdorf, T. B., Menz, M. M., Andreatta, M., Fullana, M. A., Golkar, A., Haaker, J., Heitland, I., Hermann, A., Kuhn, M., Kruse, O., Meir Drexler, S., Meulders, A., Nees, F., Pittig, A., Richter, J., Romer, S., Shiban, Y., Schmitz, A., Straube, B., . . . Merz, C. J. (2017). Don't fear 'fear conditioning': Methodological considerations for the design and analysis of studies on human fear acquisition, extinction, and return of fear. *Neuroscience & Biobehavioral Reviews, 77*, 247–285. https://doi.org/10.1016/j.neubiorev.2017.02.026

MaderaDelEste Films. (2011). *Woman Scream.* https://freesound.org/people/sironboy/sounds/132106/

Maren, S. (2014). Nature and causes of the immediate extinction deficit: A brief review. *Neurobiology of Learning and Memory, 113*, 19–24. https://doi.org/10.1016/j.nlm.2013.10.012

McGregor, T., Purves, K. L., Constantinou, E., Baas, J. M. P., Barry, T. J., Carr, E., Craske, M. G., Lester, K. J., Palaiologou, E., Breen, G., Young, K. S., & Eley, T. C. (2021). Large-scale remote fear conditioning: Demonstration of associations with anxiety using the FLARe smartphone app. *Depress Anxiety, 38*(7), 719–730. https://doi.org/10.1002/da.23146

Merz, C. J., Hamacher-Dang, T. C., & Wolf, O. T. (2016). Immediate extinction promotes the return of fear. *Neurobiology of Learning and Memory, 131*, 109–116. https://doi.org/10.1016/j.nlm.2016.03.013

Milad, M. R., Quirk, G. J. (2012). Fear extinction as a model for translational neuroscience: Ten years of progress. *Annual Review of Psychology, 63*, 129–151. https://doi.org/10.1146/annurev.psych.121208.131631

Mineka, S., & Öhman, A. (2002). Phobias and preparedness: The selective, automatic, and encapsulated nature of fear. *Biological Psychiatry, 52*(10), 927–937. https://doi.org/10.1016/S0006-3223(02)01669-4

Norton, P. J., & Price, E. C. (2007). A meta-analytic review of adult cognitive-behavioral treatment outcome across the anxiety disorders. *Journal of Nervous and Mental Disease, 195*(6), 521–531. https://doi.org/10.1097/01.nmd.0000253843.70149.9a

Öhman, A., & Mineka, S. (2001). Fears, phobias, and preparedness: Toward an evolved module of fear and fear learning. *Psychological Review, 108*(3), 483–522. https://doi.org/10.1037/0033-295X.108.3.483

Ojala, K. E., & Bach, D. R. (2020). Measuring learning in human classical threat conditioning: Translational, cognitive and methodological considerations. *Neuroscience & Biobehavioral Reviews, 114*, 96–112. https://doi.org/10.1016/j.neubiorev.2020.04.019

Panitz, C., Endres, D., Buchholz, M., Khosrowtaj, Z., Sperl, M. F. J., Mueller, E. M., Schubö, A., Schütz, A. C., Teige-Mocigemba, S., & Pinquart, M. (2021). A revised framework for the investigation of expectation update versus maintenance in the context of expectation

PsychOpen GOLD

violations: The ViolEx 2.0 Model. *Frontiers in Psychology, 12*, Article 726432. https://doi.org/10.3389/fpsyg.2021.726432

Pavlov, I. (1927). *Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex.* Oxford University Press.

Peirce, J. W. (2007). PsychoPy – Psychophysics software in Python. *Journal of Neuroscience Methods, 162*(1-2), 8–13. https://doi.org/10.1016/j.jneumeth.2006.11.017

Pittig, A., Heinig, I., Goerigk, S., Richter, J., Hollandt, M., Lueken, U., Pauli, P., Deckert, J., Kircher, T., Straube, B., Neudeck, P., Koelkebeck, K., Dannlowski, U., Arolt, V., Fydrich, T., Fehm, L., Ströhle, A., Totzeck, C., Margraf, J., . . . Wittchen, H.-U. (2023). Change of threat expectancy as mechanism of exposure-based psychotherapy for anxiety disorders: Evidence from 8,484 exposure exercises of 605 patients. *Clinical Psychological Science, 11*(2), 199–217. https://doi.org/10.1177/21677026221101379

Purves, K. L., Constantinou, E., McGregor, T., Lester, K. J., Barry, T. J., Treanor, M., Sun, M., Margraf, J., Craske, M. G., Breen, G., & Eley, T. C. (2019). Validating the use of a smartphone app for remote administration of a fear conditioning paradigm. *Behaviour Research and Therapy, 123*, Article 103475. https://doi.org/10.1016/j.brat.2019.103475

Quirk, G. J., & Mueller, D. (2008). Neural mechanisms of extinction learning and retrieval. *Neuropsychopharmacology, 33*(1), 56–72. https://doi.org/10.1038/sj.npp.1301555

Raes, A. K., Koster, E. H., Loeys, T., & De Raedt, R. (2011). Pathways to change in one-session exposure with and without cognitive intervention: An exploratory study in spider phobia. *Journal of Anxiety Disorders, 25*(7), 964–971. https://doi.org/10.1016/j.janxdis.2011.06.003

R Development Core Team. (2021). *R: A language and environment for statistical computing* (4.1.2) [Computer software]. R Foundation for Statistical Computing.

Rescorla, R. A., & Wagner, A. R. (1972). A theory of Pavlovian conditioning: Variations in the effectiveness of reinforcement and nonreinforcement. In A. H. Black & W. F. Prokasy (Eds.), *Classical conditioning II: Current theory and research* (pp. 64-99). Appleton-Century-Crofts.

Salkovskis, P. M., Hackmann, A., Wells, A., Gelder, M. G., & Clark, D. M. (2007). Belief disconfirmation versus habituation approaches to situational exposure in panic disorder with agoraphobia: A pilot study. *Behaviour Research and Therapy, 45*(5), 877–885. https://doi.org/10.1016/j.brat.2006.02.008

Scheveneels, S., Boddez, Y., De Ceulaer, T., & Hermans, D. (2019). Ruining the surprise: The effect of safety information before extinction on return of fear. *Journal of Behavior Therapy and Experimental Psychiatry, 63*, 73–78. https://doi.org/10.1016/j.jbtep.2018.11.001

Scheveneels, S., Boddez, Y., Van Daele, T., & Hermans, D. (2019). Virtually unexpected: No role for expectancy violation in virtual reality exposure for public speaking anxiety. *Frontiers in Psychology, 10*, Article 2849. https://doi.org/10.3389/fpsyg.2019.02849

Scheveneels, S., Boddez, Y., Vervliet, B., & Hermans, D. (2019). Modeling hierarchical versus random exposure schedules in Pavlovian fear extinction: No evidence for differential fear outcomes. *Behavior Therapy, 50*(5), 967–977. https://doi.org/10.1016/j.beth.2019.03.001

PsychOpen GOLD

Singmann, H., Bolker, B., Westfall, J., Aust, F., Ben-Shachar, M. S. (2020). *afex: Analysis of factorial experiments* (R package version 0.28-0) [Computer software]. https://CRAN.R-project.org/package=afex

Stegmann, Y., Andreatta, M., Pauli, P., & Wieser, M. J. (2021). Associative learning shapes visual discrimination in a web-based classical conditioning task. *Scientific Reports, 11*(1), Article 15762. https://doi.org/10.1038/s41598-021-95200-6

Taylor, S., Abramowitz, J. S., & McKay, D. (2012). Non-adherence and non-response in the treatment of anxiety disorders. *Journal of Anxiety Disorders, 26*(5), 583–589. https://doi.org/10.1016/j.janxdis.2012.02.010

Taylor, S., Zvolensky, M. J., Cox, B. J., Deacon, B., Heimberg, R. G., Ledley, D. R., Abramowitz, J. S., Holaway, R. M., Sandin, B., Stewart, S. H., Coles, M., Eng, W., Daly, E. S., Arrindell, W. A., Bouvard, M., & Cardenas, S. J. (2007). Robust dimensions of anxiety sensitivity: Development and initial validation of the Anxiety Sensitivity Index-3. *Psychological Assessment, 19*(2), 176–188. https://doi.org/10.1037/1040-3590.19.2.176

Wise, T., & Dolan, R. J. (2020). Associations between aversive learning processes and transdiagnostic psychiatric symptoms in a general population sample. *Nature Communications, 11*(1), Article 4179. https://doi.org/10.1038/s41467-020-17977-w

Zimmerman, M., Dalrymple, K., Chelminski, I., Young, D., & Galione, J. N. (2010). Recognition of irrationality of fear and the diagnosis of social anxiety disorder and specific phobia in adults: Implications for criteria revision in DSM-5. *Depression and Anxiety, 27*(11), 1044–1049. https://doi.org/10.1002/da.20716

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Fear of Happiness Predicts Concurrent but not Prospective Depressive Symptoms in Adolescents

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Supplementary Materials: Materials [see Index of Supplementary Materials]

Abstract

Background: It is increasingly recognised that the study of responses to positive emotions significantly contributes to our understanding of psychopathology. Notably, positive emotions are not necessarily experienced as pleasurable. Instead, some believe that experiencing happiness may have negative consequences, referred to as fear of happiness (FOH), or they experience a fear of losing control over positive emotions (FOLC). According to reward devaluation theory, such an association of positivity with negative outcomes will result in positive stimuli being devalued over time, contributing to or maintaining depressive symptoms. The prospective relationship between fears of positivity and depressive symptoms is yet to be examined in adolescents. The present longitudinal study investigated whether FOH and FOLC prospectively predict depressive symptoms.

Method: 128 adolescents between 16-18 years of age (M = 16.87, SD = 0.80) recruited from two secondary schools in Flanders, Belgium, completed measures of depressive symptoms (Depression Anxiety Stress Scales) including consummatory anhedonia, FOH (Fear of Happiness Scale), and FOLC (Affective Control Scale) in their classroom at baseline and 2-months follow-up. Regression analyses were performed to test the association between FOH, FOLC, and depressive symptoms.

Results: FOH concurrently, but not prospectively, predicted depressive symptoms. There was no significant association between FOH and consummatory anhedonia. FOLC was not a significant predictor of depressive symptoms or consummatory anhedonia.

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Conclusion: These findings suggest that FOH may only be concurrently related to depressive symptoms. Considering prior findings in adults, future research should investigate the association of FOH with anticipatory anhedonia in adolescents.

Keywords

adolescents, dampening, depression, fear of happiness, positive affect, anhedonia

Highlights

- Concurrent and prospective associations between fears of positivity and adolescents' depressive symptoms were tested.
- Fear of happiness was concurrently but not prospectively associated with depressive symptoms.
- Fear of happiness did not predict consummatory anhedonia; anticipatory anhedonia was not assessed.
- Fear of losing control over positive emotions did not predict depressive symptoms or anhedonia.

The ability to regulate emotional experience plays a vital role in development and maintenance of emotional disorders in adolescents (Young et al., 2019). Research into emotion regulation has to date primarily focused on negative emotions but it is increasingly recognised that studying positive emotions is also of great value. Because positive and negative emotions are independent of each other, emotion regulation may function differently in each domain (Wood et al., 2003). Moreover, deficits in experience and regulation of positive emotions are present across various forms of psychopathology (Dillon & Pizzagalli, 2010). From a clinical perspective, most psychological treatments are targeting negative emotions and are often ineffective for improving deficits in positive emotion regulation (Dunn, 2012). Thus, investigating positive emotion regulation may contribute to our understanding of psychopathology, particularly depressive disorders, over and above insights gained through research into negative emotion regulation.

Defining FOH and FOLC

Notably, positive emotions are not necessarily experienced as pleasurable. Instead, empirical evidence suggests that some individuals are even afraid of positive emotions. One reason may be the belief that experiencing happiness may have negative consequences, referred to as fear of happiness (FOH; Joshanloo, 2013). Individuals may experience FOH because they are more afraid of the loss after feelings of happiness have ended than they value experiencing feelings of happiness. Other individuals experience FOH because they have repeatedly been disappointed when looking forward to pleasurable activities and are afraid of being disappointed again. Another reason for fearing positive emotions may be that individuals are afraid of losing control over their positive emotions (FOLC;

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Williams et al., 1997), for example because they get carried away with their excitement and consequently become careless.

Generally, deficits in the experience of positive emotions predict a poor prognosis of depression (Morris et al., 2009), possibly because positive emotions were found to increase resilience against negative life events (Tugade & Fredrickson, 2004). However, fear of positive emotions may prevent individuals from savouring positive emotions and using them to cope with adversities. For example, a patient with an agoraphobic mother reported getting excited to go to the beach as a child, which repeatedly ended in her mother experiencing a panic attack, triggering an argument with her father, and creating a terrible atmosphere. As a result, the patient felt she would be better off not looking forward to enjoyable activities because she got to associate positive emotions with negative outcomes (P. Gilbert, 2007). According to reward devaluation theory, such a repeated association of positive emotions with either an ultimate negative outcome or simultaneous negative emotions may result in positive stimuli being devalued over time (Winer & Salem, 2016). Positive stimuli are consciously inhibited or avoided because individuals fear that their initially positive experience will result in negative outcomes. Ultimately, positivity becomes a signal of negative affect (Jordan et al., 2021), which may be reflected in FOH. A meta-analysis (Winer & Salem, 2016) provides evidence for reward devaluation theory by showing that depressed patients are more likely to avoid positive information in a dot probe task compared to anxious patients and healthy controls. Moreover, two experimental studies demonstrated that pairing environmental reward with inhibition of rewarding behaviour slowed responses to reward or reduced the reward value (Veling et al., 2011; Veling & Aarts, 2009). Notably, inhibition of reward was only visible in participants initially sensitive to the reward, suggesting the initially-rewarding stimulus was devalued rather than lacked value from the start.

Because FOH is characterised by deficits in the positive affect system, it may be specifically related to anhedonia, a hallmark symptom of depression. Anhedonia encompasses both deficits in looking forward to pleasurable events (anticipatory anhedonia) and deficits in experiencing pleasure during an enjoyable event (consummatory anhedonia) (Gard et al., 2006). Since individuals with FOH associate happiness with negative consequences, they may lack motivation to approach pleasurable events and may in turn develop anticipatory anhedonia. Ultimately, this increase in anticipatory anhedonia may contribute to the development of other symptoms of depression such as sadness and lack of hope because individuals lack motivation to approach reward. This was supported by Jordan et al. (2018) who found anticipatory anhedonia to mediate the relationship between fear of positive evaluation, another fear of positivity related to FOH, and other depressive symptoms in adults. On the other hand, individuals with FOH may also experience consummatory anhedonia when confronted with positive events because they associate positivity with negative outcomes. This may trigger other depressive symptoms such as lack of hope or sadness when they realise that they cannot enjoy positive

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experiences anymore. For adolescents, who cannot withdraw as easily when caregivers confront them with pleasurable experiences, this may be especially relevant. Hence, FOH may be associated with and predict anticipatory and consummatory anhedonia, which in turn contributes to other depressive symptoms. Previous research found that FOH is strongly correlated with depression, anxiety, and stress (P. Gilbert et al., 2012). Using a slightly different measure of FOH, Joshanloo et al. (2014) showed that FOH predicted lower life satisfaction above a set of recognized predictors at the individual (e.g., autonomy) and cultural level (e.g., wealth). These findings of cross-sectional studies demonstrate that FOH is associated with lower wellbeing and psychopathology. There is currently only one study providing evidence for a significant positive prospective link between FOH and depressive symptoms in adults (Jordan et al., 2021).

In contrast to FOH, FOLC reflects losing control over positive emotions and may therefore be more related to bipolar disorder. Given FOLC's effect on the positive valence system, it may be especially associated with anhedonia. Individuals with FOLC may be unable to look forward to pleasurable events (anticipatory anhedonia) because they anticipate losing control of their emotions, but they may also be unable to enjoy pleasurable events in the moment (consummatory anhedonia) because they fear to lose control any moment instead of enjoying the experience. This feeling of lack of control may be especially prominent in adolescents as affective control is reduced during adolescence compared to childhood and adulthood (Schweizer et al., 2020). Notably, poor affective control is associated with mental health problems. Also fear of losing affective control (i.e. FOLC) has been associated with increased depressive symptoms (Yoon et al., 2018). Yet, findings are limited by the cross-sectional design of previous studies and FOLC's influence on depressive symptoms requires further investigation.

Importance of Assessing an Adolescent Sample

Adolescence is a crucial period with regard to mental health because a substantial amount of depressed patients experience their first episode in adolescence (Zisook et al., 2007). Given the possible role of FOH and FOLC in the development of depressive disorders, it is important to study the associations of FOH and FOLC with depressive symptoms not only in adults, which has been done in prior research, but also in adolescents. Understanding which factors contribute to the development of depressive symptoms in adolescence would allow us to counteract the alarming rise of mental disorders among young people (Patel et al., 2007). This rise is to be expected considering that adolescents undergo an emotionally challenging period, in which they develop strategies to regulate their emotions more independently. However, research on the use, adaptiveness, and effectiveness of emotion regulation strategies in adolescents is scarce (Riediger & Klipker, 2014). Two experimental studies found that inducing thoughts to downregulate positive emotions (dampening) completely reduced the effects of a positive memory recall in adults while in adolescents the positive memory still positively

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impacted happiness (Dunn et al., 2018; Yilmaz et al., 2019). These findings support the idea that appraisal-based emotion regulation strategies like dampening are less potent in adolescents because top-down cognitive control is still developing (Skinner & Zimmer-Gembeck, 2016). In sum, adolescence is an important period for emotional development. Given that emotion regulation strategies, or at least their effects, seem to differ between adults and adolescents it is important to better understand how adolescents respond to emotions in order to counteract the alarming rise in mental disorders.

The Present Study

This study aims to investigate whether FOH and FOLC prospectively predict depressive symptoms. 128 adolescents completed self-report questionnaires of depressive symptoms (including consummatory anhedonia), FOH, and FOLC at baseline and 2-months later. Based on prior cross-sectional research, we hypothesized that FOH and FOLC would cross-sectionally and prospectively predict depressive symptoms including anhedonia. Hypotheses were formulated prior to data analysis.

Method

Participants

Our sample was recruited as part of a larger study aiming to test whether negative self-referent processing predicts depressive symptoms in adolescents (Belmans et al., 2023). For this larger study, a power analysis in G*Power (Faul et al., 2007) indicated a required sample of $N = 58$ participants to reach a power of .80 with $\alpha = .05$ based on a cross-sectional effect size of Cohen's $d = .82$ (Iijima et al., 2017). The larger study oversampled to account for attrition and because smaller prospective effects were expected compared to previously observed cross-sectional effects. School classes, rather than individual participants, were recruited from two secondary schools in Flanders, Belgium, resulting in a total sample of 128 adolescents (60.63% female). Adolescents were 16-18 years old ($M = 16.87$, $SD = 0.80$) and most were of Belgian origin (80%). At follow-up assessment, 11 adolescents (8.7%) did not participate because they were absent from school on the day of assessment.

The age group was chosen to ensure that participants understand the computer task in the larger study. Sensitivity analyses conducted in G*Power revealed that the present study was able to detect a small-to-medium effect (Cohen's $f = .28$) in concurrent and prospective multiple regression models given $N = 128$, a power of .80, and $\alpha = .05$. The study was approved by the Social and Societal Ethics Committee at KU Leuven (G-2018-01-1090) and all participants provided informed consent in accordance with the Declaration of Helsinki (World Medical Association, 2013).

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Measures

Depression Subscale of Depressive Anxiety Stress Scales (DASS-D)

Depressive symptoms were assessed with the 7-item DASS-D (Lovibond & Lovibond, 1995). Participants indicated on a 4-point scale, from d*id not apply to me at all* to *applied to me very much, or most of the time*, how they felt during the past week (e.g., *I felt down-hearted and blue*). One item assesses consummatory anhedonia (*I couldn't seem to get any enjoyment out of the things I did*). The total score is calculated as the sum of all item scores. The Dutch DASS-D has good psychometric properties (de Beurs et al., 2001).

Fear of Happiness Scale (FOHS)

To assess fear of happiness, the Dutch FOHS was used (Joshanloo, 2013; Nelis et al., n.d.). Its 5 items are scored on a 7-point scale ranging from *strongly disagree* to *strongly agree* (e.g., *I prefer not to be too joyful, because usually joy is followed by sadness*).

Positive Affect Subscale of Affective Control Scale (ACS-PA)

FOLC was assessed with the 13-item ACS-PA (Raes et al., 2017; Williams et al., 1997). On a 7-point scale ranging from *very strongly disagree* to *very strongly agree*, participants indicated how they respond to positive affect (e.g., *When I feel really happy, I go overboard, so I don't like getting overly ecstatic*).

Procedure

At baseline and 2-months follow-up, participants completed all questionnaires and a computer task that is not part of this study collectively in their classrooms. The duration of follow-up was chosen such that both assessments took place in the same school year to minimise attrition.

Statistical Analyses

To test whether FOH and FOLC predicted concurrent and prospective depressive symptoms, regression analyses with DASS-D scores as criterion variable were performed for cross-sectional and prospective data separately. FOH and FOLC scores were entered as predictors and the dummy-coded variable female was added as covariate. For prospective analyses, DASS-D scores at baseline were entered as in a first step, before all other predictors were entered. Since previous studies identified anhedonia as a mediator between fear of positive evaluation and depressive symptoms, we performed post-hoc analyses to test the association between fears of positivity and the single-item measure of consummatory anhedonia from the DASS-D scale (Item 1). Using this item as criterion variable, we conducted an additional ordinal logistic regression. Predictor variables were the same as in aforementioned analyses except for prospective analyses, in which the baseline

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consummatory anhedonia score was entered in the first step. *z*-scores of continuous predictors were added to compute standardised odds ratios as a measure of effect size. Collinearity between predictors was assessed by a Variance Inflation Factor (VIF) larger than 10. To confirm that the proportional odds assumption was met, the brant test was applied (Brant, 1990). Additionally, the proportional odds assumption for each predictor was checked using likelihood ratio tests comparing a proportional odds model with a partial proportional odds model for which the proportional odds assumption was relaxed for the respective predictor.

Benjamini-Hochberg adjustment for multiple testing was applied to all *p*-values except those testing a priori hypotheses. We reported partial R^2 as effect size with .02, .13, and .26 indicating small, medium, and large effects, respectively (Cohen, 1992). For the ordinal regression analysis, we reported *OR* as effect size with 1.44, 2.48, and 4.27 indicating small, medium, and large effects, respectively (Sánchez-Meca et al., 2003). Missing data was limited. 11 participants were lost to follow-up because they were not present at school on the day of assessment. Only their baseline data was included in the analysis. Additionally, single items were missing from the DASS-D and FOLC scales for individual participants. In total, there were 0.002% of DASS-D items missing at baseline, 0.004% of FOLC items missing at baseline, and 0.0007% of FOLC items missing at follow-up. Little's test for MCAR demonstrated that missing data at both time points were missing completely at random (Little, 1988). Missing items were imputed using the mean score of all remaining questionnaire items. Analyses were conducted in R (R Core Team, 2021) using the stats package (version 4.1.1) for linear regression analyses and the VGAM package (version 1.1-7) for ordinal regression analyses (Yee, 2022).

Results

Descriptive Statistics and Internal Consistency

Means, standard deviations, ranges, and Cronbach's α for all measures are reported in Table 1.

Correlational Analyses

Zero-order Pearson correlations revealed significant correlations of depressive symptoms with FOH and FOLC at baseline (Table 2). Higher levels of depressive symptoms were associated with greater FOH and FOLC. Zero-order correlations between predictors at baseline and depressive symptoms at follow-up yielded similar results.

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Table 1

Descriptive Information for Baseline and Follow-up Measures

Variable	*n*	*M*	*SD*	Min	Max	α
Assessment T1						
DASS-D	127	4.39	3.98	0	17	.84
FOH	127	13.69	6.85	5	35	.89
FOLC	127	39.38	9.54	15	60	.82
Assessment T2						
DASS-D T2	116	3.92	3.68	0	15	.83
FOH T2	116	12.21	6.34	5	28	.89
FOLC T2	116	37.20	10.33	13	60	.83

Note. α = Cronbach's alpha.

Table 2

Pearson Correlations Between Depressive Symptoms (DASS-D), Fear of Happiness, and Fear of Losing Control Over Positive Emotions

Variable	1	2	3	4	5	6
1. DASS-D	–	.45***	.26**	.69***	.37***	.27**
2. FOH	[.30, .58]	–	.50***	.36***	.69***	.39***
3. FOLC	[.09, .42]	[.35, .62]	–	.25**	.41***	.68***
4. DASS-D T2	[.58, .77]	[.19, .51]	[.07, .41]	–	.45***	.34***
5. FOH T2	[.20, .52]	[.58, .78]	[.25, .55]	[.29, .58]	–	.52***
6. FOLC T2	[.09, .43]	[.23, .54]	[.57, .77]	[.17, .49]	[.38, .64]	–

Note. Pearson correlations with Benjamini-Hochberg adjustment for multiple testing are reported above the diagonal. 95% confidence intervals are reported below the diagonal.
*p < .05. **p < .01. ***p < .001.

Regression Analyses

Results of regression analyses are displayed in Table 3 and will be reported using effect sizes and corresponding confidence intervals (CIs). An effect size of zero indicated that the predictor did not significantly impact the outcome. Hence, when a CI does not include zero, the effect is considered significant.

FOH was significantly associated with depressive symptoms at baseline with a medium effect size (partial R^2 = .14, 95% CI [.05, .26]), with greater FOH predicting higher levels of depressive symptoms. FOH did not significantly predict depressive symptoms at follow-up when controlling for depressive symptoms at baseline, which is reflected in the effect size falling below the cut-off for a small effect (partial R^2 = .004, 95% CI [0, .04]). However, FOH significantly predicted depressive symptoms at follow-up with

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a small-to-medium effect size when baseline depressive symptoms were deleted from the model (partial R^2 = .07, 95% CI [.004, .19]; see Appendix A in the Supplementary Materials). FOLC was not significantly associated with depressive symptoms at baseline nor at follow-up. The effect size for both concurrent and prospective associations of FOLC with depressive symptoms fell well below the threshold for a small effect (see Table 3). An examination of VIFs confirmed no violations of multicollinearity (see Table 3).

Table 3

Summary of Regression Analyses for Variables Predicting Depressive Symptoms (DASS-D) at T1 and T2

Variable	*B* (*SE*)	*B* 95% CI	β	*p*	partial R^2	R^2	VIF
DV: DASS-D T1							
Constant	0.04 (1.40)	[-2.72, 2.81]		.97			
Female	0.21 (0.65)	[-1.08, 1.51]	.03	.74	.001 [0, .03]		1.01
FOH T1	0.25 (0.05)	[0.14, 0.35]	.43	< .001	.140 [.05, .26]		1.34
FOLC T1	0.02 (0.04)	[-0.06, 0.10]	.05	.59	.002 [0, .03]	.21	1.33
DV: DASS-D T2							
Step 1							
Constant	0.90 (0.47)	[-0.03, 1.83]		.06			
Female	0.30 (0.52)	[-0.73, 1.33]	.04	.56	.002 [0, .03]		1.02
DASS-D T1	0.66 (0.07)	[0.53, 0.80]	.68	< .001	.460 [.28, .61]	.48	1.02
Step 2							
Constant	-0.19 (1.08)	[-2.33, 1.95]		.86			
Female	0.25 (0.52)	[-0.79, 1.28]	.03	.64	.001 [0, .03]		1.04
DASS-D T1	0.62 (0.07)	[0.48, 0.77]	.64	< .001	.340 [.18, .51]		1.20
FOH T1	0.04 (0.05)	[-0.05, 0.13]	.07	.37	.004 [0, .04]		1.49
FOLC T1	0.02 (0.03)	[-0.04, 0.08]	.05	.52	.002 [0, .03]	.49	1.33

Note. 95% percentile bootstrap confidence intervals for partial R^2 are reported in brackets.

Ordinal logistic regression analyses using the single-item anhedonia score as criterion variable are displayed in Table 4 and will be reported using odds ratios (*OR*) and corresponding CIs. An *OR* of one indicated that there is no association between predictor and outcome. Hence, when a CI does not include one, the effect is considered significant. Due to low frequencies of the outcome categories "Applied to me to a considerable degree or a good part of time" and "Applied to me very much or most of the time" for consummatory anhedonia, these two categories were combined to increase statistical power of the overall model. For the model predicting anhedonia at baseline, the proportional odds assumption for FOLC was violated and a partial proportional odds model was used

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instead. For all other predictors in both models, the proportional odds assumption was satisfied.

Table 4

Summary of Ordinal Logistic Regression Analyses for Variables Predicting Consummatory Anhedonia (Single Item DASS-D) at T1 and T2

Variable	β (*SE*)	*p*	*OR*	*OR* 95% CI	VIF
DV: Anhedonia T1					
Female	0.38 (0.36)	.71	1.46	[0.73, 2.93]	1.01
FOH T1	0.47 (0.21)	.06	1.61	[1.07, 2.41]	1.34
Comparison: (Applied to a considerable degree & Applied to some degree) vs. Did not apply at all					
FOLC T1	-0.01 (0.21)	.97	0.99	[0.66, 1.49]	1.33
Comparison: Applied to a considerable degree vs. (Applied to some degree & Did not apply at all)					
FOLC T1	-0.60 (0.30)	.29	0.55	[0.31, 0.99]	
Nagelkerke Pseudo-R^2 = 0.09					
DV: Anhedonia T2					
Female	0.15 (0.39)	.71	1.16	[0.54, 2.50]	1.04
Anhedonia at T1 [not at all as reference]					
To some degree	1.11 (0.41)	.01	3.02	[1.34, 6.80]	1.03
To a considerable degree	2.01 (0.65)	.01	7.46	[2.08, 26.81]	
Fears of positive emotions					
FOH T1	0.44 (0.22)	.07	1.56	[1.01, 2.41]	1.37
FOLC T1	0.22 (0.22)	.64	1.24	[0.81, 1.91]	1.33

Note. Nagelkerke Pseudo-R^2 = 0.23.

After multiple testing correction, there was a trend towards an association between FOH and consummatory anhedonia at baseline (*OR* = 1.61; 95% CI [1.07, 2.41]), meaning that a one unit increase in FOH at baseline was associated with a 61% increase in the odds to experience consummatory anhedonia at baseline to some or a considerable degree as compared to not at all. Similarly, there was a trend towards an association between FOH at baseline and consummatory anhedonia at follow-up when controlling for consummatory anhedonia at baseline (*OR* = 1.56; 95% CI [1.01, 2.41]), meaning that a one unit increase in FOH at baseline was associated with a 56% increase in the odds to experience anhedonia at follow-up to some or a considerable degree as compared to not at all. FOLC was not significantly associated with consummatory anhedonia at baseline nor at follow-up (see Table 4). An examination of VIFs confirmed no violations of multicollinearity (see Table 4).

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Discussion

This study aimed to investigate whether FOH and FOLC concurrently and prospectively predict depressive symptoms in adolescents. Results showed that higher levels of FOH are related to higher concurrent depressive symptoms but were not predictive of depressive symptoms two months later. FOLC was not a significant predictor of depressive symptoms or anhedonia at the concurrent or prospective level. Importantly, it is unlikely that the lack of significant prospective associations with depressive symptoms was caused by low power. A post-hoc sensitivity analysis revealed that the minimum detectable effect size in this study was small-to-medium ($f^2 = 0.085$) given $\alpha = .05$ and a power of .80. From a clinical perspective, effects that are smaller than this small-to-medium effect are unlikely to make a meaningful impact in clinical practice as small effects can easily be overshadowed by other influencing factors. Thus, the current study was sufficiently powered to detect an effect that is clinically meaningful. This suggests that the lack of significant prospective associations is not caused by low power but may be explained by a negligible prospective association between FOH, FOLC, and depressive symptoms in our sample.

Our findings are in line with prior research on a closely related construct, i.e. dampening (Feldman et al., 2008; Nelis et al., 2015). Dampening is defined as downgrading positive emotions by decreasing intensity and duration of positive mood states (Feldman et al., 2008). Therefore, dampening can be regarded as a broader concept that partly encompasses the construct of FOH because some dampening thoughts include the fear-related aspect of FOH while other dampening thoughts are not related to FOH. In alignment with our findings, increased dampening has been consistently associated with higher levels of concurrent depressive symptoms in adults and adolescents (Feldman et al., 2008; Nelis et al., 2015). However, results on the prospective association between dampening and depressive symptoms are mixed, with some studies reporting that dampening predicts increased depressive symptoms (Hudson et al., 2015; Raes et al., 2012) and others reporting absence of effects (K. E. Gilbert et al., 2013; Nelis et al., 2015).

Notably, there is some evidence that dampening may be specifically predictive of anhedonia (Nelis et al., 2018). Since anhedonia includes diminished pleasure in positive experiences, it might be more strongly linked to dampening responses compared to general depressive symptoms. Similarly, fear of positive evaluation, another type of fear of positivity closely linked to FOH, has been shown to affect depressive symptoms via anticipatory anhedonia (Jordan et al., 2018). Considering the similarities of, and strong correlation between dampening and FOH, FOH may display similar correlation patterns with anhedonic symptoms compared to general depressive symptoms. In this study, we observed a trend towards a concurrent and prospective association between FOH and consummatory anhedonia but no prospective association between FOH and general depressive symptoms. Moreover, the prospective association between FOH and depressive symptoms decreased when the consummatory anhedonia item was excluded from the

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measure of depressive symptoms (see Appendix B in the Supplementary Materials). However, the size of the association between FOH and consummatory anhedonia is rather small and did not pass the multiple testing correction. One possible explanation for this non-significant association of FOH with consummatory anhedonia may be the use of a single-item measure. This measure may be problematic because single-item measures are more affected by measurement error as they cannot be compared to corresponding items measuring the same construct, resulting in lower or at least unknown reliability compared to multi-item scales (Allen et al., 2022). Moreover, the used single-item measure only captures consummatory but not anticipatory anhedonia. This is important given that Jordan et al. (2018) found that anticipatory, but not consummatory, anhedonia mediates the effect of fear of positive evaluation on depressive symptoms. It is possible that FOH, like fear of positive evaluation, mainly affects anticipatory and to a lesser extent consummatory anhedonia. Future studies should use a more fine-grained measure of anhedonia to differentiate the relationships between FOH, anticipatory and consummatory anhedonia, and depressive symptoms.

This study was carried out in a non-clinical sample. It is possible that the prospective association between FOH and depressive symptoms is only evident in clinical populations with stronger depressive symptoms at baseline. However, one prior study did not find a prospective association between dampening and depressive symptoms in remitted depressed patients (K. E. Gilbert et al., 2013), suggesting that there is no prospective link between dampening and depressive symptoms in clinically-depressed populations. On the other hand, Jordan et al. (2018) found an effect of fear of positive evaluation on depressive symptoms via anticipatory anhedonia in a community sample with mild depressive symptoms. Future studies should disentangle the relationship between fears of positivity and depressive symptoms in clinical samples.

Unexpectedly, we did not find any association between FOLC and depressive symptoms. One possible explanation is that the original factor structure of the ACS is based on expert opinion and does not provide acceptable fit in factor analyses (Melka et al., 2011). However, re-analysing the data with the factor structure derived from exploratory factor analysis did not change the results (see Appendix C in the Supplementary Materials), suggesting that FOLC has no association with depressive symptoms in adolescents, at least not in our sample.

The main limitations of our study were the reliance on self-report measures and the use of the DASS as only measure of depressive symptoms. The DASS mainly assesses symptoms related to negative emotions and only includes one item measuring consummatory anhedonia. Moreover, the average scores on the DASS-D are quite low in our sample compared to a Dutch-speaking clinically depressed sample (de Beurs et al., 2001). Future studies should investigate the relationship between FOH, FOLC, and depressive symptoms in adolescent samples with more prominent depressive symptoms. Another limitation of this study is the failure to measure positive emotions. Future studies should

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specifically assess positive emotions to examine whether the association of FOH and depressive symptoms is dependent on the current level of positive emotions.

In conclusion, this study shows that FOH is concurrently but not prospectively associated with depressive symptoms. There was no significant association between FOH and the single-item measure of consummatory anhedonia, however, anticipatory anhedonia was not assessed. In light of prior findings on the effect of related fears of positivity on anticipatory anhedonia in adults, future research should investigate the concurrent and prospective association between FOH and anticipatory anhedonia in adolescents using a more fine-grained measure of anhedonia.

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Ethics Statement: This study was approved by the Social and Societal Ethics Committee at KU Leuven (G-2018-01-1090). All participants provided informed consent after being informed about all aspects of the study in accordance with the Declaration of Helsinki (2013).

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Data Availability: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Supplementary Materials

The Supplementary Materials contain the following items (for access see Index of Supplementary Materials below):

- *Code used for analyses*
- *Appendix A*: Regression Analysis for Variables Predicting Depressive Symptoms (DASS-D) at T2 Without Controlling for Baseline Depressive Symptoms
- *Appendix B*: Hierarchical Regression Analysis for Variables Predicting Depressive Symptoms Excluding the Anhedonia Item (DASS-D 2) at T2
- *Appendix C*: Hierarchical Regression Analyses for Variables Predicting Depressive Symptoms (DASS-D) at T2 Using the Updated Factor Structure of ACS

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Index of Supplementary Materials

Kock, M., Belmans, E., & Raes, F. (2023a). *Supplementary materials to "Fear of happiness predicts concurrent but not prospective depressive symptoms in adolescents"* [Analysis code]. OSF. https://osf.io/r9gkm

Kock, M., Belmans, E., & Raes, F. (2023b). *Supplementary materials to "Fear of happiness predicts concurrent but not prospective depressive symptoms in adolescents"* [Additional analyses]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.12919

References

Allen, M. S., Iliescu, D., & Greiff, S. (2022). Single item measures in psychological science. *European Journal of Psychological Assessment, 38*(1), 1–5. https://doi.org/10.1027/1015-5759/a000699

Belmans, E., Raes, F., Vervliet, B., & Takano, K. (2023). Depressive symptoms and persistent negative self-referent thinking among adolescents: A learning account. *Acta Psychologica, 232*, Article 103823. https://doi.org/10.1016/j.actpsy.2022.103823

Brant, R. (1990). Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics, 46*(4), 1171–1178. https://doi.org/10.2307/2532457

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155–159. https://doi.org/10.1037/0033-2909.112.1.155

de Beurs, E., van Dyck, R., Marquenie, L. A., Lange, A., & Blonk, R. W. B. (2001). De DASS: Een vragenlijst voor het meten van depressie, angst en stress [The DASS: A questionnaire for the measurement of depression, anxiety, and stress]. *Gedragstherapie, 34*(1), 35–53.

Dillon, D. G., & Pizzagalli, D. A. (2010). Maximizing positive emotions: A translational, transdiagnostic look at positive emotion regulation. In A. M. Kring & D. M. Sloan (Eds.), *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 229–252). Guilford Press.

Dunn, B. D. (2012). Helping depressed clients reconnect to positive emotion experience: Current insights and future directions. *Clinical Psychology & Psychotherapy, 19*(4), 326–340. https://doi.org/10.1002/cpp.1799

Dunn, B. D., Burr, L. A., Smith, H. B., Hunt, A., Dadgostar, D., Dalglish, L., Smith, S., Attree, E., Jell, G., Martyn, J., Bos, N., & Werner-Seidler, A. (2018). Turning gold into lead: Dampening appraisals reduce happiness and pleasantness and increase sadness during anticipation and recall of pleasant activities in the laboratory. *Behaviour Research and Therapy, 107*, 19–33. https://doi.org/10.1016/j.brat.2018.05.003

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

Feldman, G. C., Joormann, J., & Johnson, S. L. (2008). Responses to positive affect: A self-report measure of rumination and dampening. *Cognitive Therapy and Research, 32*(4), 507–525. https://doi.org/10.1007/s10608-006-9083-0

PsychOpen GOLD

Gard, D. E., Gard, M. G., Kring, A. M., & John, O. P. (2006). Anticipatory and consummatory components of the experience of pleasure: A scale development study. *Journal of Research in Personality, 40*(6), 1086–1102. https://doi.org/10.1016/j.jrp.2005.11.001

Gilbert, K. E., Nolen-Hoeksema, S., & Gruber, J. (2013). Positive emotion dysregulation across mood disorders: How amplifying versus dampening predicts emotional reactivity and illness course. *Behaviour Research and Therapy, 51*(11), 736–741. https://doi.org/10.1016/j.brat.2013.08.004

Gilbert, P. (2007). *Psychotherapy and counselling for depression* (3rd ed.). SAGE.

Gilbert, P., McEwan, K., Gibbons, L., Chotai, S., Duarte, J., & Matos, M. (2012). Fears of compassion and happiness in relation to alexithymia, mindfulness, and self-criticism. *Psychology and Psychotherapy, 85*(4), 374–390. https://doi.org/10.1111/j.2044-8341.2011.02046.x

Hudson, M. R., Harding, K. A., & Mezulis, A. (2015). Dampening and brooding jointly link temperament with depressive symptoms: A prospective study. *Personality and Individual Differences, 83*, 249–254. https://doi.org/10.1016/j.paid.2015.04.025

Iijima, Y., Takano, K., Boddez, Y., Raes, F., & Tanno, Y. (2017). Stuttering thoughts: Negative self-referent thinking is less sensitive to aversive outcomes in people with higher levels of depressive symptoms. *Frontiers in Psychology, 8*, Article 1333. https://doi.org/10.3389/fpsyg.2017.01333

Jordan, D. G., Collins, A. C., Dunaway, M. G., Kilgore, J., & Winer, E. S. (2021). Negative affect interference and fear of happiness are independently associated with depressive symptoms. *Journal of Clinical Psychology, 77*(3), 646–660. https://doi.org/10.1002/jclp.23066

Jordan, D. G., Winer, E. S., Salem, T., & Kilgore, J. (2018). Longitudinal evaluation of anhedonia as a mediator of fear of positive evaluation and other depressive symptoms. *Cognition and Emotion, 32*(7), 1437–1447. https://doi.org/10.1080/02699931.2017.1289895

Joshanloo, M. (2013). The influence of fear of happiness beliefs on responses to the satisfaction with life scale. *Personality and Individual Differences, 54*(5), 647–651. https://doi.org/10.1016/j.paid.2012.11.011

Joshanloo, M., Lepshokova, Z. K., Panyusheva, T., Natalia, A., Poon, W.-C., Yeung, V. W.-l., Sundaram, S., Achoui, M., Asano, R., Igarashi, T., Tsukamoto, S., Rizwan, M., Khilji, I. A., Ferreira, M. C., Pang, J. S., Ho, L. S., Han, G., Bae, J., & Jiang, D.-Y. (2014). Cross-cultural validation of Fear of Happiness Scale across 14 national groups. *Journal of Cross-Cultural Psychology, 45*(2), 246–264. https://doi.org/10.1177/0022022113505357

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*(404), 1198–1202. https://doi.org/10.1080/01621459.1988.10478722

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Melka, S. E., Lancaster, S. L., Bryant, A. R., Rodriguez, B. F., & Weston, R. (2011). An exploratory and confirmatory factor analysis of the Affective Control Scale in an undergraduate sample.

PsychOpen GOLD

Journal of Psychopathology and Behavioral Assessment, 33(4), 501–513. https://doi.org/10.1007/s10862-011-9236-7

Morris, B. H., Bylsma, L. M., & Rottenberg, J. (2009). Does emotion predict the course of major depressive disorder? A review of prospective studies. *The British Journal of Clinical Psychology, 48*(3), 255–273. https://doi.org/10.1348/014466508X396549

Nelis, S., Bastin, M., Raes, F., & Bijttebier, P. (2018). When do good things lift you up? Dampening, enhancing, and uplifts in relation to depressive and anhedonic symptoms in early adolescence. *Journal of Youth and Adolescence, 47*(8), 1712–1730. https://doi.org/10.1007/s10964-018-0880-z

Nelis, S., Holmes, E. A., & Raes, F. (2015). Response styles to positive affect and depression: Concurrent and prospective associations in a community sample. *Cognitive Therapy and Research, 39*(4), 480–491. https://doi.org/10.1007/s10608-015-9671-y

Nelis, S., Raes, F., & Smets, J. (n.d.). *Dutch version of the fear of happiness scale (FHS-Dutch)* [Unpublished questionnaire].

Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental health of young people: A global public-health challenge. *The Lancet, 369*(9569), 1302–1313. https://doi.org/10.1016/S0140-6736(07)60368-7

Raes, F., Belmans, E., & de Keyzer, B. (2017). *ACS-NL: Authorized Dutch translation.* Faculty of Psychology and Educational Sciences, KU Leuven.

Raes, F., Smets, J., Nelis, S., & Schoofs, H. (2012). Dampening of positive affect prospectively predicts depressive symptoms in non-clinical samples. *Cognition & Emotion, 26*(1), 75–82. https://doi.org/10.1080/02699931.2011.555474

R Core Team. (2021). *R: A language and environment for statistical computing* [Computer software]. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/

Riediger, M., & Klipker, K. (2014). Emotion regulation in adolescence. In J. J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 187–202). Guilford Press.

Sánchez-Meca, J., Marín-Martínez, F., & Chacón-Moscoso, S. (2003). Effect-size indices for dichotomized outcomes in meta-analysis. *Psychological Methods, 8*(4), 448–467. https://doi.org/10.1037/1082-989X.8.4.448

Schweizer, S., Gotlib, I. H., & Blakemore, S.-J. (2020). The role of affective control in emotion regulation during adolescence. *Emotion, 20*(1), 80–86. https://doi.org/10.1037/emo0000695

Skinner, E. A., & Zimmer-Gembeck, M. J. (2016). Age differences and changes in ways of coping across childhood and adolescence. In E. A. Skinner & M. J. Zimmer-Gembeck (Eds.), *The development of coping: Stress, neurophysiology, social relationships, and resilience during childhood and adolescence* (pp. 53–62). Springer International. https://doi.org/10.1007/978-3-319-41740-0_3

Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology, 86*(2), 320–333. https://doi.org/10.1037/0022-3514.86.2.320

PsychOpen GOLD

Veling, H., & Aarts, H. (2009). Putting behavior on hold decreases reward value of need-instrumental objects outside of awareness. *Journal of Experimental Social Psychology, 45*(4), 1020–1023. https://doi.org/10.1016/j.jesp.2009.04.020

Veling, H., Aarts, H., & Stroebe, W. (2011). Fear signals inhibit impulsive behavior toward rewarding food objects. *Appetite, 56*(3), 643–648. https://doi.org/10.1016/j.appet.2011.02.018

Williams, K. E., Chambless, D. L., & Ahrens, A. (1997). Are emotions frightening? An extension of the fear of fear construct. *Behaviour Research and Therapy, 35*(3), 239–248. https://doi.org/10.1016/S0005-7967(96)00098-8

Winer, E. S., & Salem, T. (2016). Reward devaluation: Dot-probe meta-analytic evidence of avoidance of positive information in depressed persons. *Psychological Bulletin, 142*(1), 18–78. https://doi.org/10.1037/bul0000022

Wood, J. V., Heimpel, S. A., & Michela, J. L. (2003). Savoring versus dampening: Self-esteem differences in regulating positive affect. *Journal of Personality and Social Psychology, 85*(3), 566–580. https://doi.org/10.1037/0022-3514.85.3.566

World Medical Association. (2013). Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA, 310*(20), 2191–2194. https://doi.org/10.1001/jama.2013.281053

Yee, T. W. (2022). *VGAM: Vector Generalized Linear and Additive Models* (Version 1.1-7) [Computer software].

Yilmaz, M., Psychogiou, L., Javaid, M., Ford, T., & Dunn, B. D. (2019). Making the worst of a good job: Induced dampening appraisals blunt happiness and increase sadness in adolescents during pleasant memory recall. *Behaviour Research and Therapy, 122*, Article 103476. https://doi.org/10.1016/j.brat.2019.103476

Yoon, S., Van Dang, J. M., & Rottenberg, J. (2018). Are attitudes towards emotions associated with depression? A Conceptual and meta-analytic review. *Journal of Affective Disorders, 232*, 329–340. https://doi.org/10.1016/j.jad.2018.02.009

Young, K. S., Sandman, C. F., & Craske, M. G. (2019). Positive and negative emotion regulation in adolescence: Links to anxiety and depression. *Brain Sciences, 9*(4), Article 76. https://doi.org/10.3390/brainsci9040076

Zisook, S., Lesser, I., Stewart, J. W., Wisniewski, S. R., Balasubramani, G. K., Fava, M., Gilmer, W. S., Dresselhaus, T. R., Thase, M. E., Nierenberg, A. A., Trivedi, M. H., & Rush, A. J. (2007). Effect of age at onset on the course of major depressive disorder. *American Journal of Psychiatry, 164*(10), 1539–1546. https://doi.org/10.1176/appi.ajp.2007.06101757

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Reduction of Pathological Skin-Picking Via Expressive Writing: A Randomized Controlled Trial

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Supplementary Materials: Materials, Preregistration [see Index of Supplementary Materials]

Abstract

Background: Expressive writing (EW: a personal form of writing about emotional distress, without regard to writing conventions) can improve physical and mental health. The present study investigated whether EW can reduce pathological skin-picking. In addition, the effects of two modalities of writing were contrasted with each other: computer vs. paper/pencil.

Method: A total of 132 females with self-reported pathological skin-picking participated in a two-week intervention. They either carried out six EW sessions or wrote about six abstract paintings (control condition), using either paper/pencil or a computer. Before and after each session, participants rated their affective state and the urge to pick their skin via a smartphone application. Questionnaires for assessing skin-picking severity were completed before and after the two-week intervention.

Results: The urge for skin-picking decreased directly after a writing session. The reduction was more pronounced in participants of the EW group, who also experienced reduced tension and increased feelings of relief at the end of a writing session. EW also reduced the severity of focused skin-picking after the two-week intervention. The writing modality had no differential effect on skin-picking symptoms.

Conclusions: This study identified beneficial effects of EW on pathological skin-picking. A future study could investigate EW as a potential tool in the context of (online) psychotherapy for skin-picking disorder.

Keywords

skin-picking, expressive writing, app-assisted approach, tension, relief

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Highlights

- Expressive writing (EW) reduces pathological skin-picking.
- EW reduces the urge for skin-picking.
- EW increases feelings of relief.
- The beneficial effects of EW are associated with trait anxiety.

Skin-picking is a common behavior in the general population. While occasional manipulation of the skin in the form of picking at scabs, bumps, or the cuticles around fingernails can be considered normal and generally as not having any negative consequences, more frequent and intense skin-picking can lead to somatic problems (skin lesions, infections, scars) and impaired socio-emotional functioning. In this case, excessive skin-picking has developed into a mental disorder, labeled as skin-picking disorder (SPD; American Psychiatric Association, 2013).

Research suggests that (benign as well as pathological) skin-picking often occurs in reaction to the experiencing of negative affective states (e.g., anger, anxiety). It usually provides short-term relief of tension and elicits positive feelings (Bohne et al., 2002). Indeed, many people who pick their skin report that they find it soothing, satisfying, and/or rewarding (Gallinat et al., 2021; Schienle & Wabnegger, 2020). Thus, skin-picking can be seen to serve emotion regulation, which can be functional (as in occasional skin-picking), or dysfunctional (as in SPD).

Several studies have shown associations between excessive skin-picking and difficulties in emotion regulation (Prochwicz et al., 2018; Schienle et al., 2018; Snorrason et al., 2010). For example, Snorrason et al. (2010) demonstrated that difficulties in emotion regulation (e.g., difficulties engaging in goal-directed behavior under distress), as well as increased emotional reactivity, predicted pathological skin-picking. A study by Schienle et al. (2018) also found strong associations between excessive skin-picking and emotion dysregulation. More specifically, the severity of focused skin-picking (i.e., skin-picking performed with full awareness, in contrast to automatic skin-picking) was predicted by difficulties in controlling impulsive behaviors, self-disgust (the tendency to feel disgusted by one's behavior), and disgust proneness (the tendency to experience disgust towards potential transmitters of disease). Further, Prochwicz et al. (2018) investigated a non-clinical sample (university students) and also found an association between a strategy for emotion regulation and skin-picking severity. It was shown in that study that those who used cognitive reappraisal more often (i.e., re-evaluation of emotion-eliciting situations/cognitive distancing) reported a lower skin-picking severity.

The studies mentioned above suggest that excessive skin-picking might be used as an alternative strategy for controlling one's negative emotions when other effective strategies are not at hand. Along this line of reasoning, the emotion regulation model of SPD (e.g., Snorrason et al., 2010) holds that skin-picking is an emotion regulation

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strategy used by people who have difficulties in applying more adaptive strategies. Based on these findings, it would appear important to offer alternative methods for emotion regulation to those who pick their skin excessively. One possible approach is expressive writing (EW).

EW can be described as personal and emotional writing without regard to form or writing conventions (e.g., spelling, punctuation, grammar). EW was first introduced by Pennebaker and Beall (1986) who asked students to write about their thoughts and feelings associated with a stressful/traumatic or neutral event. The protocol in that investigation included four writing sessions, each lasting 15 minutes. It was found that EW fostered favorable physical and mental health-related outcomes: a reduction of visits to the university health center during a 6-month follow-up period and improved well-being. Further, two meta-analyses support the notion that EW about upsetting experiences produces improvements in mood as well as in indicators of quality of life (Pavlacic et al., 2019; Reinhold et al., 2018).

The mechanisms underlying the positive effects of EW are still under investigation. Pennebaker et al. (1990) have suggested that the process of EW can help one to better understand a distressing event that has taken place (gaining insight), and further, that EW can promote better problem-solving. EW has also been suggested to support disinhibition (catharsis), self-regulation, social integration, and acceptance of the negative experience (Frattaroli, 2006; Pavlacic et al., 2019). Finally, other authors have emphasized the role of exposure in EW (Frattaroli, 2006). Participants subject to EW interventions repeatedly confront themselves with thoughts and feelings regarding an upsetting event. Similarities can be drawn between this approach and exposure (or flooding) therapy, which promotes habituation, extinction, and cognitive restructuring. Based on meta-analytical findings, Frattaroli (2006) concluded that exposure theory has received the most empirical support for explaining EW effects.

In the case of excessive skin-picking, it is very likely that EW possesses an additional positive component: The mechanical requirements of writing (either by hand or by computer) make skin-picking difficult to perform at the same time. Thus, EW incorporates a form of 'stimulus control' (by reducing the opportunity to perform skin-picking), which has been identified as a successful psychological treatment strategy for skin-picking disorder (Snorrason et al., 2017). Further, the process of writing – holding the pen and performing up and down movements – is somewhat similar to the physical movements involved in skin-picking. Along these lines, patients with SPD have reported that drawing (e.g., pencil sketches) can be a replacement behavior for skin-picking (Atkin, 2017). Thus, it is assumed that the process of writing in EW, particularly in the paper/pencil form, may contribute to its effectiveness in reducing skin-picking.

The present study investigated whether a two-week intervention with EW (including six writing sessions) could reduce pathological skin-picking. Short-term effects of EW (e.g., changes in the urge to pick one's skin directly after a writing session), as well

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as mid-term effects (e.g., changes in self-reported skin-picking severity), were assessed. Further, the effects of two modalities of writing on the urge for skin-picking were contrasted with each other: computer vs. paper/pencil. The following hypothesis had been preregistered: Expressive writing (particularly paper/pencil writing) reduces skin-picking behavior. In addition, an exploratory regression analysis was carried out to identify variables (e.g., number of completed writing sessions, trait anxiety) that were associated with the effectiveness of expressive writing (in terms of reduction in the urge for skin-picking).

Method

Participants

Participants with self-reported pathological skin-picking were invited to participate in a study on the effects of different writing interventions (this was carried out via postings on social media, and self-help groups for skin-picking disorder). The invitation included a link to an online survey that checked that participants met inclusion/exclusion criteria. Inclusion criteria were female sex, because of a higher prevalence of skin-picking behavior in the female population (APA, 2013), and scores ≥ 7 on the Skin Picking Scale-Revised (SPS_R, Gallinat et al., 2016). Exclusion criteria included an existing diagnosis of a psychotic disorder, substance dependence, posttraumatic stress disorder, or depression with severe symptoms. Furthermore, participants who reported skin diseases were excluded. A total of 308 participants were eligible; of them, 158 could be contacted and agreed to participate in the study. Twenty-six participants (16%) dropped out of the study during the intervention. Data from 132 participants were included in the analyses (see Supplementary Figure 1: CONSORT flow diagram). 34% of the females participated in self-help groups during the course of the study.

The participants were randomly allocated to one of four groups: (a) Expressive Writing (paper/pencil), (b) Expressive Writing (computer), (c) Picture description (paper/pencil), (d) Picture description (computer). The four groups did not differ in the number of participants, mean age, years of education, and reported symptom severity of skin-picking as assessed by the Skin Picking Scale (SPS_R; Gallinat et al., 2016) and the Milwaukee Inventory for the Dimensions of Adult Skin-picking (MIDAS; Walther et al., 2009; $M = 22.36$, $SD = 4.56$). Moreover, participants did not differ in trait anxiety and trait depression according to the State-Trait Anxiety and Depression Inventory (STADI; Laux et al., 2013). For group characteristics see Table 1.

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Table 1

Group Characteristics (Means, Standard Deviations, F/Chi-Square Statistics)

Characteristic	Expressive Writing (paper/pencil)	Expressive Writing (computer)	Picture Description (paper/pencil)	Picture Description (computer)	Statistics
	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**	
Mean age (years)	28.21 (8.13)	27.71 (10.69)	30.29 (11.80)	27.50 (6.98)	$F(3,128) = .61$, $p = .608$, $\eta_p^2 = .014$
Years of education	14.09 (2.14)	13.68 (2.17)	13.68 (2.26)	14.03 (2.16)	$F(3,128) = .34$, $p = .796$, $\eta_p^2 = .008$
SPS_R	14.58 (4.15)	14.58 (3.78)	14.11 (4.13)	14.47 (4.04)	$F(3,128) = .11$, $p = .954$, $\eta_p^2 = .003$
MIDAS (focused)	22.88 (4.97)	22.55 (3.84)	21.50 (5.28)	22.70 (3.81)	$F(3,128) = .661$, $p = .578$, $\eta_p^2 = .015$
STADI_depression	20.70 (5.75)	21.45 (6.07)	21.58 (6.04)	22.00 (5.87)	$F(3,128) = .268$, $p = .849$, $\eta_p^2 = .006$
STADI_anxiety	23.97 (5.55)	23.55 (5.41)	23.74 (6.32)	25.20 (5.19)	$F(3,128) = .530$, $p = .662$, $\eta_p^2 = .012$
	N	***N***	***N***	***N***	
Number of participants	33	31	38	30	$\chi^2(3) = 1.15$, $p = .765$
Dropout rate	9	3	8	6	$\chi^2(3) = 2.23$, $p = .527$

Note. SPS_R = skin picking scale revised; MIDAS (focused) = subscale focused picking of the Milwaukee Inventory for the Dimensions of Adult skin picking; STADI_depression = subscale trait depression of the State Trait Anxiety and Depression Inventory; STADI_anxiety = subscale trait anxiety of the State Trait Anxiety and Depression Inventory.

All participants provided written informed consent before participating. This study was preregistered on the German Register for Clinical Studies (DRKS00029224; 2022/06/07) and approved by the ethics committee of the University (GZ. 39/79/63 ex 2021/22).

Questionnaires

Before and after the two-week intervention participants filled out the following questionnaires via online surveys:

a. German version of the Skin Picking Scale-Revised (Gallinat et al., 2016), which assesses symptom severity and impairment due to skin-picking during the last week. The eight items (e.g., How strong was your urge to pick your skin?) are answered on

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5-point scales (0 = no urge; 4 = very strong urge). An overall score (total SPS_R; Cronbach's alpha = .81) was computed that reflects the severity of skin-picking. A score of 7 represents the clinical cut-off (Gallinat et al., 2016).

b. The Milwaukee Inventory for the Dimensions of Adult Skin-picking (MIDAS; Walther et al., 2009) is a self-report questionnaire with two subscales: automatic skin-picking (Cronbach's $\alpha = 0.62$; e.g., I don't notice that I have picked my skin until after it's happened.) and focused skin-picking (Cronbach's $\alpha = 0.75$; e.g. I experience an extreme urge to pick before I pick). The six items of each subscale are judged on 5-point Likert scales (1 = not at all; 5 = very much). Due to the low Cronbach's α of the automatic skin-picking subscale, no further analyses were performed with this subscale.

c. The trait version of the State-Trait Anxiety and Depression Inventory (STADI; Laux et al., 2013) has two subscales: Depression ($\alpha = .913$) and Anxiety ($\alpha = .866$), with ten items each (e.g., depression: "I am sad"; anxiety: "I worry that something might happen") that are scored on a four-point Likert scale ranging from 1 (not at all) to 4 (very much).

App-Assisted Interventions

All participants of the four intervention groups were asked to set aside at least 10 minutes for each writing session in a quiet place without disturbance. In total, six writing sessions had to be completed within a two-week period (with a maximum of one writing session per day). The participants had the option to write more than six times during the two weeks if they felt to do so. Before and after each writing session, the participants rated their affective state (pleasantness, tension, relief, urge to pick the skin) via a smartphone app on 100-point Likert scales (0 = I do not feel good, tense, relieved, no urge to pick my skin; 100 = I feel good, tense, relieved, a strong urge to pick my skin). The rating interval (pre vs. post-writing) was set to 10 minutes (it was not possible to provide the app ratings earlier).

The group-specific instructions for the writing sessions were as follows:

a. *Expressive writing:* Expressive writing is an intervention in which people spend a few minutes writing about specific, personally relevant topics over several days. Let your thoughts and feelings wander freely while writing. Expressive writing has been studied since the 1980s and offers a beneficial way to engage with one's emotions and manage them. Write for at least 10 minutes about a topic that is currently on your mind. Explore your thoughts and emotions openly that you perceive while writing. Spelling, syntax, or grammar are irrelevant. It is desirable to get into a flow of writing. Choose a time of the day that suits you best and find a quiet place where you will not be disturbed (e.g., put your mobile phone in flight mode).

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b. *Picture description:* A picture description is a visual representation translated into language. It is meant to be a reproduction of what is seen in the picture. For example, image descriptions enable visually impaired people to find access to pictorial representations such as paintings or photographs. The detailed descriptions train analytical and structural thinking, which are important skills for problem-solving and finding new solutions. Choose a time of the day that suits you best and find a quiet place where you will not be disturbed (e.g., put your mobile phone in flight mode). Describe for at least 10 minutes one of the abstract pictures that you have received from us. Write about the appearance of the image as factually and neutrally as possible, as if you were describing it to a visually impaired person.

Half of the participants were asked to use paper and pencil to complete the task, while the other half of the participants were assigned to the computer-writing groups. The written texts remained with the participants; the experimenters had no access to the texts.

Procedure

After the first online survey (checking of inclusion/exclusion criteria), eligible participants were scheduled for a personal meeting where they were randomly allocated to one of four interventions: (a) Expressive Writing (paper/pencil), (b) Expressive Writing (computer), (c) Picture description (paper/pencil), (d) Picture description (computer). All participants received further information about the study, including instructions for using the smartphone app. After participants completed the two-week writing intervention, they were asked to fill out a second online survey (questionnaires). Moreover, participants were asked to count the words written in each session. We consider the number of written words as a proxy for the time spent writing. Further, we chose this measure to detect potential noncompliance (e.g., refusal to engage in writing). The procedure is depicted in Figure 1.

Statistical Analysis

Self-reports assessed via the smartphone app: Mixed-model analyses of variance (ANOVAs) were conducted to compare the two INTERVENTIONS (Expressive Writing (EW) vs Picture Description (PD)) and the two WRITING MODALITIES (paper pencil (pp) vs computer (c)), before vs after a writing session (factor: TIME). This was done for the dependent measures: urge to pick one's skin, feelings of tension, relief, and pleasantness. The ratings were averaged across the number of writing sessions during the two weeks. Moreover, word count (number of written words) was compared between the INTERVENTIONS via an ANOVA.

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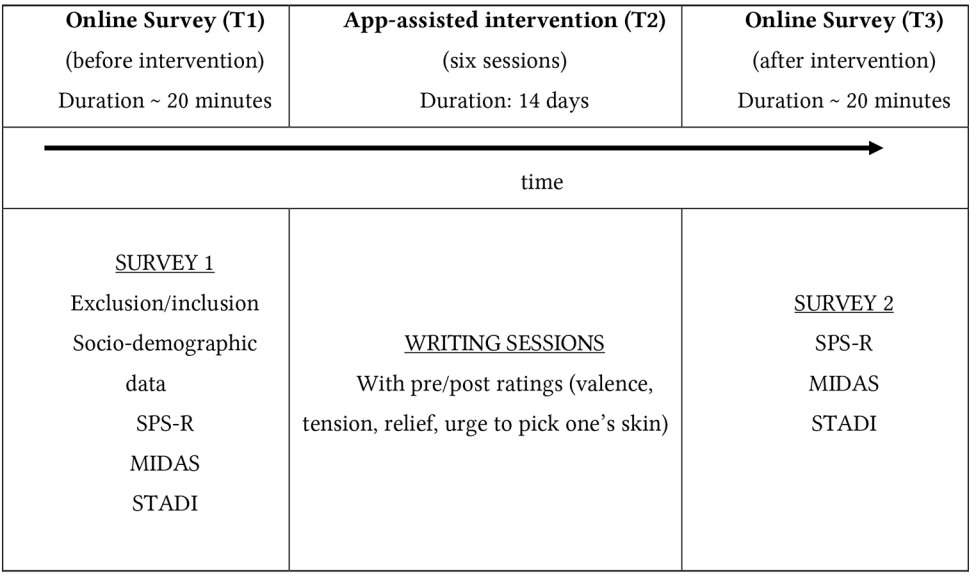
Figure 1

Procedure



Note. SPS-R: skin-picking scale (revised); MIDAS (Milwaukee inventrory of the dimensions of adult skin-picking); STADI: subscales trait anxiety/ depression of the state trait anxiety and depression inventory.

Questionnaires: Mixed-model analyses of variance (ANOVAs) were computed to compare the questionnaire scores (SPS-R; MIDAS; STADI_depression, STADI_anxiety) between INTERVENTIONS and TIME (before and after the two-week intervention).

Exploratory regression analyses: To identify variables (number of completed writing sessions, word count, trait anxiety, trait depression) that are associated with the effectiveness of Expressive Writing (reduction in the urge to pick one's skin before vs. after a writing session), a multiple linear regression analysis was conducted. The model was assessed for multicollinearity (all variance inflation factors (VIFs) < 1.5; tolerance > 0.7) and residual distribution (Cook's distance < 0.3, Durbin Watson > 1.5 and < 2.5). All analyses were conducted with SPSS version 28.

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Results

Self-Reports Assessed Via the Smartphone App

Number of Completed Writing Sessions

On average, participants completed four writing sessions (range: 1-12). The number of sessions did not differ between the INTERVENTION groups, M_{EWpp} = 3.88, SD = 2.71; M_{EWc} = 4.55, SD = 2.49, M_{PDpp} = 3.76, SD = 2.39, M_{PDc} = 2.97, SD = 2.54; $F(3,128)$ = 2.003, p = .117, η_p^2 = .045.

Word Count

The ANOVA that was carried out revealed that the four INTERVENTION groups differed in the number of written words per writing session, $F(3,128)$ = 14.36, p < .001, η_p^2 = .252. Tukey post-hoc comparisons (see Supplementary Table S1) showed that the EWc group had the highest word count (M = 316, SD = 154), followed by the EWpp group (M = 210, SD = 84), the PDc group (M = 205, SD = 135), and the PDpp group (M = 142, SD = 51).

Urge to Pick One's Skin

The ANOVA revealed a significant main effect of TIME, $F(1,128)$ = 50.64, p < .001, η_p^2 = .283, and a significant interaction TIME x INTERVENTION, $F(1,128)$ = 8.75, p = .004, η_p^2 = .064. All other effects were non-significant (all p > .05; see Supplementary Table S2). After a session of expressive writing, participants reported a reduced urge to pick their skin compared to before the session, $t(63)$ = 7.02, p < .001. After a session of picture description, the urge to pick was less intense compared to before the PD session, $t(67)$ = 3.12, p = .003; Figure 2.

The reduction in the urge to pick was more pronounced in the expressive writing groups (M_{diff} = -15.19, SD = 17.30) than in the picture description groups (M_{diff} = -6.43, SD = 16.97; $t(130)$ = 2.94, p = .004).

Relief

The ANOVA revealed a significant main effect of TIME, $F(1,128)$ = 10.07, p = .002, η_p^2 = .073, and a significant interaction TIME x INTERVENTION, $F(1,128)$ = 9.83, p = .002, η_p^2 = .071. Post hoc comparisons showed that participants felt more relieved after expressive writing than before, $t(63)$ = 4.02; p < .001. In the picture description groups, the participants did not significantly differ in their ratings for relief before and after a writing session, $t(67)$ = .04; p = .979; Figure 2. All other effects were non-significant (all p > .005; also see Supplementary Table S2).

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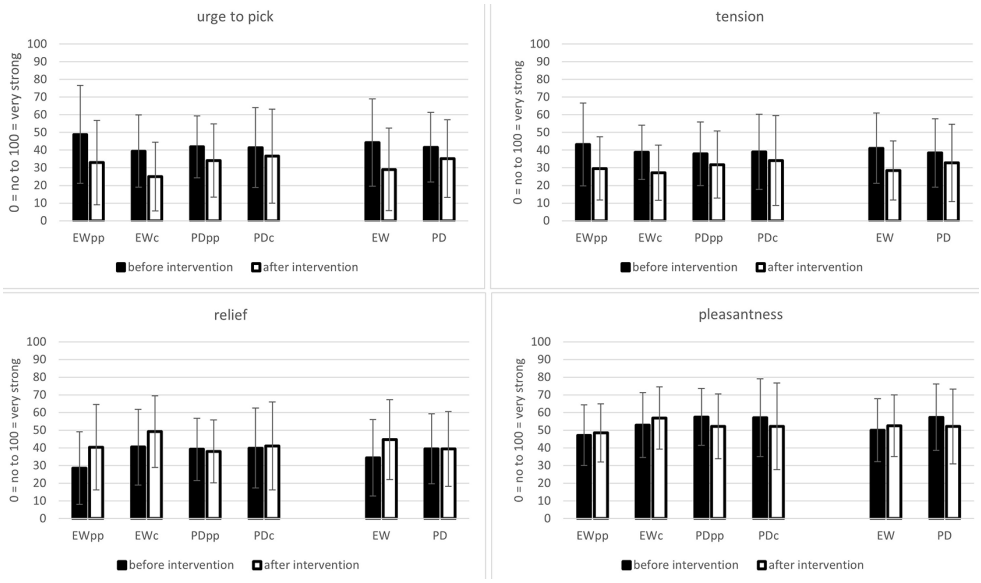
Figure 2

Means and Standard Deviations for the App-Data



Note. EWpp = expressive writing paper/pencil; EWc = expressive writing computer; PDpp = picture description paper pencil; PDc = picture description computer; EW = expressive writing; PD = picture description.

Tension

The ANOVA revealed a significant main effect of TIME, $F(1,128) = 29.95$, $p < .001$, $\eta_p^2 = .190$, and a significant interaction TIME x INTERVENTION, $F(1,128) = 4.52$, $p = .036$, $\eta_p^2 = .034$. Post hoc comparisons showed that after both expressive writing, $t(63) = 5.23$; $p < .001$, and picture description, $t(67) = 2.52$; $p = .014$, participants reported reduced feelings of tension compared to before writing. The reduction of tension was more pronounced in the expressive writing groups, $M_{diff} = -12.60$, $SD = 19.28$, than in the picture description groups, $M_{diff} = -5.61$, $SD = 18.35$; $t(130) = 2.14$, $p = .035$. For means and standard deviations see Figure 2. All other effects were non-significant (all $p > .005$; also see Supplementary Table S2).

Pleasantness

The ANOVA revealed a significant interaction effect TIME x INTERVENTION, $F(1,128) = 7.88$, $p = .006$, $\eta_p^2 = .058$. All other effects were non-significant (all $p > .005$, see Supplementary Table S2). Post hoc comparisons revealed that participants in the picture description groups felt more pleasant than participants in the expressive writing groups

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before the session $t(130) = 2.31$; $p = .023$. After the session, the groups did not differ in valence ratings, $t(130) = .12$; $p = .905$. In the picture description groups, participants felt more unpleasant after the writing than before, $t(67) = 2.56$; $p = .013$. In the expressive writing group, participants did not significantly differ in their pleasantness ratings before and after the session, $t(63) = 1.41$; $p = .165$. For means and standard deviations see Figure 2.

Questionnaire Data

Skin Picking Scale (Revised)

The ANOVA revealed a significant main effect of TIME, $F(1,128) = 28.53$, $p < .001$, $\eta_p^2 = .182$. After the two-week intervention, participants scored lower on the SPS-R ($M = 12.89$, $SD = 4.72$) than before ($M = 14.42$, $SD = 4.00$) independent of INTERVENTION and WRITING MODALITY. All other effects were non-significant (all $p < .005$; see Supplementary Table S3).

Milwaukee Inventory for the Dimensions of Adult Skin-Picking (Focused)

The ANOVA revealed a significant main effect of TIME, $F(1,128) = 5.56$, $p = .020$, $\eta_p^2 = .042$, and an interaction effect TIME x INTERVENTION, $F(1,128) = 7.46$, $p = .007$, $\eta_p^2 = .055$. Post hoc comparisons showed that participants of the expressive writing groups scored lower on the focused picking scale of the MIDAS after the intervention ($M = 21.47$, $SD = 4.65$) than before, $M = 22.72$, $SD = 4.42$; $t(63) = 4.04$, $p < .001$. In contrast, participants of the picture description groups did not differ in their scores before ($M = 22.03$, $SD = 4.69$) and after the two-week intervention, $M = 22.10$, $SD = 4.46$; $t(67) = .20$; $p = .842$. All other effects were non-significant (all $p > .05$; see Supplementary Table S3).

State-Trait Anxiety Depression Inventory

The ANOVA revealed no significant effects for trait anxiety and trait depression (all $p > .05$; see Supplementary Table S3).

Regression Analysis

The regression equation for the dependent variable ‘reduction in the urge to pick one’s skin’ (before minus after a session of EW) with the predictors number of writing sessions, word count, depression, and anxiety, was significant, $R^2 = .17$; $F(4,63) = 2.98$, $p = .026$. Trait Anxiety was a significant positive predictor. Participants with a higher level of trait anxiety showed a greater reduction in the urge to pick their skin due to expressive writing (for statistics see Table 2).

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Table 2

Results of the Multiple Linear Regression Analysis for the Association Between "Reduction in the Urge to Pick" (Before Minus After a Writing Session) and "Number of Writing Sessions," "Wordcount", "STADI_Anxiety" and "STADI_Depression"

						95.0% CI B			
Variable	***B***	***SE B***	**β**	***t***	***p***	***LL***	***UL***	***r***	***sr***
(Constant)	-13.973	10.913		-1.280	.205	-35.810	7.864		
wordcount	.005	.016	.036	.303	.763	-.026	.036	.014	.039
frequency	-.751	.800	-.113	-.939	.352	-2.352	.850	-.106	-.121
STADI_anxiety	1.091	.461	.344	2.368	.021	.169	2.014	.390	.295
STADI_depression	.244	.431	.083	.567	.573	-.618	1.106	.263	.074

Note. SE B = standard error of B; 95% CI *B* = 95% confidence interval for *B*; *r* = bivariate correlation, and *sr* = partial correlation; wordcount = average number of written words per writing session; frequency = number of writing sessions; STADI_anxiety = subscale trait anxiety of the state trait anxiety and depression inventory; STADI_depression = subscale depression of the state trait anxiety and depression inventory.

Discussion

This study investigated the effects of expressive writing (using an app-assisted approach) on excessive skin-picking behavior. Each participant was asked to complete six writing sessions over two weeks that either focused on emotional experiences with personal relevance (expressive writing), or the description of abstract paintings (control condition).

The main findings of this study were that expressive writing (EW) produced positive short-term and mid-term effects on skin-picking behavior. Directly after a writing session, the two EW groups (computer, paper/pencil) reported a reduced urge to pick their skin. Interestingly, the control groups also expressed less of an urge to manipulate their skin after describing a painting. This latter finding implies the positive effects of distraction on skin-picking behavior. This is in line with clinical recommendations which suggest, for example, distracting one's hands with stress balls, fidgets, or tangle toys to reduce skin-picking (e.g., Snorrason, Goetz, & Lee, 2017). Similarly, cognitive-behavioral therapy for skin-picking disorder typically includes stimulus control techniques as well as habit reversal training: This involves those affected being taught to engage in harmless motor behaviors (like clenching one's fists), which in turn prevent skin-picking (e.g., Snorrason, Goetz, & Lee 2017).

Importantly, the effects of EW on skin-picking go beyond distraction and motor control. In the present study, EW was associated with a more pronounced reduction in the urge to pick one's skin than picture description (a reduction of -15 vs. -6 points on a scale ranging from 0 to 100). Moreover, only EW was associated with the reduction of focused skin-picking as indexed by the MIDAS. Whereas the control groups showed no change, the EW groups showed an average reduction of one point in their MIDAS scores.

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Thus, EW and picture description exhibited differential effects on skin-picking symptoms (with small to moderate effect sizes).

EW also demonstrated immediate effects on participants' affective states. Directly after a writing session, participants in the EW groups reported a greater reduction of tension than those in the control groups. In addition to this, those in the EW groups also experienced increased feelings of relief (this positive emotion occurs as a response to a threat that has abated or disappeared). Previous findings have suggested that EW exerts its effects through habituation, and/or through the (re)structuring of anxious feelings (Sabo-Mordechay et al., 2019; Pennebaker & Chung, 2011; Perry & Ward-Smith, 2018). In this sense, the findings of the present study imply that EW may have assisted participants in reducing their emotional distress, which in turn reduced the need for skin-picking (i.e., the emotional distress may have no longer been pronounced enough to trigger skin-picking). This interpretation is also in line with exposure theory: When patients repeatedly confront themselves with negative feelings, this repetition and exposure can eventually lead to extinction of those feelings and associated thoughts (see Frattaroli, 2006).

An exploratory analysis was carried out which attempted to identify variables associated with the effectiveness of EW. This regression analysis showed that the number of writing sessions completed and the number of words written during a session did not contribute significantly to the positive effects of EW. In the present study, participants completed on average four writing sessions; this was below the six sessions they were originally instructed to carry out. Nonetheless, this amount of writing was sufficient to reduce skin-picking behavior. This finding is also in line with recommendations based on a meta-analysis by Frattaroli (2006) who investigated optimal conditions for EW effects; these conditions included completing a minimum of only three writing sessions. Thus, the average of four writing sessions carried out in the current study can be seen as sufficient to produce positive results.

A further finding of the current study was that there was a general trend toward more words being written on the computer compared to handwriting. This appears to reflect different writing speeds for each modality. An unexpected finding was that the writing modality had no differential effect on the reduction of skin-picking symptoms. We had assumed that the process of writing (performing up and down movements) would be similar to the physical movements involved in skin-picking, and could therefore be an efficient replacement behavior. The null findings of the current study, however, are in line with results reported in the meta-analysis by Frattaroli (2006). In that study, it was concluded that the mode of disclosure did not moderate EW outcomes; studies using handwritten disclosure did not produce larger effects than studies using typed disclosure.

The present investigation also showed that high levels of reported trait anxiety were associated with more positive effects of EW (in terms of a greater reduction in the urge

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to pick one's skin). Anxiety has been shown to be a typical elicitor of skin-picking episodes (e.g., Yeo & Lee, 2017). Further, patients with skin-picking disorder report elevated trait anxiety and show elevated rates of comorbid anxiety disorders (Schienle et al., 2022). Other studies have demonstrated that EW is effective at reducing anxiety and associated problems (e.g., test anxiety; see Park et al., 2014; Robertson et al., 2021; Shen et al., 2018). For example, Park et al. (2014) showed that highly math-anxious individuals performed significantly worse on a math test than individuals with low anxiety. Notably, a subsequent EW intervention significantly reduced the group difference in test scores. The authors of that study proposed that the EW might have enabled participants to more effectively identify and differentiate their emotional experience, which may have led to the use of better emotion regulation strategies. Further, the use of specific words in the EW task related to anxiety, cause, and insight, was positively related to math performance (also see Shen et al., 2018). Thus, confrontation with anxious feelings, as well as cognitive restructuring, appear to be important components involved in the positive effects of EW on anxiety and related problems; both components are elements of exposure therapy, which is a highly effective method for reducing symptoms of anxiety and other negative emotions (e.g., Hollon & Beck, 1994; Margraf & Schneider, 1990; Ruhmland & Margraf, 2001). In the current study, while trait anxiety was not found to be reduced on average after the EW intervention, trait anxiety was however identified as a moderator for the effects of EW on the urge to perform skin-picking (i.e., participants high in trait anxiety were found to benefit more from EW). Considering this, in future EW studies that focus on excessive skin-picking, text analyses could be implemented to further elucidate anxiety-associated mechanisms of EW in the context of this dysfunctional behavior. Further, additional trait variables associated with affective processing in the context of pathological skin-picking (e.g., disgust propensity, difficulties in emotion regulation) should be investigated (Schienle et al., 2018).

It is important to mention the potential limitations of the present study. First, we only studied females. Therefore, the results cannot be generalized to males or other groups. Second, some of the participants took part in self-help groups during the study; this could have biased results. However, none of the participants received any other form of psychological treatment during the course of the study. Third, observed changes in skin-picking behavior were based on the self-reports of participants. In future studies, objective measures could be introduced (e.g., photos of affected skin before and after the EW intervention). Finally, participants received a brief intervention lasting only two weeks. The implementation of EW as an additional component in a (longer-lasting) psychotherapy would very likely enhance its effectiveness. Further, this type of psychotherapy would not have to be based on conventional face-to-face interactions but could be provided via online counseling. The present study underlines how technologies such as app-assisted interventions can be used to promote beneficial effects for reducing psychological symptoms, in this case, pathological skin-picking. Such e-therapy approaches

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might also enhance the effectiveness of EW interventions, since larger effects of EW have been obtained when participants have disclosed at home vs. in other (non-private) settings (Frattaroli, 2006).

Conclusion

This study revealed positive immediate effects of EW on skin-picking, including a reduced urge for skin-picking and increased feelings of relief. Mid-term effects of EW on skin-picking were also found, relating to a reduction in focused skin-picking (according to self-reports). The beneficial effects of EW were independent of the writing modality (paper/pencil vs. computer) and were also found to be associated with trait anxiety.

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Ethics Statement: All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Graz and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. The study was approved by the ethics committee of the University of Graz (GZ. 39/79/63 ex 2021/22).

Data Availability: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Supplementary Materials

The Supplementary Materials contain the following items (for access see Index of Supplementary Materials below):

1. The pre-registration protocol for the study.
2. Follow-up tests (Tukey post-hoc comparisons) for the analysis of variance (ANOVA) that compared the four interventions (Expressive Writing: paper/pencil; Expressive Writing: computer; Picture Description: paper/pencil; Picture description: computer) concerning word count (number of written words during a session) are provided in the Supplementary Table S1.
3. *F*-statistics (*F*, *df*, *p*, part η2) for the mixed-model analyses of variance (ANOVAs) to compare the two INTERVENTIONS (Expressive Writing (EW) vs Picture Description (PD)) and the two WRITING MODALITIES (paper pencil (pp) vs computer (c)), before vs after a writing session

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(factor: TIME) concerning the app ratings (urge to pick one's skin, feelings of tension, relief, and pleasantness) are provided in Supplementary Table S2.

4. *F*-statistics (*F*, *df*, *p*, part η2) for the mixed-model analyses of variance (ANOVAs) to compare the questionnaire scores (SPS-R; MIDAS; STADI_depression, STADI_anxiety) between INTERVENTIONS and TIME (before and after the two-week intervention) are provided in Supplementary Table S3.
5. Supplementary Figure S1 depicts the CONSORT flow diagram.

Index of Supplementary Materials

Schlintl, C., & Schienle, A. (2022). *Effect of expressive writing on emotions and thoughts in dermatillomania* [Pre-registration protocol; DRKS-ID: DRKS00029224]. German Clinical Trials Register. https://drks.de/search/en/trial/DRKS00029224

Schlintl, C., & Schienle, A. (2023). *Supplementary materials to "Reduction of pathological skin-picking via expressive writing: A randomized controlled trial"* [Additional information]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.12906

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Atkin, L. (2017, November). *Re-imagining compulsive skin picking: Art for recovery* [Video]. Ted Conferences. https://www.ted.com/talks/liz_atkin_re_imagining_compulsive_skin_picking_art_for_recovery

Bohne, A., Wilhelm, S., Keuthen, N. J., Baer, L., & Jenike, M. A. (2002). Skin picking in German students: Prevalence, phenomenology, and associated characteristics. *Behavior Modification, 26*(3), 320–339. https://doi.org/10.1177/0145445502026003002

Frattaroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin, 132*(6), Article 823. https://doi.org/10.1037/0033-2909.132.6.823

Gallinat, C., Keuthen, N. J., & Backenstrass, M. (2016). A self-report instrument for the assessment of dermatillomania: Reliability and validity of the German skin picking scale-revised. *Psychotherapie, Psychosomatik, Medizinische Psychologie, 66*(6), 249–255.

Gallinat, C., Stürmlinger, L. L., Schaber, S., & Bauer, S. (2021). Pathological skin picking: Phenomenology and associations with emotions, self-esteem, body image, and subjective physical well-being. *Frontiers in Psychiatry, 12*, Article 732717. https://doi.org/10.3389/fpsyt.2021.732717

Hollon, S., & Beck, A. T. (1994). Cognitive and cognitive-behavioral therapies. In A. E. Bergin & S. L. Garfield (Eds.), *Handbook of psychotherapy and behavior change* (4th ed., pp. 393–442). Wiley.

Laux, L., Hock, M., Bergner-Köther, R., Hodapp, V., & Renner, K.-H. (2013). Das *State-Trait-Angst-Depressions-Inventar (STADI)*. Manual. Hogrefe.

Margraf, J., & Schneider, S. (1990). *Panik. Angstanfälle und ihre Behandlung* (2nd ed.). Springer.

PsychOpen GOLD

Park, D., Ramirez, G., & Beilock, S. L. (2014). The role of expressive writing in math anxiety. *Journal of Experimental Psychology: Applied, 20*(2), 103–111. https://doi.org/10.1037/xap0000013

Pavlacic, J. M., Buchanan, E. M., Maxwell, N. P., Hopke, T. G., & Schulenberg, S. E. (2019). A meta-analysis of expressive writing on posttraumatic stress, posttraumatic growth, and quality of life. *Review of General Psychology, 23*(2), 230–250. https://doi.org/10.1177/1089268019831645

Pennebaker, J. W., & Beall, S. K. (1986). Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology, 95*(3), 274–281. https://doi.org/10.1037/0021-843X.95.3.274

Pennebaker, J. W., & Chung, C. K. (2011). Expressive writing: Connections to physical and mental health. In H. S. Friedman (Ed.), *Oxford handbook of health psychology* (pp. 417-437). Oxford University Press.

Pennebaker, J. W., Colder, M., & Sharp, L. K. (1990). Accelerating the coping process. *Journal of Personality and Social Psychology, 58*(3), 528–537. https://doi.org/10.1037/0022-3514.58.3.528

Perry, J. A., & Ward-Smith, P. (2018). Expressive writing as an intervention to decrease distress in pediatric critical care nurses. *Clinical Nursing Studies, 6*(3), 96–100. https://doi.org/10.5430/cns.v6n3p96

Prochwicz, K., Kłosowska, J., & Kałużna-Wielobób, A. (2018). The relationship between emotion regulation strategies, personality traits and skin picking behaviours in a non-clinical sample of Polish adults. *Psychiatry Research, 264*, 67–75. https://doi.org/10.1016/j.psychres.2018.03.046

Reinhold, M., Bürkner, P.-C., & Holling, H. (2018). Effects of expressive writing on depressive symptoms—A meta-analysis. *Clinical Psychology: Science and Practice, 25*(1), Article e12224. https://doi.org/10.1037/h0101749

Robertson, S. M., Short, S. D., Sawyer, L., & Sweazy, S. (2021). Randomized controlled trial assessing the efficacy of expressive writing in reducing anxiety in first-year college students: The role of linguistic features. *Psychology & Health, 36*(9), 1041–1065. https://doi.org/10.1080/08870446.2020.1827146

Ruhmland, M., & Margraf, J. (2001). Effektivität psychologischer Therapien von generalisierter Angststörung und sozialer Phobie: Meta-Analysen auf Störungsebene. *Verhaltenstherapie, 11*(1), 27–40. https://doi.org/10.1159/000050322

Sabo-Mordechay, D. S., Nir, B., & Eviatar, Z. (2019). Expressive writing – Who is it good for? Individual differences in the improvement of mental health resulting from expressive writing. *Complementary Therapies in Clinical Practice, 37*, 115–121. https://doi.org/10.1016/j.ctcp.2019.101064

Schienle, A., Schlintl, C., & Wabnegger, A. (2022). A neurobiological evaluation of soft touch training for patients with skin-picking disorder. *NeuroImage: Clinical, 36*, Article 103254. https://doi.org/10.1016/j.nicl.2022.103254

Schienle, A., & Wabnegger, A. (2020). Two subtypes of pathological skin-picking: Evidence from a voxel-based morphometry study. *Journal of Obsessive-Compulsive and Related Disorders, 25*, Article 100534. https://doi.org/10.1016/j.jocrd.2020.100534

PsychOpen GOLD

Schienle, A., Zorjan, S., Übel, S., & Wabnegger, A. (2018). Prediction of automatic and focused skin picking based on trait disgust and emotion dysregulation. *Journal of Obsessive-Compulsive and Related Disorders, 16*, 1–5. https://doi.org/10.1016/j.jocrd.2017.10.006

Shen, L., Yang, L., Zhang, J., & Zhang, M. (2018). Benefits of expressive writing in reducing test anxiety: A randomized controlled trial in Chinese samples. *PLoS ONE, 13*(2), Article e0191779. https://doi.org/10.1371/journal.pone.0191779

Snorrason, I., Goetz, A. R., & Lee, H. (2017). Psychological treatment of excoriation disorder. In J. S. Abramowitz, D. McKay, & E. A. Storch (Eds.), *The Wiley handbook of obsessive compulsive disorders* (Vol. 2, pp. 990-1008). Wiley. https://doi.org/10.1002/9781118890233.ch56

Snorrason, Í., Smari, J., & Olafsson, R. P. (2010). Emotion regulation in pathological skin picking: Findings from a non-treatment seeking sample. *Journal of Behavior Therapy and Experimental Psychiatry, 41*(3), 238–245. https://doi.org/10.1016/j.jbtep.2010.01.009

Walther, M. R., Flessner, C. A., Conelea, C. A., & Woods, D. W. (2009). The Milwaukee Inventory for the Dimensions of Adult Skin Picking (MIDAS): Initial development and psychometric properties. *Journal of Behavior Therapy and Experimental Psychiatry, 40*(1), 127–135. https://doi.org/10.1016/j.jbtep.2008.07.002

Yeo, S. K., & Lee, W. K. (2017). The relationship between adolescents' academic stress, impulsivity, anxiety, and skin picking behavior. *Asian Journal of Psychiatry, 28*, 111–114. https://doi.org/10.1016/j.ajp.2017.03.039

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An Online Mindfulness Intervention for International Students: A Randomized Controlled Feasibility Trial

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Supplementary Materials: Preregistration [see Index of Supplementary Materials]

Abstract

Background: Student mobility across borders poses challenges to health systems at the university and country levels. International students suffer from stress more than their local peers, however, do not seek help or underutilize existing help offers. Some barriers to help-seeking among international students are insufficient information regarding the health offers, stigma, and language, which might be overcome via culturally adapted internet and mobile-based interventions (IMI).

Method: A randomized controlled feasibility trial with a parallel design assessed the feasibility and potential efficacy of an online mindfulness intervention adapted for international university students. Participants were randomized into either an adapted online mindfulness intervention (StudiCareM-E) (IG, n = 20) or a waitlist control group (WL, n = 20). Participants were assessed at baseline (t0) and eight-week post-randomization (t1). The feasibility of StudiCareM-E was evaluated regarding intervention adherence, client satisfaction, and potential negative effects. The potential efficacy of StudiCareM-E was measured by means of the level of mindfulness, perceived stress, depression, anxiety, presenteeism, and wellbeing. Efficacy outcomes were evaluated with regression models on the intention-to-treat (ITT) sample (n = 40), adjusting for the baseline values.

Results: Participants' formative feedback suggested improvements in the content of the IMI. There were no crucial negative effects compared to WL. Assessment dropout was 35% (IG: 50%: WL: 20%),

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and intervention dropout was 60%. StudiCareM-E yielded significant improvements in mindfulness (β = .34), well-being (β = .37), and anxiety (β = -.42) compared to WL.

Conclusion: StudiCareM-E might be used among culturally diverse international student populations to improve their well-being. Future studies might carefully inspect the extent of the adaptation needs of their target group and design their interventions accordingly.

Keywords

e-health, digital health, student mental health, cultural adaptation, internet intervention, international student

Highlights

- International students suffer from more stress compared to their local peers but rarely seek help.
- Internet interventions can be adapted to cater to the needs of culturally diverse international students.
- The adapted internet intervention for international students offers great potential to improve psychological outcomes.

Starting university after high school is a challenging time. University students experience stress due to financial issues, love life, and family relationships (Karyotaki et al., 2020), and sexual identity (Rentería et al., 2021). Exposure to these stressors might result in developing a mental health problem or low academic functioning, even dropping out of university (Athira et al., 2020; Bantjes et al., 2021; Bruffaerts et al., 2018). Prevalence of mental health problems among university students assessed from eight countries, and 19 universities, resulted in 35% of student participants (N = 13.984) having at least one mental health problem (i.e. anxiety, mood, or substance use), with Major Depressive Disorder (MDD) (21.2% lifetime prevalence, 18.5% 12-month prevalence) being the most common and Generalized Anxiety Disorder (GAD) the second most common (18.6% lifetime prevalence, 16.7% 12-month prevalence) (Auerbach et al., 2018). The burden from mental health problems comprises 45% of the overall disease burden among 10-24-year-olds (Gore et al., 2011). Moreover, the majority of mental health problems over the lifetime first develop before the age of 24, which makes this time of university crucial to screen for mental health problems and provide prevention and/or treatment opportunities (Jones, 2013).

Students who cross borders to study are increasing in Europe, especially in Germany, where the number of international students substantially increased from 312.000 in 2018 to 416.437 in 2020 (Eurostat, 2018; Statistisches Bundesamt, 2021). International students encounter similar life challenges as students studying in their home country but are also faced with additional stressors that may trigger homesickness (Akhtar & Kröner-Herwig, 2015), problems in socializing with the local students (Byrne et al., 2019), adapting to a new country, lifestyle, and language, and a new academic culture and customs

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(Forbes-Mewett & Sawyer, 2016; Yu & Wright, 2016). Studying abroad, while mostly associated with positive experiences, can cause some challenges and result in mental burden (Orygen, 2020; Stokes et al., 2021).

Even though university students suffer from psychological distress, their help-seeking behavior is very limited (Auerbach et al., 2016). This can be attributed to various factors, such as not being familiar with the symptoms of or the help options for mental health problems, social stigma, social and cultural influences (e.g. traditional masculine ideals) (Lynch et al., 2018), limited access to professional help via university, and financial problems (Auerbach et al., 2016; Gulliver et al., 2010; Orygen, 2020). Although their psychological stress level is higher compared to students of the host country (Lu et al., 2014), international students are less likely to seek help from a counseling service (Lu et al., 2014; Stokes et al., 2021), have lower mental health literacy, and less positive attitudes towards seeking help (Clough et al., 2019). Some barriers which are specific to international students might be related to cultural backgrounds where symptom severity is underestimated, hesitation because of their family's reaction, and language barrier (Lu et al., 2014). In general, cultural influences play an important role in attitudes toward mental health and help-seeking (Hudak et al., 2018). Furthermore, international students who reach out to a counseling service fail to utilize psychological help services, e.g. not attending the necessary number of sessions, and even benefit less from it, compared to local students who utilized these services (Stokes et al., 2021), and drop out of the treatment prematurely (Nilsson et al., 2004). In summary, there is a persistent discrepancy between mental health needs and actual help-seeking behavior among international students. Therefore, it is critical to offer appropriate psychological help to this particularly vulnerable sub-group of the student population (Teegen & Conrad-Popova, 2021).

Barriers to help-seeking could be overcome by an easily accessible offer via delivering psychological health interventions online. Internet- and mobile-based interventions (IMI) have the advantage of being independent of time and place, ability to reach populations otherwise hard to reach, offering interventions to treat and prevent various psychological problems, and are cost-effective (Ebert et al., 2018). Likewise, IMI have proven to be effective in university student populations with small to moderate effects in decreasing psychological symptoms (Harrer et al., 2019). Provided as guided IMI they could work as effectively as face-to-face cognitive behavioral therapy (Carlbring et al., 2018). The limited number of studies that targeted international students' wellbeing via offering an IMI resulted in improved mental health (Kanekar et al., 2010), reduction of sleep difficulties (Spanhel, Burdach, et al., 2021), more help-seeking, and reduced stigma (Clough et al., 2020). However, issues around the adherence and uptake of IMI still persist (Batterham et al., 2021; Molloy et al., 2021). IMI can also aim at treating mental health problems, e.g. depression, but can also be utilized in promoting health skills (Galante et al., 2018; Sevilla-Llewellyn-Jones et al., 2018). An example of a helpful skill to promote mental health and well-being is mindfulness. Mindfulness refers to

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experiencing the present and being aware of life with acceptance and self-compassion, without any judgment (Slom & Kabat-Zinn, 2020). Mindfulness-based interventions could be delivered successfully online (Jayawardene et al., 2017), and have been tested and found effective among students (Hall et al., 2018; Mak et al., 2015; Nguyen-Feng et al., 2017) and general and clinical populations (Querstret et al., 2018; Sevilla-Llewellyn-Jones et al., 2018). A recent meta-analysis of RCTs of online mindfulness interventions resulted in significant small to moderate effects on depression (g = .34), anxiety (g = .26), mindfulness (g = .40), stress (g = .44), well-being (g = .22). These effects were maintained in the follow-up for depression (g = .25) and anxiety (g = .23) (Sommers-Spijkerman et al., 2021). Mindfulness interventions can be seen as less threatening due to their associations with well-being and calmness, instead of interventions targeting mental health problems which might impede help-seeking due to stigma (Clement et al., 2015). Mindfulness interventions could also be adapted to meet the needs of a specific target group. For instance, the delivery method could be changed (e. g. intervention taking place in a cultural community center), the facilitator, researcher/therapist, could be matched with a target group's cultural background, a culturally congruent recruitment strategy could be adopted, the content could be changed, culturally appropriate analogies could be used (Watson-Singleton et al., 2019), dispelling myths around mindfulness (Castellanos et al., 2020; Cotter & Jones, 2020; Lawlor, 2022), storytelling, and community input can be utilized (Le & Gobert, 2015). However, the adaptation of online mindfulness interventions is rarely defined in detail in the previous literature, but systematic adaptation frameworks are emerging (Loucks et al., 2022; Spanhel, Balci, et al., 2021). Moreover, mindfulness interventions' transdiagnostic nature and growing popularity in recent years via advertising as a self-care instrument make them more appealing. They could therefore serve as an alternative way to reach out to international students with various psychological problems.

Objectives

In order to explore the feasibility and possible efficacy of the online mindfulness intervention adapted for international students, StudiCare Mindfulness – English version (StudiCareM-E), the following research questions will be explored.

Research questions:

1. Are the study methods feasible and transferable to a future, large-scale randomized controlled trial with regard to implementation and the chosen recruitment strategy?
2. What are the levels of intervention satisfaction, adherence, negative effects, and acceptance?
3. Does the internet-based intervention StudiCareM-E have a potential effect on increasing mindfulness levels compared to a waitlist control group?

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4. What effects does the StudiCareM-E have on measures of psychological well-being (depression, stress, anxiety, well-being, and presenteeism) in comparison to the waitlist control group?

Method

This is a two-armed, randomized controlled trial of parallel design (registered in the German Clinical Trials Register DRKS00017507) comparing guided IMI StudiCareM-E (IG) with a waitlist control group (WL) receiving the unguided version of the same IMI eight weeks post-randomization. The study was approved by the ethics committee of Ulm University (Number 413/18) and followed the CONSORT guidelines for feasibility trials (Eldridge et al., 2016).

Participants

The eligibility criteria for participating in the study were: being at least 18 years old, having a low to moderate level of mindfulness (Freiburg Mindfulness Inventory FMI $\leq$ 37), having internet access, having student status, ability to read and understand English (all self-reported), giving consent to participate in the study. Exclusion criteria included being in a mindfulness course, having a higher than moderate mindfulness level, and being in psychotherapy.

Procedure

Participants were recruited from July 2019 to March 2020. The recruitment was done through regular emails sent out twice a year from the cooperating universities of the StudiCare project (Harrer et al., 2018; Küchler et al., 2019) in Germany, Switzerland, and Austria, complemented by study posters and further on-site recruitment strategies at the Ulm University. The email consisted of information regarding various trainings that are offered within the StudiCare project at a given time along with an invitation to participate in the training. Additional emails were sent to universities' international offices in the above-mentioned countries. Potential participants received a direct link to the study website to register and were then invited to the screening via email. After screening and providing informed consent, participants were invited to complete the initial survey. Participants were randomized into either intervention (immediate access) or waitlist (access eight weeks post-randomization) control group. Afterward, they got access to online training.

Randomization

Randomization was carried out by an independent researcher who was not involved in the Studicare Project. A simple randomization list applying block sizes of two and

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four by a computer generator was created using Sealed Envelope[1]. 20 participants were allocated to each study arm with a 1:1 ratio, making a total of 40 participants.

Intervention

Based on Acceptance and Commitment Therapy (Hayes et al., 1999) and stress management principles (Kaluza, 2015), StudiCareM-E consists of seven weekly modules and two booster sessions; each module takes approximately 50 minutes to complete (Küchler et al., 2020; Schultchen et al., 2020). StudiCareM-E has been shown to yield a high effect among German-speaking students compared to a waitlist control group (d = 1.37) (Küchler et al., 2022).

Participants were advised to complete one module per week. Participants who completed seven modules received access to booster sessions one and two, four and 12 weeks, respectively, after completion of the last module. The focus of the intervention is on promoting mindfulness and psychological flexibility. The content is delivered on a content management platform (www.minddistrict.com) via text, images, audio files, and interactive quizzes. Participants were able to access the online platform Minddistrict at all times. Every module aims at improving a different skill, such as identifying stress-inducing thinking patterns and getting in touch with values in life. At the end of each module, homework is assigned to the participant, and at the beginning of the next module, the participants are encouraged to monitor their progress. Each module introduces a different kind of meditation exercise, e.g. body scan, interoception. A mindfulness journal and a summary of the respective module were available at the end of each module. Content and introduced mindfulness exercises of each module are presented in Table 1.

Adaptation of the Intervention

Cultural adaptation of the intervention was based on Resnicow's theory of cultural sensitivity in health behavior intervention development, which has two dimensions: surface and deep structure. According to the theory, interventions could be altered to fit the target groups' needs and features in these levels where surface-level alterations concern visible characteristics of the target population such as language, music, food choices, and clothing, whereas deep structure changes refer to counting intersecting effects of cultural, social, historical and psychological influences on the target health behavior (Resnicow et al., 2000). In this trial, surface structure changes were conducted to make the intervention content more compatible with culturally diverse international students. Conducted changes to the original German intervention represented in Table 2 based on Spanhel et al.'s taxonomy of cultural adaptation of IMI for mental health problems (Spanhel, Balci,

1) https://www.sealedenvelope.com/simple-randomiser/v1/lists

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Table 1

Intervention Modules and Mindfulness Exercises

Module names	Content	Mindfulness meditation exercises
Awareness	An introduction to the concept of mindfulness	Body scan, mindful walking exercise
Mindful body perception	Mindful perception of bodily signals	Heart meditation, mindful perception of satiety and hunger
Stress-aggravating thought	Mindful coping strategies to deal with stress and distancing from stressful thoughts	Power of thoughts, mindful straightening the posture
A beneficial thought	Developing a beneficial thought to deal with stress	Inhaling the beneficial thought, short breathing meditation
Values in life	Discovering what is important and valuable in life	Here and now exercise
Self-care	Looking at yourself with a loving gaze	Loving and kindness meditation
Body&mind	Enjoying small things in life with mindfulness	Shavasana and mindful yoga
Refresh I&II	Review of previous modules	Repeating the previous exercises

et al., 2021). The taxonomy consists of various components that researchers can adapt in order to make IMI more appropriate to the new target group: ten components related to the content of the intervention, four methodological, and three procedural components. Changes were implemented in content components (e.g. stigmatization of mental health problems), methodological (e.g. guidance in English), and procedural domains (e.g. using a theoretical framework for adaptation). For English-speaking international students, the intervention content of StudiCare-Mindfulness (Küchler et al., 2020; Schultchen et al., 2020) was translated to English and certain aspects (e.g. language barrier, different education systems) changed in accordance with student life and stress sources.

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Table 2

Culturally Adapted Elements of StudiCare Mindfulness-E

Core components / Specific components	Example
Content components	
1. Illustrated characters	
Appearances/ names of characters	change of names of characters to diverse names (e.g. Hua, Andrew, Farah)
Content/ stories/ background of characters	added characters from various regions of the world who migrated to study in Germany
2. Illustrated activities	
Daily life	walking the dog, tutoring a fellow student, and contact with family members living abroad
3. Illustrated environment/ burdens	
Burdens	high level of pressure for academic excellence, adapting to a foreign academic culture
4. Language translation	
Translating intervention	German to English
5. Language tailoring	
Simplify text: shortening text passages, simplifying sentences	less technical phrasing, modify wording for easier readability
Use of concrete terms or informal language	the colloquial form was used
Milder descriptions of mental health concepts	describing psychological problems in a university context
6. Difference in concepts of mental health and its treatment	
Stigmatization of mental health problems	framing the goal of the intervention as a mindfulness-based stress management tool instead of mental health intervention in order to reduce the stigma
7. Goals of treatment	
Increase understanding of treatment possibilities	Introducing various ways of coping with university-related stressors.
8. Methods of treatment	
Information/ links to other helpful addresses	psychological help offers which might be available in English are presented to each participant

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Core components / Specific components	Example
Methodological components	
9. Guidance	
Person used as guide	Guidance by an English-speaking psychologist (SB)
Format of guidance (tailored feedback)	participants can ask for personal contact in addition to semi-structured feedback
Procedural components	
10. Methods used to obtain information	
Personal interaction (focus groups, interviews, discussions, think-aloud)	received feedback in the form of qualitative data for the process evaluation and further implementation of the program
Surveys/ questionnaires	assessed acceptance and effectiveness
Pilot/ feasibility studies	this trial has been conducted to measure the feasibility to inform a future definitive trial.
11. Persons involved	
Target group and associated people	International students
Professionals working with the target group	International office workers of partner universities distributed recruitment emails
12. Theoretical framework	
Guideline for cultural adaptation of face-to-face treatment	surface structure changes were based on the cultural sensitivity framework by Resnicow (Resnicow et al., 2000)

Guidance

At the end of each module, intervention group (IG) participants received feedback from an e-coach, who was a trained psychologist (SB). Each feedback consisted of a review of their progress in the intervention and encouragement to continue the intervention such as “Dear ...., thanks for sending your third module! I am happy that you are working actively on the program.” and continues with a review of completed exercises “The second task was to think about stressful situations in the past and what helped you to cope with stress. You wrote that ... was very helpful for you.” and end with an encouragement to continue with the upcoming module “I wish you a relaxed week with many attentive moments and a lot of fun while working on module 4.”. Moreover, reminder emails were sent to the participants who did not complete the modules in time. The e-coach was instructed to take no longer than 15 minutes per feedback, which results in a planned e-coaching time of max. 105 minutes per participant for all seven modules.

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SMS Coach

In IMI, receiving SMS messages may contribute to adherence and intervention effect (Lentferink et al., 2017; Webb et al., 2010). Consequently, a voluntary text message coach was implemented and offered to each participant. These motivational SMS messages were set to be sent every two days, throughout the intervention. They consisted of motivational texts to promote the use of learned skills, be mindful throughout the day, and continue the intervention, such as "'The true art of life is to see beauty in the daily.' What beautiful moment did you experience today?", and "'Every moment is absolute, alive and meaningful.' – What was your mindful moment today? When was the least mindful moment? How did you feel then?".

Control Group

Control group participants received a document summarizing the alternative support offers via email after the randomization. Participants of the control group got access to the unguided version of the StudiCareM-E eight weeks after the randomization.

Assessment and Outcomes

Assessments were conducted via an online platform, www.unipark.de, at baseline (t0) and eight weeks post-randomization (t1), blinding of outcome assessment was not possible. All data were self-reported.

Acceptability was measured via participants' attitudes towards the IMI, their formative feedback, and satisfaction with the intervention and its potential negative effects. Open-ended questions at the end of each module were extracted from the Minddistrict platform. These outcomes are reported descriptively.

The primary efficacy outcome of this study is Mindfulness level. Secondary outcomes are Anxiety, Stress, Depression, Personality, Well-being, Presenteeism, Client Satisfaction, Risks and Negative Effects of Psychotherapy, and Acceptance and Adherence questions.

Mindfulness was assessed using the Freiburg Mindfulness Inventory (FMI), which consists of 14 items measuring mindfulness on a 4-point scale ranging from 1= rarely to 4 = almost always, and showed high internal consistency ($\alpha = 0.84$) (Walach et al., 2006).

Anxiety was measured with a 7-item Generalized Anxiety Disorder Questionnaire (GAD-7) on a scale from 0 = not at all to 3 = nearly every day and has high internal consistency ($\alpha = 0.92$) (Spitzer et al., 2006).

Stress outcome was measured with 4-item Perceived Stress Scale (0 = never to 4 = very often), which also showed good reliability ($\alpha = 0.77$) (Warttig et al., 2013).

Depression was measured with an 8-item Patient Health Questionnaire, where high reliability was observed ($\alpha = 0.89$) and rated on a scale of 0 = not at all to 3 = early every day (Kroenke et al., 2001).

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WHO-5 well-being index was used to assess subjective well-being on a scale of 0 = at no time to 5 = all of the time, which showed high internal consistency, $\alpha > 0.80$ (Lara-Cabrera et al., 2022; Spanhel, Burdach, et al., 2021; Topp et al., 2015).

Presenteeism, i.e. loss of productivity was measured with the Presenteeism Scale for Students. The subscale of work impairment was used to assess the degree of presenteeism, which consist of 10 items; with total scores ranging from 10 to 50, higher scores represent a higher degree of presenteeism and showed high reliability, $\alpha = 0.90$ (Matsushita et al., 2011).

Eight weeks after randomization, in addition to the above-mentioned tools, assessments of intervention satisfaction were done using the Client Satisfaction Questionnaire (total scores range from 8 to 32) adapted to Internet-based Interventions (Boß et al., 2016). Negative effects of Psychotherapy were measured using INEP (Inventory for the Assessment of Negative Effects of Psychotherapy) adapted to online interventions with 22 items describing possible negative effects that may occur during the online intervention and whether they are attributed to the intervention (Ladwig et al., 2014). The results of this scale are presented descriptively.

Sample Size

In order to determine the sample size for this feasibility trial, we followed the recommendation by Whitehead et al. (2016), resulting in a sample size of 15 participants per trial arm for pilot testing of a potential confirmatory trial with 90% power and two-sided 5% significance. A meta-analysis resulted in an effect size of 0.40 for mindfulness-based IMI, therefore we assumed a higher effect size, i.e. 0.50 because this trial is guided (Sommers-Spijkerman et al., 2021). With the expectation of a 30% dropout, we aimed at reaching a sample size of 40 in total.

Statistical Analyses

IBM SPSS/version 26 and R Studio were used in statistical analyses with a significance level of $\alpha = 0.05$. Descriptive statistics (means, *SD*s for continuous outcomes, and percentages for categorical variables) were used to summarize the demographic and feasibility data for study groups. Linear regression models were used to investigate potential group differences, where baseline values were used as covariates in all models (dummy coded predictor: IG = 1). For each outcome, we reported standardized regression coefficients and corresponding 95% CI and adjusted R^2 values.

Data analyses were based on the intention-to-treat principle (ITT). Missing data were imputed based on multivariate imputation by chained equations to create 20 completed datasets with 15 iterations. Predictive mean matching was applied as an imputation model.

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Results

Feasibility

Recruitment and Participants

Recruitment lasted from May 2019 until March 2020. One hundred and twenty-three participants were invited to the screening. n = 46 did not complete the screening. Out of 77 screened, 37 were excluded due to the following reasons: not providing informed consent (n = 18), having a high FMI score (> 37) (n = 10), being in psychotherapy (n = 6), being in another mindfulness training (n = 1), not being a student (n = 1), and providing an inaccessible email address (n = 1). n = 40 provided consent and were randomized to either IG or WL groups, see Figure 1.

The mean age of the participants was M = 26.23 (SD = 4.51), 77.5% were female, 37.5% could speak the host country's language well (>B2 level), and 97% speak English well (>B2 level). The study level of the participants varied: out of 40, 24 studied in a master's program, nine were in a bachelor's program, six were in a Ph.D. program, and one participant was doing an internship semester. The baseline characteristics of the participants are tabulated in Table 3.

Out of 40 randomized participants, 26 (IG: 50%; WL: 80%) completed the t1, resulting in a study dropout of 35%. There was a baseline difference between assessment dropouts and non-dropouts, where non-dropouts had slightly more stress (mean difference = 1.68).

Intervention Adherence

Out of 20 participants randomized into the IG, eight participants (40%) completed at least five core modules (four of them completed the seven modules), whereas four did not finish the first module. Three completed the first module, two participants completed two modules, two participants three modules and one participant completed the fourth module, see Figure 2. All the intervention completers also completed the post-randomization assessment. No reasons were reported regarding no uptake of the intervention. The average intervention duration among the intervention completers was 60 days, five of them completed the intervention within 60 days. Eight participants signed up for the SMS coach. Based on 10 participants' answers to the open-ended questions on t1, participants practiced mindfulness on average 3.6 days weekly during the intervention. On these days, they spent an average of 18.3 minutes practicing mindfulness.

Acceptability

In order to assess the acceptability of the StudiCareM-E among the participants, we used various sources: open-ended questions by the end of the post-intervention measurement, treatment satisfaction measured via CSQ, and potential negative effects measured with INEP-On, and formative user feedback extracted via the online platform of Minddistrict.

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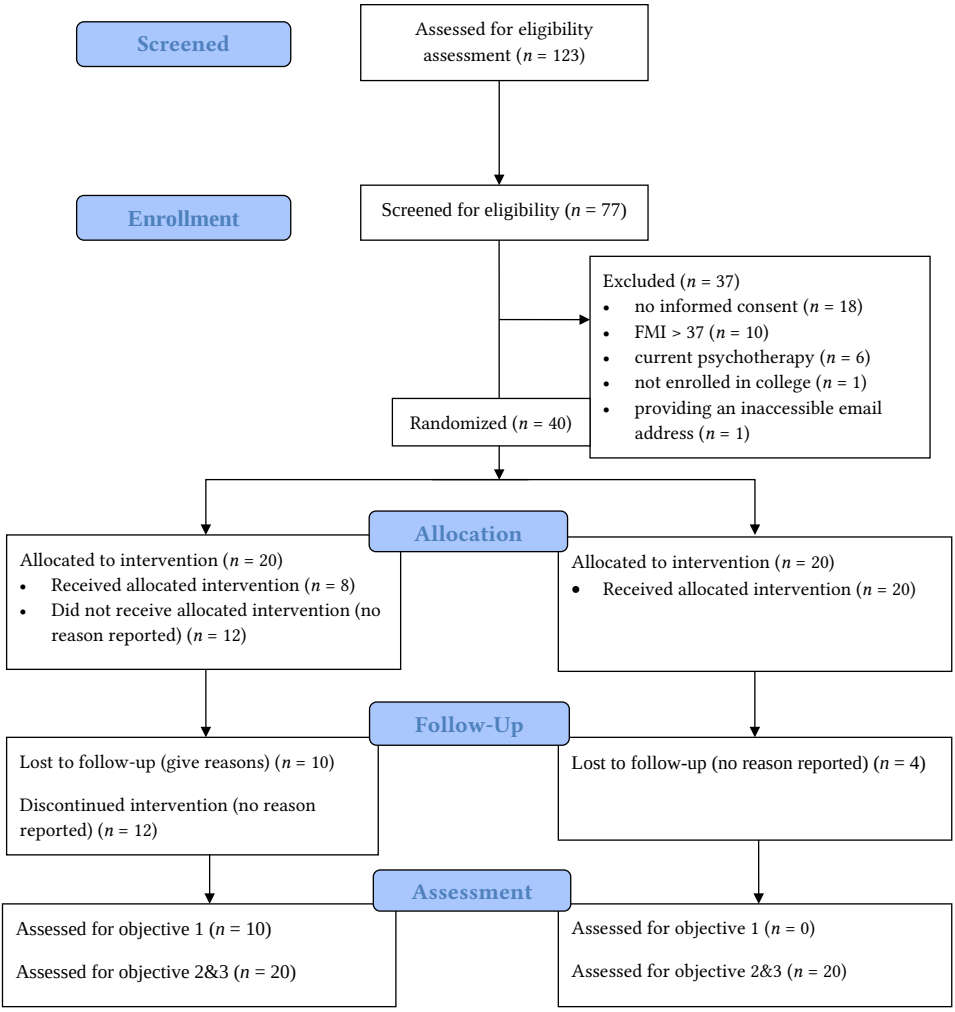
Figure 1

Flow Diagram



According to the data from the open-ended questions at t1 (n = 10), five participants (25%) signed up for the SMS coach and found this helpful. Six participants stated that mindfulness meditation exercises were the most helpful element of the intervention. Body scan and body-related exercises, e.g. mindful yoga, were well-liked by the participants. Two participants stressed that example characters and the quiz on stress sources

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Table 3

Baseline Characteristics

Variable	All Participants (*n* = 40)		IG (*n* = 20)		WL (*n* = 20)	
	n	**%**	***n***	**%**	***n***	**%**
Sociodemographic characteristics						
Age (*M, SD*)	26.23	4.5	25.05	3.5	27.40	5.2
Female gender	31	77.5	19	95	12	60
Single	23	57.5	12	60	11	55
Knowledge of host country language (> B2 level)	15	37.5	5	25.0	10	50.0
Country of origin						
Albania (*n* = 2), Belarus (*n* = 3), Belgium (*n* = 1), Cameroon (*n* = 1), Canada (*n* = 3), Colombia (*n* = 2), Costa Rica (*n* = 1), France (*n* = 2), German (*n* = 1), Ghana (*n* = 1), India (*n* = 1), Indonesia (*n* = 2), Italy (*n* = 3), Kazakhstan (*n* = 1), Kyrgyz Republic (*n* = 1), Mexica (*n* = 2), Nepal (*n* = 1), Pakistan (*n* = 1), Portugal (*n* = 1), Romania (*n* = 1), Russia (*n* = 1), Sweden (*n* = 1), Turkey (*n* = 4), Ukraine (*n* = 1), USA (*n* = 2)						
Study characteristics						
Full-time student	34	85	18	90	16	80
Semester (*M, SD*)	10.14	6.8	9.21	5.02	11.06	8.36
Study subject						
Business and Finance	8	20.0	4	20.0	4	20.0
Social Sciences	8	20.0	6	30.0	2	10.0
Engineering	7	17.5	4	20.0	3	15.0
Medicine & Health	5	12.5	3	15.0	2	10.0
Nature Sciences	5	12.5	0	0	5	12.5
Computer Sciences	4	10.0	1	5.0	3	15.0
Design	2	5.0	1	5.0	1	5.0
Psychology	1	2.5	1	5.0	0	0
Treatment utilization						
Psychotherapy experience	10	25	7	35	3	15
	M	***SD***	***M***	***SD***	***M***	***SD***
Outcome measures						
Mindfulness level	27.28	5.75	27.30	6.27	27.25	5.34
Depressive symptoms	16.68	3.39	18.10	2.28	19.25	3.9
Anxiety symptoms	17.27	4.42	16.75	4.09	17.80	4.77
Presenteeism level	27.85	2.21	27.8	2.40	27.9	2.05
Well-being	35.20	17.09	37.60	17.25	32.80	17
Stress level	13.38	2.44	13.10	2.31	13.65	2.58

Note. *M* = Mean; *SD* = Standard Deviation; *IG* = Intervention Group; *WL* = Waitlist control group.

were beneficial. The majority of the participants (79%) found the length of the modules just right. On average the participants scored the feasibility of doing the modules with daily tasks 7.3 out of a 10-point scale (0 = not feasible; 10 = very feasible) and scored 3.8 on the same scale regarding the disturbance the processing of modules caused in

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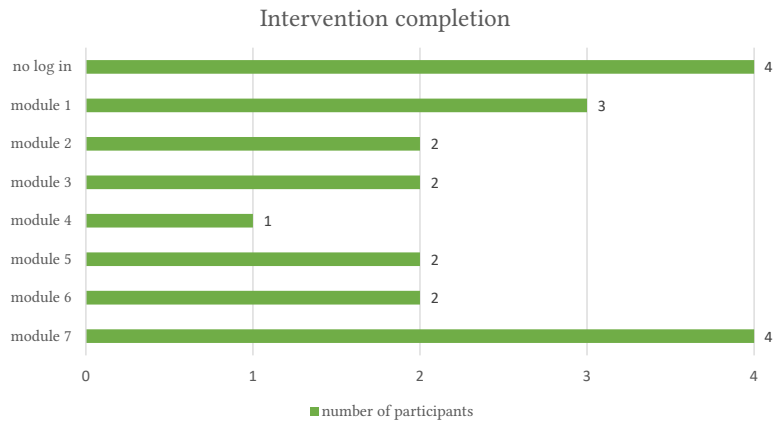
Figure 2

Intervention Completion



their everyday life. Additionally, they scored 8.9 on their likelihood of participating in a mindfulness-based intervention in the future.

In terms of treatment satisfaction, the ITT data on CSQ, the overall satisfaction with the intervention was $M = 25.4$, $SD = 2.2$. All of the completers would definitely or probably recommend the intervention to a friend and 90% reported that the intervention met their needs, 70% would like to receive such intervention if they need help in the future, and 80% found the intervention satisfactory.

Potential negative effects of StudiCareM-E were evaluated with INEP-On in t1. Based on the results from INEP-On, six IG participants reported seven negative effects caused by the IMI in the following domains: anxiety about finding insurance ($n = 1$), increased financial worries ($n = 1$), data security ($n = 1$), feeling forced to do the exercises of the intervention despite not wanting to do it ($n = 3$), difficulties in making important decisions without asking the therapist ($n = 2$), found training or the formulations of the e-Coach contained hurtful statements ($n = 1$) and feeling that being made fun of in the intervention material ($n = 1$). One participant reported negative effects on each of the above-mentioned domains, whereas the rest of the five participants reported negative effects on a single domain. Of the five, two reported feeling forced into finishing modules, and three reported neglecting hobby/social contacts. No suicidal ideation was reported caused by the IMI. The magnitude of all negative effects reported was low to moderate.

According to the formative feedback extracted from the Minddistrict platform, all of the modules were well-liked, scoring ≥ 7 out of a 10-point scale, the most liked being the last module (Module 7: Body and Mind). Recommendations included adding more

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video/audio files, diversifying example characters' experiences, adding more mindfulness meditation exercises, and decreasing the number of text fields.

Efficacy Outcomes

Descriptive statistics of the study outcomes at the baseline are represented in Table 3. There were no baseline differences observed. Controlling for baseline mindfulness levels, IG participants showed improvement in mindfulness at the T1 compared to WL (β = 0.34, 95% CI [0.06, 0.63], $p < .05$; Adjusted $R^2 = 0.13$). Moreover, anxiety was improved among IG participants, compared to WL (β = -0.42, 95% CI [-0.72, -0.11], $p < .05$; Adjusted $R^2 = 0.14$) as well as Well-being (β = 0.37, 95% CI [0.07, 0.68], $p < .05$; Adjusted $R^2 = 0.13$). The effect estimates (β, CI, and p values) of the rest of the secondary outcomes are presented in Table 4.

Table 4

Post-Randomization Between-Group Differences Adjusted for Baseline Values

Outcome	Baseline (T1) *M* (*SD*)	Post-treatment (T2) *M* (*SD*)	Standardized coefficient ß	95% CI	*p*
Mindfulness (FMI)	27.27 (5.75)	31.79 (4.50)	0.34	[0.06 - 0.63]	.01
Depression symptoms (PHQ-8)	18.68 (3.39)	16.89 (3.88)	-0.10	[-0.39 - 0.21]	.52
Anxiety symptoms (GAD-7)	17.27 (4.42)	15.53 (3.84)	-0.42	[-0.72 - -0.11]	.01
Stress level (PSS-4)	13.38 (2.44)	11.79 (2.05)	-0.14	[-0.46 - 0.17]	.37
Wellbeing (WHO-5)	35.20 (17.09)	44.42 (15.44)	0.37	[0.07 - 0.68]	.02
PSS (Presenteeism-Work Impairment score)	13.38 (2.44)	27.66 (1.47)	-0.01	[-0.34 - 0.32]	.94

Note. *M* = mean; *SD* = Standard deviation; FMI = Freiburg Mindfulness Inventory; GAD-7 = Generalized Anxiety Disorder Questionnaire; PHQ-8 = Patient Health Questionnaire; PSS = Presenteeism Scale for Students; PSS-4 = Short Form Perceived Stress Scale; WHO-5 = World Health Organization Well-Being Index.

Discussion

This RCT evaluated the feasibility, acceptability, and potential efficacy of a cross-cultural version of a mindfulness-based IMI among international university students studying in Germany, Austria, and Switzerland. The initial results suggest that the adapted version of StudiCareM-E was feasible, perceived acceptable, and offered benefits in psychological outcomes compared to WL, and minor negative effects were reported among IG participants. Our preliminary results might guide a powered definitive trial. Working examples and recommendations for improvement are presented in the following paragraphs.

Our recruitment strategy included sending emails via cooperating universities, using social media channels of university groups/student clubs, and hanging hard copy posters around the Ulm University campus. We aimed at reaching a total of 40 participants,

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which took 11 months. The length of the recruitment is longer than a previous digital sleep intervention for international students, where n = 81 was reached in seven months (Spanhel, Burdach, et al., 2021). One reason for this might be the length and transdiagnostic nature of our intervention. Moreover, international student offices could be better utilized to aid the recruitment process in a future trial. With the above-mentioned strategy, we reached a population of mostly female (77%) participants, aiming for a post-graduate degree (82.5%), e.g. master's and Ph.D., which was higher than DAAD's 2019/20 report of international students studying for a postgraduate degree in Germany (52%) (DAAD, 2020).

A post-randomization assessment dropout rate of 35% was detected. Half of the IG and 20% of the WL failed to do the post-randomization assessment. This rate is in accordance with previous mindfulness IMI among students (Lahtinen et al., 2023). It is no surprise to have fewer dropouts in a waitlist control condition because the participants of this condition got access to the intervention only after completing the post-randomization assessment. In order to avoid dropouts, we sent out six reminder emails to participants who did not complete this assessment. However, the success of these measures was limited. Future trials might include reminder SMS or phone calls to decrease the dropout rate.

The intervention adherence rate among IG participants was 40%. This rate is in line with a recent meta-analysis of online mindfulness interventions conducted with students and non-student populations, in which adherence rates ranged from 35 to 92% (Sommers-Spijkerman et al., 2021). Although guided IMI correlated with higher rates of adherence (Treanor et al., 2021; Zarski et al., 2016), this was not the case in our trial. According to a review, some factors related to an increase in adherence to IMI are the female gender, being in the control group, having time flexibility to do the intervention, computer literacy, guidance, and depth of personalized feedback to increase self-efficacy (Beatty & Binnion, 2016). Although our sample embodied some of these factors, e.g. guidance, others could be improved. Program content seems to be a decisive factor in adherence. Credibility, positive perceptions of the intervention content, personalization of the intervention team (e.g. providing a photo of the team), and intensity (e.g. too long/short and/or being too generic) of the content play a role in adherence (Beatty & Binnion, 2016). The inclusion of some persuasive design aspects might aid adherence as well (Baumeister et al., 2019). As mentioned by the participants as well, computer-human dialogue support, e.g. audio and visual content, and social support, e.g. competition, categories can be improved in a future definitive trial.

One specific component of this trial was that we adapted our intervention to a culturally diverse group of international students. This diversity of the target group might require novel intervention features beyond surface structure changes (Resnicow et al., 2000) to increase adherence. Adapting an intervention for a group of participants from various cultural, social, and financial backgrounds is particularly challenging, and

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naturally, offering intervention content as common as possible to be able to appeal to the majority is demanding. Therefore, one should carefully inspect all the parameters and make sure that the cultural adaptation of the IMI adds a substantial benefit to its target group. In this context, evidence of cultural adaptations' substantial benefits is still inconclusive. Based on a recent meta-analysis, cultural adaptation of health promotion IMI might not be worth the considerable amount of effort because such adaptions do not seem to yield better effectiveness compared to active and passive controls (Balci et al., 2022). However, a previous review suggested that culturally adapted face-to-face and online interventions resulted in reducing depression and anxiety (Harper Shehadeh et al., 2016). Moreover, cultural adaptions are poorly reported in existing literature, which makes it difficult to compare across studies and draw definitive conclusions (Balci et al., 2022). The next step should include comparing an adapted IMI to a non-adapted intervention. Such dismantling trials could provide insights into whether cultural adaptation processes are actually beneficial. In a recent trial, a non-culturally adapted sleep IMI yielded beneficial effects for culturally diverse international student groups (Spanhel, Burdach, et al., 2021). This might bring out the idea that some intervention contents might not significantly benefit from an elaborate adaptation process, especially for low threshold interventions (Böttche et al., 2021; Cuijpers et al., 2018; Spanhel, Burdach, et al., 2021). This trend emerged in our results as well, where we only realized surface-level adaptations (Resnicow et al., 2000) and still found potential effectiveness. More importantly, IMI have different mechanisms of change, therefore a detailed cultural adaptation might be beneficial for a certain IMI content or delivery, but not for all (Domhardt et al., 2021; Heim & Kohrt, 2019). In a review, most of the culturally adapted interventions did not modify their core contents but included core additions and delivery methods to make the intervention more acceptable to the new target group while ensuring the fidelity of the original intervention (Chu & Leino, 2017). For mindfulness-based IMI, valued living, cognitive fusion, present moment awareness, and acceptance are effective mediators among college students (Levin, Haeger, Pierce, & Twohig, 2017; Viskovich & Pakenham, 2020). Some of these mediators are part of the universal human condition, therefore, might not even need any adaptation. Lastly, acculturation might play a role in attitudes toward seeking mental health (Lu et al., 2014). Therefore, acculturation levels of international students might be considered when adapting or developing interventions for this population.

Only six negative effects were reported and these were low to mild in extent. Moreover, the IMI caused no suicidal ideation. Negative effects of psychotherapy are expected and their reporting is increasing (Rozental et al., 2018). This result suggested that StudiCareM-E is a rather safe intervention, and might be also administered in an unguided form.

Furthermore, StudiCareM-E participants showed improvements in mindfulness, anxiety, and well-being levels. Stress and depression scores did not reach significance. While

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a trend suggests possible beneficial effects regarding these outcomes, a powered definitive trial would be necessary to confirm these effects since this trial was only powered for feasibility. The mean effect sizes are higher than in a meta-analysis of online mindfulness interventions compared to a waitlist and no-treatment controls (Spijkerman et al., 2016). However, trials with waitlist control groups tend to yield higher effect sizes (van Agteren et al., 2021), thus in order to validate the StudiCareM-E's efficacy, research should initially test this in a powered trial with more follow-up points, and compare it to treatment as usual, a placebo control group or active controls.

Like any other, this trial is not free from limitations. Firstly, our sample mostly consisted of female participants, therefore our results cannot be generalized to male or non-binary populations. However, this is a common trend in psychological interventions. Secondly, a major limitation of this trial was grouping international students from various backgrounds and living situations under the label of international students, consequently masking potential differences among them. Thirdly, our sample consisted of participants with diverse cultural backgrounds. According to a meta-analysis of 99 studies, it was found that studies with more homogenous participants in terms of cultural background yielded larger effect sizes (Soto et al., 2018). Even though culturally adapted, this intervention was in English. People prefer to have a unity of language with their mental health care provider (Villalobos et al., 2016), and providing interventions in the chosen language of the client is a significant predictor of better outcomes (Soto et al., 2018). Despite this fact, participants assessed the language of the intervention as being easy to understand. However, still providing the intervention content in the participant's chosen language might increase the efficacy of the intervention further. Therefore, a future definitive trial might consider offering the same intervention in different languages to choose from and might adapt the intervention based on parsimonious social and cultural features. Fourth, this feasibility trial used a WL control group. As expected, trials of culturally adapted face-to-face mental health interventions with a WL group resulted in higher effect sizes, compared to an active control condition (d = 0.53 vs d = 0.47) (Soto et al., 2018). This is also true for IMI (Sommers-Spijkerman et al., 2021). Fifth, due to high dropout and low adherence, we were able to collect less qualitative and quantitative data to inform acceptability and potential efficacy. Assessment dropout was 35% in total, which is in accordance with the previous research (Nilsson et al., 2004). Possible reasons for this may include a lack of monetary incentives, procrastination, and the typical workload of student life. In order to tackle potential bias arising from differential dropout, we multiply imputed our data with the assumption of missing at random (Bell et al., 2013), and added baseline values as covariates in all regression models. However, there was a baseline difference between assessment dropout and non-dropouts where, participants who completed the post-randomization assessment had a slightly higher stress level in the beginning of the study, therefore might be more motivated, needed a medium to deal with the stress, and had more place to grow. Lastly, this feasibility trial reached a limited

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sample size; therefore, the initial efficacy results should be interpreted with caution. An inspection of sustainability of intervention effect beyond post-treatment is warranted.

Conclusion

Online interventions to decrease stress and improve the well-being of international university students seem to have great potential, whereas face-to-face offers are not often utilized and benefited in limitation. Despite being presented to vastly culturally diverse student groups, StudiCareM-E yielded beneficial results with good acceptability and non-crucial negative effects. A future definitive RCT might offer a more robust efficacy and potential moderator and mediator effects.

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Competing Interests: The authors have declared that no competing interests exist.

Ethics Statement: The study was approved by the ethics committee of Ulm University (Number 413/18).

Reporting Guidelines: This article follows the guidelines of CONSORT statement.

Twitter Accounts: @Psksumeyyeb

Data Availability: The dataset may be obtained (from S.B.) on request depending on to-be-specified data security and data exchange regulation agreements. To ensure confidentiality, shared data will exclude any identifying participant information.

Supplementary Materials

The Supplementary Materials contain the pre-registration information for the study (for access see Index of Supplementary Materials below).

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Index of Supplementary Materials

Balci, S., Küchler, A., Ebert, D. D., & Baumeister, H. (2019). *English version of the StudiCare mindfulness: A randomized controlled pilot study* [Pre-registration protocol; DRKS-ID: DRKS00017507]. German Clinical Trials Register. https://drks.de/search/en/trial/DRKS00017507

References

Akhtar, M., & Kröner-Herwig, B. (2015). Acculturative stress among international students in context of socio-demographic variables and coping styles. *Current Psychology, 34*(4), 803–815. https://doi.org/10.1007/s12144-015-9303-4

Athira, K. V., Bandopadhyay, S., Samudrala, P. K., Naidu, V. G. M., Lahkar, M., & Chakravarty, S. (2020). An overview of the heterogeneity of major depressive disorder: Current knowledge and future prospective. *Current Neuropharmacology, 18*(3), 168–187. https://doi.org/10.2174/1570159X17666191001142934

Auerbach, R. P., Alonso, J., Axinn, W. G., Cuijpers, P., Ebert, D. D., Green, J. G., Hwang, I., Kessler, R. C., Liu, H., Mortier, P., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L. H., Benjet, C., Caldas-de-Almeida, J. M., Demyttenaere, K., ... Bruffaerts, R. (2016). Mental disorders among college students in the WHO World Mental Health Surveys. *Psychological Medicine, 46*(14), 2955–2970. https://doi.org/10.1017/S0033291716001665

Auerbach, R. P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D. D., Green, J. G., Hasking, P., Murray, E., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Stein, D. J., Vilagut, G., Zaslavsky, A. M., & Kessler, R. C. (2018). WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. *Journal of Abnormal Psychology, 127*(7), 623–638. https://doi.org/10.1037/abn0000362

Balci, S., Spanhel, K., Sander, L. B., & Baumeister, H. (2022). Culturally adapting internet- and mobile-based health promotion interventions might not be worth the effort: A systematic review and meta-analysis. *npj Digital Medicine, 5*(1), Article 34. https://doi.org/10.1038/s41746-022-00569-x

Bantjes, J., Saal, W., Gericke, F., Lochner, C., Roos, J., Auerbach, R. P., Mortier, P., Bruffaerts, R., Kessler, R. C., & Stein, D. (2021). Mental health and academic failure among first-year university students in South Africa. *South African Journal of Psychology, 51*(3), 396–408. https://doi.org/10.1177/0081246320963204

Batterham, P. J., Calear, A. L., Sunderland, M., Kay-Lambkin, F., Farrer, L. M., Christensen, H., & Gulliver, A. (2021). A brief intervention to increase uptake and adherence of an internet-based program for depression and anxiety (Enhancing Engagement with Psychosocial Interventions): Randomized controlled trial. *Journal of Medical Internet Research, 23*(7), Article e23029. https://doi.org/10.2196/23029

Baumeister, H., Kraft, R., Baumel, A., Pryss, R., & Messner, E.-M. (2019). Persuasive e-health design for behavior change. In H. Baumeister & C. Montag (Eds.), *Digital phenotyping and mobile*

PsychOpen GOLD

sensing: New developments in psychoinformatics (pp. 261–276). Springer International. https://doi.org/10.1007/978-3-030-31620-4_17

Beatty, L., & Binnion, C. (2016). A systematic review of predictors of, and reasons for, adherence to online psychological interventions. *International Journal of Behavioral Medicine, 23*(6), 776–794. https://doi.org/10.1007/s12529-016-9556-9

Bell, M. L., Kenward, M. G., Fairclough, D. L., & Horton, N. J. (2013). Differential dropout and bias in randomised controlled trials: When it matters and when it may not. *BMJ (Clinical Research Ed.), 346*(January), Article e8668. https://doi.org/10.1136/bmj.e8668

Boß, L., Lehr, D., Reis, D., Vis, C., Riper, H., Berking, M., & Ebert, D. D. (2016). Reliability and validity of assessing user satisfaction with web-based health interventions. *Journal of Medical Internet Research, 18*(8), Article e234. https://doi.org/10.2196/jmir.5952

Böttche, M., Kampisiou, C., Stammel, N., El-Haj-Mohamad, R., Heeke, C., Burchert, S., Heim, E., Wagner, B., Renneberg, B., Boettcher, J., Glaesmer, H., Gouzoulis-Mayfrank, E., Zieselak, J., Konnopka, A., Murray, L., & Knaevelsrud, C. (2021). From formative research to cultural adaptation of a face-to-face and internet-based cognitive-behavioural intervention for Arabic-speaking refugees in Germany. *Clinical Psychology in Europe, 3*(Special Issue), Article e4623. https://doi.org/10.32872/cpe.4623

Bruffaerts, R., Mortier, P., Kiekens, G., Auerbach, R. P., Cuijpers, P., Demyttenaere, K., Green, J. G., Nock, M. K., & Kessler, R. C. (2018). Mental health problems in college freshmen: Prevalence and academic functioning. *Journal of Affective Disorders, 225*(1), 97–103. https://doi.org/10.1016/j.jad.2017.07.044

Byrne, E., Brugha, R., & McGarvey, A. (2019). "A melting pot of cultures" – Challenges in social adaptation and interactions amongst international medical students. *BMC Medical Education, 19*(1), Article 86. https://doi.org/10.1186/s12909-019-1514-1

Carlbring, P., Andersson, G., Cuijpers, P., Riper, H., & Hedman-Lagerlöf, E. (2018). Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: An updated systematic review and meta-analysis. *Cognitive Behaviour Therapy, 47*(1), 1–18. https://doi.org/10.1080/16506073.2017.1401115

Castellanos, R., Yildiz Spinel, M., Phan, V., Orengo-Aguayo, R., Humphreys, K. L., & Flory, K. (2020). A systematic review and meta-analysis of cultural adaptations of mindfulness-based interventions for Hispanic populations. *Mindfulness, 11*(2), 317–332. https://doi.org/10.1007/s12671-019-01210-x

Chu, J., & Leino, A. (2017). Advancement in the maturing science of cultural adaptations of evidence-based interventions. *Journal of Consulting and Clinical Psychology, 85*(1), 45–57. https://doi.org/10.1037/ccp0000145

Clement, S., Schauman, O., Graham, T., Maggioni, F., Evans-Lacko, S., Bezborodovs, N., Morgan, C., Rüsch, N., Brown, J. S. L., & Thornicroft, G. (2015). What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychological Medicine, 45*(1), 11–27. https://doi.org/10.1017/S0033291714000129

PsychOpen GOLD

Clough, B. A., Nazareth, S. M., & Casey, L. M. (2020). Making the grade: A pilot investigation of an e-intervention to increase mental health literacy and help-seeking intentions among international university students. *British Journal of Guidance and Counselling, 48*(3), 347–359. https://doi.org/10.1080/03069885.2019.1673312

Clough, B. A., Nazareth, S. M., Day, J. J., & Casey, L. M. (2019). A comparison of mental health literacy, attitudes, and help-seeking intentions among domestic and international tertiary students. *British Journal of Guidance and Counselling, 47*(1), 123–135. https://doi.org/10.1080/03069885.2018.1459473

Cotter, E. W., & Jones, N. (2020). A review of Latino/Latinx participants in mindfulness-based intervention research. *Mindfulness, 11*(3), 529–553. https://doi.org/10.1007/s12671-019-01266-9

Cuijpers, P., Karyotaki, E., Reijnders, M., Purgato, M., & Barbui, C. (2018). Psychotherapies for depression in low- and middle-income countries: A meta-analysis. *World Psychiatry, 17*(1), 90–101. https://doi.org/10.1002/wps.20493

DAAD. (2020). *Studierende nach Abschlussarten.* https://www.daad.de/de/der-daad/was-wir-tun/zahlen-und-fakten/mobilitaet-auslaendischer-studierender/

Domhardt, M., Steubl, L., Boettcher, J., Buntrock, C., Karyotaki, E., Ebert, D. D., Cuijpers, P., & Baumeister, H. (2021). Mediators and mechanisms of change in internet- and mobile-based interventions for depression: A systematic review. *Clinical Psychology Review, 83*(August 2020), Article 101953. https://doi.org/10.1016/j.cpr.2020.101953

Ebert, D. D., Van Daele, T., Nordgreen, T., Karekla, M., Compare, A., Zarbo, C., Brugnera, A., Øverland, S., Trebbi, G., Jensen, K. L., Kaehlke, F., & Baumeister, H. (2018). Internet- and mobile-based psychological interventions: Applications, efficacy, and potential for improving mental health. *European Psychologist, 23*(2), 167–187. https://doi.org/10.1027/1016-9040/a000318

Eldridge, S. M., Chan, C. L., Campbell, M. J. M., Bond, C. M., Hopewell, S., Thabane, L., Lancaster, G. A., O'Cathain, A., Altman, D., Bretz, F., Campbell, M. J. M., Cobo, E., Craig, P., Davidson, P., Groves, T., Gumedze, F., Hewison, J., Hirst, A., Hoddinott, P., … Tugwell, P. (2016). CONSORT 2010 statement: Extension to randomised pilot and feasibility trials. *Pilot and Feasibility Studies, 2*(1), Article 64. https://doi.org/10.1186/s40814-016-0105-8

Eurostat. (2018). *Learning mobility statistics.* https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Learning_mobility_statistics

Forbes-Mewett, H., & Sawyer, A.-M. (2016). International students and mental health. *Journal of International Students, 6*(3), 661–677. https://doi.org/10.32674/jis.v6i3.348

Galante, J., Dufour, G., Vainre, M., Wagner, A. P., Stochl, J., Benton, A., Lathia, N., Howarth, E., & Jones, P. B. (2018). A mindfulness-based intervention to increase resilience to stress in university students (the Mindful Student Study): A pragmatic randomised controlled trial. *The Lancet Public Health, 3*(2), e72–e81. https://doi.org/10.1016/S2468-2667(17)30231-1

Gore, F. M., Bloem, P. J. N., Patton, G. C., Ferguson, J., Joseph, V., Coffey, C., Sawyer, S. M., & Mathers, C. D. (2011). Global burden of disease in young people aged 10-24 years: A systematic analysis. *The Lancet, 377*(9783), 2093–2102. https://doi.org/10.1016/S0140-6736(11)60512-6

PsychOpen GOLD

Gulliver, A., Griffiths, K. M., & Christensen, H. (2010). Perceived barriers and facilitators to mental health help-seeking in young people: A systematic review. *BMC Psychiatry, 10*(1), Article 113. https://doi.org/10.1186/1471-244X-10-113

Hall, B. J., Xiong, P., Guo, X., Sou, E. K. L., Chou, U. I., & Shen, Z. (2018). An evaluation of a low intensity mHealth enhanced mindfulness intervention for Chinese university students: A randomized controlled trial. *Psychiatry Research, 270*, 394–403. https://doi.org/10.1016/j.psychres.2018.09.060

Harper Shehadeh, M., Maercker, A., Heim, E., Chowdhary, N., & Albanese, E. (2016). Cultural adaptation of minimally guided interventions for common mental disorders: A systematic review and meta-analysis. *JMIR Mental Health, 3*(3), Article e44. https://doi.org/10.2196/mental.5776

Harrer, M., Adam, S. H., Baumeister, H., Cuijpers, P., Karyotaki, E., Auerbach, R. P., Kessler, R. C., Bruffaerts, R., Berking, M., & Ebert, D. D. (2019). Internet interventions for mental health in university students: A systematic review and meta-analysis. *International Journal of Methods in Psychiatric Research, 28*(2), Article e1759. https://doi.org/10.1002/mpr.1759

Harrer, M., Adam, S. H., Fleischmann, R. J., Baumeister, H., Auerbach, R., Bruffaerts, R., Cuijpers, P., Kessler, R. C., Berking, M., Lehr, D., & Ebert, D. D. (2018). Effectiveness of an internet- and app-based intervention for college students with elevated stress: Randomized controlled trial. *Journal of Medical Internet Research, 20*(4), Article e136. https://doi.org/10.2196/jmir.9293

Hayes, S. C., Strosahl, K. D., & Willson, K. G. (1999). *Acceptance and committment therapy: An experiential approach to behavior change*. Guilford.

Heim, E., & Kohrt, B. A. (2019). Cultural adaptation of scalable psychological interventions: A new conceptual framework. *Clinical Psychology in Europe, 1*(4), Article e37679. https://doi.org/10.32872/cpe.v1i4.37679

Hudak, N. C., Carmack, H. J., & Smith, E. D. (2018). Student perceptions of providers' cultural competence, attitudes towards providers, and patient satisfaction at a university health center: International and U.S. student differences. *Journal of International Students, 8*(2), 960–976. https://doi.org/10.32674/jis.v8i2.122

Jayawardene, W. P., Lohrmann, D. K., Erbe, R. G., & Torabi, M. R. (2017). Effects of preventive online mindfulness interventions on stress and mindfulness: A meta-analysis of randomized controlled trials. *Preventive Medicine Reports, 5*, 150–159. https://doi.org/10.1016/j.pmedr.2016.11.013

Jones, P. B. (2013). Adult mental health disorders and their age at onset. *British Journal of Psychiatry, 202*(S54), S5–S10. https://doi.org/10.1192/bjp.bp.112.119164

Kaluza, G. (2015). *Stressbewältigung*. Springer Berlin Heidelberg.

Kanekar, A., Sharma, M., & Atri, A. (2010). Enhancing social support, hardiness, and acculturation to improve mental health among Asian Indian international students. *International Quarterly of Community Health Education, 30*(1), 55–68. https://doi.org/10.2190/IQ.30.1.e

Karyotaki, E., Cuijpers, P., Albor, Y., Alonso, J., Auerbach, R. P., Bantjes, J., Bruffaerts, R., Ebert, D. D., Hasking, P., Kiekens, G., Lee, S., McLafferty, M., Mak, A., Mortier, P., Sampson, N. A., Stein,

PsychOpen GOLD

D. J., Vilagut, G., & Kessler, R. C. (2020). Sources of stress and their associations with mental disorders among college students: Results of the World Health Organization World Mental Health Surveys International College Student Initiative. *Frontiers in Psychology, 11*(July), Article 1759. https://doi.org/10.3389/fpsyg.2020.01759

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Küchler, A. M., Albus, P., Ebert, D. D., & Baumeister, H. (2019). Effectiveness of an internet-based intervention for procrastination in college students (StudiCare Procrastination): Study protocol of a randomized controlled trial. *Internet Interventions, 17*(March), Article 100245. https://doi.org/10.1016/j.invent.2019.100245

Küchler, A. M., Kählke, F., Vollbrecht, D., Peip, K., Ebert, D. D., & Baumeister, H. (2022). Effectiveness, acceptability, and mechanisms of change of the internet-based intervention StudiCare Mindfulness for college students: A randomized controlled trial. *Mindfulness, 13*(9), 2140–2154. https://doi.org/10.1007/s12671-022-01949-w

Küchler, A. M., Schultchen, D., Pollatos, O., Moshagen, M., Ebert, D. D., & Baumeister, H. (2020). StudiCare Mindfulness—Study protocol of a randomized controlled trial evaluating an internet- and mobile-based intervention for college students with no and "on demand" guidance. *Trials, 21*(1), Article 975. https://doi.org/10.1186/s13063-020-04868-0

Ladwig, I., Rief, W., & Nestoriuc, Y. (2014). What are the risks and side effects of psychotherapy? – Development of an inventory for the assessment of negative effects of psychotherapy (INEP). *Verhaltenstherapie, 24*(4), 252–263. https://doi.org/10.1159/000367928

Lahtinen, O., Aaltonen, J., Kaakinen, J., Franklin, L., & Hyönä, J. (2023). The effects of app-based mindfulness practice on the well-being of university students and staff. *Current Psychology, 42*(6), 4412–4421. https://doi.org/10.1007/s12144-021-01762-z

Lara-Cabrera, M. L., Betancort, M., Muñoz-Rubilar, A., Rodríguez-Novo, N., Bjerkeset, O., & Las Cuevas, C. D. (2022). Psychometric properties of the WHO-5 Well-Being Index among nurses during the COVID-19 pandemic: A cross-sectional study in three countries. *International Journal of Environmental Research and Public Health, 19*(16), Article 10106. https://doi.org/10.3390/ijerph191610106

Lawlor, J. M. (2022). *Online sexual mindfulness intervention for Black and interracial couples: A pilot study* [Master's thesis, Brigham Young University]. ScholarsArchive. http://hdl.lib.byu.edu/1877/etd12436

Le, T. N., & Gobert, J. M. (2015). Translating and implementing a mindfulness-based youth suicide prevention intervention in a native American community. *Journal of Child and Family Studies, 24*(1), 12–23. https://doi.org/10.1007/s10826-013-9809-z

Lentferink, A. J., Oldenhuis, H. K. E., De Groot, M., Polstra, L., Velthuijsen, H., & Van Gemert-Pijnen, J. E. W. C. (2017). Key components in ehealth interventions combining self-tracking and persuasive eCoaching to promote a healthier lifestyle: A scoping review. *Journal of Medical Internet Research, 19*(8), Article e277. https://doi.org/10.2196/jmir.7288

PsychOpen GOLD

Levin, M. E., Haeger, J. A., Pierce, B. G., & Twohig, M. P. (2017). Web-based acceptance and commitment therapy for mental health problems in college students: A randomized controlled trial. *Behavior Modification, 41*(1), 141–162. https://doi.org/10.1177/0145445516659645

Loucks, E. B., Crane, R. S., Sanghvi, M. A., Montero-Marin, J., Proulx, J., Brewer, J. A., & Kuyken, W. (2022). Mindfulness-based programs: Why, when, and how to adapt? *Global Advances in Health and Medicine, 11*, 1–12. https://doi.org/10.1177/21649561211068805

Lu, S. H., Dear, B. F., Johnston, L., Wootton, B. M., & Titov, N. (2014). An internet survey of emotional health, treatment seeking and barriers to accessing mental health treatment among Chinese-speaking international students in Australia. *Counselling Psychology Quarterly, 27*(1), 96–108. https://doi.org/10.1080/09515070.2013.824408

Lynch, L., Long, M., & Moorhead, A. (2018). Young men, help-seeking, and mental health services: Exploring barriers and solutions. *American Journal of Men's Health, 12*(1), 138–149. https://doi.org/10.1177/1557988315619469

Mak, W. W. S., Chan, A. T. Y., Cheung, E. Y. L., Lin, C. L. Y., & Ngai, K. C. S. (2015). Enhancing web-based mindfulness training for mental health promotion with the health action process approach: Randomized controlled trial. *Journal of Medical Internet Research, 17*(1), Article e8. https://doi.org/10.2196/jmir.3746

Matsushita, M., Adachi, H., Arakida, M., Namura, I., Takahashi, Y., Miyata, M., Kumano-go, T., Yamamura, S., Shigedo, Y., Suganuma, N., Mikami, A., Moriyama, T., & Sugita, Y. (2011). Presenteeism in college students: Reliability and validity of the presenteeism scale for students. *Quality of Life Research, 20*(3), 439–446. https://doi.org/10.1007/s11136-010-9763-9

Molloy, A., Ellis, D. M., Su, L., & Anderson, P. L. (2021). Improving acceptability and uptake behavior for internet-based cognitive-behavioral therapy. *Frontiers in Digital Health, 3*(March), Article 653686. https://doi.org/10.3389/fdgth.2021.653686

Nguyen-Feng, V. N., Greer, C. S., & Frazier, P. (2017). Using online interventions to deliver college student mental health resources: Evidence from randomized clinical trials. *Psychological Services, 14*(4), 481–489. https://doi.org/10.1037/ser0000154

Nilsson, J. E., Berkel, L. A., Flores, L. Y., & Lucas, M. S. (2004). Utilization rate and presenting concerns of international students at a university counseling center: Implications for outreach programming. *Journal of College Student Psychotherapy, 19*(2), 49–59. https://doi.org/10.1300/J035v19n02_05

Orygen. (2020, June). *International students and their mental and physical safety* (Report). https://internationaleducation.gov.au/International-network/Australia/InternationalStrategy/EGIProjects/Documents/ORYGEN - International Student Mental Health and Physical Safety June 2020.pdf

Querstret, D., Cropley, M., & Fife-Schaw, C. (2018). The effects of an online mindfulness intervention on perceived stress, depression and anxiety in a non-clinical sample: A randomised waitlist control trial. *Mindfulness, 9*(6), 1825–1836. https://doi.org/10.1007/s12671-018-0925-0

PsychOpen GOLD

Rentería, R., Benjet, C., Gutiérrez-García, R. A., Abrego-Ramírez, A., Albor, Y., Borges, G., Covarrubias Díaz-Couder, M. A., Durán, M. del S., González-González, R., Guzmán Saldaña, R., Hermosillo De la Torre, A. E., Martínez-Jerez, A. M., Martinez Martinez, K. I., Medina-Mora, M. E., Martínez Ruiz, S., Paz Pérez, M. A., Pérez Tarango, G., Zavala Berbena, M. A., Méndez, E., … Mortier, P. (2021). Prevalence of 12-month mental and substance use disorders in sexual minority college students in Mexico. *Social Psychiatry and Psychiatric Epidemiology, 56*(2), 247–257. https://doi.org/10.1007/s00127-020-01943-4

Resnicow, K., Soler, R., Braithwaite, R. L., Ahluwalia, J. S., & Butler, J. (2000). Cultural sensitivity in substance use prevention. *Journal of Community Psychology, 28*(3), 271–290. https://doi.org/10.1002/(SICI)1520-6629(200005)28:3<271::AID-JCOP4>3.0.CO;2-I

Rozental, A., Castonguay, L., Dimidjian, S., Lambert, M., Shafran, R., Andersson, G., & Carlbring, P. (2018). Negative effects in psychotherapy: Commentary and recommendations for future research and clinical practice. *BJPsych Open, 4*(4), 307–312. https://doi.org/10.1192/bjo.2018.42

Schultchen, D., Küchler, A. M., Schillings, C., Weineck, F., Karabatsiakis, A., Ebert, D. D., Baumeister, H., & Pollatos, O. (2020). Effectiveness of a guided online mindfulness-focused intervention in a student population: Study protocol for a randomised control trial. *BMJ Open, 10*(3), Article e032775. https://doi.org/10.1136/bmjopen-2019-032775

Sevilla-Llewellyn-Jones, J., Santesteban-Echarri, O., Pryor, I., McGorry, P., & Alvarez-Jimenez, M. (2018). Web-based mindfulness interventions for mental health treatment: Systematic review and meta-analysis. *Journal of Medical Internet Research, 5*(3), Article e10278. https://doi.org/10.2196/10278

Slom, J., & Kabat-Zinn, J. (2020). *An artful path to mindfulness: MBSR-based activities for using creativity to reduce stress and embrace the present moment*. New Harbinger.

Sommers-Spijkerman, M., Austin, J., Bohlmeijer, E., & Pots, W. (2021). New evidence in the booming field of online mindfulness: An updated meta-analysis of randomized controlled trials. *JMIR Mental Health, 8*(7), Article e28168. https://doi.org/10.2196/28168

Soto, A., Smith, T. B., Griner, D., Domenech Rodríguez, M., & Bernal, G. (2018). Cultural adaptations and therapist multicultural competence: Two meta-analytic reviews. *Journal of Clinical Psychology, 74*(11), 1907–1923. https://doi.org/10.1002/jclp.22679

Spanhel, K., Balci, S., Feldhahn, F., Bengel, J., Baumeister, H., & Sander, L. (2021). Cultural adaptation of internet- and mobile-based interventions for mental disorders: A systematic review. *npj Digital Medicine, 4*, Article 128. https://doi.org/10.1038/s41746-021-00498-1

Spanhel, K., Burdach, D., Pfeiffer, T., Lehr, D., Spiegelhalder, K., Ebert, D. D., Baumeister, H., Bengel, J., & Sander, L. B. (2021). Effectiveness of an internet-based intervention to improve sleep difficulties in a culturally diverse sample of international students: A randomised controlled pilot study. *Journal of Sleep Research, 31*(2), Article e13493. https://doi.org/10.1111/jsr.13493

Spijkerman, M. P. J., Pots, W. T. M., & Bohlmeijer, E. T. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review, 45*, 102–114. https://doi.org/10.1016/j.cpr.2016.03.009

PsychOpen GOLD

Spitzer R. L., Kroenke K., Williams J. W., & Löwe B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Statistisches Bundesamt. (2021). *Studierende an Hochschulen – Wintersemester 2021/22* (Fachserie 11 Reihe 4.1). https://de.statista.com/statistik/daten/studie/301225/umfrage/auslaendische-studierende-in-deutschland-nach-herkunftslaendern/

Stokes, H., Griner, D., Smith, T. B., Beecher, M. E., Allen, G. E. K., Cox, J., Hobbs, K., & Kirtley, N. (2021). Psychotherapy utilization and presenting concerns among international Asian and Asian American students in a university counseling center. *Journal of College Student Psychotherapy, 35*(2), 118–135. https://doi.org/10.1080/87568225.2019.1650681

Teegen, B. C., & Conrad-Popova, D. (2021). International graduate students and cultural competency in counselling services: Directions for health practitioners. *British Journal of Guidance and Counselling*. Advance online publication. https://doi.org/10.1080/03069885.2021.1961211

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 well-being index: A systematic review of the literature. *Psychotherapy and Psychosomatics, 84*(3), 167–176. https://doi.org/10.1159/000376585

Treanor, C. J., Kouvonen, A., Lallukka, T., & Donnelly, M. (2021). Acceptability of computerized cognitive behavioral therapy for adults: Umbrella review. *JMIR Mental Health, 8*(7), Article e23091. https://doi.org/10.2196/23091

van Agteren, J., Iasiello, M., Lo, L., Bartholomaeus, J., Kopsaftis, Z., Carey, M., & Kyrios, M. (2021). A systematic review and meta-analysis of psychological interventions to improve mental wellbeing. *Nature Human Behaviour, 5*(5), 631–652. https://doi.org/10.1038/s41562-021-01093-w

Villalobos, B. T., Bridges, A. J., Anastasia, E. A., Ojeda, C. A., Rodriguez, J. H., & Gomez, D. (2016). Effects of language concordance and interpreter use on therapeutic alliance in Spanish-speaking integrated behavioral health care patients. *Psychological Services, 13*(1), 49–59. https://doi.org/10.1037/ser0000051

Viskovich, S., & Pakenham, K. I. (2020). Randomized controlled trial of a web-based Acceptance and Commitment Therapy (ACT) program to promote mental health in university students. *Journal of Clinical Psychology, 76*(6), 929–951. https://doi.org/10.1002/jclp.22848

Walach, H., Buchheld, N., Buttenmüller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness – The Freiburg Mindfulness Inventory (FMI). *Personality and Individual Differences, 40*(8), 1543–1555. https://doi.org/10.1016/j.paid.2005.11.025

Warttig, S. L., Forshaw, M. J., South, J., & White, A. K. (2013). New, normative, English-sample data for the Short Form Perceived Stress Scale (PSS-4). *Journal of Health Psychology, 18*(12), 1617–1628. https://doi.org/10.1177/1359105313508346

Watson-Singleton, N. N., Black, A. R., & Spivey, B. N. (2019). Recommendations for a culturally-responsive mindfulness-based intervention for African Americans. *Complementary Therapies in Clinical Practice, 34*(404), 132–138. https://doi.org/10.1016/j.ctcp.2018.11.013

PsychOpen GOLD

Webb, T. L., Joseph, J., Yardley, L., & Michie, S. (2010). Using the Internet to promote health behavior change: A systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of Medical Internet Research, 12*(1), Article e4. https://doi.org/10.2196/jmir.1376

Whitehead, A. L., Julious, S. A., Cooper, C. L., & Campbell, M. J. (2016). Estimating the sample size for a pilot randomised trial to minimise the overall trial sample size for the external pilot and main trial for a continuous outcome variable. *Statistical Methods in Medical Research, 25*(3), 1057–1073. https://doi.org/10.1177/0962280215588241

Yu, B., & Wright, E. (2016). Socio-cultural adaptation, academic adaptation and satisfaction of international higher degree research students in Australia. *Tertiary Education and Management, 22*(1), 49–64. https://doi.org/10.1080/13583883.2015.1127405

Zarski, A. C., Lehr, D., Berking, M., Riper, H., Cuijpers, P., & Ebert, D. D. (2016). Adherence to internet-based mobile-supported stress management: A pooled analysis of individual participant data from three randomized controlled trials. *Journal of Medical Internet Research, 18*(6), Article e146. https://doi.org/10.2196/jmir.4493

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Overall Anxiety Severity and Impairment Scale (OASIS) and Overall Depression Severity and Impairment Scale (ODSIS): Adaptation and Validation in Buenos Aires, Argentina

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Supplementary Materials: Materials [see Index of Supplementary Materials]

Abstract

Background: The OASIS and ODSIS scales are two transdiagnostic brief 5-item instruments designed to assess the severity and functional impairment associated with symptoms of anxiety and depression, respectively. The present study aimed to adapt and validate the online versions of both scales in Buenos Aires, Argentina.

Method: A sample of 344 women and men from the general population of Buenos Aires completed a test battery consisting of the OASIS, the ODSIS, the Beck Depression Inventory (BDI), the Beck Anxiety Inventory (BAI), the Positive and Negative Affect Scale (PANAS) and the Multicultural Quality of Life Index (MQLI). Descriptive statistics and item discrimination of both scales were analyzed, as well as their factorial structure, internal consistency, and convergent and discriminant validity, using the R programming language.

Results: The results showed a unidimensional factorial structure, excellent internal consistency, and adequate construct validity for both the OASIS and the ODSIS.

Conclusion: These results supports the use of both scales as valid and reliable instruments to assess severity and interference due to anxiety and depression in the general population of Buenos Aires, Argentina.

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Keywords

anxiety, depression, adaptation, validation, psychometrics

Highlights

- Both scales are valid and reliable instruments for the assessment and detection of anxiety and depressive symptoms.
- Their availability is important for the reliable application of the Unified Protocol in our country.
- They can be used in our context in an online format without compromising their psychometric properties.

Emotional disorders (Barlow, 1991) are the most frequent psychological problems in the Argentinian population. The lifetime prevalence of anxiety disorders reaches 16.4% and for major depressive disorder it reaches 8.7%, while their annual prevalence reaches 9.4% and 3.8%, respectively (Stagnaro et al., 2018). Additionally, both groups of disorders are costly (Parés-Badell et al., 2014; Ruiz-Rodríguez et al., 2017), interfering (Kazdin & Blase, 2011; Olatunji et al., 2007) and highly comorbid problems (Brown et al., 2001; Brown & Barlow, 2009).

There are multiple tools to assess general anxiety and depression, such as the Beck Anxiety Inventory (BAI; Beck et al., 1988; Argentinian adaptation by Vizioli & Pagano, 2020) or the Beck Depression Inventory (BDI; Beck et al., 1996; Argentinian adaptation by Brenlla & Rodríguez, 2006). Similarly, there are also numerous instruments to assess symptoms associated with specific anxiety disorders, such as the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990; Argentinian adaptation by Rodríguez Biglieri & Vetere, 2011) for generalized anxiety disorder, and the Panic Disorder Severity Scale (PDSS; Shear et al., 1997) for panic disorder, not yet adapted to our setting.

However, all of these instruments are limited to assessing the frequency and intensity of specific symptoms and do not offer a global measure of the severity and interference associated with these symptoms, either in established disorders or at subclinical levels (González Robles et al., 2018; Norman et al., 2006). Scales of this type do not adequately reflect the impact of symptoms on functioning (Bentley et al., 2014) and are of little use in assessing the overall impact of treatment (Ito, Oe, et al., 2015).

Similarly, while scales designed to assess specific symptoms of specific diagnoses are ideal for detailed assessments, they are less useful in clinical settings when assessing comorbid cases (Campbell-Sills et al., 2009). Additionally, the use of different scales can be time-consuming and impractical in settings such as primary care (Campbell-Sills et al., 2009; Osma et al., 2019).

In view of these problems, two scales have been developed to capture the severity and interference of anxious and depressive symptomatology in a brief and transdiagnostic manner–that is, regardless of the diagnostic category of these symptoms: the Overall

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Anxiety Severity and Impairment Scale (OASIS; Norman et al., 2006) and the Overall Depression Severity and Impairment Scale (ODSIS; Bentley et al., 2014).

The OASIS is a brief scale designed to assess the severity and interference associated with anxiety. It can be used with individuals with one or more anxiety disorders or with anxiety symptoms below the diagnostic threshold. It consists of 5 items referring to the past week and it's scored on a Likert-type scale ranging from 0 to 4. Higher scores indicate greater anxiety-related severity and impairment. Severity is captured by items that ask for the frequency and intensity of anxiety symptoms (e.g., "2. In the last week, when you have felt anxious, how intense or severe was your anxiety?"), while interference is measured by items that assess the impact of these symptoms on work/school and social life. It also includes an item that evaluates avoidance as a specific symptom of anxiety. In its original version, it yielded a mean of 7.16 (*SD* = 3.05), excellent internal consistency (α = .80), a unifactorial structure and excellent convergent validity in a non-clinical sample (Norman et al., 2006).

The scale was developed to capture common domains of all anxiety disorders in a fast and simple way in demanding clinical settings such as primary care (González-Robles et al., 2018), and to monitor changes in symptoms over the course of treatment (Campbell-Sills et al., 2009). It was validated in both clinical and non-clinical samples and in paper-and-pencil and online formats, showing excellent internal consistency and good convergent and discriminative validity (Bragdon et al., 2016; Campbell-Sills et al., 2009; Farrahi et al., 2020; González-Robles et al., 2018; Hermans et al., 2015; Ito, Oe, et al., 2015; Moore et al., 2015; Norman et al., 2006; Norman et al., 2011; Osma et al., 2019; Osma et al., 2021; Sandora et al., 2021). Different cut-off scores have been proposed to discriminate between people with clinical and subclinical anxiety in their different validations (see Table 1).

The ODSIS was developed based on the OASIS in order to capture the severity and interference associated with depressive symptoms. It maintains the same structure of 5 items, which refer to the last week and are scored on a Likert-type scale ranging from 0 to 4, with higher scores indicating greater severity and functional interference associated with depression (Bentley et al., 2014). Like the OASIS, its items assess the frequency and intensity of depressive symptoms and their interference with work/school and social life (e.g., "5. In the past week, how much has depression interfered with your social life and relationships?"). The most notable difference is that the OASIS item assessing avoidance was replaced by one assessing interference due to loss of interest and difficulty experiencing pleasure as a symptom of depression. In its original version, it yielded a mean of 5.50 (*SD* = 5.04), excellent internal consistency (α = .94), a unifactorial structure, and adequate convergent and discriminant validity in the clinical subsample (Bentley et al., 2014).

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Table 1

Validations of the OASIS

Authors	Country	Sample	Format	*M* (*SD*)	Cutoff points
Bragdon et al. (2016)	USA	Clinical sample (*N* = 202)	Paper-and-pencil	AD: 9.63 (*SD* = 4.69) WAD: 4.96 (*SD* = 4.26)	–
Campbell-Sills et al. (2009)	USA	Clinical sample (*N* = 1036)	Paper-and-pencil	10.77 (*SD* = 4.02)	8
Farrahi et al. (2020)	Iran	Students sample (*N* = 464)	Paper-and-pencil	4.83 (*SD* = 3.68)	–
González-Robles et al. (2018)	Spain	Clinical sample (*N* = 583)	Online	8.69 (*SD* = 4.21)	7.5
Hermans et al. (2015)	Netherlands	Clinical sample (*N* = 257)	Paper-and-pencil	AD: 8.46 (*SD* = 3.96) WAD: 3.00 (*SD* = 3.51)	5
Ito, Oe, et al. (2015)	Japan	Clinical (*N* = 1667) and Non-clinical sample (*N* = 1163)	Online	Clinical: 9.69 (*SD* = 5.55) Non-clinical: 5.56 (*SD* = 4.91)	9
Moore et al. (2015)	USA	Clinical sample (*N* = 347)	Paper-and-pencil	9.35 (*SD* = 4.38)	8
Norman et al. (2006)	USA	Students sample (*N* = 711)	Paper-and-pencil	7.16 (*SD* = 3.05)	–
Norman et al. (2011)	USA	Students sample (*N* = 171)	Paper-and-pencil	6.61 (*SD* = 4.01)	8
Osma et al. (2019)	Spain	Clinical sample (*N* = 339)	Paper-and-pencil	10.45 (*SD* = 4.49	10
Osma et al. (2021)	Spain	Students sample (*N* = 382)	Online	3.92 (*SD* = 4.13)	4
Sandora et al. (2021)	Czech Republic	Non clinical sample (*N* = 2912)	Online	9.50 (*SD* = 4.25)	15

Note. AD = Anxiety disorders; WAD = Without anxiety disorders; *SD* = Standard deviation.

This scale was designed to be used across mood disorders and with depressive symptoms below the diagnostic threshold (Bentley et al., 2014). It was validated in clinical and non-clinical samples and in paper-and-pencil and online formats, showing excellent internal consistency and good convergent and discriminative validity (Bentley et al., 2014; Ito, Bentley, et al., 2015; Mira et al., 2019; Osma et al., 2019; Osma et al., 2021; Sandora et al.,

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2021). Different cut-off scores have been proposed to discriminate between people with clinical and subclinical depression in their different validations (see Table 2).

Table 2

Validations of the ODSIS

Authors	Country	Sample	Format	*M* (*SD*)	Cutoff points
Bentley et al. (2014)	USA	1. Clinical sample (*N* = 100) 2. Students sample (*N* = 566) 3. Community sample (*N* = 189)	Paper-and-pencil	1. 5.50 (*SD* = 5.04) 2. 2.57 (*SD* = 3.36) 3. 5.16 (*SD* = 4.81)	8
Ito, Bentley, et al. (2015)	Japan	Clinical (*N* = 1667) and Non-clinical sample (*N* = 1163)	Online	Clinical: 8.68 (*SD* = 6.32) Non-clinical: 3.67 (*SD* = 4.87)	5
Mira et al. (2019)	Spain	Clinical sample (*N* = 474)	Online	7.83 (*SD* = 4.90)	5
Osma et al. (2019)	Spain	Clinical sample (*N* = 339)	Paper-and-pencil	9.87 (*SD* = 5.14)	10
Osma et al. (2021)	Spain	Students sample (*N* = 382)	Online	2.79 (*SD* = 4.06)	5
Sandora et al. (2021)	Czech Republic	Non-clinical sample (*N* = 2912)	Online	8.73 (*SD* = 4.34)	12

Note. *M* = Mean; *SD* = Standard deviation.

The administration of instruments in online format has increased in recent years, due to advantages such as accessibility and ease of administration and scoring (van Ballegooijen et al., 2016). Although paper and online versions of the same instrument often correlate strongly, mean scores and psychometrics may differ (Alfonsson et al., 2014), so specific validations need to be conducted for online administration. Both the OASIS and ODSIS were developed in paper-and-pencil format, and their online use requires specific validation in this format, as was conducted in other media (González-Robles et al., 2018; Mira et al., 2019).

Considering that both anxiety disorders and depression are highly prevalent, comorbid and often associated with significant distress and interference, it is necessary to have transdiagnostic measures to capture the severity and interference associated with anxious and depressive symptomatology in our local environment. Although there are

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instruments designed to assess symptoms of anxiety and depression that have been adapted and validated in our setting, none of them can quickly capture the severity and social and occupational interference associated with such symptomatology. The present study aims to carry out the linguistic, cultural and psychometric adaptation of the online versions of the OASIS and ODSIS scales in the population of Buenos Aires, Argentina.

Method

Linguistic and Cultural Adaptation

The adaptation of both instruments was carried out taking into consideration the recommendations of the International Test Commission (ICT) for the adaptation of tests to other cultures (Muñiz et al., 2013). The translation into Spanish was carried out following a direct translation method by five independent translators and five judges who evaluated the quality of the translations on a Likert scale from 1 (quite different) to 4 (identical). The translations that received the highest number of high scores (3 or 4) on the Likert scale from the judges were selected to form the preliminary versions of both scales.

With the preliminary version of the instrument, a pilot test was carried out with a sample of 12 individuals using Google Forms, in which the comprehension of the items was evaluated and a first analysis of the items was carried out. Participants signed an informed consent form expressing their voluntary participation. The final adapted versions of both instruments can be found in Appendices A and B (see Supplementary Materials).

Procedure

The psychometric properties of the translated and culturally adapted versions of the OASIS and the ODSIS were analysed. The recruitment of participants was non-probabilistic using the snowball method through the dissemination of flyers on social media. All participants gave their consent to participate in the study in which the confidentiality of the data, the purposes of the research and the possibility of withdrawing from the study at any time were clarified. All participants then completed a set of scales through a virtual Google Forms questionnaire.

Participants

The sample consisted of 344 adults (18-65 years old) from the general population residing in the City of Buenos Aires (26.7%, $N = 92$), Greater Buenos Aires (49.1%, $N = 169$) and the Province of Buenos Aires (24.1%, $N = 83$), Argentina. The mean age of the sample was 29.44 ($SD = 10.62$). The 80.5% identified with the female gender ($N = 277$), 19.2% with the male gender ($N = 66$) and the remaining 0.3% with a fluid gender ($N = 1$). In terms of

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educational level, 56.1% had completed secondary school (N = 193), 43.3% had completed university (N = 149) and 0.6% had completed primary school (N = 2).

Instruments

Socio-Demographic Questionnaire

As part of the test battery, an ad-hoc questionnaire was included in which the participants' age, gender, place of residence and level of education were asked.

Beck Depression Inventory II (BDI II)

The BDI-II (Beck et al., 1996; Argentinian adaptation by Brenlla & Rodríguez, 2006) is an inventory designed to assess depressive symptoms. It consists of 21 items referring to the past week and is scored on a Likert-type scale from 0 (not at all) to 3 (severely). The higher the score, the greater the severity of the depressive symptomatology. The validation in our setting showed an adequate internal consistency with a Cronbach's alpha coefficient of .88.

Beck Anxiety Inventory (BAI)

The BAI (Beck et al., 1988; Argentinian adaptation by Vizioli & Pagano, 2020) is composed of 21 items that assess the severity of anxiety symptoms. Each item refers to specific anxiety symptoms and is scored on a Likert-type scale from 0 (not at all) to 4 (it bothered me a lot). Higher scores indicate greater severity of the anxiety symptomatology. Its validation in the local setting yielded a Cronbach's alpha coefficient of 0.93.

Brief Positive and Negative Affect Schedule (PANAS)

The PANAS (Thompson, 2007; Argentinian adaptation by Moriondo et al., 2012) is an instrument designed to dimensionally measure positive and negative affect. In the present study, the short version of the instrument designed by Thompson (2007) and adapted to Argentina by Moriondo et al. (2012) was selected, consisting of four subscales: trait positive affect (five items), trait negative affect (five items), state positive affect (five items) and state negative affect (five items). Each item is scored on a Likert-type scale from 1 (very little or not at all) to 5 (very much or completely). It was adapted in our context with a Cronbach's alpha coefficient of .73 (.84 for negative affect and .75 for positive affect).

Multicultural Quality of Life Index (MQLI)

The MQLI (Mezzich et al., 1996; Argentinian adaptation by Jatuff et al., 2007) is a self-administered instrument designed to assess quality of life in a brief, multicultural and multidimensional way. It consists of 10 items assessing different aspects of quality of life, each of which is scored on a Likert-type scale from 1 (poor) to 10 (excellent).

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All sub-dimensions are summed to produce the Global Quality of Life Index. The higher the score, the higher the quality of life perceived. It was adapted to our setting with a Cronbach's alpha of .85.

Overall Anxiety Severity and Impairment Scale (OASIS)

The OASIS (Norman et al., 2006) is a brief scale designed to measure the severity and interference associated with anxiety symptoms. It consists of 5 items inquiring about the frequency and intensity of anxiety symptoms, the interference caused by anxiety symptoms in school/work and social life and avoidance as a specific symptom of anxiety. Each item consists of 5 response options on a Likert-type scale from 0 (little or none) to 4 (extreme). It was adapted to Spanish in Spain with a Cronbach's alpha of .86 (González-Robles et al., 2018).

Overall Depression Severity and Impairment Scale (ODSIS)

The ODSIS (Bentley et al., 2014) is a brief scale designed to measure the severity and interference associated with depressive symptoms. It consists of 5 items inquiring about the frequency and intensity of depressive symptoms, the interference caused by depressive symptoms in school/work and social life and the difficulty experiencing pleasure and/or interest as a specific symptom of depression. Each item consists of 5 response options on a Likert-type scale ranging from 0 (little or none) to 4 (extreme). It was adapted to Spanish in Spain with a Cronbach's alpha of .92 (Mira et al., 2019).

Data Analysis

All analyses were carried out using the R programming language. First, the sociodemographic characteristics of the sample (N = 344) and the descriptive statistics (mean, variance, skewness and kurtosis) of both OASIS and ODSIS items were analysed.

Prior to the analysis of the internal structure of both scales, the existence of adequate intercorrelation between items was assessed using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity. To analyse the factor structure, a Confirmatory Factor Analysis was carried out. Following Norman et al. (2006) and Bentley et al. (2014), a one-factor model was tested for both scales. The fit of the models was assessed using the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Standardised Mean Squared Error (SRMR) as criteria. The following cut-off scores were used to determine a good fit: CFI and TLI around .90 and SRMR below 0.08 (Marsh et al., 2004).

For the analysis of internal consistency, both Cronbach's Alpha and Omega Coefficients were calculated (Dunn et al., 2014). Convergent and discriminant validity was explored by calculating Pearson's r correlations between the OASIS and ODSIS and well-established measures of anxiety (BAI), depression (BDI), positive and negative affect

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(PANAS) and quality of life (MQLI). To interpret the correlation values, the *p*-value was calculated and the benchmarks for *r*-values proposed by Hinkle et al. (2003) were used. *r*-values between .90 and 1.00 were considered very high, those between .70 and .90 were considered high, those between .50 and .70 were considered moderate and those between .30 and .50 were considered low. Corrected item-total correlations were also calculated to analyze the discrimination of the items of both scales.

We also wanted to explore the existence of differences in the scores of both scales regarding gender. For this purpose, a Student's *t*-test for independent samples was performed. Because the criteria of normality and homoscedasticity of variances were not met in all groups, a Wilcoxon test was also performed. Finally, a linear regression was performed to determine whether age was a good predictor of change in severity levels of depression and anxiety.

Results

Descriptive Analysis of the Items

The mean score of the OASIS in the sample analysed was 6.52 (*SD* = 3.90). The mean, variance, skewness and kurtosis of each item were analysed. All items had skewness and kurtosis values between -1 and 1, suggesting a normal distribution (see Table 3).

Table 3

Mean, Standard Deviation, Skewness, and Kurtosis of OASIS Items

Item	*M*	*SD*	Skewness	Kurtosis
1	1.88	0.96	0.38	-0.43
2	1.62	0.86	0.01	-0.32
3	0.96	1.03	1	0.54
4	1.98	0.95	0.75	0.06
5	0.99	1.04	0.83	-0.06

As for the ODSIS, the mean score in the sample analysed was 4.48 (*SD* = 4.40). All items had skewness and kurtosis values between -1 and 1.03, suggesting a normal distribution (see Table 4).

Item Discrimination Analysis

Item discrimination was calculated using corrected item-total correlations. All OASIS items showed to discriminate adequately ($r > .30$) [Item 1 ($r = .66$), Item 2 ($r = .68$), Item 3 ($r = .65$), Item 4 ($r = .73$), Item 5 ($r = .67$)]. Similarly, the ODSIS items also showed

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Table 4

Mean, Standard Deviation, Skewness, and Kurtosis of ODSIS Items

Item	*M*	*SD*	Skewness	Kurtosis
1	0.96	0.98	0.92	0.45
2	0.88	0.92	0.72	-0.19
3	0.89	1.05	1.02	0.2
4	0.77	0.93	1.03	0.15
5	0.77	1	1.02	1

adequate discrimination ($r > .30$) [(Item 1 ($r = .84$), Item 2 ($r = .83$), Item 3 ($r = .87$), Item 4 ($r = .84$), Item 5 ($r = .81$)].

Internal Structure Analysis

First, the existence of adequate intercorrelation between items was assessed using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity, obtaining evidence suggesting the feasibility of conducting a factor analysis for both the OASIS ($KMO = .83$; $\chi^2 = 227.86$, $gl = 10$, $p < .001$) and the ODSIS ($KMO = .87$; $\chi^2 = 452.48$, $gl = 10$, $p < .001$). Confirmatory factor analysis (CFA) was then conducted on the one-factor model proposed in previous research for the OASIS (Norman et al., 2006) and ODSIS (Bentley et al., 2014). Model fit was determined by the Comparative Fit Index (CFI = .991 for the OASIS; CFI = .999 for the ODSIS), the Tucker-Lewis Index (TLI = .982 for the OASIS; TLI = .997 for the ODSIS) and the standardised root mean square error (SRMR = .061 for the OASIS; SRMR = .031 for the ODSIS), obtaining adequate goodness-of-fit indices.

Internal Consistency Analysis

For the analysis of internal consistency, Cronbach's alpha coefficient was calculated, obtaining a value of $\alpha = .90$ for the OASIS and $\alpha = .97$ for the ODSIS. The Omega coefficient yielded a value of $\omega = .93$ for the anxiety scale and $\omega = .93$ for the depression scale.

Convergent and Discriminant Validity

Pearson's *r* correlations between the OASIS, the ODSIS and related scales are shown in Table 5. A high and significant positive association was found between the OASIS and the ODSIS, $r(343) = .70$, $p < .01$, the BDI, $r(343) = .70$, $p < .01$, and between the OASIS and the BAI, $r(343) = .73$, $p < . 01$. A moderate and significant positive association was

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found between the OASIS and the negative trait affectivity, $r(343) = .61$, $p < .05$, and state, $r(343) = .54$, $p < .05$, subscales of the PANAS. On the other hand, a moderate and significant negative association was found between the OASIS and the MQLI, $r(343) = -.66$, $p < .01$, and a low and significant negative association between the OASIS and the positive trait affectivity, $r(343) = -.46$, $p < .05$, and state, $r(343) = -.42$, $p < .01$, subscales of the PANAS.

Table 5

Correlations Between OASIS and ODSIS and Other Scales

	OASIS	ODSIS	BDI	BAI	MQLI	PANAST NA	PANAST PA	PANASS NA	PANASS PA
OASIS	–	.70**	.70**	.73**	-.66*	.61*	-.46*	.54*	-.42**
ODSIS	.70**	–	.73**	.62**	-.65**	.51**	-.49**	.46**	-.40**

Note. OASIS = Overall Anxiety Severity and Impairment Scale; ODSIS = Overall Depression Severity and Impairment Scale; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; MQLI = Multicultural Quality of Life Index; PANAST = Positive and Negative Affect Scale Trait; PANASS = Positive and Negative Affect Scale State; NA = Negative Affect; PA = Positive Affect.
*$p < .05$. **$p < .01$.

A high and significant positive association was found between ODSIS and BDI, $r(343) = .73$, $p < .01$, a moderate and significant positive association between ODSIS and BAI, $r(343) = .62$, $p < .01$, and the negative trait affectivity subscale, $r(343) = .51$, $p < .01$, of the PANAS and a low and significant positive association with the negative state affectivity subscale, $r(343) = .46$, $p < .01$. On the other hand, a moderate and significant negative association was found between the ODSIS and the MQLI, $r(343) = -.65$, $p < .01$, and a low and significant negative association between the ODSIS and the positive trait, $r(343) = -.49$, $p < .01$, and state, $r(343) = -.40$, $p < .01$, subscales of the PANAS.

Differences According to Gender and Age

Differences in OASIS and ODSIS scores were assessed regarding gender. A *t*-test was conducted to compare the OASIS and ODSIS scores of those who reported identifying with the female gender and those who reported identifying with the male gender to explore the existence of significant gender differences. It was found that females scored significantly higher than males on both the OASIS, $t(107) = -2.76$, $p < .01$, and ODSIS, $t(117) = -2.91$, $p < .01$. Considering that the assumption of normality in the groups was not met, a Wilcoxon test was also performed, which also yielded statistically significant differences for OASIS, $W = 10935$, $p < .05$, and ODSIS, $W = 10783$; $p < .05$.

Finally, to assess whether age functioned as a good predictor of anxiety severity and interference, a linear regression was performed taking the OASIS score as the dependent

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variable and age as the predictor variable. It was found that the higher the age, the lower the severity and interference due to anxiety, β = -0.10, $F(1, 342) = 27.75$, $p < .001$, $R^2 = .07$. The same procedure was performed to determine whether age functioned as a good predictor of severity and interference due to depression, finding that the older the age the lower the severity and interference due to depression, β = -0.10, $F(1, 342) = 23.13$, $p < .001$, $R^2 = .06$.

Discussion

The aim of the present study was to carry out the adaptation and validation of the OASIS and ODSIS in the Argentine population in an online format. The psychometric validation included the analysis of item discrimination, factorial structure, internal consistency, convergent and discriminant validity, and differences in scores as a function of sociodemographic variables for both scales.

Considering only those adaptations that took participants from the general population, both the OASIS ($M = 6.52$; $SD = 3.90$) and the ODSIS ($M = 4.48$; $SD = 4.40$) yielded mean scores higher than those obtained in the Japanese (Ito, Oe, et al., 2015; Ito, Bentley, et al., 2015) adaptations, but lower than those obtained in the Czech study (Sandora et al., 2021). The latter may be due to the fact that in the Czech study the data were collected during the COVID-19 pandemic, which may have influenced the scores obtained. Also, the ODSIS yielded higher mean scores than those obtained in the non-clinical subsample of the original validation (Bentley et al., 2014). The higher scores obtained in local adaptations compared to Japanese or American ones may be linked to the high prevalence of problems linked to anxiety and depression in Argentina (Stagnaro et al., 2018).

On the other hand, taking into account the adaptations that were performed in online format, as expected the local adaptations presented lower scores than those that took a clinical sample (González-Robles et al., 2018; Mira et al., 2019) but higher than the one that took a sample of students (Osma et al., 2021). However, all the above comparisons should be taken with caution because there have been no studies investigating the cross-cultural measurement invariance of these scales.

The 5 items of both scales were found to discriminate adequately ($r > .30$), indicating that they allow to distinguish between people with different levels of severity and interference due to anxiety and depression, respectively.

As in previous research (Bentley et al., 2014; Norman et al., 2006; Osma et al., 2019), confirmatory factor analysis revealed a unidimensional factor structure with strong factor loadings for all items of both scales. Regarding reliability, both the OASIS and the ODSIS demonstrated excellent internal consistency in the sample of Argentinian participants (α = .90 and ω = .93. for the OASIS and α = .97 and ω = .93. for the ODSIS), showing values similar to those of previous validations performed in the general

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population (Bentley et al., 2014; Ito, Bentley, et al., 2015; Ito, Oe, et al., 2015; Sandora et al., 2021).

Regarding construct validity, significant positive correlations were found between the OASIS and the BAI and between the ODSIS and the BDI, providing evidence for the convergent validity of both scales with two of the most widely used instruments for the assessment of anxiety and depression. The fact that significant positive correlations were also found between the OASIS and the ODSIS, the BDI and the PANAS subscales of trait and state negative affect, but lower than that found for the BAI, is interpreted as evidence of the discriminant validity of the instrument. Likewise, the fact that significant positive correlations were also found between the ODSIS and the OASIS, the BAI and the negative trait and state affect subscales of the PANAS, but lower than that found in relation to the BDI, is interpreted as evidence of the instrument's discriminant validity. Taken together, these findings provide evidence of adequate construct validity for both the OASIS and the ODSIS, in agreement with previous research (González-Robles et al., 2018; Mira et al., 2019; Osma et al., 2019; Osma et al., 2021).

In contrast to previous adaptations (González-Robles et al., 2018; Ito, Bentley, et al., 2015; Ito, Oe, et al., 2015; Mira et al., 2019), significant differences were found in the OASIS and ODSIS total scores as a function of gender and age. Individuals who identified with the female gender scored significantly higher on both scales than males, which is consistent with previous literature that indicates that Argentinian women are 85% more likely to suffer from anxiety disorders than men (Stagnaro et al., 2018). Furthermore, in line with the research by Stagnaro et al. (2018), which reported a higher prevalence of emotional disorders in younger individuals, it was found that the levels of severity and interference due to anxiety and depression decrease with increasing age. The older the age, the lower the severity and interference due to anxiety and depression.

In sum, the results of the present study are consistent with those obtained in previous validations performed in the general population (Bentley et al., 2014; Ito, Bentley, et al., 2015; Ito, Oe, et al., 2015; Sandora et al., 2021), and support the OASIS and ODSIS scales as valid and reliable instruments to assess the severity and functional interference due to anxiety and depression in the general population of Buenos Aires, Argentina.

This is the first study to evaluate the psychometric properties of the OASIS and ODSIS scales in Argentina. Having instruments adapted to our environment that allow us to measure the severity of anxiety and depression and their level of interference in daily functioning is essential to assess and detect both groups of disorders, which are highly prevalent in our population (Stagnaro et al., 2018), whether they occur in isolation or in comorbidity, both in clinical and non-clinical settings. Their availability is also a first step for the reliable application of the Unified Protocol, a transdiagnostic treatment designed to address emotional disorders that uses both scales to measure the patient's change in anxiety and depressive symptomatology on a weekly basis (Barlow et al., 2011).

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Furthermore, and in line with previous research (González-Robles et al., 2018; Ito, Bentley, et al., 2015; Ito, Oe, et al., 2015; Mira et al., 2019), the results also suggest that both the OASIS and the ODSIS can be used in our setting in an online format without compromising their psychometric properties. Having adapted instruments in online format is important because it enables their use in the context of internet-based interventions, which have proliferated in recent decades in the field of cognitive-behavioral therapies (Andersson et al., 2019). The development of these interventions is especially important in Argentina, where access to evidence-based treatments is difficult and the inclusion of the technology in academia is still scarce (Distéfano et al., 2015). The availability of both scales in online format represents a contribution to this promising field in Argentina.

Limitations

Limitations of the study include the fact that the sample consisted of people from the general population of Buenos Aires, which limits the generalizability of the results to clinical settings and people from another regions of the country. In addition, no methods were used to guarantee whether the participants were receiving psychological treatment or have an actual mental disorder. Also, the mean age of the participants was very young and the educational level very high, which may have been related to the method chosen to reach them.

Another limitation was that the proportion of males and females was not balanced, which may have affected the representativeness of the results. Unlike previous studies (Sandora et al., 2021), the comparison between men and women was performed without having calculated measurement invariance between both genders because the sample size was smaller than recommended in the literature (<100) to calculate it (Meade & Bauer, 2007; Putnick & Bornstein, 2016). Finally, unlike previous adaptations, test-retest reliability, sensitivity to change and cut-off scores for both scales could not be established in our population. It would be desirable for future research to consider these aspects and analyse them in a clinical sample.

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Competing Interests: The authors have declared that no competing interests exist.

Data Availability: Materials and analysis code for this study are available by emailing the corresponding author.

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Supplementary Materials

The Supplementary Materials contain the following items (for access see Index of Supplementary Materials below):

- *Appendix A:* presents the Argentine version of the Overall Anxiety Severity and Impairment Scale (OASIS)
- *Appendix B:* presents the Argentine version of the Overall Depression Severity and Impairment Scale (ODSIS).

Index of Supplementary Materials

Rojas, R. L., Cremades, C. F., Celleri, M., & Garay, C. J. (2023). *Supplementary materials to "Overall Anxiety Severity and Impairment Scale (OASIS) and Overall Depression Severity and Impairment Scale (ODSIS): Adaptation and validation in Buenos Aires, Argentina"* [Argentine versions of the OASIS and ODSIS]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.12903

References

Alfonsson, S., Maathz, P., & Hursti, T. (2014). Interformat reliability of digital psychiatric self-report questionnaires: A systematic review. *Journal of Medical Internet Research, 16*(12), Article e268. https://doi.org/10.2196/jmir.3395

Andersson, G., Titov, N., Dear, B. F., Rozental, A., & Carlbring, P. (2019). Internet-delivered psychological treatments: From innovation to implementation. *World Psychiatry, 18*(1), 20–28. https://doi.org/10.1002/wps.20610

Barlow, D. H. (1991). Disorders of emotion. *Psychological Inquiry, 2*(1), 58–71. https://doi.org/10.1207/s15327965pli0201_15

Barlow, D. H., Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Allen, L. B., & Ehrenreich-May, J. (2011). *The Unified Protocol for Transdiagnostic Treatment of Emotional Disorders: Therapist guide.* Oxford University Press.

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56*(6), 893–897. https://doi.org/10.1037/0022-006X.56.6.893

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory II.* Psychological Corporation.

Bentley, K. H., Gallagher, M. W., Carl, J. R., & Barlow, D. H. (2014). Development and validation of the Overall Depression Severity and Impairment Scale. *Psychological Assessment, 26*(3), 815–830. https://doi.org/10.1037/a0036216

Bragdon, L. B., Diefenbach, G. J., Hannan, S., & Tolin, D. F. (2016). Psychometric properties of the Overall Anxiety Severity and Impairment Scale (OASIS) among psychiatric outpatients. *Journal of Affective Disorders, 201*, 112–115. https://doi.org/10.1016/j.jad.2016.05.005

Brenlla, M. E., & Rodríguez, C. M. (2006). *Adaptación argentina del Inventario de Depresión de Beck (BDI-II)* [Argentine adaptation of the Beck Depression Inventory (BDI-II)]. Paidós.

PsychOpen GOLD

Brown, T. A., & Barlow, D. H. (2009). A proposal for a dimensional classification system based on the shared features of the DSM-IV anxiety and mood disorders: Implications for assessment and treatment. *Psychological Assessment, 21*(3), Article 256. https://doi.org/10.1037/a0016608

Brown, T. A., Campbell-Sills, L. A., Lehman, C. L., Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology, 110*(4), 585–599. https://doi.org/10.1037/0021-843X.110.4.585

Campbell-Sills, L., Norman, S. B., Craske, M. G., Sullivan, G., Lang, A. J., Chavira, D. A., Bystritskyi, A., Sherbourneg, C., Bryrne, P. R., & Stein, M. B. (2009). Validation of a brief measure of anxiety-related severity and impairment: The Overall Anxiety Severity and Impairment Scale (OASIS). *Journal of Affective Disorders, 112*(1-3), 92–101. https://doi.org/10.1016/j.jad.2008.03.014

Distéfano, M. J., Mongelo, M. C., O'Conor, J., & Lamas, M. C. (2015). Psicoterapia y tecnología: implicancias y desafíos en la inserción de recursos innovadores en la práctica clínica argentina [Psychotherapy and technology: Implications and challenges in the insertion of innovative resources in Argentine clinical practice]. *Revista electrónica de psicología Iztacala, 18*(4), 1342–1362. https://revistas.unam.mx/index.php/repi/article/view/53433

Dunn, T. J., Baguley, T., & Brunsen, V. (2014). From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *British Journal of Psychology, 105*(3), 399–412. https://doi.org/10.1111/bjop.12046

Farrahi, H., Gharraee, B., Oghabian, M. A., Pirmoradi, M. R., Najibi, S. M., & Batouli, S. A. H. (2020). Psychometric properties of the Persian version of the Overall Anxiety Severity and Impairment Scale (OASIS). *Iranian Journal of Psychiatry and Behavioral Sciences, 14*(4), Article e100674. https://doi.org/10.5812/ijpbs.100674

González-Robles, A., Mira, A., Miguel, C., Molinari, G., Díaz-García, A., García-Palacios, A., Bretón-López, J., Quero, S., Baños, R., & Botella, C. (2018). A brief online transdiagnostic measure: Psychometric properties of the Overall Anxiety Severity and Impairment Scale (OASIS) among Spanish patients with emotional disorders. *PLoS One, 13*(11), Article e0206516. https://doi.org/10.1371/journal.pone.0206516

Hermans, M., Korrelboom, K., & Visser, S. (2015). A Dutch version of the Overall Anxiety Severity and Impairment Scale (OASIS): Psychometric properties and validation. *Journal of Affective Disorders, 172*, 127–132. https://doi.org/10.1016/j.jad.2014.09.033

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (2003). *Applied statistics for the behavioral sciences* (Vol. 663). Houghton Mifflin College Division.

Ito, M., Bentley, K. H., Oe, Y., Nakajima, S., Fujisato, H., Kato, N., Miyamae, M., Kanie, A., Horikoshi, M., & Barlow, D. H. (2015). Assessing depression related severity and functional impairment: The Overall Depression Severity and Impairment Scale (ODSIS). *PloS One, 10*(4), Article e0122969. https://doi.org/10.1371/journal.pone.0122969

Ito, M., Oe, Y., Kato, N., Nakajima, S., Fujisato, H., Miyamae, M., Kanie, A., Horikoshi, M., & Norman, S. B. (2015). Validity and clinical interpretability of Overall Anxiety Severity and Impairment Scale (OASIS). *Journal of Affective Disorders, 170*, 217–224. https://doi.org/10.1016/j.jad.2014.08.045

PsychOpen GOLD

Jatuff, D., Zapata-Vega, M. I., Montenegro, R., & Mezzich, J. E. (2007). El índice multicultural de calidad de vida en Argentina: un estudio de validación [The multicultural quality of life index in Argentina: A validation study]. *Actas españolas de psiquiatría, 35*(4), 253–258. http://repositorio.ub.edu.ar/handle/123456789/4774

Kazdin, A. E., & Blase, S. L. (2011). Rebooting psychotherapy research and practice to reduce the burden of mental illness. *Perspectives on Psychological Science, 6*(1), 21–37. https://doi.org/10.1177/1745691610393527

Marsh, H. W., Wen, Z., & Hau, K. T. (2004). Structural equation models of latent interactions: Evaluation of alternative estimation strategies and indicator construction. *Psychological Methods, 9*(3), 275–300. https://doi.org/10.1037/1082-989X.9.3.275

Meade, A. W., & Bauer, D. J. (2007). Power and precision in confirmatory factor analytic tests of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 14*(4), 611–635. https://doi.org/10.1080/10705510701575461

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*(6), 487–495. https://doi.org/10.1016/0005-7967(90)90135-6

Mezzich, J. E., Cohen, N. L. & Ruiperez, M. A. (1996). *A Quality of Life Index: Brief description and validation* [Paper presentation]. International Congress of the International Federation for Psychiatric Epidemiology. Santiago de Compostela, Spain.

Mira, A., González-Robles, A., Molinari, G., Miguel, C., Díaz-García, A., Bretón-López, J., García-Palacios, A., Quero, S., Baños, R., & Botella, C. (2019). Capturing the severity and impairment associated with depression: The Overall Depression Severity and Impairment Scale (ODSIS) validation in a Spanish clinical sample. *Frontiers in Psychiatry, 10*, Article 180. https://doi.org/10.3389/fpsyt.2019.00180

Moore, S. A., Welch, S. S., Michonski, J., Poquiz, J., Osborne, T. L., Sayrs, J., & Spanos, A. (2015). Psychometric evaluation of the Overall Anxiety Severity and Impairment Scale (OASIS) in individuals seeking outpatient specialty treatment for anxiety-related disorders. *Journal of Affective Disorders, 175*, 463–470. https://doi.org/10.1016/j.jad.2015.01.041

Moriondo, M., De Palma, P., Medrano, L. A., & Murillo, P. (2012). Adaptación de la Escala de Afectividad Positiva y Negativa (PANAS) a la población de adultos de la ciudad de Córdoba: análisis psicométricos preliminares [Adaptation of the Positive and Negative Affectivity Scale (PANAS) to the adult population of Cordoba: Preliminary psychometric analyses]. *Universitas Psychologica, 11*(1), 187–196. https://dialnet.unirioja.es/servlet/articulo?codigo=5030124https://doi.org/10.11144/Javeriana.upsy11-1.aeap

Muñiz, J., Elosua, P., & Hambleton, R. K. (2013). Directrices para la traducción y adaptación de los tests: segunda edición [Guidelines for translation and adaptation of tests: Second edition]. *Psicothema, 25*(2), 151–157. https://doi.org/10.7334/psicothema2013.24

Norman, S. B., Campbell-Sills, L., Hitchcock, C. A., Sullivan, S., Rochlin, A., Wilkins, K. C., & Stein, M. B. (2011). Psychometrics of a brief measure of anxiety to detect severity and impairment:

PsychOpen GOLD

The Overall Anxiety Severity and Impairment Scale (OASIS). *Journal of Psychiatric Research, 45*(2), 262–268. https://doi.org/10.1016/j.jpsychires.2010.06.011

Norman, S. B., Hami Cissell, S., Means-Christensen, A. J., & Stein, M. B. (2006). Development and validation of an Overall Anxiety Severity and Impairment Scale (OASIS). *Depression and Anxiety, 23*(4), 245–249. https://doi.org/10.1002/da.20182

Parés-Badell, O., Barbaglia, G., Jerinic, P., Gustavsson, A., Salvador-Carulla, L., & Alonso, J. (2014). Cost of disorders of the brain in Spain. *PloS One, 9*(8), Article e105471. https://doi.org/10.1371/journal.pone.0105471

Olatunji, B. O., Cisler, J. M., & Tolin, D. F. (2007). Quality of life in the anxiety disorders: A meta-analytic review. *Clinical Psychology Review, 27*(5), 572–581. https://doi.org/10.1016/j.cpr.2007.01.015

Osma, J., Martínez-Loredo, V., Díaz-García, A., Quilez-Orden, A., & Peris-Baquero, Ó. (2021). Spanish adaptation of the Overall Anxiety and Depression Severity and Impairment Scales in university students. *International Journal of Environmental Research and Public Health, 19*(1), Article 345. https://doi.org/10.3390/ijerph19010345

Osma, J., Quilez-Orden, A., Suso-Ribera, C., Peris-Baquero, O., Norman, S. B., Bentley, K. H., & Sauer-Zavala, S. (2019). Psychometric properties and validation of the Spanish versions of the overall anxiety and depression severity and impairment scales. *Journal of Affective Disorders, 252*, 9–18. https://doi.org/10.1016/j.jad.2019.03.063

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review, 41*, 71–90. https://doi.org/10.1016/j.dr.2016.06.004

Rodríguez-Biglieri, R., & Vetere, G. L. (2011). Psychometric characteristics of the Penn State Worry Questionnaire in an Argentinean sample: A cross-cultural contribution. *The Spanish Journal of Psychology, 14*(1), 452–463. https://doi.org/10.5209/rev_SJOP.2011.v14.n1.41

Ruiz-Rodríguez, P., Cano-Vindel, A., Navarro, R. M., Medrano, L., Moriana, J. A., Aguado, C. B., Cabré, G. J., & González-Blanch, C. (2017). Impacto económico y carga de los trastornos mentales comunes en España: una revisión sistemática y crítica [Economic impact and burden of common mental disorders in Spain: A systematic and critical review]. *Ansiedad y Estrés, 23*(2-3), 118–123. https://doi.org/10.1016/j.anyes.2017.10.003

Sandora, J., Novak, L., Brnka, R., van Dijk, J. P., Tavel, P., & Malinakova, K. (2021). The abbreviated Overall Anxiety Severity and Impairment Scale (OASIS) and the abbreviated Overall Depression Severity and Impairment Scale (ODSIS): Psychometric properties and evaluation of the Czech versions. *International Journal of Environmental Research and Public Health, 18*(19), Article 10337. https://doi.org/10.3390/ijerph181910337

Shear, M. K., Brown, T. A., Barlow, D. H., Money, R., Sholomskas, D. E., Woods, S. W., Gorman, J. M., & Papp, L. A. (1997). Multicenter Collaborative Panic Disorder Severity Scale. *American Journal of Psychiatry, 154*(11), 1571–1575. https://doi.org/10.1176/ajp.154.11.1571

Stagnaro, J. C., Cía, A., Vázquez, N., Vommaro, H., Nemirovsky, M., Serfaty, E., Sustas, E., Medina Mora, M. E., Benjet, C., Aguilar-Gaxiola, S., & Kessler, S. (2018). Estudio epidemiológico de

PsychOpen GOLD

salud mental en población general de la República Argentina [Epidemiological study of mental health in the general population of Argentina]. *Vertex. Revista Argentina de Psiquiatría, 29*(142), 275–299. https://apsa.org.ar/docs/vertex142.pdf

Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the Positive and Negative Affect Schedule (PANAS). *Journal of Cross-Cultural Psychology, 38*(2), 227–242. https://doi.org/10.1177/0022022106297301

van Ballegooijen, W., Riper, H., Cuijpers, P., van Oppen, P., & Smit, J. H. (2016). Validation of online psychometric instruments for common mental health disorders: A systematic review. *BMC Psychiatry, 16*(1), Article 45. https://doi.org/10.1186/s12888-016-0735-7

Vizioli, N. A., & Pagano, A. E. (2020). Adaptación del Inventario de Ansiedad de Beck en población de Buenos Aires [Adaptation of the Beck Anxiety Inventory in a Buenos Aires population]. *Interacciones, 6*(3), Article e171. https://doi.org/10.24016/2020.v6n3.171

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Cognitive Symptoms Link Anxiety and Depression Within a Validation of the German State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA)

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Supplementary Materials: Data, Materials [see Index of Supplementary Materials]

Abstract

Background: In the present study we aimed to develop a German version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA) and evaluate the psychometric properties. Associations of cognitive and somatic anxiety with other measures of anxiety, depression, and stress, elucidating possible underlying functional connections, were also examined, as symptoms of anxiety, depression and stress often overlap.

Method: Two samples (n1 = 301; n2 = 303) were collected online and in the lab, respectively. Dynamic connections between somatic and cognitive anxiety, other measures of anxiety, depression, and stress, were analyzed using a network approach. Psychometric analyses were conducted using exploratory and confirmatory factor analyses.

Results: We replicated and validated the two-factorial structure of the STICSA with the German translation. Network analyses revealed cognitive trait anxiety as the most central node, bridging anxiety and depression. Somatic trait anxiety exhibited the highest discriminant validity for distinguishing anxiety from depression.

Conclusion: The central role of cognitive symptoms in these dynamic interactions suggests an overlap of these symptoms between anxiety and depression and that differential diagnostics should focus more on anxious somatic symptoms than on cognitive symptoms. The STICSA could therefore be useful in delineating differences between anxiety and depression and for differential

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assessment of mood and anxiety symptoms. Additional understanding of both cognitive and somatic aspects of anxiety might prove useful for therapeutic interventions.

Keywords

questionnaire, anxiety, depression, somatic symptoms, cognitive symptoms

Highlights

- Cognitive symptoms link depression and anxiety within a network approach.
- Somatic symptoms exhibit high discriminant validity towards depression.
- Differentiating subcomponents of anxious symptoms may help differentiate anxiety and depression.
- The German version of the STICSA is a reliable and valid measure of trait anxiety.

Anxiety disorders and depression are among the most prevalent mental disorders, are highly comorbid and cause a high burden of disease (Bandelow & Michaelis, 2015; Leray et al., 2011; Martin, 2003; Michael et al., 2007). Symptoms of anxiety, depression and stress often overlap (Mineka et al., 1998) and identifying overlapping and distinctive features of anxiety and depression is highly important (Eysenck & Fajkowska, 2018). Anxiety and depression are clearly not identical emotional states, but the high comorbidity rate and the diagnostic overlap point to common nonspecific features and mechanisms, that are also important for treatment (Eysenck & Fajkowska, 2018; Marchetti et al., 2016). There is also evidence that anxiety and depression dynamically interact and may trigger each other (Starr & Davila, 2012a, 2012c).

Anxiety can be divided into state and trait anxiety (e.g. Endler & Kocovski, 2001). Trait anxiety is a stable predisposition to experience anxiousness or to experience state anxiety frequently (Spielberger, 1966). State anxiety is an anxiety experienced within a specific moment and varies significantly between individuals and is associated with the development of pathological anxiety when experienced more often and with high intensity (Spielberger, 1966). Many models describing anxiety emphasize the multidimensionality of anxiety. This is particularly important when aiming for comprehensive assessment of anxiety and distinguishing anxiety from depression. Dimensions include cognitive, physiological and behavioral aspects of anxiety (Elwood et al., 2012). So far, established measures of anxiety rarely distinguish between cognitive and somatic dimensions of anxiety. The Cognitive Somatic Anxiety Questionnaire (Delmonte & Ryan, 1983; Schwartz et al., 1978) and the Endler Multidimensional Anxiety Scales (Endler et al., 1991) both include scales on cognitive and somatic symptoms but exclusively focus on trait assessment.

Distinguishing between anxiety and depression requires examining the complex and multilayered facets of both syndromes (Eysenck & Fajkowska, 2018). Several approaches examine anxiety and depression in a common theoretical framework. One approach

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suggests that anxiety focuses on the future and depression on the past resulting in respective cognitive biases (Eysenck et al., 2006; Pomerantz & Rose, 2014). However, there is evidence that worry and rumination differ in their effects on behavioral and physiological responses to every day events and stressors, and that there is not a specific link between anxiety and worry, or depression and rumination (Kircanski et al., 2017; Lewis et al., 2018). Beck's content-specificity hypothesis suggests that anxiety is marked by a focus on danger, and in depression by self-deprecation (Beck, 1976; Beck et al., 1987). Lastly, the tripartite model of anxiety and depression posits that anxiety and depression share a component of underlying negative affectivity or distress but anxiety is additionally marked by physiological hyperarousal, whereas depression is additionally marked by low positive affectivity (Clark, 2009; Clark & Watson, 1991). However, none of these approaches can fully capture the complexity of how anxiety and depression overlap, how they differ, and how they interact (Eysenck & Fajkowska, 2018).

In addition, some of the established instruments for the assessment of anxiety exhibit low discriminant validity regarding depressive symptoms. For instance, the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983) is almost exclusively used to assess state and trait anxiety, but recent findings suggest that the STAI also assesses depressive symptoms alongside anxiety. Anxiety and depressive symptom severity are similarly correlated with the STAI trait and state score, and individuals with depressive disorders score significantly higher on average than individuals with anxiety disorders (Kennedy et al., 2001; Knowles & Olatunji, 2020). Both anxiety and depression appear to share a component of negative affect (e.g. Anderson & Hope, 2008; Balon, 2005; Bieling et al., 1998; Caci et al., 2003).

In clinical research and practice, it is important to assess distinct aspects of anxiety, rather than just negative affectivity. Therefore, an instrument is needed that validly assesses anxiety, separately from depressive symptoms. In contrast to other questionnaires, the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA; Ree et al., 2008) aims to measure anxiety without including negative affectivity. The STICSA has 21 items for the state and trait scales, respectively, and has been shown to be a reliable instrument for the assessment of anxiety. The STICSA considers the multidimensionality of anxiety, as well as the need to differentiate it from depressive symptoms (Elwood et al., 2012; Grös et al., 2007; Ree et al., 2008). While the two-factorial structure of cognitive and somatic anxiety has been validated for the state and trait scale of the STICSA, other factorial solutions have also been proposed. Factor solutions for all items of the STICSA state and trait version revealed a four-factor model, as well as a higher-order model with a global anxiety factor and four first-order factors (STICSA trait cognitive subscale, STICSA trait somatic subscale, STICSA state cognitive subscale, and STICSA state somatic subscale). Aside from the two-factor solutions for the trait and state scale, respectively, utilized by Ree et al. (2008), these four-factor solutions have also been validated (Carlucci et al., 2018; Roberts et al., 2016). Superior concurrent and divergent validity has been

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shown compared to the STAI (Tindall et al., 2021). So far, the STICSA was not available in a German version.

The aim of the present study was to develop and validate a German version of the STICSA. To this end, the STICSA was translated into German and assessed in two independent samples (online and in the lab). We expected to replicate the two-factorial structure of the questionnaire. We examined associations with other scales assessing anxiety, as well as depressive symptoms and stress, to establish discriminant validity and parse different components of anxiety and depression. We expected that the STICSA would be positively associated with depressive symptoms, anxiety and stress. We also expected the STICSA to better distinguish between anxiety and depressive symptoms, possibly with the somatic subscale being less influential in the dynamic interactions between anxious and depressive symptoms.

Materials and Method

Samples

Sample Size Estimation

Minimum sample size for factor analysis was estimated based on simulation studies by Gagne and Hancock (2006), who proposed a method that bases sample size estimation on measurement model quality or reliability, which can both be derived from the number of indicators per factor and the factor loadings of each indicator. Therefore, taking into account the number of indicators per factor (n = 10 and n = 11, respectively) and the factor loadings of the original questionnaire, we estimated a minimum sample size of N = 250.

Sample 1

Complete data from 510 individuals were collected online using the internet platform LimeSurvey (LimeSurvey Project Team, 2015) and participants' identity remained anonymous to the research team. All participants were above 18 years of age and were native speakers of German. 209 participants were excluded due to either false responding to the control items (n = 17), no fluency in German (n = 7), the presence of current or past self-reported mental disorders other than anxiety disorders or depression (n = 95), or neurological disorders (n = 90). Other mental and neurological disorders were excluded to distinctly examine anxious and depressive symptoms, and avoid confounding effects (e.g. Bulloch et al., 2015). The final sample included 301 participants (mean age 26.6 years ± 8.8 standard deviation (*SD*), range 18-62 years; 67.1% female and 0.1% diverse; 96.7% had completed advanced education degrees; 19.9% self-reported diagnoses of anxiety and/or depressive disorders). Participants could take part in a lottery to win 10 Euro.

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Sample 2

Complete data from 311 individuals were collected using the internet platform LimeSurvey (LimeSurvey Project Team, 2015) during a session in the lab as part of another research project. All participants were above 18 years of age, native speakers of German and had no neurological disorders. 8 participants were excluded due to the presence of current or past self-reported mental disorders other than anxiety disorders or depression. The final sample included 303 participants (mean age 24.9 years ± 5.2 standard deviation (*SD*), range 18-45 years; 48.8% female; 93.4% had completed advanced education degrees; 7.6% self-reported diagnoses of anxiety and/or depressive disorders). Participants were compensated for their participation with 10 Euro per hour.

The ethics committee at the Technische Universität Dresden approved all study procedures (EK 330082018) and study procedures for *Sample 2* (EK 372092017, and EK 585122019).

Measures

The assessment for *Sample 1* included both the STICSA state and trait (Ree et al., 2008), the STAI (Laux et al., 1981; Spielberger et al., 1983), the Depression Anxiety Stress Scales (DASS-21; Henry & Crawford, 2005; Nilges & Essau, 2015), and the Beck Depression Inventory II (BDI; Beck et al., 1996; Kühner et al., 2007). For more information on these measures see the Supplementary Materials. We also obtained information about gender, age, education level, presence of mental and neurological disorders, and native language. Two control items to check for attention were included (Meade & Craig, 2012). The order of the questionnaires was randomized across participants. The assessment for *Sample 2* included the STICSA trait (Ree et al., 2008) as well as information about gender, age, education level, and native language. Bilingual psychologists translated the STICSA into German and back into English. The retranslated questionnaire was compared to the original version. Differing items were discussed and adapted.

Data Analysis

To validate the German version of the STICSA trait, we first performed exploratory factor analysis (EFA) with oblique rotation (oblimin) and maximum likelihood estimation on *Sample 1*. Due to non-normality of the data, as assessed by Mardia's test (Mardia, 1970), the analysis was conducted on a polychoric correlation matrix (Holgado–Tello et al., 2010). To extract the number of factors or components, we used techniques with comparably high accuracy rates (Ruscio & Roche, 2012): parallel analysis for component extraction (PA), minimum average partial procedure (MAP), optimal coordinates (OC), acceleration factor (AF) and comparison data (CD). To validate the factorial structure of the STICSA trait, we performed a confirmatory factor analysis (CFA), also based on a polychoric correlation matrix, on *Sample 2*. We used the diagonally weighted least

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squares (WLSMV) estimator, which is specifically designed for ordinal data (Li, 2016). Reliability was assessed using McDonald's omega and Cronbach's alpha (Cronbach, 1951; McDonald, 2013; Revelle & Zinbarg, 2009). Convergent and discriminant validity were examined using Kendall's tau correlations (Kendall, 1938) with measures of individual traits that have been linked to anxiety, within *Sample 1*. Kendall's tau has been shown to be a better estimate of the correlation in the population if the data is distributed non-normally (Howell, 2012). A validation of the STICSA state can be found within the Supplementary Materials.

To analyze the dynamic connections between the assessed traits, we used a network approach and estimated a standardized Gaussian Graphical Model (GGM) using the graphical lasso as a regularization method; the tuning parameter was selected according to the Extended Bayesian information criterion (Chen & Chen, 2008; Foygel & Drton, 2010; Friedman et al., 2008; Lauritzen, 1996). The analysis was performed based on polychoric correlations within *Sample 1* (Epskamp & Fried, 2018). Edge weight, or correlation accuracy and stability of node centrality indices as measures of node importance were assessed using bootstrapping (see Epskamp et al., 2018). An alternative model for comparison of network estimation was also estimated, see Supplementary Materials. Data and code are available at OSF (Overmeyer & Endrass, 2023a). All analyses were carried out with R (R Core Team, 2018), for used packages see Supplementary Materials.

Results

Exploratory Factor Analysis (Sample 1)

Assumptions for EFA were met (see Supplementary Materials). An initial analysis was conducted to extract the number of factors to retain. PA extracted two components, MAP, CD and AF extracted 2 factors and OC extracted five factors. We analyzed the data using five and two factors. Compared to the two-factor solution, the five-factor solution yielded more cross loadings and did not seem to adhere to meaningful constructs (see Supplementary Materials). Due to the more convincing results from the two-factor solution, two factors were retained in the analysis (for analysis choice recommendations see Costello & Osborne, 2005; Fabrigar et al., 1999). Table 1 displays the factor loadings after rotation. Item clustering replicated the factors from the original STICSA *cognitive* and *somatic* factors. Factors were correlated, $\phi = 0.61$, 95% CI [0.50, 0.66].

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Table 1

Oblimin Rotated Standardized Loadings (Pattern Matrix) Based Upon Polychoric Correlation Matrix

Item No.	STICSA *cognitive*	STICSA *somatic*
Item 3	**0.72**	0.17
Item 4	**0.59**	0.02
Item 5	**0.41**	0.19
Item 9	**0.80**	-0.01
Item 10	**0.87**	-0.07
Item 13	**0.76**	0.04
Item 16	**0.64**	0.01
Item 17	**0.61**	0.08
Item 19	**0.78**	-0.02
Item 11	**0.22**	0.13
Item 1	-0.01	**0.57**
Item 2	-0.15	**0.77**
Item 6	0.31	**0.49**
Item 7	0.24	**0.56**
Item 8	0.09	**0.67**
Item 12	-0.07	**0.62**
Item 14	0.08	**0.63**
Item 15	-0.01	**0.55**
Item 18	0.17	**0.69**
Item 20	0.21	**0.51**
Item 21	-0.19	**0.64**

Note. STICSA cognitive and STICSA somatic = State-Trait Inventory for Cognitive and Somatic Anxiety, cognitive and somatic symptoms subscales (STICSA trait).

Confirmatory Factor Analysis (Sample 2)

As a second analysis, we performed a CFA, also on a polychoric correlation matrix. Goodness of Fit for the proposed model was tested via Root Mean Square Error of Approximation, $RMSEA_{robust}$ = 0.04, 95% CI [0.03, 0.05], and Tucker Lewis Index of factoring reliability (TLI_{robust} = 0.95), values of RMSEA close to 0.06 and TLI close to 0.95 indicate acceptable fit (Hu & Bentler, 1999). Additionally, the RMSEA test of close fit (χ^2 = 247, df = 188, p = .998) indicates close fit, and the RMSEA test of not-close fit (χ^2 = 247, df = 188, p < .001) indicates the model does not fit poorly (MacCallum et al., 1996; Steiger, 2007). The χ^2 test of model fit (χ^2_{robust} = 291, df = 188), however, was significant (p_{robust} < .001), providing evidence against perfect model fit.

The standardized factor loadings (λ), their corresponding confidence intervals (CI) and standard errors (*SE*) are presented in Table 2. All factor loading estimates were significant and were of satisfactory magnitude. As expected, the two factors STICSA

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cognitive and *somatic* highly covaried in CFA (*cov* = 0.70; $p < .001$; 95% CI [0.61, 0.78]; *SE* = 0.04). For a visualization of the STICSA structure see Figure 1.

Table 2

Standardized Factor Loadings (λ) Based on Polychoric Correlations and Estimated Using Diagonally Weighted Least Squares

		CI		
Item	**λ**	***LL***	***UL***	***SE***
STICSA *cognitive*				
3	0.75	0.68	0.83	0.04
4	0.57	0.46	0.68	0.06
5	0.54	0.44	0.64	0.05
9	0.71	0.63	0.78	0.04
10	0.75	0.67	0.82	0.04
11	0.27	0.15	0.40	0.06
13	0.72	0.63	0.80	0.05
16	0.69	0.60	0.77	0.05
17	0.63	0.53	0.73	0.05
19	0.72	0.63	0.81	0.05
STICSA *somatic*				
1	0.55	0.44	0.66	0.05
2	0.55	0.45	0.65	0.05
6	0.73	0.62	0.85	0.04
7	0.62	0.49	0.76	0.04
8	0.62	0.50	0.75	0.04
12	0.55	0.43	0.67	0.06
14	0.76	0.61	0.91	0.06
15	0.47	0.32	0.61	0.06
18	0.64	0.51	0.61	0.04
20	0.67	0.57	0.77	0.04
21	0.28	0.15	0.42	0.07

Note. CI = confidence interval; *SE* = standard error; all loadings were significant. STICSA cognitive and STICSA somatic = State-Trait Inventory for Cognitive and Somatic Anxiety, cognitive and somatic symptoms subscales (STICSA trait).

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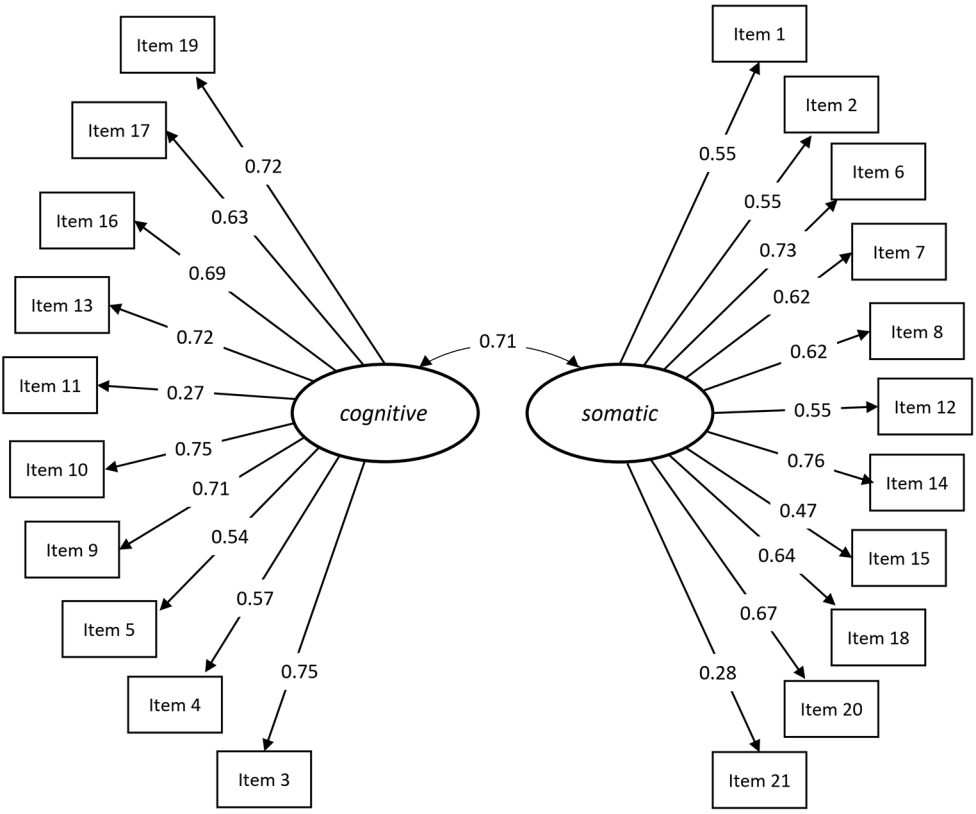
Figure 1

Path Diagram of the STICSA Trait (Ree et al., 2008) Results, Including All Items With Their Respective Standardized Factor Loadings on the Subscales as Well as the Correlation Between the Two Subscales



Reliability

McDonald's omega and Cronbach's alpha suggested satisfactory reliability for the STICSA in general (*Sample 1*: ω = 0.89, 95% CI [0.86, 0.92], α = 0.89, 95% CI [0.86, 0.91]; *Sample 2:* ω = 0.85, 95% CI [0.81, 0.88], α = 0.84, 95% CI [0.81, 0.87]), as well as for the subscales (*Sample 1*: ω_{cog} = 0.86, 95% CI [0.84, 0.89], ω_{som} = 0.81, 95% CI [0.76, 0.85], α_{cog} = 0.86, 95% CI [0.83, 0.88], α_{som} = 0.81, 95% CI [0.76, 0.85]; *Sample 2*: ω_{cog} = 0.81, 95% CI [0.77, 0.84], ω_{som} = 0.73, 95% CI [0.67, 0.78], α_{cog} = 0.81, 95% CI [0.77, 0.84], α_{som} = 0.73, 95% CI [0.67, 0.78]).

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Validity and Network Dynamics

We examined the validity of the STICSA and its subscales in *Sample 1*, see Table 3 for results. Correlations were moderate to large in magnitude. It is important to note that the tau statistic has a different metric from other correlation coefficients (see Gilpin, 1993).

Table 3

Kendall's tau Correlations and Their Respective p-Value Between the Two Subscales of the STICSA and Measures of Anxiety, Depression and Stress Within Sample 1

	1		2		3		4		5		6		7
Measure	**τ**	***p***	**τ**	***p***	**τ**	***p***	**τ**	***p***	**τ**	***p***	**τ**	***p***	
1. STICSA *cognitive*	–	–											
2. STICSA *somatic*	**0.38**	.001	–	–									
3. STAI	**0.38**	.001	**0.24**	.001	–	–							
4. DASS *anx*	**0.44**	.001	**0.40**	.001	**0.33**	.001	–	–					
5. DASS *stress*	**0.51**	.001	**0.34**	.001	**0.32**	.001	**0.41**	.001	–	–			
6. DASS *depr*	**0.51**	.001	**0.19**	.001	**0.30**	.001	**0.31**	.001	**0.50**	.001	–	–	
7. BDI	**0.47**	.001	**0.21**	.001	**0.54**	.001	**0.37**	.001	**0.49**	.001	**0.54**	.001	–

Note. STICSA cognitive and STICSA somatic = State-Trait Inventory for Cognitive and Somatic Anxiety, cognitive and somatic symptoms subscale scores (STICSA trait); STAI = State-Trait Anxiety Inventory-Trait sum score; DASS anx = Depression Anxiety Stress Scales sum score of anxiety subscale; DASS stress = Depression Anxiety Stress Scales sum score of stress subscale; DASS depr = Depression Anxiety Stress Scales sum score of depression subscale; BDI = Beck Depression Inventory II sum score.

The connections between the nodes, or edge weights, within the network model calculated for Sample 1 (for a visualization see Figure 2) can be interpreted as partial correlations. They therefore represent the connection between the different measures, controlled for the presence of all other variables in the network (Borsboom & Cramer, 2013). The strongest connections were the connections between DASS anxiety and STICSA somatic (*pr* = 0.33), between STICSA somatic and STICSA cognitive (*pr* = 0.28), between BDI and DASS depression (*pr* = 0.39), between DASS depression and DASS stress (*pr* = 0.28) – and interestingly between STICSA cognitive and DASS depression (*pr* = 0.30). The connection between STICSA somatic and DASS depression was negative but small (*pr* = -0.14). STICSA cognitive appeared to be the most central node. It showed the highest values for node strength, closeness and expected influence, which indicate how strongly the node is connected to other nodes – directly as well as indirectly (Epskamp et al., 2018). The *z*-standardized raw values of centrality indices of the GGM are visualized in the Supplementary Materials. In contrast, STICSA somatic has stronger links to DASS anxiety and fewer or even negative connections with depression. Results are supported within the alternative model (see Supplementary Materials).

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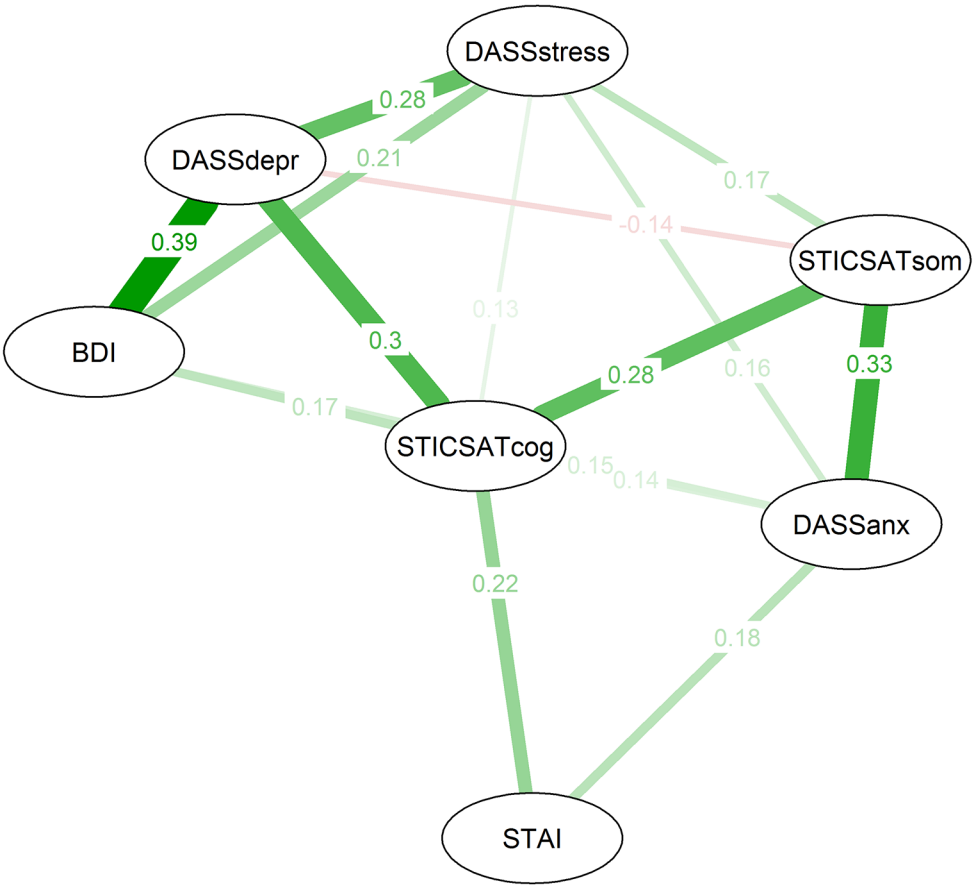
Figure 2

Between-Subject Graphical Lasso Network With Tuning Parameter Selected Using the Extended Bayesian Information Criterion



Note. Nodes represent the examined self-report measures or their respective subscales for depression, stress and anxiety. Edges (connections) can be interpreted as partial correlation coefficients. Red (dashed) lines represent negative edges, green (solid) lines positive edges. STICSATcog = STICSA trait (Ree et al., 2008) cognitive subscale sum score, STICSATsom = STICSA trait (Ree et al., 2008) somatic subscale sum score, STAI = State-Trait Anxiety Inventory (STAI, Spielberger et al., 1983) sum score, DASSanx = Depression Anxiety Stress Scales (DASS-21, Henry & Crawford, 2005) anxiety subscale sum score, DASSstress = Depression Anxiety Stress Scales (DASS-21, Henry & Crawford, 2005) stress subscale sum score, DASSdepr = Depression Anxiety Stress Scales (DASS-21, Henry & Crawford, 2005) depression subscale sum score, BDI = Beck Depression Inventory II (BDI, Beck et al., 1996) sum score.

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Discussion

This study investigated the psychometric properties of a German version of the STICSA and dynamic associations with depressive symptoms, stress and negative affectivity. The two-factorial structure of the original version was replicated and validated for both the trait and state version of the questionnaire (see Supplementary Materials for results for the state version). All items consistently loaded on the expected factors. The somatic and cognitive anxiety factors were moderately correlated, as expected. The subscales were differentially associated with measures of anxiety and negative affectivity, depression, and stress. The cognitive subscale of the STICSA was shown to be the most central node within the network, and therefore may influence the connections between all other measures. Results show that not only is the German version of the STICSA a reliable and valid instrument, but that it also helps to distinguish the common and distinct facets of depression and anxiety.

Dynamic interactions between psychological constructs can be conceptualized within network analyses (Costantini et al., 2019). Our results suggest that cognitive symptoms, as assessed by the STICSA are at the centre of a network intertwining depressive, anxious and stress-related symptoms, with evidence that cognitive symptoms are the most influential node. Interestingly, the STAI exhibited a large correlation with the BDI, but not in the presence of other anxiety measures and stress measures. Within the network, the STAI and measures of depression only exhibited an indirect connection, with the connecting node being the cognitive symptoms of the STICSA. This fits well with research suggesting that anxiety and depressive symptoms can be differentiated using the BDI and the Beck anxiety inventory (Beck et al., 1988), particularly using items of the cognitive domain in depression and those from the physical domain in anxiety (Lee et al., 2018). A study using questionnaires as well as ecological momentary assessment found that overlapping symptoms between depression and generalized anxiety disorder bridged other symptoms across the diagnostic boundary, while cognitive and somatic symptoms still more strongly clustered within disorders (Shin, 2020). Another study identified "worrying about past" and "worrying about future" as the most prominent symptoms connecting individual depression and anxiety symptoms and "feeling unhappy" and "feeling lonely" as the most prominent disorder bridging symptoms among depression symptoms, with associations possibly explaining comorbidities (Konac et al., 2021). When integrating the approach of worry symptoms bridging disorders with the tripartite model, the finding that the cognitive symptom of worrying links depression and anxiety seems fitting: as rumination increases, the association between anxious and depressed mood is strengthened (Starr & Davila, 2012b). The insufficient focus on differences in content between anxiety and depression within the tripartite model has been criticized before (Eysenck & Fajkowska, 2018), as has the failure of the different versions of the classification systems to delineate the blurred (diagnostic) line between anxiety and depression: Demyttenaere and Heirman (2020) proposed a more phenomeno-

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logical or psychopathological approach to better understand the differences between expressions of anxiety and depression. It has been suggested that the negative affectivity component can be subdivided into "worry or apprehension anxiety" and "dysthymia or valence depression" (Eysenck & Fajkowska, 2018; Fajkowska et al., 2018; Renner et al., 2018). Interestingly, there is evidence the arousal or somatic symptoms component most strongly relates to fear as measured by the Positive and Negative Affective Schedule and that the reactive and regulative functions of affect are related to the structure and function of anxiety and depression components (Domaradzka & Fajkowska, 2018). This may also explain the central role of the cognitive subscale of the STICSA within our analysis – most of the items are focused on general cognitive aspects and the subscale does not differentiate between aspects of worry vs. dysthymia.

Within the network model, the somatic subscale was only indirectly associated with the BDI, and was even negatively associated with the DASS depression subscale. These findings align with previous research indicating that the somatic anxiety subscale was less correlated with measures of depression (Tindall et al., 2021). Another study found that the somatic subscale was related to differences in both subjective and psychophysiological responses to emotional stimuli between groups of high vs. low anxiety (Barros et al., 2022). Thus, the somatic subscale of the STICSA may be useful in differentiating between anxiety and depression. However, it is essential to continuously evaluate the STICSA for future conceptualizations of anxiety. Especially research on dynamic interactions between anxiety and depression, indicating that symptoms reinforce each other, potentially explaining the high levels of comorbidity (McElroy et al., 2018), and that anxiety can worsen the severity of depression in late-life (An et al., 2019). Future research into the delineation of depression and anxiety may benefit from examining these interactions.

Limitations of the current study include the relatively small sample sizes and the high homogeneity of the samples pertaining education. Not all items may be optimal for the subscales. For Items 1, 7, 8 and 14 the highest step of the Likert scale was not used. Additionally, Items 11 and 21 showed low factor loadings ($\lambda \approx 0.30$) on their respective subscales, and it may be discussed if it is statistically meaningful to include these items (Tabachnick et al., 2007). While the STICSA appears to clearly distinguish between cognitive and somatic aspects of anxiety, and acknowledges the multidimensionality of anxiety, it does not assess the behavioral dimension of anxiety as described by Elwood et al. (2012). This might prove an oversight, as anxiety is often marked by fearful avoidance, which may be useful as a discriminant symptom – however, it has been shown that the presence of depressive symptoms exacerbates fearful avoidance behavior (Seekatz et al., 2016). Also, cultural context might change the importance of somatic symptoms in the interaction between anxiety and depression (Escovar et al., 2018; Kim et al., 2019; Park & Kim, 2020). Despite the compelling findings on discriminant validity, there has been a study that reported evidence that the cognitive and somatic scales of the STICSA are not

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equally robust, with the authors concluding that the items appear to measure a mixture of both latent cognitive and somatic anxiety (Styck et al., 2022). However, Styck et al. (2022) did assess the presence of mental or neurological disorders which could influence responses for somatic symptoms (Bulloch et al., 2015) – future studies should evaluate the STICSA scales in other disorders.

Conclusion

The German version of the STICSA appears to be a reliable and valid measure of trait and state anxiety, providing the ability to discriminate between the subscales of somatic and cognitive anxiety. As the subscales assess different facets of anxiety, it is not surprising they appear to differ in their discriminant validity and their associations to depressive symptoms and stress. Somatic symptoms of anxiety appear to most reliably assess symptoms primarily associated with anxiety, whereas cognitive symptoms seem to link anxious and depressive symptoms. The central role of cognitive symptoms in these dynamic interactions suggests that differential diagnostics should focus more on anxious somatic symptoms than on cognitive symptoms. Information gathered using the STICSA could be useful in differential diagnosis of mood and anxiety disorders, and additional understanding of both cognitive and somatic aspects of anxiety might prove useful for therapeutic interventions.

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Competing Interests: The authors have declared that no competing interests exist.

Ethics Statement: The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The ethics committee at the Technische Universität Dresden approved all study procedures (EK 330082018) and study procedures for *Sample 2* (EK 372092017, and EK 585122019).

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Data Availability: The data that support the findings of this study are openly available at the Open Science Framework (OSF) (Overmeyer & Endrass, 2023a).

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Supplementary Materials

The Supplementary Materials for this article contain the following items (for access see Index of Supplementary Materials below):

1. The data that support the findings of this study
2. Additional information on the analysis of the STICSA trait:
   - on methods
   - on the exploratory factor analysis, with alternative factor solutions
   - on the network analysis
3. Additional information on the analysis of the STICSA state:
   - on methods
   - on the exploratory factor analysis, with alternative factor solutions
   - on the confirmatory factor analysis
4. The German Version of the STICSA trait and STICSA state

Index of Supplementary Materials

Overmeyer, R., & Endrass, T. (2023a). *Differentiating anxiety and depression using a German version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA)* [Research data and code]. OSF. https://doi.org/10.17605/OSF.IO/J48RG

Overmeyer, R., & Endrass, T. (2023b). *Supplementary materials to "Cognitive symptoms link anxiety and depression within a validation of the German State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA)"* [Additional information]. PsychOpen GOLD. https://doi.org/10.23668/psycharchives.12910

References

An, M. H., Park, S. S., You, S. C., Park, R. W., Park, B., Woo, H. K., Kim, H. K., & Son, S. J. (2019). Depressive symptom network associated with comorbid anxiety in late-life depression. *Frontiers in Psychiatry, 10*, Article 856. https://doi.org/10.3389/fpsyt.2019.00856

Anderson, E. R., & Hope, D. A. (2008). A review of the tripartite model for understanding the link between anxiety and depression in youth. *Clinical Psychology Review, 28*(2), 275–287. https://doi.org/10.1016/j.cpr.2007.05.004

Balon, R. (2005). Measuring anxiety: Are we getting what we need? *Depression and Anxiety, 22*(1), 1–10. https://doi.org/10.1002/da.20077

Bandelow, B., & Michaelis, S. (2015). Epidemiology of anxiety disorders in the 21st century. *Dialogues in Clinical Neuroscience, 17*(3), 327–335. https://doi.org/10.31887/DCNS.2015.17.3/bbandelow

Barros, F., Figueiredo, C., Bras, S., Carvalho, J. M., & Soares, S. C. (2022). Multidimensional assessment of anxiety through the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA): From dimensionality to response prediction across emotional contexts. *PLoS One, 17*(1), Article e0262960. https://doi.org/10.1371/journal.pone.0262960

PsychOpen GOLD

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. International Universities Press.

Beck, A. T., Brown, G., Steer, R. A., Eidelson, J. I., & Riskind, J. H. (1987). Differentiating anxiety and depression: A test of the cognitive content-specificity hypothesis. *Journal of Abnormal Psychology, 96*(3), 179–183. https://doi.org/10.1037/0021-843X.96.3.179

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56*(6), 893–897. https://doi.org/10.1037/0022-006X.56.6.893

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck Depression Inventory (BDI-II)* (Vol. 10). Pearson. https://doi.org/10.1037/t00742-000

Bieling, P. J., Antony, M. M., & Swinson, R. P. (1998). The State-Trait Anxiety Inventory, Trait version: Structure and content re-examined. *Behaviour Research and Therapy, 36*(7-8), 777–788. https://doi.org/10.1016/S0005-7967(98)00023-0

Borsboom, D., & Cramer, A. O. (2013). Network analysis: An integrative approach to the structure of psychopathology. *Annual Review of Clinical Psychology, 9*, 91–121. https://doi.org/10.1146/annurev-clinpsy-050212-185608

Bulloch, A. G. M., Fiest, K. M., Williams, J. V. A., Lavorato, D. H., Berzins, S. A., Jetté, N., Pringsheim, T. M., & Patten, S. B. (2015). Depression—A common disorder across a broad spectrum of neurological conditions: A cross-sectional nationally representative survey. *General Hospital Psychiatry, 37*(6), 507–512. https://doi.org/10.1016/j.genhosppsych.2015.06.007

Caci, H., Bayle, F. H., Dossios, C., Robert, P., & Boyer, P. (2003). The Spielberger trait anxiety inventory measures more than anxiety. *European Psychiatry, 18*(8), 394–400. https://doi.org/10.1016/j.eurpsy.2003.05.003

Carlucci, L., Watkins, M. W., Sergi, M. R., Cataldi, F., Saggino, A., & Balsamo, M. (2018). Dimensions of anxiety, age, and gender: Assessing dimensionality and measurement invariance of the State-Trait for Cognitive and Somatic Anxiety (STICSA) in an Italian sample. *Frontiers in Psychology, 9*, Article 2345. https://doi.org/10.3389/fpsyg.2018.02345

Chen, J. H., & Chen, Z. H. (2008). Extended Bayesian information criteria for model selection with large model spaces. *Biometrika, 95*(3), 759–771. https://doi.org/10.1093/biomet/asn034

Clark, D. A. (2009). Cognitive behavioral therapy for anxiety and depression: Possibilities and limitations of a transdiagnostic perspective. *Cognitive Behavior Therapy, 38*(S1), 29–34. https://doi.org/10.1080/16506070902980745

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*(3), 316–336. https://doi.org/10.1037/0021-843X.100.3.316

Costantini, G., Richetin, J., Preti, E., Casini, E., Epskamp, S., & Perugini, M. (2019). Stability and variability of personality networks: A tutorial on recent developments in network psychometrics. *Personality and Individual Differences, 136*, 68–78. https://doi.org/10.1016/j.paid.2017.06.011

PsychOpen GOLD

Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation, 10*, Article 7. https://doi.org/10.7275/jyj1-4868

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334. https://doi.org/10.1007/BF02310555

Delmonte, M., & Ryan, G. (1983). The Cognitive-Somatic Anxiety Questionnaire (CSAQ): A factor analysis. *British Journal of Clinical Psychology, 22*(3), 209–212. https://doi.org/10.1111/j.2044-8260.1983.tb00601.x

Demyttenaere, K., & Heirman, E. (2020). The blurred line between anxiety and depression: Hesitations on comorbidity, thresholds and hierarchy. *International Review of Psychiatry, 32*(5-6), 455–465. https://doi.org/10.1080/09540261.2020.1764509

Domaradzka, E., & Fajkowska, M. (2018). Structure of affect in types of anxiety and depression. *Journal of Individual Differences, 40*(2), 82–91. https://doi.org/10.1027/1614-0001/a000279

Elwood, L. S., Wolitzky-Taylor, K., & Olatunji, B. O. (2012). Measurement of anxious traits: A contemporary review and synthesis. *Anxiety, Stress, & Coping, 25*(6), 647–666. https://doi.org/10.1080/10615806.2011.582949

Endler, N. S., Edwards, J. M., & Vitelli, R. (1991). *Endler Multidimensional Anxiety Scales (EMAS)*. Western Psychological Services Los Angeles.

Endler, N. S., & Kocovski, N. L. (2001). State and trait anxiety revisited. *Journal of Anxiety Disorders, 15*(3), 231–245. https://doi.org/10.1016/S0887-6185(01)00060-3

Epskamp, S., Borsboom, D., & Fried, E. I. (2018). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods, 50*(1), 195–212. https://doi.org/10.3758/s13428-017-0862-1

Epskamp, S., & Fried, E. I. (2018). A tutorial on regularized partial correlation networks. *Psychological Methods, 23*(4), 617–634. https://doi.org/10.1037/met0000167

Escovar, E. L., Craske, M., Roy-Byrne, P., Stein, M. B., Sullivan, G., Sherbourne, C. D., Bystritsky, A., & Chavira, D. A. (2018). Cultural influences on mental health symptoms in a primary care sample of Latinx patients. *Journal of Anxiety Disorders, 55*, 39–47. https://doi.org/10.1016/j.janxdis.2018.03.005

Eysenck, M. W., & Fajkowska, M. (2018). Anxiety and depression: Toward overlapping and distinctive features. *Cognition and Emotion, 32*(7), 1391–1400. https://doi.org/10.1080/02699931.2017.1330255

Eysenck, M. W., Payne, S., & Santos, R. (2006). Anxiety and depression: Past, present, and future events. *Cognition and Emotion, 20*(2), 274–294. https://doi.org/10.1080/02699930500220066

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*(3), 272–299. https://doi.org/10.1037/1082-989X.4.3.272

Fajkowska, M., Domaradzka, E., & Wytykowska, A. (2018). Attentional processing of emotional material in types of anxiety and depression. *Cognition and Emotion, 32*(7), 1448–1463. https://doi.org/10.1080/02699931.2017.1295026

PsychOpen GOLD

Foygel, R., & Drton, M. (2010). Extended Bayesian information criteria for Gaussian graphical models. In J. Lafferty, C. Williams, J. Shawe-Taylor, R. Zemel, & A. Culotta (Eds.), *Advances in Neural Information Processing Systems 23 (NIPS 2010)*. NIPS Foundation. https://papers.nips.cc/paper_files/paper/2010/hash/072b030ba126b2f4b2374f342be9ed44-Abstract.html

Friedman, J., Hastie, T., & Tibshirani, R. (2008). Sparse inverse covariance estimation with the graphical lasso. *Biostatistics, 9*(3), 432–441. https://doi.org/10.1093/biostatistics/kxm045

Gagne, P., & Hancock, G. R. (2006). Measurement model quality, sample size, and solution propriety in confirmatory factor models. *Multivariate Behavioral Research, 41*(1), 65–83. https://doi.org/10.1207/s15327906mbr4101_5

Gilpin, A. R. (1993). Table for conversion of Kendall's tau to Spearman's rho within the context of measures of magnitude of effect for meta-analysis. *Educational and Psychological Measurement, 53*(1), 87–92. https://doi.org/10.1177/0013164493053001007

Grös, D. F., Antony, M. M., Simms, L. J., & McCabe, R. E. (2007). Psychometric properties of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA): Comparison to the State-Trait Anxiety Inventory (STAI). *Psychological Assessment, 19*(4), Article 369. https://doi.org/10.1037/1040-3590.19.4.369

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44*(2), 227–239. https://doi.org/10.1348/014466505X29657

Holgado–Tello, F. P., Chacón–Moscoso, S., Barbero–García, I., & Vila–Abad, E. (2010). Polychoric versus Pearson correlations in exploratory and confirmatory factor analysis of ordinal variables. *Quality & Quantity, 44*(1), 153–166. https://doi.org/10.1007/s11135-008-9190-y

Howell, D. C. (2012). *Statistical methods for psychology*. Cengage Learning.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Kendall, M. G. (1938). A new measure of rank correlation. *Biometrika, 30*(1-2), 81–93. https://doi.org/10.1093/biomet/30.1-2.81

Kennedy, B. L., Schwab, J. J., Morris, R. L., & Beldia, G. (2001). Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *Psychiatric Quarterly, 72*(3), 263–276. https://doi.org/10.1023/A:1010305200087

Kim, J. H. J., Tsai, W., Kodish, T., Trung, L. T., Lau, A. S., & Weiss, B. (2019). Cultural variation in temporal associations among somatic complaints, anxiety, and depressive symptoms in adolescence. *Journal of Psychosomatic Research, 124*, Article 109763. https://doi.org/10.1016/j.jpsychores.2019.109763

Kircanski, K., LeMoult, J., Ordaz, S., & Gotlib, I. H. (2017). Investigating the nature of co-occurring depression and anxiety: Comparing diagnostic and dimensional research approaches. *Journal of Affective Disorders, 216*, 123–135. https://doi.org/10.1016/j.jad.2016.08.006

PsychOpen GOLD

Knowles, K. A., & Olatunji, B. O. (2020). Specificity of trait anxiety in anxiety and depression: Meta-analysis of the State-Trait Anxiety Inventory. *Clinical Psychology Review, 82*, Article 101928. https://doi.org/10.1016/j.cpr.2020.101928

Konac, D., Young, K. S., Lau, J., & Barker, E. D. (2021). Comorbidity between depression and anxiety in adolescents: Bridge symptoms and relevance of risk and protective factors. *Journal of Psychopathology and Behavioral Assessment, 43*(3), 583–596. https://doi.org/10.1007/s10862-021-09880-5

Kühner, C., Bürger, C., Keller, F., & Hautzinger, M. (2007). Reliability and validity of the revised Beck Depression Inventory (BDI-II): Results from German samples. *Der Nervenarzt, 78*(6), 651–656. https://doi.org/10.1007/s00115-006-2098-7

Lauritzen, S. L. (1996). *Graphical models* (Vol. 17). Clarendon Press.

Laux, L., Glanzmann, P., Schaffner, P., & Spielberger, C. (1981). *STAI – State-Trait-Angstinventar* [State-Trait Anxiety Inventory]. beltz test gmbh.

Lee, K., Kim, D., & Cho, Y. (2018). Exploratory factor analysis of the Beck Anxiety Inventory and the Beck Depression Inventory-II in a psychiatric outpatient population. *Journal of Korean Medical Science, 33*(16), Article e128. https://doi.org/10.3346/jkms.2018.33.e128

Leray, E., Camara, A., Drapier, D., Riou, F., Bougeant, N., Pelissolo, A., Lloyd, K. R., Bellamy, V., Roelandt, J. L., & Millet, B. (2011). Prevalence, characteristics and comorbidities of anxiety disorders in France: Results from the "Mental Health in General Population" Survey (MHGP). *European Psychiatry, 26*(6), 339–345. https://doi.org/10.1016/j.eurpsy.2009.12.001

Lewis, E. J., Yoon, K. L., & Joormann, J. (2018). Emotion regulation and biological stress responding: Associations with worry, rumination, and reappraisal. *Cognition and Emotion, 32*(7), 1487–1498. https://doi.org/10.1080/02699931.2017.1310088

Li, C. H. (2016). Confirmatory factor analysis with ordinal data: Comparing robust maximum likelihood and diagonally weighted least squares. *Behavior Research Methods, 48*(12), 936–949. https://doi.org/10.3758/s13428-015-0619-7

LimeSurvey Project Team. (2015). *LimeSurvey: An open source survey tool.* LimeSurvey Project, Hamburg, Germany. https://www.limesurvey.org

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*(2), 130–149. https://doi.org/10.1037/1082-989X.1.2.130

Marchetti, I., Loeys, T., Alloy, L. B., & Koster, E. H. (2016). Unveiling the structure of cognitive vulnerability for depression: Specificity and overlap. *PLoS One, 11*(12), Article e0168612. https://doi.org/10.1371/journal.pone.0168612

Mardia, K. V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika, 57*(3), 519–530. https://doi.org/10.1093/biomet/57.3.519

Martin, P. (2003). The epidemiology of anxiety disorders: A review. *Dialogues in Clinical Neuroscience, 5*(3), 281–298. https://doi.org/10.31887/DCNS.2003.5.3/pmartin

McDonald, R. P. (2013). *Test theory: A unified treatment.* Psychology Press. https://doi.org/10.4324/9781410601087

PsychOpen GOLD

McElroy, E., Fearon, P., Belsky, J., Fonagy, P., & Patalay, P. (2018). Networks of depression and anxiety symptoms across development. *Journal of the American Academy of Child and Adolescent Psychiatry, 57*(12), 964–973. https://doi.org/10.1016/j.jaac.2018.05.027

Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods, 17*(3), 437–455. https://doi.org/10.1037/a0028085

Michael, T., Zetsche, U., & Margraf, J. (2007). Epidemiology of anxiety disorders. *Psychiatry, 6*(4), 136–142. https://doi.org/10.1016/j.mppsy.2007.01.007

Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology, 49*(1), 377–412. https://doi.org/10.1146/annurev.psych.49.1.377

Nilges, P., & Essau, C. (2015). Die Depressions-Angst-Stress-Skalen [The Depression-Anxiety-Stress Scales]. *Der Schmerz, 29*(6), 649–657. https://doi.org/10.1007/s00482-015-0019-z

Overmeyer, R., & Endrass, T. (2022). *Differentiating anxiety and depression using a German version of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA)* [Data file]. https://osf.io/j48rg/

Park, S.-C., & Kim, D. (2020). The centrality of depression and anxiety symptoms in major depressive disorder determined using a network analysis. *Journal of Affective Disorders, 271*, 19–26. https://doi.org/10.1016/j.jad.2020.03.078

Pomerantz, A. M., & Rose, P. (2014). Is depression the past tense of anxiety? An empirical study of the temporal distinction. *International Journal of Psychology, 49*(6), 446–452. https://doi.org/10.1002/ijop.12050

R Core Team. (2018). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org

Ree, M. J., French, D., MacLeod, C., & Locke, V. (2008). Distinguishing cognitive and somatic dimensions of state and trait anxiety: Development and validation of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). *Behavioural and Cognitive Psychotherapy, 36*(3), 313–332. https://doi.org/10.1017/S1352465808004232

Renner, K. H., Hock, M., Bergner-Kother, R., & Laux, L. (2018). Differentiating anxiety and depression: The State-Trait Anxiety-Depression Inventory. *Cognition and Emotion, 32*(7), 1409–1423. https://doi.org/10.1080/02699931.2016.1266306

Revelle, W., & Zinbarg, R. E. (2009). Coefficients alpha, beta, omega, and the glb: Comments on Sijtsma. *Psychometrika, 74*(1), 145–154. https://doi.org/10.1007/s11336-008-9102-z

Roberts, K. E., Hart, T. A., & Eastwood, J. D. (2016). Factor structure and validity of the State-Trait Inventory for Cognitive and Somatic Anxiety. *Psychological Assessment, 28*(2), 134–146. https://doi.org/10.1037/pas0000155

Ruscio, J., & Roche, B. (2012). Determining the number of factors to retain in an exploratory factor analysis using comparison data of known factorial structure. *Psychological Assessment, 24*(2), 282–292. https://doi.org/10.1037/a0025697

Schwartz, G. E., Davidson, R. J., & Goleman, D. J. (1978). Patterning of cognitive and somatic processes in the self-regulation of anxiety: Effects of meditation versus exercise. *Psychosomatic Medicine, 40*(4), 321–328. https://doi.org/10.1097/00006842-197806000-00004

PsychOpen GOLD

Seekatz, B., Meng, K., Bengel, J., & Faller, H. (2016). Is there a role of depressive symptoms in the fear-avoidance model? A structural equation approach. *Psychology, Health & Medicine, 21*(6), 663–674. https://doi.org/10.1080/13548506.2015.1111392

Shin, K. E. (2020). *Dynamics of symptom relations in major depressive disorder and generalized anxiety disorder: Time-series network analysis approach* [Unpublished doctoral thesis]. Pennsylvania State University.

Spielberger, C. D. (1966). Theory and research on anxiety. *Anxiety and Behavior, 1*(3), 413–428.

Spielberger, C., Gorsuch, R., Lushene, R., Vagg, P., & Jacobs, G. (1983). *Manual for the State-Trait Anxiety Inventory (form Y self-evaluation questionnaire).* Consulting Psychologists Press.

Starr, L. R., & Davila, J. (2012a). Cognitive and interpersonal moderators of daily co-occurrence of anxious and depressed moods in generalized anxiety disorder. *Cognitive Therapy and Research, 36*(6), 655–669. https://doi.org/10.1007/s10608-011-9434-3

Starr, L. R., & Davila, J. (2012b). Responding to anxiety with rumination and hopelessness: Mechanism of anxiety-depression symptom co-occurrence? *Cognitive Therapy and Research, 36*(4), 321–337. https://doi.org/10.1007/s10608-011-9363-1

Starr, L. R., & Davila, J. (2012c). Temporal patterns of anxious and depressed mood in generalized anxiety disorder: A daily diary study. *Behaviour Research and Therapy, 50*(2), 131–141. https://doi.org/10.1016/j.brat.2011.11.005

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences, 42*(5), 893–898. https://doi.org/10.1016/j.paid.2006.09.017

Styck, K. M., Rodriguez, M. C., & Yi, E. H. (2022). Dimensionality of the State–Trait Inventory of Cognitive and Somatic Anxiety. *Assessment, 29*(2), 103–127. https://doi.org/10.1177/1073191120953628

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5). Pearson.

Tindall, I. K., Curtis, G. J., & Locke, V. (2021). Dimensionality and measurement invariance of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA) and validity comparison with measures of negative emotionality. *Frontiers in Psychology, 12*, Article 644889. https://doi.org/10.3389/fpsyg.2021.644889

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Multidimensional Assessment of Strengths and Their Association With Mental Health in Psychotherapy Patients at the Beginning of Treatment

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Abstract

Background: Modern concepts assume that mental health is not just the absence of mental illness but is also characterized by positive well-being. Recent findings indicated a less pronounced distinction of positive and negative mental health dimensions in clinical samples. Self-perceived strengths were associated with markers of mental health in healthy individuals. However, analyses of strengths and their association with different mental health variables in clinical populations are scarce.

Method: A cross-sectional design was conducted at a German outpatient training and research center. 274 patients before treatment (female: 66.4%, mean age = 42.53, SD = 13.34, range = 18-79) filled out the Witten Strengths and Resource Form (WIRF), a multidimensional self-report of strengths, as well as other instruments assessing positive and negative mental health variables. Data was analyzed with structural equation modeling and latent regression analyses.

Results: Confirmatory factor analysis of the WIRF showed good model fit for the assumed three-subscale solution. Regarding mental health, a one-factor model with positive and negative variables as opposite poles showed acceptable fit. A correlated dual-factor model was not appropriate for the data. All WIRF subscales significantly predicted unique parts of variance of the latent mental illness factor ($p = .035 - p < .001$).

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Conclusion: The context-specific assessment of patients' strengths was confirmed and led to an information gain in the prediction of mental health. Results suggest that positive and negative facets of mental health are highly entwined in people with pronounced symptoms. The scientific and practical implications of these findings are discussed.

Keywords

strengths, resources, resilience, mental health, dual-factor model, structural equation model

Highlights

- The Witten Strengths and Resource Form (WIRF) captures strengths in three situational contexts.
- A confirmatory factor analysis supported the context-structure of the WIRF in a clinical sample.
- Positive and negative mental health variables were highly correlated in patients before treatment.
- WIRF subscales provided incremental information in the prediction of patients' mental health.

Traditionally mental health has been understood as the absence of psychopathology. This view suggests that people are either mentally ill or mentally healthy at a given point in time. In contrast, modern dual-factor models emphasize a two-dimensional structure of mental health (Keyes, 2002; WHO, 2005). According to such models, a dimension of negative mental health (NMH) is defined by the absence or presence of mental illness and burden, whereas a positive mental health (PMH) dimension is characterized by high or low emotional, psychological, and social well-being. In contrast to the unidimensional view of mental health, two-factor models assume that these two dimensions are negatively related but still distinct from each other (Iasiello et al., 2020; Keyes, 2005). On the one hand, this means that individuals with mental disorders can still have moderate to high levels of well-being. On the other hand, a person with low well-being may not necessarily develop psychopathology. These assumptions were examined using various statistical approaches in healthy samples (Iasiello et al., 2020). In most studies, both dimensions were assessed with specific instruments and then examined with confirmatory factor analysis or structural equation models (SEM). These procedures are used when created theoretical models are to be tested with empirical data (Schreiber et al., 2006). Latent factors, such as mental health, that cannot be measured directly are extracted from the observed data. This allows a way to determine whether the study participants' data are more consistent with a one-dimensional or a two-factor understanding of mental health. Findings with healthy samples consistently showed that a model with two correlated factors (NMH and PMH) best reflects mental health (Kim et al., 2014; Magalhães & Calheiros, 2017). This result means that psychopathology is only on average and not

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necessarily associated with lower well-being. If NMH and PMH are at least partially distinct factors, it may be useful to examine specific correlates and predictors of these two dimensions (Schotanus-Dijkstra et al., 2017).

Findings from clinical samples showed mixed results for the dual-factor hypothesis. Most studies also found evidence for a correlated two-dimensional model of mental health (Alterman et al., 2010; de Vos et al., 2018; Díaz et al., 2018; Franken et al., 2018; Teismann et al., 2018; Tomba et al., 2014). On the other hand, van Erp Taalman Kip and Hutschemaekers (2018) showed that only a one-factor model of mental health fitted the data in an outpatient sample (n = 1069). The authors stated that psychopathology and well-being were more entwined in people with pronounced symptoms than in healthy subjects. This would imply that high psychopathology is almost always connected with low well-being (van Erp Taalman Kip & Hutschemaekers, 2018). One possible reason for this may be that people with mental disorders experience high levels of negative affect, meaning they often feel bad in everyday life (Stanton & Watson, 2014). This, in turn, could make it more difficult to feel good about potentially pleasant experiences or situations (Carl et al., 2013). Such limited positive reactivity might prevent individuals with marked psychopathology from also feeling well (at least temporarily). Statistically, such a global perception by patients of either feeling bad or good is expressed in a high negative correlation between psychopathology and well-being. Various studies, including the ones that found evidence for a dual-factor structure of mental health, found large correlations of NMH and PMH measures in clinical samples, r = -.67 – -.72 (Bos et al., 2016; Franken et al., 2018; Lukat et al., 2016; van Erp Taalman Kip & Hutschemaekers 2018). These correlations are significantly higher than in healthy individuals, suggesting that patients may have less access to or less acknowledge positive experiences and situations at the beginning of psychotherapy because these are overshadowed by high symptom burden (Iasiello et al., 2020). In turn, this makes it difficult for clinicians to utilize the positive experience of patients in psychotherapy.

Psychological strengths (also named resources; Munder et al., 2019) are discussed as promotive factors of mental health for both healthy and clinical samples (Grawe & Grawe-Gerber, 1999; Taylor & Broffman, 2011). Strengths are defined as already existing intra- and interpersonal potentials and abilities of a person (Grawe, 1997; Willutzki, 2008). Several authors argued that an aspect is defined as a strength by the following criteria: (1) subjective positive evaluation, and/or (2) functionality to reach personal goals (Grawe 1997; Willutzki, 2008). The literature often distinguishes personal and social strengths (Taylor & Broffman, 2011). Examples of personal strengths are the optimistic handling of difficulties and the implementation of individually positive activities, while social strengths are characteristics that help to form good relationships or perceive contacts. Current concepts of strengths point to the importance of situational context in judging whether an aspect is positive and/or helpful (Flückiger, 2009; Taylor & Broffman, 2011; Willutzki, 2008). For example, a supporting family member or friend can be a high-

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ly important resource to cope with everyday problems. However, a supporting person may also be part of the avoidance system of an anxiety disorder, making approach coping more difficult in this specific situation. Research findings further indicated that aspects, rated as strengths by the person him-/herself (self-perceived strengths), are stronger related to good mental health outcomes compared to observer rated factors (Melrose et al., 2015; Prati & Pietrantoni, 2010). Various studies showed that self-perceived strengths were strongly associated with higher PMH and predicted participants' long-term well-being in healthy samples (Gloria & Steinhardt, 2016; Mc Elroy & Hevey, 2014; Niemeyer et al., 2019; Siedlecki et al., 2014).

Strengths and their relationship to mental health are less researched in clinical populations, although the activation of strengths is a widely supported mechanism in psychotherapy (Munder et al., 2019). It is assumed that people with mental disorders often do not perceive possible strengths in themselves as strengths, although these are recognized as such by outsiders (For example, the therapist values the patient's creativity as helpful, while the patient perceives it as trivial for coping with the problem). High levels of psychopathology appear to be associated with negativity biases, which may be one reason why patients have less access to their own strengths that are present despite their distress (Stanton & Watson, 2014; Trompetter et al., 2017). With respect to this, two studies showed that both psychiatric inpatients and psychotherapy outpatients report significantly lower levels of self-perceived strengths compared to healthy individuals with large effect sizes for this difference (Goldbach et al., 2020; Victor et al., 2019). Most available instruments assess strengths over all situations a person experiences (trans-situational). Such global measures can be problematic in clinical samples because they only reflect that patients have a strong focus on their problems and, in turn, a low perception of their strengths (Iasiello et al., 2022; Joseph & Wood, 2010). Thus, such instruments do not provide additional information compared to problem measurements in the clinical context.

Therefore, Victor et al. (2019) developed the Witten Strengths and Resource Form (WIRF), an assessment tool designed to capture strengths in three situational contexts: (1) strengths in everyday life (EvdayS), (2) strengths used to successfully cope with previous crises (CrisesS), and (3) strengths in connection with current problems (ProbS). The multidimensional structure was transferred from an existing diagnostic interview and obtained for the questionnaire by means of an exploratory factor analysis using data from a sample of 144 psychotherapy patients (Victor et al., 2019; Willutzki et al., 2005). To determine construct validity, the subscales were correlated with relevant instruments: All subscales showed significant positive correlations with an established strengths instrument (Tagay et al., 2014; Victor et al., 2019). The instrument is designed to capture how patients rate their strengths in dealing with different situations. A person may indeed have different thoughts about how pronounced and helpful one's strengths are in different circumstances, so that diverse aspects of patients' perceptions could be

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represented by the subscales of the WIRF. For example, people who are currently under a lot of stress, but at the same time know what strengths have helped them in the past, may feel more able to manage the difficulty. The inclusion of different subscales of the WIRF would amount to incremental prediction of, for example, mental health, because the subscales contain different information of patients' experience. However, whether the subscales of the WIRF capture different aspects of strengths perception is still unclear and needs to be confirmed confirmatory in a larger sample.

Objectives

To the best of our knowledge, no study has yet analyzed the association of strengths with different mental health variables in the clinical context. The first aim of this study was to confirm the three-subscale structure of the WIRF in a sample of psychotherapy outpatients. Furthermore, to extend research on the dual-factor model, the second aim was to analyze the latent factor structure of mental health in psychotherapy outpatients with different positive and negative measures. The third aim of this study was to explore whether the strengths subscales of the WIRF may predict unique parts of patients' mental health/mental illness.

> *H1:* It is expected that the structure of the WIRF with (1) strengths in everyday life (EvdayS), (2) strengths used to successfully cope with previous crises (CrisesS), and (3) strengths in connection with current problems (ProbS) as separate subscales will show a good model fit in a clinical sample.
>
> *H2*: It is expected that a dual-factor model of mental health – with PMH and NMH as correlated, but distinct factors – will be a more appropriate description of mental health related data in a clinical sample compared to a one-factor model with PMH and NMH as opposite poles of the same dimension. To address this hypothesis, two latent factor models will be created based on actual measurements and tested against each other in terms of model fit.
>
> *H3*: It is further hypothesized that all WIRF subscales will significantly predict unique variance in the latent factors of mental health/mental illness. For the EvdayS scale, small to moderate positive correlations are expected only with measures of PMH. For the CrisesS scale, small to moderate correlations are expected with measures of PMH (positively directed) and NMH (negatively directed). ProbS is expected to correlate strongly positive with PMH measures and strongly negative with NMH measures.

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Method

Design and Sample Description

Participants were recruited between 2016 and 2019 at the Center of Mental Health and Psychotherapy (CMHP), an outpatient training and research center for cognitive behavioral therapy (CBT) at Witten/Herdecke University, Germany. A cross-sectional design was applied where patients filled out all instruments at one point in time before the first psychotherapy session. General inclusion criteria were as follows: (1) at least one mental disorder according to DSM-IV criteria, (2) at least 16 years of age, (3) sufficient German language skills. Patients that fulfilled inclusion criteria were informed about the study procedures and signed the informed consent. After study inclusion, patients' diagnoses were determined with the Structured Clinical Interview for DSM-IV (SCID; Wittchen et al., 1997) within the first treatment sessions. Diagnostic interviews were performed by licensed CBT therapists or trainee therapists in advanced CBT training. All therapists were trained in the use of diagnostic interviews in prior workshops as a part of their training schedules.

The total sample consisted of 274 adult psychotherapy outpatients (female: 66.4%, M_{age} = 42.53, *SD* = 13.34, range = 18-79). Most common primary diagnoses were affective disorders (33.58%), anxiety disorders (17.88%), and adjustment disorders (12.04%). 33 patients (12.04%) had at least two disorders. On average, patients had 1.14 diagnoses (*SD* = 0.40, range: 1-3). More than half the patients (52.55%) had prior psychological treatment. Table 1 shows demographic data of the clinical sample.

Instruments

Self-Perceived Strengths

Patients' strengths were assessed with the WIRF (Victor et al., 2019). The instrument conceptualized strengths as individually usable abilities that help to cope with specific situations (Munder et al., 2019; Taylor & Broffman, 2011). The WIRF is a multidimensional self-report with 36 items (Likert scale from 0 "completely disagree" to 5 "completely agree"), assessing a person's strengths with three subscales: strengths in everyday life (EvdayS), strengths in previous successful crises management (CrisesS), and strengths in connection with current problems (ProbS). Participants are presented with various strengths and asked to what extent they were able to use them in the specific context. In each subscale, the same 12 items are presented in a different order to compare a person's perception of strengths across contexts. Each subscale starts with a short introduction referring to the context (e.g., for CrisesS: In the next step we would like to ask you to think back to rather difficult times of your life. Everybody goes through such times. Please now think of a situation that was difficult for you to handle, but which you nevertheless tackled successfully, i.e., a situation about which you would say today: "I handled

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Table 1

Description of the Clinical Sample

Characteristic		
	M	***SD***
Age	42.53	13.34
	n	**%**
Gender		
Female	182	66.42
Male	86	31.39
Missing	6	2.19
Relationship status[a]		
Single	80	29.20
In a relationship	146	53.28
Level of education[a]		
No graduation	4	1.46
Secondary education	56	20.44
A levels	46	16.79
Academic degree	36	13.14
Completed apprenticeship	122	44.53
Employment[a]		
Employed	164	60.00
Self-employed	7	2.55
Unemployed	49	17.88
Training/Studies	3	1.09
Retired	29	10.58

[a]optional answer.

that pretty well", or "I'm quite happy with myself about how I did that". The following statements suggest some possible actions people can take in difficult situations).

A mean score was calculated for each subscale, which represents a patient's global perception of whether he/she experiences his or her existing strengths as sufficient and helpful in the respective context. Items can be further grouped into three themes: action regulation (planning and performing activities), relaxation (taking time to relax and enjoy life), and social strengths (helpful interaction patterns).

The WIRF was developed based on a multidimensional concept from an existing diagnostic interview (Willutzki et al., 2005). A survey of psychotherapy experts, identifying relevant strengths, was conducted to create an item pool. After this, a preliminary strengths questionnaire was developed and tested in a sample of psychotherapy outpa-

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tients different from the one in this study (n = 144), yielding to the WIRF. Item indices as well as psychometric properties were analyzed in both a clinical sample and healthy controls (Victor et al., 2019). All subscales showed good internal consistency (α = .84 – .88). Moreover, the subscales showed hypothesis-consistent correlations with other strengths and social support assessments, indicating convergent validity (Victor et al., 2019).

PMH Constructs

The WHO-5 Well-Being Index — The WHO-5 (Bech et al., 2003; WHO, 1998) is an internationally used five item self-report to assess the general subjective well-being of a person in the last two weeks (Likert scale from 0 "At no time" to 5 "All the time"). Subjective well-being is characterized by the frequency of positive feelings and one's satisfaction with life (Topp et al., 2015). A mean score of the five items was used to represent a person's general well-being in this study. The German version showed excellent internal consistency, α = .92 (Brähler et al., 2007). Moreover, a systematic review indicated good construct and predictive validity of the instrument in healthy and clinical samples (Topp et al., 2015). Internal consistency in our sample was α = .88.

The Sense of Coherence Scale – Short Form — The SOC-L9 (Schumacher et al., 2000) assesses a person's sense of coherence as conceptualized in the salutogenic model of health (Antonovsky, 1987). Sense of coherence is operationalized by three components (comprehensibility, manageability, meaningfulness) and describes the global orientation of an individual that he/she has the resources to cope with stress and life in general (Antonovsky, 1987). The instrument contains nine items (Likert scale from 1 "Very often" to 7 "Rarely/Never"), from which a mean score is formed that reflects the global sense of coherence. The German version showed good internal consistency, α = .87 (Singer & Brähler, 2007). Another study showed evidence for construct validity of the SOC-L9 with significant correlations with established PMH scales, r = .60 – .64 (Lin et al., 2020). Internal consistency in our sample was α = .85.

NMH Constructs

The Brief Symptom Inventory – Short Version — The BSI-18 (Spitzer et al., 2011) is a self-report measure to assess psychopathology in the last week. It contains 18 items (Likert scale from 0 "Not at all" to 4 "Nearly every day"), measuring symptoms of somatization, anxiety, and depression. The global severity index (GSI) of the instrument was used to represent a person's level of general psychopathology in this study. Internal consistency of the GSI was good to excellent in several clinical samples, α = .88 – .93 (Franke et al., 2017; Spitzer et al., 2011). Internal consistency in our sample was α = .89.

The Perceived Stress Questionnaire — The PSQ-20 (Fliege et al., 2001) is an internationally used self-report measure to assess stress experience in the last four weeks.

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Stress is operationalized by four components (tension, worries, overload, lack of joy) and represents the global level of current burden. The instrument contains 20 items (Likert scale from 1 "Almost never" to 5 "Usually"), that were averaged to a mean score in this study. The German version showed good internal consistency, α = .80 – .86 (Fliege et al., 2001). Moreover, evidence of construct validity was indicated with negative associations with quality of life and social support measures (Fliege et al., 2001). Internal consistency in our sample was α = .92.

The Incongruence Questionnaire – Short Version — The K-INK (Grosse Holtforth & Grawe, 2003) is a self-report assessing psychological incongruence resulting from an insufficient realization of motivational goals. A high level of incongruence occurs when a person's real-world experiences do not match with their desired goal states. The authors stated that incongruence is closely related to the experience of psychopathological symptoms (Grosse Holtforth & Grawe, 2003). It consists of 23 items (Likert scale from 1 "Far too little" to 5 "Perfectly good") measuring incongruence in the context of both approximation and avoidance. A mean score was formed from the 23 items representing global incongruence. The German version showed good to excellent internal consistency in clinical samples, α = .87 – .91 (Grosse Holtforth & Grawe, 2003). Internal consistency in our sample was α = .89.

Statistical Analyses

All analyses were conducted using R, version 3.6.3, packages: lavaan (Rosseel, 2012). Descriptive statistics of sample characteristics and analyzed variables were determined. Normality of analyzed variables was tested with separate Shapiro-Wilk's tests. Bivariate correlations between analyzed variables were determined and tested with a significance level of α = .05.

In order to examine the main hypotheses, SEM using maximum likelihood estimation with robust standard errors (Huber-White) and scaled test-statistics were conducted (MLR; Rosseel, 2012). This procedure allows constructs that are not directly observable to be derived from the data (latent factors) and placed in relation to one another (Schreiber et al., 2006). Goodness of fit for all models was evaluated with a combination of well-established fit indices: comparative fit index (CFI), root mean square of approximation (RMSEA), standardized root mean square residual (SRMR). Hu and Bentler (1999) recommended the following criteria: CFI ≥ .95, RMSEA ≤ .06, SRMR ≤ .08 (good fit); CFI ≥ .90, RMSEA ≤ .08 (acceptable fit). Moreover, chi-square statistics for each SEM were determined. Several studies found that results of chi-square tests in SEM were highly related to sample size, therefore, it was not used for an interpretation of model fit in this study (Hu & Bentler, 1999; Peugh & Feldon, 2020).

To examine the first hypothesis, whether the subscales of the strengths instrument capture different facets, a SEM with the latent variables WIRF-EvdayS, WIRF-CrisesS,

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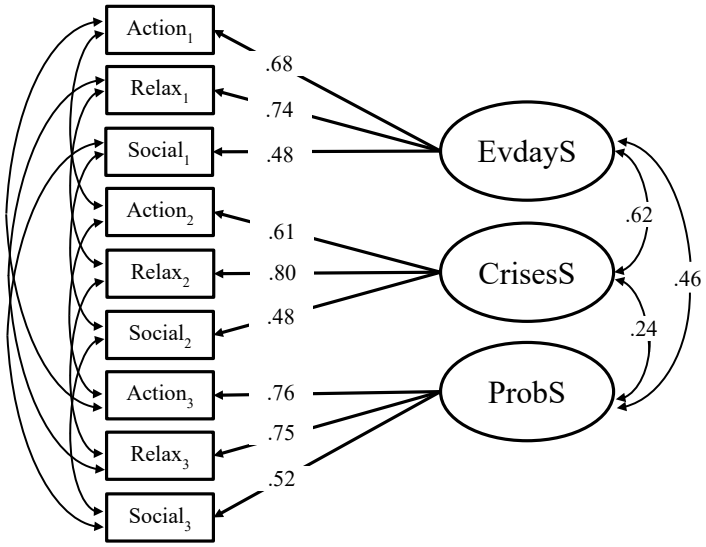
and WIRF-ProbS was arranged. Latent variables are usually defined with the single items of the respective measure. However, based on assumptions from prior studies, it was assumed that such a model would have included too many parameters and would have led to estimation problems with respect to the sample size (Little et al., 2002). Therefore, item parceling was used to reduce the number of parameters in this SEM. Parceling describes that a subset of items is bundled to packages. In this case, the single items were averaged to scores of the three strengths themes found by Victor et al. (2019): action regulation (5 items) relaxation (4 items) social strengths (3 items). Latent variables were defined with the item bundles in each context (see Figure 1). All latent variables were allowed to covary. Furthermore, residual covariances were allowed between corresponding manifest variables in the three subscales (e.g., relaxation in WIRF-EvdayS and WIRF-CrisesS).

Figure 1

Structural Equation Model of the Three-Subscale Solution of the WIRF



Note. EvdayS = Witten Strengths and Resource Form, strengths in everyday life; CrisesS = Witten Strengths and Resource Form, strengths used in prior crises; ProbS = Witten Strengths and Resource Form, in connection with current problems; Action/Relax/Social = Items of WIRF parceled to action regulation, relaxation, and social support.

To examine the second hypothesis, two measurement models for mental health were compared. The first model assumed a dual-factor structure with WHO-5 and SOC-L9 being indicators of a latent variable representing PMH and BSI-18, PSQ-20 and K-INK being indicators of a latent variable representing NMH. Latent variables were allowed

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to covary. The second model assumed a one-factor structure with all manifest variables loading on one latent variable. Models were compared with Akaike Information Criterion (AIC) to determine which model better fit the data. The AIC is used to compare nested models, with lower values indicating a better model fit (Boedeker, 2017).

To examine the third hypothesis, a SEM combining the better fitting model of mental health from Hypothesis 2 with the WIRF model from Hypothesis 1 was arranged. Stepwise regression analyses with the latent variables WIRF-EvdayS, WIRF-CrisesS, and WIRF-ProbS as predictors of the latent mental health/illness factor were conducted and tested with a significance level of $\alpha = .05$.

Results

Preliminary Analyses

Total missing data was 4.93%. All analyzed variables but WIRF-ProbS showed deviations from the normal distribution, $p = .028 - p < .001$. Therefore, non-parametric correlations (Spearman) were determined for these relationships: WIRF subscales as manifest variables were significantly correlated with moderate to large coefficients, $r = .35$ - $.60$, $ps < .001$. All PMH and NMH variables were strongly correlated to each other. WIRF-EvdayS and WIRF-CrisesS showed modest correlation coefficients in their association with PMH and NMH variables. WIRF-ProbS was moderately to strongly correlated to PMH and NMH measures. Table 2 shows descriptive statistics and correlations of analyzed variables.

Measurement Models

The first step was to review the context structure of the WIRF. Although the chi-square test statistic was statistically significant, the other fit indices suggested that the three-subscale solution for the WIRF could be confirmed by means of confirmatory factor analysis, $\chi^2_{MLR}(15) = 28.43$, $p = .019$, CFI = .98, RMSEA = .06, SRMR = .06. Although all WIRF subscales consist of the same items, three delineable factors could be filtered from the data. Thus, it seems warranted to assess strengths in the different contexts separately, since the subscales overlap only partially.

In a next step, the dual- and the one-factor model of mental health were computed and compared against each other. The model fit for the dual-factor model was good regarding CFI (.99) and SRMR (.02). However, χ^2_{MLR}-test statistic was significant, $\chi^2(4) = 12.29$, $p = .015$, and the RMSEA of .09 was too large. The AIC was 2275.38. Moreover, the covariance matrix of the latent variables in the dual-factor model was not positive definite due to a high estimated correlation between NMH and PMH suggesting virtual identity of the two latent variables.

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Table 2

Descriptive Statistics and Correlations of Analyzed Variables

Measure	1	2	3	4	5	6	7	8
1. WIRF-EvdayS	–							
2. WIRF-CrisesS	.60***	–						
3. WIRF-ProbS	.43***	.35***	–					
4. WHO-5	.19**	.18**	.55***	–				
5. SOC-L9	.16**	.24***	.42***	.50***	–			
6. BSI-18	-.12	-.14*	-.44***	-.56***	-.67***	–		
7. PSQ-20	-.11	-.13*	-.44***	-.58***	.67***	.61***	–	
8. K-INK	-.19**	-.17**	-.50***	-.53***	.75***	.59***	.68***	–
M	3.39[a]	3.00[a]	2.87[a]	1.62[b]	3.80[c]	1.13[d]	2.89[e]	3.05[f]
SD	0.82	0.91	0.94	1.00	1.13	0.72	0.56	0.66

Note. Spearman ρ coefficients are displayed; WIRF-EvdayS = Witten Strengths and Resource Form, strengths in everyday life; WIRF-CrisesS = Witten Strengths and Resource Form, strengths used in prior crises; WIRF-ProbS = Witten Strengths and Resource Form, strengths in connection with current problems; WHO-5 = WHO-5 Well-being Index; SOC-L9 = Sense of Coherence scale – Short form; BSI-18 = Brief Symptom Inventory – Short version; PSQ-20 = Perceived Stress Questionnaire; K-INK = Incongruence questionnaire – Short version.

[a]n = 274. [b]n = 257. [c]n = 258. [d]n = 245. [e]n = 243. [f]n = 259.

*p < .05. **p < .01. ***p < .001.

The fit of the one-factor model, however, was worse compared to the dual-factor model, $\chi^2_{MLR}(5) = 25.54$, $p < .001$, CFI = .97, RMSEA = .13, SRMR = .03, AIC = 2287.22. In sum, the dual-factor model led to estimation problems, but the one-factor model did not describe the data adequately. Therefore, we sought to improve the data description of the one-factor model, which could be achieved by allowing a residual correlation between the two indicators of PMH (i.e., WHO-5 and SOC). This led to a trending acceptable data fit of the one-factor model, $\chi^2_{MLR}(4) = 12.29$, $p = .015$, CFI = .99, RMSEA = .09, SRMR = .02, AIC = 2275.38. Thus, confirmatory factor analysis revealed that a dual-factor structure for mental health with a differentiation between positive and negative aspects was not appropriate in our sample. The closest fit was a bipolar model (one factor) in which high mental illness was almost always associated with low mental health. The further analyses were conducted based on the adjusted one-factor model. The latent factor of this model will be named mental illness in the following, because NMH constructs loaded positively, while PMH constructs loaded negatively on that factor (see Figure 2).

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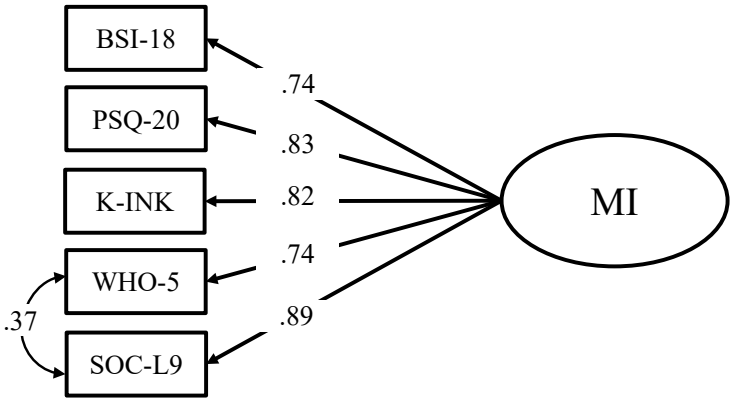
Figure 2

Structural Equation Model of the One-Factor Model of Mental Illness



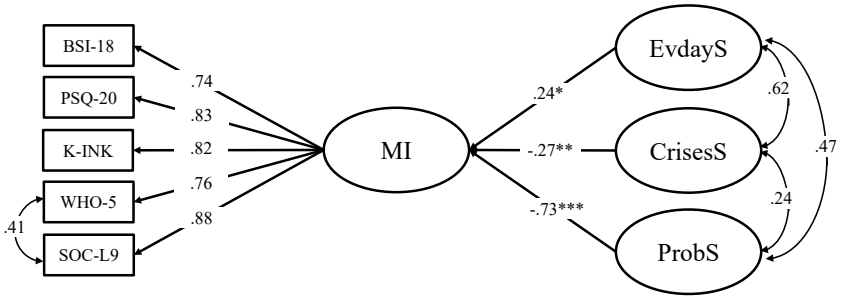
Note. MI = Latent mental illness factor; BSI-18 = Brief Symptom Inventory – Short version; PSQ-20 = Perceived Stress Questionnaire; K-INK = Incongruence questionnaire – Short version; WHO-5 = WHO-5 Well-being Index; SOC-L9 = Sense of Coherence scale – Short form.

Latent Regression Analyses

After having established measurement models of strengths and mental health, we investigated the relationship between the WIRF subscales and general mental illness by means of a latent regression analysis (see Figure 3).

Figure 3

Core of the Structural Equation Model for the Regression of the WIRF Subscales on Mental Illness



Note. EvdayS = Witten Strengths and Resource Form, strengths in everyday life; CrisesS = Witten Strengths and Resource Form, strengths used in prior crises; ProbS = Witten Strengths and Resource Form, in connection with current problems; MI = Latent mental illness factor; BSI-18 = Brief Symptom Inventory – Short version; PSQ-20 = Perceived Stress Questionnaire; K-INK = Incongruence questionnaire – Short version; WHO-5 = WHO-5 Well-being Index; SOC-L9 = Sense of Coherence scale – Short form.

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When mental illness was regressed on the three subscales of the WIRF separately, all three regression coefficients were statistically significant with β = -0.36, p = .007, for WIRF-EvdayS, β = -0.29, p = .007, for WIRF-CrisesS, and β = -0.67, p < .001, for WIRF-ProbS.

The model resulting from the multiple regression of mental illness on all three WIRF subscales fitted the data well, $\chi^2_{MLR}(61) = 126.12$, p < .001, CFI = .96, RMSEA = .06, SRMR = .05. WIRF-CrisesS and WIRF-ProbS were almost unchanged when compared to the single regression analyses. More self-perceived strengths in these contexts were associated with less mental illness. The two scales are incrementally significant and predict independent proportions of mental illness. However, the link between mental health and WIRF-EvdayS changed its sign from negative to positive. This may be interpreted as a negative suppression effect resulting from the inclusion of other predictors (Beckstead, 2012). In a post-hoc analysis, it was found that the inclusion of WIRF-ProbS affected this suppression effect on WIRF-EvdayS, suggesting that these two subscales share a high common intersection with the criterion (mental illness). WIRF-EvdayS can, therefore, not be considered an independent predictor. Table 3 shows results of the latent regression analysis.

Table 3

Results of the Latent Regression Analysis With All WIRF Subscales Included as Predictors

Variables	*b*	*SE*	*z*	*p*	Std.lv
Criterion: Mental illness[a]					
WIRF-EvdayS	0.20	0.10	2.11	.035	0.24
WIRF-CrisesS	-0.21	0.08	-2.62	.009	-0.27
WIRF-ProbS	-0.44	0.05	-8.69	< .001	-0.73

Note. WIRF-EvdayS = Witten Strengths and Resource Form, strengths in everyday life; WIRF-CrisesS = Witten Strengths and Resource Form, strengths used in prior crises; WIRF-ProbS = Witten Strengths and Resource Form, in connection with current problems; b = estimate of predictor in the SEM; SE = standard error; Std.lv = standardized estimate of the continuous latent variable.

[a]Latent factor of the one-factor model (positive and negative mental health as two opposite poles).

Discussion

One aim of this study was to analyze a multidimensional assessment of strengths developed for the application in clinical samples. Many patients experience a lot of negative feelings and low self-efficacy in dealing with current problems at the beginning of psychotherapy (Tecuta et al., 2015). As studies suggest, the perception of one's own strengths also seems to be limited by this negative perspective. Strengths that are present despite the problems and symptoms (e.g., taking up a hobby) are not necessarily experienced by patients as helpful, although outsiders would name these aspects as strengths. Only

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measuring strengths to deal with current problems seems to provide little information gain in the clinical context, as such measures tend to inversely express problem burden. The assessment tool used in this study (i.e., the WIRF) measured strengths with three subscales: (1) strengths in everyday life (EvdayS), (2) strengths used to successfully cope with previous crises (CrisesS), and (3) strengths in connection with current problems (ProbS). It was intended to examine whether the subscales are indeed distinguishable and whether they provide a better prediction of mental health. Another aim of this study was to test the assumptions of the dual-factor model of mental health on another clinical sample. For this purpose, we investigated whether patients' data at therapy start point to an independence of well-being and distress, or whether only one of these states was experienced at a time.

Results showed that the WIRF subscales were significantly interrelated with moderate to large coefficients. ProbS showed moderate correlation coefficients in relation to PMH and NMH measures, while EvdayS and CrisesS were only slightly associated with these variables. Although each subscale was comprised of the identical 12 items, the three-subscale solution of the WIRF was confirmed. The subscales were filtered out as partially independent factors, suggesting that strengths can be captured in separate contexts by using explicit instructions. Only a one-factor model of mental health/illness was appropriate for data of the clinical sample. NMH measures were positively related, and PMH measures negatively related to the latent factor. This result means that patients with high symptom burden hardly experienced well-being at the same time. All WIRF subscales were significant predictors of the mental illness factor in the latent regression analysis. The coefficients of WIRF-CrisesS and WIRF-ProbS remained stable in the multiple regression analysis. These two subscales were significant and incremental predictors of lower mental illness.

Interpretation of Results

Our first hypothesis was confirmed as findings support the multidimensional structure of the WIRF. Although all subscales query the same 12 items and the same strengths in terms of content, they could be statistically distinguished. The questionnaire uses instructions to focus patients' perceptions on the particular context. In contrast, established instruments only capture positive trait characteristics or strengths that are currently experienced (Peterson & Park, 2009; Tagay et al., 2014). A unique feature of the instrument in this study is that the WIRF also captures strengths that have been used successfully in the past and in good times. This differential assessment of strengths seems to be relevant in clinical samples, as studies indicate a high problem focus and negative affect in patients (Stanton & Watson, 2014). Willutzki (2008) states that the high level of suffering of individuals at the beginning of therapy leads to the fact that they hardly perceive existing strengths in themselves or evaluate them as helpful. In other words, patients' perception of their strengths is strongly related to current distress and can hardly be

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assessed independently of problems (cf. Iasiello et al., 2022). The statistically independent subscales of the WIRF may make existing strengths more visible to patients themselves and their therapists. This might have scientific implications: As shown in the testing of the third hypothesis, the WIRF subscales were independent predictors of mental illness. WIRF-ProbS accounted for the largest proportion of variance, which means that a person with many self-perceived strengths for coping with current problems had fewer symptoms and more well-being. This result was to be expected since successful problem management usually leads to less stress. Beyond this effect, WIRF-CrisesS incrementally predicted mental illness. This indicates that patients who are currently under a lot of stress, but at the same time know what strengths have helped them in the past, have better mental health in comparison to persons with less good strengths awareness. The awareness of strengths in coping with previous crises may be associated to a stable sense of mastery, which was positively related to resilience and mental health in prior studies (Burns et al., 2011). WIRF-CrisesS may be relevant to research that focuses on the description and etiology of mental health in clinical populations, as it seems to be less entwined with psychopathology and, therefore, may contribute to an increase in information (Bos et al., 2016). Moreover, in the context of psychotherapy research, WIRF-CrisesS was found to be a significant predictor of treatment outcome beyond problem-associated measures (Schürmann-Vengels et al., 2022).

The independence of WIRF subscales also provide practical implications: Although recent studies indicated that patients perceive fewer current strengths than healthy individuals, this does not mean that strengths to cope with their problems do not exist (Goldbach et al., 2020; Victor et al., 2019). The results of this study highlight that it makes sense for therapists to actively address existing strengths to further foster mental health. It may be helpful to draw the patient's attention to helpful abilities, pleasant activities, or positive relationships. For example, interventions from the solution-focused brief therapy are recommended because these target situations in which patients have already been able to use their strengths successfully (similar to WIRF-CrisesS; Franklin et al., 2017). The diagnostic of strengths during treatment with the WIRF can have the advantage that patients on the one hand recognize which strengths have helped them in the past (via CrisesS) and on the other hand experience how strengths develop during psychotherapy (via ProbS). Patients answered the subscales differently in this study, which suggests that a comparison between the contexts may provide therapists with additional information. This could facilitate working with patients' strengths in sessions.

The dual-factor model of mental health was not supported in this clinical sample. A high association of positive and negative variables was found, similar to prior studies in this framework (Franken et al., 2018; Lukat et al., 2016; van Erp Taalman Kip & Hutschemaekers, 2018). This finding suggests that positive and negative facets of mental health are more entwined in people with pronounced symptoms than in healthy subjects. One possible explanation for this finding could be that patients focus strongly on bur-

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densome factors at the beginning of psychotherapy. From a clinical perspective, such negativity bias may contribute to patients' poorer ability to perceive positive aspects in their lives or to judge them as relevant (Carl et al., 2013; Gollan et al., 2016). This, in turn, might lead to patients frequently talking about problems and little about positive experience in the therapy session. A recent study also showed that instruments assessing PMH are answered differently by individuals with severe distress than by healthy subjects (Iasiello et al., 2022). Patients may tend to condition their well-being on the presence of psychopathological symptoms and automatically fill out positive questionnaires low. These explanatory attempts should be considered as hypotheses and tested in future research.

Almost all studies on the dual-factor model find degree of independence of positive and negative facets of mental health even in clinical samples (de Vos et al., 2018; Díaz et al., 2018; Franken et al., 2018; Teismann et al., 2018). In addition, a study using ecological momentary assessment in individuals with generalized anxiety disorder showed that these people self-reported several positive phases in their daily lives, despite severe worry (Vîslă et al., 2021). These results suggest that patients can, in principle, also report well-being and positive moments. However, a problem focus often dominates in patients themselves and in therapy. Therefore, it is recommended to provide space for positive reports from patients (even if they are rare or seem small). Therapists should also ask specifically about patients' strengths, exceptions, and positive changes.

Limitations and Future Directions

This study has several limitations. The size of the clinical sample was small for SEM, according to established thumb rules of 5-10 observations per parameter, so that replication studies are needed. On the other hand, simulation studies indicated that even smaller sample sizes could be sufficient for particular SEM analyses (e.g. Wolf et al., 2013). No comparisons to other clinical samples or healthy controls were included, which limits generalizability of the results. Moreover, the cross-sectional design restricted the predictive value assumed in the regression analysis. Longitudinal designs should analyze the predictive relevance of the strengths subscales for PMH and NMH. Furthermore, moderation analyses should differentiate how resources act on mental health in clinical samples. Our results suggest the assessment of strengths in psychotherapy studies. Repeated assessment of strengths during treatment should trace potential increases of PMH and related process factors.

Conclusion

The WIRF is a promising complementary instrument of strengths in clinical psychology and psychotherapy. Its multidimensional structure reaching beyond current problems is a unique feature of the instrument and may be relevant for etiology and intervention

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studies. The results of this study suggest that PMH is not easily detected in the presence of simultaneous marked psychopathology. This underlines the relevance of differential assessments of patients' positive facets.

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References

Alterman, A. I., Cacciola, J. S., Ivey, M. A., Coviello, D. M., Lynch, K. G., Dugosh, K. L., & Habing, B. (2010). Relationship of mental health and illness in substance abuse patients. *Personality and Individual Differences, 49*(8), 880–884. https://doi.org/10.1016/j.paid.2010.07.022

Antonovsky, A. (1987). *Unraveling the mystery of health: How people manage stress and stay well.* Jossey-Bass.

Bech, P., Olsen, L. R., Kjoller, M., & Rasmussen, N. K. (2003). Measuring well-being rather than the absence of distress symptoms: A comparison of the SF-36 Mental Health subscale and the WHO-Five Well-Being Scale. *International Journal of Methods in Psychiatric Research, 12*(2), 85–91. https://doi.org/10.1002/mpr.145

Beckstead, J. W. (2012). Isolating and examining sources of suppression and multicollinearity in multiple linear regression. *Multivariate Behavioral Research, 47*(2), 224–246. https://doi.org/10.1080/00273171.2012.658331

Boedeker, P. (2017). Hierarchical linear modeling with maximum likelihood, restricted maximum likelihood, and fully Bayesian estimation. *Practical Assessment, Research, and Evaluation, 22*, Article 2. https://doi.org/10.7275/5vvy-8613

Bos, E. H., Snippe, E., de Jonge, P., & Jeronismus, B. F. (2016). Preserving subjective wellbeing in the face of psychopathology: Buffering effects of personal strengths and resources. *PLoS ONE, 11*(3), Article e0150867. https://doi.org/10.1371/journal.pone.0150867

PsychOpen GOLD

Brähler, E., Mühlan, H., Albani, C., & Schmidt, S. (2007). Teststatistische Prüfung und Normierung der deutschen Versionen des EUROHIS-QOL Lebensqualität-Index und des WHO-5 Wohlbefindens-Index. *Diagnostica, 53*(2), 83–96. https://doi.org/10.1026/0012-1924.53.2.83

Burns, R. A., Anstey, K. J., & Windsor, T. D. (2011). Subjective well-being mediates the effects of resilience and mastery on depression and anxiety in a large community sample of young and middle-aged adults. *Australian and New Zealand Journal of Psychiatry, 45*(3), 240–248. https://doi.org/10.3109/00048674.2010.529604

Carl, J. R., Soskin, D. P., Kerns, C., & Barlow, D. H. (2013). Positive emotion regulation in emotional disorders: A theoretical review. *Clinical Psychology Review, 33*(3), 343–360. https://doi.org/10.1016/j.cpr.2013.01.003

de Vos, J. A., Radstaak, M., Bohlmeijer, E. T., & Westerhof, G. J. (2018). Having an eating disorder and still being able to flourish? Examination of pathological symptoms and well-being as two continua of mental health in a clinical sample. *Frontiers in Psychology, 9*, Article 2145. https://doi.org/10.3389/fpsyg.2018.02145

Díaz, D., Stavraki, M., Blanco, A., & Bajo, M. (2018). 11-M victims 3 years after Madrid terror attacks: Looking for health beyond trauma. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being, 19*(3), 663–675. https://doi.org/10.1007/s10902-016-9842-x

Fliege, H., Rose, M., Arck, P., Levenstein, S., & Klapp, B. F. (2001). Validierung des "Perceived Stress Questionnaire" (PSQ) an einer deutschen Stichprobe. *Diagnostica, 47*(3), 142–152. https://doi.org/10.1026//0012-1924.47.3.142

Flückiger, C. (2009). Ressourcenorientierung. *Psychotherapie, Psychosomatik, Medizinische Psychologie, 59*(6), 234–243. https://doi.org/10.1055/s-0028-1090270

Franke, G. H., Jaeger, S., Glaesmer, H., Barkmann, C., Petrowski, K., & Brähler, E. (2017). Psychometric analysis of the Brief Symptom Inventory 18 (BSI-18) in a representative German sample. *BMC Medical Research Methodology, 17*(1), Article 14. https://doi.org/10.1186/s12874-016-0283-3

Franken, K., Lamers, S. M. A., Ten Klooster, P. M., Bohlmeijer, E. T., & Westerhof, G. J. (2018). Validation of the Mental Health Continuum-Short Form and the dual continua model of well-being and psychopathology in an adult mental health setting. *Journal of Clinical Psychology, 74*(12), 2187–2202. https://doi.org/10.1002/jclp.22659

Franklin, C., Zhang, A., Froerer, A., & Johnson, S. (2017). Solution focused brief therapy: A systematic review and meta-summary of process research. *Journal of Marital and Family Therapy, 43*(1), 16–30. https://doi.org/10.1111/jmft.12193

Gloria, C. T., & Steinhardt, M. A. (2016). Relationships among positive emotions, coping, resilience and mental health. *Stress and Health: Journal of the International Society for the Investigation of Stress, 32*(2), 145–156. https://doi.org/10.1002/smi.2589

Goldbach, N., Reif, A., Preuss, H., Röhm, M., Straus, E., Streicher, E., Windmann, S., & Oertel, V. (2020). The role of resources in the face of psychopathology. *Journal of Clinical Psychology, 76*(3), 406–422. https://doi.org/10.1002/jclp.22884

PsychOpen GOLD

Gollan, J. K., Hoxha, D., Hunnicutt-Ferguson, K., Norris, C. J., Rosebrock, L., Sankin, L., & Cacioppo, J. (2016). Twice the negativity bias and half the positivity offset: Evaluative responses to emotional information in depression. *Journal of Behavior Therapy and Experimental Psychiatry, 52*, 166–170. https://doi.org/10.1016/j.jbtep.2015.09.005

Grawe, K. (1997). Research-informed psychotherapy. *Psychotherapy Research, 7*(1), 1–19. https://doi.org/10.1080/10503309712331331843

Grawe, K., & Grawe-Gerber, M. (1999). Ressourcenaktivierung: Ein primäres Wirkprinzip der Psychotherapie [Resource activation: A primary change principle in psychotherapy]. *Psychotherapeut, 44*(2), 63–73. https://doi.org/10.1007/s002780050149

Grosse Holtforth, M., & Grawe, K. (2003). Der Inkongruenzfragebogen (INK). *Zeitschrift für klinische Psychologie und Psychotherapie, 32*(4), 315–323. https://doi.org/10.1026/0084-5345.32.4.315

Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Iasiello, M., Muir-Cochrane, E., van Agteren, J., & Fassnacht, D. (2022). The effect of psychological distress on measurement invariance in measures of mental wellbeing. *International Journal of Environmental Research and Public Health, 19*(16), Article 10072. https://doi.org/10.3390/ijerph191610072

Iasiello, M., van Agteren, J., & Muir-Cochrane, E. (2020). Mental health and/or mental illness: A scoping review of the evidence and implications of the dual-continua model of mental health. *Evidence Base, 2020*(1), 1–45. https://doi.org/10.21307/eb-2020-001

Joseph, S., & Wood, A. (2010). Assessment of positive functioning in clinical psychology: Theoretical and practical issues. *Clinical Psychology Review, 30*(7), 830–838. https://doi.org/10.1016/j.cpr.2010.01.002

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior, 43*(2), 207–222. https://doi.org/10.2307/3090197

Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*(3), 539–548. https://doi.org/10.1037/0022-006X.73.3.539

Kim, E. K., Furlong, M. J., Dowdy, E., & Felix, E. D. (2014). Exploring the relative contributions of the strength and distress components of dual-factor complete mental health screening. *Canadian Journal of School Psychology, 29*(2), 127–140. https://doi.org/10.1177/0829573514529567

Lin, M., Bieda, A., & Margraf, J. (2020). Short Form of the Sense of Coherence Scale (SOC-L9) in the US, Germany, and Russia. *European Journal of Psychological Assessment, 36*(5), 796–804. https://doi.org/10.1027/1015-5759/a000561

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9*(2), 151–173. https://doi.org/10.1207/S15328007SEM0902_1

PsychOpen GOLD

Lukat, J., Margraf, J., Lutz, R., van der Veld, W. M., & Becker, E. S. (2016). Psychometric properties of the Positive Mental Health Scale (PMH-scale). *BMC Psychology, 4*, Article 8. https://doi.org/10.1186/s40359-016-0111-x

Magalhães, E., & Calheiros, M. M. (2017). A dual-factor model of mental health and social support: Evidence with adolescents in residential care. *Children and Youth Services Review, 79*, 442–449. https://doi.org/10.1016/j.childyouth.2017.06.041

Mc Elroy, S., & Hevey, D. (2014). Relationship between adverse early experiences, stressors, psychosocial resources and wellbeing. *Child Abuse & Neglect, 38*(1), 65–75. https://doi.org/10.1016/j.chiabu.2013.07.017

Melrose, K. L., Brown, G. D. A., & Wood, A. M. (2015). When is received social support related to perceived support and well-being? When it is needed. *Personality and Individual Differences, 77*(4), 97–105. https://doi.org/10.1016/j.paid.2014.12.047

Munder, T., Karcher, A., Yadikar, Ö., Szeles, T., & Gumz, A. (2019). Focusing on patients' existing resources and strengths in cognitive-behavioral therapy and psychodynamic therapy: A systematic review and meta-analysis. *Zeitschrift für Psychosomatische Medizin und Psychotherapie, 65*(2), 144–161. https://doi.org/10.13109/zptm.2019.65.2.144

Niemeyer, H., Bieda, A., Michalak, J., Schneider, S., & Margraf, J. (2019). Education and mental health: Do psychosocial resources matter? *SSM – Population Health, 7*, Article 100392. https://doi.org/10.1016/j.ssmph.2019.100392

Peterson, C., & Park, N. (2009). Classifying and measuring strengths of character. In S. J. Lopez & C. R. Snyder (Eds.), *Oxford library of psychology. Oxford handbook of positive psychology* (2nd ed., pp. 25–33). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195187243.013.0004

Peugh, J., & Feldon, D. F. (2020). "How well does your structural equation model fit your data?": Is marcoulides and Yuan's Equivalence test the answer? *CBE-Life Science Education, 19*, Article es5. https://doi.org/10.1187/cbe.20-01-0016

Prati, G., & Pietrantoni, L. (2010). The relation of perceived and received social support to mental health among first responders: A meta-analytic review. *Journal of Community Psychology, 38*(3), 403–417. https://doi.org/10.1002/jcop.20371

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Schotanus-Dijkstra, M., ten Have, M., Lamers, S. M. A., de Graaf, R., & Bohlmeijer, E. T. (2017). The longitudinal relationship between flourishing and mental health and incident mood, anxiety and substance use disorders. *European Journal of Public Health, 27*(3), 563–568. https://doi.org/10.1093/eurpub/ckw202

Schreiber, J. B., Stage, F. K., King, J., Nora, A., & Barlow, E. A. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323–338. https://doi.org/10.3200/JOER.99.6.323-338

Schumacher, J., Wilz, G., Gunzelmann, T., & Brähler, E. (2000). Die Sense of Coherence Scale von Antonovsky – Teststatistische Überprüfung in einer repräsentativen Bevölkerungsstichprobe

PsychOpen GOLD

und Konstruktion einer Kurzskala. *PPmP – Psychotherapie · Psychosomatik · Medizinische Psychologie, 50*(12), 472–482. https://doi.org/10.1055/s-2000-9207

Schürmann-Vengels, J., Teismann, T., Margraf, J., & Willutzki, U. (2022). Patients' self-perceived strengths increase during treatment and predict outcome in outpatient cognitive behavioral therapy. *Journal of Clinical Psychology, 78*(12), 2427–2445. https://doi.org/10.1002/jclp.23352

Siedlecki, K. L., Salthouse, T. A., Oishi, S., & Jeswani, S. (2014). The relationship between social support and subjective well-being across age. *Social Indicators Research, 117*(2), 561–576. https://doi.org/10.1007/s11205-013-0361-4

Singer, S., & Brähler, E. (2007). *Die "Sense of Coherence Scale": Test-Handbuch zur deutschen Version.* Vandenhoeck & Ruprecht.

Spitzer, C., Hammer, S., Löwe, B., Grabe, H. J., Barnow, S., Rose, M., Wingenfeld, K., Freyberger, H. J., & Franke, G. H. (2011). Die Kurzform des Brief Symptom Inventory (BSI-18): Erste Befunde zu den psychometrischen Kennwerten der deutschen Version [The short version of the Brief Symptom Inventory (BSI-18): Preliminary psychometric properties of the German translation]. *Fortschritte der Neurologie, Psychiatrie, 79*(9), 517–523. https://doi.org/10.1055/s-0031-1281602

Stanton, K., & Watson, D. (2014). Positive and negative affective dysfunction in psychopathology. *Social and Personality Psychology Compass, 8*(9), 555–567. https://doi.org/10.1111/spc3.12132

Tagay, S., Düllmann, S., Repic, N., Schlottbohm, E., Fünfgeld, F., & Senf, W. (2014). Das Essener Ressourcen-Inventar (ERI) – Entwicklung und Validierung. *Trauma. Zeitschrift für Psychotraumatologie und ihre Anwendungen, 12*, 72–87.

Taylor, S. E., & Broffman, J. I. (2011). Psychosocial resources: Functions, origins, and links to mental and physical health. *Advances in Experimental Social Psychology, 44*, 1–57. https://doi.org/10.1016/B978-0-12-385522-0.00001-9

Tecuta, L., Tomba, E., Grandi, S., & Fava, G. A. (2015). Demoralization: A systematic review on its clinical characterization. *Psychological Medicine, 45*(4), 673–691. https://doi.org/10.1017/S0033291714001597

Teismann, T., Brailovskaia, J., Siegmann, P., Nyhuis, P., Wolter, M., & Willutzki, U. (2018). Dual factor model of mental health: Co-occurrence of positive mental health and suicide ideation in inpatients and outpatients. *Psychiatry Research, 260*, 343–345. https://doi.org/10.1016/j.psychres.2017.11.085

Tomba, E., Offidani, E., Tecuta, L., Schumann, R., & Ballardini, D. (2014). Psychological well-being in out-patients with eating disorders: A controlled study. *International Journal of Eating Disorders, 47*(3), 252–258. https://doi.org/10.1002/eat.22197

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 Well-Being Index: A systematic review of the literature. *Psychotherapy and Psychosomatics, 84*(3), 167–176. https://doi.org/10.1159/000376585

Trompetter, H. R., Lamers, S. M. A., Westerhof, G. J., Fledderus, M., & Bohlmeijer, E. T. (2017). Both positive mental health and psychopathology should be monitored in psychotherapy: Confirmation for the dual-factor model in acceptance and commitment therapy. *Behaviour Research and Therapy, 91*, 58–63. https://doi.org/10.1016/j.brat.2017.01.008

PsychOpen GOLD

van Erp Taalman Kip, R. M., & Hutschemaekers, G. J. M. (2018). Health, well-being, and psychopathology in a clinical population: Structure and discriminant validity of Mental Health Continuum Short Form (MHC-SF). *Journal of Clinical Psychology, 74*(10), 1719–1729. https://doi.org/10.1002/jclp.22621

Victor, P. P., Schürmann, J., Muermans, M. M., Teismann, T., & Willutzki, U. (2019). Wittener Ressourcenfragebogen (WIRF) – Ein mehrdimensionales Instrument zur subjektiven Ressourceneinschätzung [Witten Resource Questionnaire (WIRF) – A multidimensional instrument for the assessment of subjective resources]. *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie, 67*(3), 181–191. https://doi.org/10.1024/1661-4747/a000388

Vîslă, A., Zinbarg, R. E., Hilpert, P., Allemand, M., & Flückiger, C. (2021). Worry and positive episodes in the daily lives of individuals with Generalized Anxiety Disorder: An ecological momentary assessment study. *Frontiers in Psychology, 12*, Article 722881. https://doi.org/10.3389/fpsyg.2021.722881

Willutzki, U. (2008). Ressourcendiagnostik in der Klinischen Psychologie und Psychotherapie. *Klinische Diagnostik und Evaluation, 1*(2), 126–145.

Willutzki, U., Koban, C., & Neumann, B. (2005). Zur Diagnostik von Ressourcen. In J. Kosfelder, J. Michalak, S. Vocks, & U. Willutzki (Ed.), *Fortschritte der Psychotherapieforschung* (pp. 37-53). Hogrefe.

Wittchen, H.-U., Zaudig, M., & Fydrich, T. (1997). *Strukturiertes Klinisches Interview für DSM-IV (SKID)*. Beltz-Test.

Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013) Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and Psychological Measurements, 73*(6), 913–934. https://doi.org/10.1177/0013164413495237

World Health Organization. (1998). *Wellbeing measures in primary health care: The DepCare project.* WHO Regional Office for Europe.

World Health Organization. (2005). *Promoting mental health: Concepts, emerging evidence, practice.* World Health Organization.

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