EMOTION REGULATION PREDICTS ANXIETY OVER A FIVE-YEAR INTERVAL: A CROSS-LAGGED PANEL ANALYSIS

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Background: Emotion regulation (ER) deficits have been linked to symptoms of anxiety in cross-sectional studies. However, the direction of the relationship between ER and anxiety symptom severity (ASS) is unclear. Methods: In order to clarify the relationship between ER skills and ASS symptoms, we assessed skills and symptoms in 131 individuals twice over a 5-year interval. Cross-lagged panel analyses were conducted to test whether ER skills were a significant predictor of subsequent ASS or vice versa. Additionally, we explored whether specific ER skills differed in regard to the strength of prospective associations with subsequent ASS. Results: ER skills negatively predicted subsequent ASS over and above the effects of baseline ASS (whereas anxiety symptoms did not predict subsequent ER deficits). Acceptance, tolerance, and willingness to confront had the strongest prospective effects on lower subsequent ASS. Conclusions: General ER skills may play an important role in the development and maintenance of anxiety disorders.

Key words: emotion regulation; anxiety; risk factors; skills; prospective study; predictor

INTRODUCTION

Anxiety disorders are common mental disorders[1] leading to significant suffering and impairment in afflicted individuals and causing substantial direct and indirect costs to society.[2–4] Fortunately, effective psychotherapeutic treatments for these debilitating disorders have been developed in the past decades.[5,6] However, outcome research also indicates that even when treated with evidence-based interventions, anxiety disorders are associated with unsatisfactory remission rates,[7] high prevalence of subthreshold residual symptoms,[8] frequent relapse,[9] and a chronic course of the disorder.[10,11] Thus, more needs to be done to identify promising treatment targets and thus enhance the efficacy of current treatments for anxiety disorders.

Lately, deficits in emotion regulation (ER) skills have been discussed as a putative risk and maintaining factor for various mental health problems including anxiety disorders.[12–15] ER refers to the set of processes whereby people seek to monitor, evaluate, and redirect the spontaneous flow of their emotions in accordance with their needs and goals.[16–18] To help utilize the notoriously broad and abstract concept of ER for clinical purposes, Berking and colleagues have proposed...
the adaptive coping with emotions (ACE) model. This model conceptualizes adaptive ER as a situation-dependent interaction between the following skills: (1) the ability to be consciously aware of emotions, (2) the ability to identify and correctly label emotions, (3) the ability to identify what has caused and helps maintain a present emotion, (4) the ability to actively modify emotions in an adaptive way, (5) the ability to accept (defined as allowing the negative emotion to exist on a cognitive level) and tolerate (defined as willingly experiencing the emotion without engaging in behavior aiming to avoid it) found to be strongly correlated with acceptance in previous studies negative emotions when necessary, (6) the ability to approach and confront situations likely to trigger negative emotions, and (7) the ability to provide compassionate self-support in distressing situations. According to the ACE model, unsuccessful ER occurs when participants (1) try to apply ER skills but are unable to do so successfully, (2) have never developed these skills and thus are unable to even try to apply them, and (3) have access to these skills but do not try to apply them. The model also includes the hypothesis that modification and acceptance/tolerance skills are the only skills in the model that are ultimately relevant for mental health. All other skills are themselves considered relevant only to the extent that they facilitate the successful application of modification or acceptance/tolerance. Preliminary support for the validity of the model comes from several studies.

Significant deficits in general ER skills such as the ones included in the ACE model may contribute to the development of anxiety disorders in at least three ways. First, the inability to downregulate states of fear and anxiety may lead to an escalation or perpetuation of these states and thus enhance the chance that diagnostic criteria addressing dysfunctional intensity or duration of fear and anxiety will be met. Second, in the absence of adaptive coping strategies, there is an elevated risk that the individual will engage in the use of strategies that might effectively reduce fear and anxiety in the short run but lead to unwanted long-term consequences including those listed among the DSM-V criteria for anxiety disorders (e.g., avoidance of feared stimuli). Third, the inability to adaptively cope with negative emotions in general may lead to the perpetuation and escalation of emotions other than fear and anxiety that may impede successful coping with symptoms of anxiety disorders. For example, feelings of dysphoria, helplessness, and hopelessness are frequently experienced by individuals suffering from anxiety disorders and may impair the individual’s willingness and capability to confront feared stimuli.

Evidence from numerous studies supports the hypothesis that general ER skill deficits contribute to the development and maintenance of anxiety disorders. For example, in a nonclinical sample of 631 participants, ER skills as conceptualized in the ACE model significantly predicted subsequent anxiety symptom severity (ASS) over a 2-week interval. In another nonclinical sample, participants’ belief that they could successfully cope with negative mood predicted subsequent ASS over an 8-week interval. Moreover, in a nonclinical sample of adolescents, unsuccessful ER predicted ASS 7 months later and in a sample of college students, difficulties identifying and describing emotions predicted increases in ASS over a 1-year period.

Research on clinical samples indicates that individuals meeting criteria for panic disorder report difficulties identifying, labeling, accepting, and tolerating undesired emotions. Further evidence indicates that these individuals tend to use avoidant strategies when working to cope with anxiety-provoking or other types of aversive experiences and that the use of these strategies may paradoxically increase anxiety thus contributing to the development and maintenance of anxiety disorders. Individuals meeting criteria for social anxiety disorder have been found to pay less attention to their emotions in general to be less capable of describing emotions than healthy controls to experience high levels of shame and to display difficulties accepting emotional experiences when they are confronted with negative events. Similarly, in individuals suffering from posttraumatic stress disorder (PTSD), symptom severity and impairment have been found to be associated with lack of emotional clarity, a lack of emotional acceptance, and difficulties engaging in goal-directed behavior and effective ER strategies. ER difficulties have also been shown to mediate the association between PTSD symptom severity and substance abuse in patients with histories of chronic abuse. Similarly, individuals suffering from generalized anxiety disorder (GAD) have been found to display deficits in emotional clarity, a poorer understanding of emotions, greater negative reactivity to emotions, less acceptance, and less successful management of emotions. In addition, general ER skill deficits have been found to mediate the effect of preexisting GAD on psychological distress in the year following the terrorist attacks of 9/11 in a sample of New York University students directly affected by the event. Finally, individuals suffering from specific phobia report high use of avoidance, self-accusation, rumination, and catastrophizing, and low reliance on positive reappraisals when working to cope with challenging experiences.

Despite the large number of studies linking ER and ASS, there are still significant limitations in research aiming to clarify the assumed relevance of ER deficits in the development and maintenance of anxiety disorders. First, many studies use cross-sectional designs that do not clarify to what extent deficits in ER are a cause or a consequence of anxiety symptoms. Second, available longitudinal and experimental studies rarely investigate long-term associations between ER deficits and ASS, although it can be assumed that ER skills may differ with regard to their short- versus long-term efficacy. Third, previous studies have rarely assessed a broad range of possibly relevant ER skills and differences.

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regarding definitions, measures, designs, and statistical analyses that impede meaningful comparisons of findings across studies.[67] Thus, it is still unclear to what extent specific ER skills differ with regard to their effects on ASS.

In order to address these issues, we investigated the reciprocal, prospective associations between ER skills and ASS over a 5-year period in a sample of 131 participants. More specifically, we tested the hypothesis that successful ER would negatively predict subsequent ASS, whereas ASS would not predict subsequent ER skills. In addition, we explored whether specific ER skills would differ in their effects on subsequent ASS.

METHODS

PARTICIPANTS

Participants were recruited through an article that appeared in a popular German health magazine (Stern Gesundheit). In return for participating in an online-based survey, participants were offered feedback on relevant aspects of mental health and well-being (e.g., ASS). Apart from providing informed consent there were no further exclusion criteria in order to maximize the external validity of the study. The baseline assessment took place between March and May 2005 and was completed by 635 participants (dropout rate: <1%). Associations between ER and subsequent indicators of mental health in this sample over a 2-week time period were reported elsewhere.[27] All subjects participating in the baseline assessment were invited via e-mail to participate in a follow-up study scheduled 5 years after baseline assessment in order to investigate the long-term association between ER and mental health. We received automatic delivery failure e-mail responses from 126 participants. Of the remaining 509 former participants, 135 registered for the 5-year follow-up assessment, and 131 completed the German version of the Emotion-Regulation Skills Questionnaire ERSQ[22] at Time 2 and were thus included in the analyses.

PROCEDURES

Before initial assessment, participants provided informed consent by checking each of the following three boxes: (1) I would like to participate and I am at least 18 years of age, (2) I agree to receive computerized feedback after each point of assessment, and (3) I agree that my data will be stored pseudonymously for 5 years and that I am free to ask for deletion at any time. After the follow-up assessment in 5 years, my data will be stored anonymously. Next, demographic characteristics of the participants (e.g., age, gender, education, country) were assessed before participants were presented with the scales that measured the study variables.

Computerized feedback was available 2 weeks after both baseline and follow-up assessment. Consenting participants were provided with a link and a password that they could use to log into a website that presented participants with computerized feedback of their state of mental health (e.g., ASS) as well as putative risk factors (i.e., increased negative mood), and protective factors that impede the development of anxiety disorders (i.e., positive mood, effective ER skills). In addition, the feedback contained information on the individual’s scores in comparison with a reference population, the development of the assessed variables over the two time points, and educational information about the key constructs of the study. Participants also received information regarding psychiatric and psychotherapeutic treatment options for Austria, Germany, and Switzerland, providing those who had received feedback signaling significant mental health problems with numerous opportunities to seek treatment if desired. These options included websites offering self-help strategies, stress management programs, free hotlines, and emergency numbers.

The study was hosted at a noncommercial, advertisement-free website on a server at the University of Bern. Connections to this web page and data stored on the server were protected from unauthorized access. Code names and passwords were used to secure confidentiality. All study procedures followed internationally accepted human research guidelines (i.e., Helsinki Protocol) and were approved by the ethics committee of Marburg University.

MEASURES

To assess ER, we used the ERSQ,[22] which is a 27-item self-report instrument that assesses the successful application of nine ER skills that are part of the Affect Regulation Training.[19–21] Each scale is assessed on a 5-point Likert-type scale (0 = not at all to 4 = almost always). The items of the ERSQ are preceded by the stem, “Last week …” Items include: “I paid attention to my feelings” (awareness); “My physical sensations were a good indication of how I was feeling” (sensations); “I focused on a personal goal” (attention to attainment); “I accepted my emotions” (acceptance); “I felt I could cope with even intense negative feelings” (tolerance); “I did what I had planned, even if it made me feel uncomfortable or anxious” (willingness to confront situations cueing undesired emotions when necessary to attain personally relevant goals); “I was able to influence my negative feelings” (modification); and “I supported myself in emotional distressing situations” (compassionate self-support). In addition to the subscales, a total score for successful ER can be computed as the average of all items. At baseline, we utilized a 24-item version of the ERSQ as the subscale compassionate self-support had not yet been included in the ERSQ. However, at Time 2 we utilized the final (27-item) version of the ERSQ that included this subscale. Previous studies provide evidence for good internal consistency; at least adequate retest reliability; good convergent, discriminant, and factorial validity; and significant sensitivity to change of all scales of the ERSQ.[22–28,69] In the present study, the total score and the subscales of the ERSQ displayed acceptable to very good internal consistencies with alphas ranging from .77 to .94 for the baseline and .77 to .97 for the 5-year follow-up assessment of the current study (see Table 1). The correlations between baseline and follow-up assessment range from .49 to .67 (see Table 2). Given the 5-year interval, such scores can be seen as indicators of at least acceptable retest reliability.

<table>
<thead>
<tr>
<th>TABLE 1. Means, standard deviations and coefficient alphas of measures</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
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<tr>
<td>1. Awareness</td>
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<td>2. Sensations</td>
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<td>.90</td>
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<td>3. Clarity</td>
<td>3.39</td>
<td>.91</td>
</tr>
<tr>
<td>4. Understanding</td>
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<td>.95</td>
</tr>
<tr>
<td>5. Acceptance</td>
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<td>.91</td>
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<tr>
<td>6. Tolerance</td>
<td>2.62</td>
<td>.99</td>
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<tr>
<td>7. W. to confront</td>
<td>3.27</td>
<td>1.00</td>
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<tr>
<td>8. Modification</td>
<td>2.58</td>
<td>.88</td>
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<tr>
<td>9. ERSQ total score</td>
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<td>.71</td>
</tr>
<tr>
<td>10. STA total score</td>
<td>2.94</td>
<td>.62</td>
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</tbody>
</table>

Note. W. to confront, willingness to confront situations cueing negative emotions.
TABLE 2. Retest (Time 1/2) and bivariate correlations (Time 2)

<table>
<thead>
<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<td>.70</td>
<td>.76</td>
<td>.69</td>
<td>.57</td>
<td>.51</td>
<td>.56</td>
<td>.51</td>
<td>.78</td>
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<td>2. Sensations</td>
<td>.49</td>
<td>.81</td>
<td>.73</td>
<td>.68</td>
<td>.61</td>
<td>.61</td>
<td>.66</td>
<td>.85</td>
<td>−.49</td>
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<td>3. Clarity</td>
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<td>.88</td>
<td>.67</td>
<td>.62</td>
<td>.59</td>
<td>.64</td>
<td>.66</td>
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<td>4. Understanding</td>
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<td>.86</td>
<td>−.34</td>
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<td>5. Acceptance</td>
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<td>.62</td>
<td>.76</td>
<td>.87</td>
<td>−.38</td>
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<tr>
<td>6. Tolerance</td>
<td>.48</td>
<td>.71</td>
<td>.79</td>
<td>.86</td>
<td>−.36</td>
<td></td>
<td></td>
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<td>7. W. to confront</td>
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<td>−.28</td>
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<td>8. Modification</td>
<td>.51</td>
<td>.86</td>
<td>−.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. ERSQ total score</td>
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<td>−.41</td>
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<td>10. STAI total score</td>
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<td>.55</td>
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</tbody>
</table>

Note. N = 131. ERSQ, Emotion Regulation Skills Questionnaire; STAI, State-Trait Anxiety Inventory; test–retest correlations are represented in boldface along the diagonal. All correlations are significant at P < .001. W. to confront, willingness to confront situations cueing negative emotions.

To assess ASS, we used the state scale of the State-Trait Anxiety Inventory (STAI; original version[70], German version).[71] Cronbach’s alpha of the German version of the STAI in a community-based sample was .90 and above; support for the validity of this scale is provided by significant correlations with related constructs in a community sample.[72] The STAI is a frequently used self-report measure for the assessment of ASS in nonclinical and clinical populations and its validity has been demonstrated in numerous studies.[70, 71] At baseline, we used an abbreviated version of the STAI to minimize the time needed to complete the web-based assessment. We reasoned that this would reduce the dropout rate and thus enhance the external validity of the study. The shortened baseline version included the five items of the STAI, which had demonstrated the highest item-total correlations ($r_a = .60–.66$) in the validation studies of the German version: “I feel anxious,” “I am relaxed” (inverse scoring), “I feel comfortable” (inverse scoring), “I feel at ease” (inverse scoring), and “I feel nervous.” However, at follow-up we used the full version of the STAI consisting of 20 items because this was the primary dependent variable of the present study. At both assessments, participants were instructed to assess the frequency of experiencing anxiety symptoms during the preceding 7 days (similar to the instructions used for the ERSQ). Answers were measured on a 4-point Likert scale ranging from 1 = not at all to 4 = very much so. Internal consistency was high at both assessment points (Cronbach’s $\alpha = .82$ for baseline and .95 for follow-up). Moreover, a correlation of $r_{TT} = .55$ between the shortened baseline and the full version assessed 5 years later provides evidence that both versions of the STAI provide comparable scores.

STATISTICAL ANALYSES

We used a cross-lagged panel (CLP) design based on structural equation modeling[73] to investigate reciprocal prospective associations between anxiety symptoms and ER. According to Kenny, [74] CLP designs control for synchronous and autocorrelations while identifying time-lagged reciprocal effects of two constructs assessed twice over time (see Fig. 1). Moreover, by analyzing the constructs as latent variables, this approach controls for random measurement errors.[73] To deal with missing values, we employed the full information maximum likelihood procedure. This procedure has been shown to provide less biased and more reliable results than conventional missing data methods such as listwise or pairwise deletion.[75] In the current study, the rate of missing data was about 3%.

Figure 1. Structural model for reciprocal time-lagged effects between emotion regulation skills and anxiety. Standardized time-lagged effects for the ERSQ total score are presented; (a) pathways denotes autocorrelations, (b) pathways denotes synchronous correlations, (c) pathways denotes cross-lagged correlations, (d) disturbances.

Fixation of factor loadings was used as the scaling method. For each factor, the unstandardized value of the first loading was set to 1. To test for measurement invariance, we compared the fit of two measurement models. In the first measurement model, we freely estimated the factor loadings for both assessments. All factors were correlated, and we correlated the individual’s indicators over time. The second measurement model was identical to the first except that we constrained the factor loadings of each indicator to be equal across time. As the fit of the constrained model is not worse than that of the unconstrained model, the constraints are justified and ensured that the latent constructs are measured similarly at both points of assessment.

We aggregated the items into three parcels for the CLP analyses as item parcels produce more reliable latent variables than individual items.[76] At Time 1, we randomly assigned the five items of the abbreviated version of the STAI to three parcels (with two, two, and one item respectively). At Time 2, we used the 20-item version of the STAI and randomly assigned these to three parcels (with seven, seven, and six items, respectively). For the ERSQ, we used the 24-item version and randomly assigned eight items to three parcels at Time 1. At Time 2, we utilized the 27-item version of the ERSQ and randomly assigned these to three parcels (with nine items each, respectively). To control for potential effects of the additional compassionate self-support subscale (which was not yet included in the ERSQ at Time 1), we ran all analyses also with the 24-item version (and eight items per parcel) of the ERSQ at Time 2. At both points of measurement, the parcels were unrelated to the subscales of the ERSQ. For the CLP analyses of the subscales of the ERSQ, we used items instead of parcels.

Model fit was assessed by the Tucker–Lewis Index (TLI), the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Incremental Fit Index (IFI).[77, 78] Additionally, we report $\chi^2$–values and the 90% confidence interval for the RMSEA. Hu and Bentler[78] suggested that a good fit is indicated by values greater than or equal to .95 for TLI, CFI, and IFI, and less than or equal to .06 for RMSEA. For all comparisons, we set critical $\alpha$ at .05 and used one-sided tests for unidirectional and two-sided tests for bidirectional hypotheses. For the CLP analyses, we used Amos 19.[79] For all other analyses, we used SPSS 19.

RESULTS

The sample of the baseline assessment (N = 635) and the sample of individuals additionally participating in the follow-up assessment 5 years later (N = 131) did
not differ significantly with regard to sex (χ² (1, N = 635) = 68.766, P = .619), education (χ² (1, N = 635) = 76.720, P > .999), age (t(627) = .551, P = .582), ER skills (t(632) = −.971, P = .332), and ASS (t(632) = .835, P = .404). Among the final sample of 131 participants, 79% were females, with an average age of 34.7 years (SD = 10.43; range = 19–65 years). The majority of the sample had received a high school degree (76.3%) as the highest achieved level of education, 81% reported living in Germany, 15% in Switzerland, 1% in Austria, and 3% in other countries. The sample represented an exclusively white population. The average ASS level in this sample (see Table 1) differed notably from the average level of the German validation sample (Cohen’s d = 1.6) with 68% of the present sample displaying STAI-5 scores higher than one standard deviation and 37% scoring higher than two standard deviations above the mean of the validation sample.

We next estimated CLP models examining the longitudinal association between unsuccessful ER at Time 1 and anxiety psychopathology at Time 2, while controlling for baseline levels of anxiety and ER. As presented in Fig. 1 and Table 4, ER at Time 1 significantly predicted subsequent levels of anxiety at Time 2 (β = −.32, P < .01). In contrast, the cross-lagged effects of anxiety at Time 1 on ER at Time 2 (β = .08) were nonsignificant (P = .42). As shown in Table 3, the model fit the data well, χ² (46) = 67.636, P < .05, CFI = .99, IFI = .99, RMSEA = .06 (90% CI: .02–.09). Additional analyses indicated that the pattern of findings did not differ if we excluded the compassionate self-support items from the Time 2 data.

Next, we estimated the standardized regression coefficients for cross-lagged associations between specific skills and subsequent ASS (see Table 3 for statistics indicating a good model fit and Table 4 for regression coefficients). The standardized regression coefficients for all specific ER skills suggest that most of the skills included in the ERSQ did not differ notably with regard to their association with subsequent ASS (βs ranging from −.12 to −.25). Only the ERSQ subscales clarity and willingness to confront were significantly associated with the subsequent ASS (Ps < .05). The strongest effects were found for acceptance, tolerance, willingness to confront, clarity, and sensitivity (β = −.25 to −.20), whereas understanding, modification, and awareness were less strongly associated with subsequent ASS (β = −.15 to −.12). Consistent with the findings for the ERSQ total score, successful ER at Time 2 was not significantly associated with ASS at Time 1 for any of the ERSQ subscales.

**TABLE 3. Fit indices**

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<thead>
<tr>
<th></th>
<th>χ²</th>
<th>df</th>
<th>CFI</th>
<th>IFI</th>
<th>RMSEA</th>
<th>90% CI RMSEA</th>
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<td>Awareness</td>
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<td>46</td>
<td>.98</td>
<td>.98</td>
<td>.057</td>
<td>.017–.086</td>
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<tr>
<td>Sensations</td>
<td>67.824*</td>
<td>46</td>
<td>.98</td>
<td>.98</td>
<td>.06</td>
<td>.025–.09</td>
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<tr>
<td>Clarity</td>
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<td>1</td>
<td>&lt;.001</td>
<td>.00–.036</td>
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<tr>
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<td>.98</td>
<td>.058</td>
<td>.02–.088</td>
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<tr>
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<td>.99</td>
<td>.048</td>
<td>.00–.08</td>
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<tr>
<td>Tolerance</td>
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<td>.97</td>
<td>.97</td>
<td>.072</td>
<td>.043–.01</td>
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<tr>
<td>W. to confront</td>
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<td>46</td>
<td>.96</td>
<td>.96</td>
<td>.087</td>
<td>.06–.113</td>
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<tr>
<td>Modification</td>
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<td>.96</td>
<td>.96</td>
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<td>.99</td>
<td>.99</td>
<td>.06</td>
<td>.024–.089</td>
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Note. CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root mean square error of approximation; CI, confidence interval; W. to confront, willingness to confront situations cueing negative emotions. ERSQ, Emotion Regulation Skills Questionnaire. ***P < .001, **P < .01, *P < .05.

**TABLE 4. Regression coefficients for CLP models**

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Autoregression/stability</th>
<th>Cross-sectional associations</th>
<th>CLP coefficients</th>
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<tbody>
<tr>
<td></td>
<td>a1</td>
<td>a2</td>
<td>b1</td>
</tr>
<tr>
<td>Awareness</td>
<td>.59 (69)**</td>
<td>.54 (52)**</td>
<td>−.40 (−.22)**</td>
</tr>
<tr>
<td>Sensations</td>
<td>.52 (67)**</td>
<td>.49 (47)**</td>
<td>−.48 (−.25)**</td>
</tr>
<tr>
<td>Clarity</td>
<td>.63 (76)**</td>
<td>.47 (45)**</td>
<td>−.52 (−.31)**</td>
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<tr>
<td>Understanding</td>
<td>.64 (77)**</td>
<td>.51 (49)**</td>
<td>−.51 (−.29)**</td>
</tr>
<tr>
<td>Acceptance</td>
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<td>.38 (38)*</td>
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<td>Tolerance</td>
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<td>.39 (41)**</td>
<td>−.69 (−.37)**</td>
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<td>.48 (47)**</td>
<td>−.48 (−.28)**</td>
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<tr>
<td>Modification</td>
<td>.43 (52)**</td>
<td>.48 (47)**</td>
<td>−.69 (−.36)**</td>
</tr>
<tr>
<td>ERSQ total score</td>
<td>.75 (1.00)**</td>
<td>.36 (33)**</td>
<td>−.66 (−.31)**</td>
</tr>
</tbody>
</table>

Note. a1 = ER T1 ⇒ ER T2; a2 = Anxiety T1 ⇒ Anxiety T2; b1 = ER T1 ⇒ Anxiety T1; b2 = d1 ⇒ d2; c1 = ER T1 ⇒ Anxiety T2; c2 = Anxiety T1 ⇒ ER T2; all as denoted in Fig. 1; W. to confront, willingness to confront situations cueing negative emotions; ERSQ, Emotion Regulation Skills Questionnaire. Unstandardized values in parentheses; ***P < .001, **P < .01,*P < .05.
As also shown in Table 4, the CLP analyses resulted in significant autocorrelations for the ERSQ total score ($\beta = .75, P < .001$) and all ERSQ subscales ($\beta = .43--.66$, all $Ps < .01$). For ASS, the autocorrelations ranged between $\beta = .38$ and .54 and were significant in all models (all $Ps < .05$). Further analyses indicated that successful ER (ERSQ total score) was cross-sectionally associated with less ASS at both assessment points ($r_{T1} = -.66, P < .001$ for Time 1 and $r_{T2} = -.64, P < .001$ for Time 2) and that all ERSQ subscales except awareness were significantly associated with ASS at both Time 1 and Time 2 ($T1: r_{T1} = -.40$ to -.77, $T2$: $r_{T2} = -.22$ to -.74; all $Ps < .05$).

**DISCUSSION**

A growing body of research suggests that deficits in ER may contribute to the development and maintenance of anxiety disorders. However, prospective studies addressing longer time periods and simultaneously assessing a broad range of possible relevant ER skills are still rare. Thus, in the present study we used CLP analyses to test reciprocal effects of a broad range of ER skills and ASS over a 5-year interval in a sample of 131 participants. Consistent with our hypothesis, general ER skills negatively predicted ASS over the 5-year period, whereas ASS did not predict subsequent ER. Additionally, we found that specific ER skills did not differ greatly with regard to their predictive power for lower subsequent ASS. However, among all ER strategies included in the present study, the abilities to accept and tolerate negative emotions, as well as the willingness to confront situations cuing these emotions if that was necessary to attain personally relevant goals displayed the strongest association with lower subsequent ASS.

The results of the CLP analyses are consistent with findings from a previous study using similar methods and extend these findings by demonstrating that ER negatively predicts subsequent ASS over a time period as long as 5 years. Thus, the current study provides further evidence for the hypothesis that deficits in ER may significantly contribute to the development of anxiety disorders. Moreover, the findings add to the literature by providing preliminary data indicating that, although a broad range of skills may facilitate successful coping with anxiety-related problems, it might be possible to identify ER skills that are particularly important for preventing symptoms of anxiety disorders.

If these findings should be replicated in future studies, it can be hypothesized that the efficacy of treatments for anxiety disorders might be further enhanced by strengthening the treatment’s focus on general ER skills. In line with this hypothesis, it has been found that integrating an intense ER skills training in standard cognitive behavioral therapy (CBT) improves the effects of CBT-based treatment on various indicators of mental health in both a heterogeneous and in a sample of individuals meeting criteria for major depressive disorder, many of whom suffered from comorbid anxiety disorders. In addition, it has been found that improvement in negative mood regulation during an affect regulation skills training was a significant predictor of symptom reduction during subsequent prolonged exposure treatment for PTSD. Thus, it can be hypothesized that an intense training of general ER skills may help patients to cope with anxiety-related emotions, to overcome emotions that interfere with successful anxiety management (e.g., dysphoria, helplessness, and hopelessness) and/or to engage in effective therapeutic interventions that are associated with strong aversive experiences in the short term (e.g., exposure).

The finding that the abilities to accept and tolerate negative emotions, as well as the willingness to confront situations cuing these emotions were most strongly associated with less subsequent ASS implies that individuals suffering from less subsequent ASS have the ability to tolerate this experience as well as the evidence for mindfulness- and acceptance-based interventions for mental health problems. With regard to future research, the findings of the present study may point out that treatment evaluation studies should not only rely on assessing change in symptoms but should also assess changes in patients’ abilities to accept and tolerate their symptoms and confront situations cuing their emotions, as these abilities might be relevant for the long-term course of their mental health problems. Such a focus on acceptance as an outcome would allow clarification as to whether interventions that do not necessarily refer to concepts such as acceptance (e.g., exposure-based treatments) might sometimes even be superior to treatments that explicitly do so (e.g., mindfulness-based approaches). Future research should also look into which patients particularly benefit from focusing on acceptance and tolerance and which patients rather benefit from a focus on downregulating anxiety.

Findings from the present study also suggest that systematically enhancing general ER skills may help to prevent the development of anxiety disorders in the first place. In this context, it is of note that developing cost-effective prevention measures is challenging, as it is unclear how many participants would actually develop a clinical disorder without any intervention. Thus, preventive measures that target transdiagnostically relevant factors might be more cost effective than utilizing a compilation of disorder-specific measures. As numerous studies indicate that deficits in adaptive ER might be a significant risk factor for the development of various forms of mental health problems, such skills might be a promising target when working to integrate preventive measures into routine care. Strengths of the present study include the longitudinal design addressing a 5-year period, the assessment of a broad range of arguably relevant ER strategies,
and the use of statistical methods simultaneously testing for reciprocal prospective effects while controlling for potential baseline effects. Limitations of the study include: the use of a sample not clearly representative of the normal population or of a specifically defined at-risk group; the absence of a valid assessment of mental health status through the use of clinical interviews; the exclusive use of online-based, self-report measures when assessing ER skills and ASS; the use of an abbreviated version of the STAI at baseline; the use of an ER measure that does not discriminate between ER skills across different emotions; a retention of only 25% between baseline and the 5-year follow-up assessment; the absence of members of minority groups in the present sample; and insufficient power to statistically control for potential confounds that may facilitate both the acquisition of ER skills as well as the development of anxiety symptoms (e.g., familial liability).

Thus, future research should work to replicate the present findings in larger samples more validly representing the normal population or clearly defined at-risk groups. Mental health status should be carefully assessed with clinical interviews, and ER as well as ASS should be assessed with self-reports, observer-based ratings, and performance-based measures at more than two assessment points in order to clarify the dynamics between ER and ASS in greater detail (e.g., 88, 91). Ideally, such studies should assess further constructs often subsumed under the broad umbrella of ER and help clarify which concepts are most clearly distinct from the psychopathological processes themselves (which we consider an open question with regard to concepts such as catastrophizing, worrying, or ruminating over nonaffective events) while still being relevant for mental health. Moreover, these studies should use measures assessing ER skills separately for specific affective states in order to unambiguously clarify to what extent the ability to adaptively cope with such undesired emotions predicts ASS over and above the effects of the ability to effectively cope with fear and anxiety.

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