Learning and Individual Differences 52 (2016) 10–18

Contents lists available at ScienceDirect

Learning and Individual Differences

journal homepage: www.elsevier.com/locate/lindif

Overcome procrastination: Enhancing emotion regulation skills reduce procrastination

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ARTICLE INFO

Article history:
Received 14 February 2016
Received in revised form 29 September 2016
Accepted 6 October 2016

Keywords:
Procrastination
Emotion regulation
Emotion-focused intervention
Training

ABSTRACT

Procrastination is a widespread phenomenon that affects performance in various life domains including academic performance. Recently, it has been argued that procrastination can be conceptualized as a dysfunctional response to undesired affective states. Thus, we aimed to test the hypothesis that the availability of adaptive emotion regulation (ER) skills prevents procrastination.
In a first study, cross-sectional analyses indicated that ER skills and procrastination were associated and that these connections were mediated by the ability to tolerate aversive emotions. In a second study, cross lagged panel analyses showed that (1) the ability to modify aversive emotions reduced subsequent procrastination and that (2) procrastination affected the subsequent ability to tolerate aversive emotions. Finally, in a third study, a two-arm randomized control trial (RCT) was conducted. Results indicated that systematic training of the ER skills tolerate and modify aversive emotions reduced procrastination. Thus, in order to overcome procrastination, emotion-focused strategies should be considered.
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1. Introduction

Procrastination is a widespread and well-known phenomenon that refers to the voluntary delay of activities which are intended, despite the delay may have negative consequences (e.g., Klingsieck, 2013). Individuals differ in the extent they postpone tasks (Steel, 2007). Chronically engaging in problematic procrastination has been reported by about 15% of adults (Ferrari, Díaz-Morales, O'Callaghan, Díaz, & Argumedo, 2007; Harriott & Ferrari, 1996; Steel, 2007) and the prevalence is even higher in specific populations: Up to 50% of college students procrastinate consistently and problematically (Day, Mensink, & O'Sullivan, 2000). Numerous studies indicate that procrastination is associated with significant impairment of work and academic performance (e.g., Steel, 2007). Students often engage in activities like sleeping, reading, or watching TV instead of learning (Pychyl, Lee, Thibodeau, & Blunt, 2000). Moreover, procrastination reduces well-being (van Eerde, 2003), increases negative feelings such as shame or guilt (Fee & Tangney, 2000), increases symptoms of serious mental health problems such as depression (e.g., Strongman & Burt, 2000), and affects health behavior, such as delaying to seek proper care for health problems (e.g., Sirois, Melia-Gordon, & Pychyl, 2003; Stead, Shanahan, & Neufeld, 2010).

In an attempt to explain this widespread and potentially harmful phenomenon, several authors have proposed that negative emotions are an important antecedent of procrastination (Steel, 2007; Tice, Bratslavsky, & Baumeister, 2001; Wohl, Pychyl, & Bennett, 2010). Evidence for this assumption comes from studies showing that people procrastinate more when they are sad or upset and that the subjective pleasantness of the distractor moderates the link between feeling upset and procrastination (Tice et al., 2001). Moreover, depressed affect, neuroticism, and lack of control over distressing situations have been found to be associated with procrastination (McCown, Johnson, & Petzel, 1989). Finally, it was shown, that the positive effects of self-forgiveness on procrastination were mediated by the reduction of negative affect (Wohl et al., 2010).

Thus, emotion regulation plays a critical role for understanding the self-regulatory failure of procrastination. Individuals postpone or avoid aversive task in order to gain short-term positive affect at the cost of long-term goals (Tice & Bratslavsky, 2000). Regarding details of this process, Sirois and Pychyl (2013) suggest considering counterfactual thinking as an explanation of emotional misregulation that may promote procrastination. Counterfactual thinking means that individuals compare "… unfavourable outcomes that did occur in the past to possible better (upward, "if only" statements) or worse (downward, "at least" statements) outcomes that might have occurred" (Sirois & Pychyl, 2013, 119). In short, upward counterfactuals can cue aversive emotions (e.g. shame or guild) that may initiate correcting future behavior (Boninger, Gleicher, & Strathman, 1994). Considering that aversive emotions like shame or guild cause self-regulation to break down,

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http://dx.doi.org/10.1016/j.lindif.2016.10.001
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upward counterfactuals may increase procrastination. On the contrary, downward counterfactuals improve actual feelings but leads to poorer future performance. Not only aversive emotional states cue procrastination, but also susceptibility to pleasurable temptations increase procrastination if individuals try to maximize pleasant feelings on coast of long-term goals (Dewitte & Schouwenburg, 2002, Tice & Bratslavsky, 2000). But ironically, engaging in enjoyable activities while procrastinating do not increase positive but negative affect because individuals feel guilty about their task avoidance (Pychyl et al., 2000).

As aversive affective states have been shown to cue procrastination by misregulation, it can be hypothesized that the ability to adaptively cope with aversive affective states reduces the risk of procrastination. According to Berking et al. (2008; 2014), ER skills include subcomponents such as: the ability (a) to be aware of one's emotions, (b) to identify and label emotions, (c) to correctly interpret emotions related to bodily sensations, (d) to understand the prompts of emotions, (e) to support one's own self in emotionally distressing situations, (f) to actively modify negative emotions in order to feel better, (g) to accept emotions, (h) to be resilient (in order to tolerate aversive emotions), (i) to confront emotionally distressing situations in order to attain important goals, (j) to support oneself (self-support), and (k) to modify aversive emotions (see Berking & Whitley, 2014 for details). Preliminary support for the assumption validity of this model comes from several studies in clinical and non-clinical populations (Berking & Znoj, 2008; Berking, Meier, & Wupperman, 2010; Berking et al., 2011; Berking et al., 2012; Berking, Ebert, Cuijpers, & Hofmann, 2013; Radkowski, McArdle, Bockting, & Berking, 2014; Wirtz, Hofmann, Rieper & Berking, 2013). Regarding all ER skills, in the heuristic framework of Berking and Znoj (2008) the ability to tolerate (resilience) and the ability to modify aversive emotions (modification) play key roles. Findings of Berking and colleagues support this; both abilities (resilience and modification) moderate the effects of the remaining ER skills (Berking et al., 2008).

There is ample evidence that shows how deficits in affect regulation skills are associated with various mental health problems (e.g., Berking & Lukas, 2015). Moreover, there is evidence that emotional self-regulation reduces procrastination (e.g., Blunt & Pychyl, 1998). It was shown that interventions which induct positive moods (Tice, Baumeister, Shmueli, & Muraven, 2007) or interventions of self-affirmation (Schmeichel & Vohs, 2009) enhance self-regulation capacity, which is needed to overcome procrastination. At last, recent research found that the association between health-related intention and actual engaging in health-related behavior was moderated by ER skills (Eckert, Ebert, Lehr, Sieland, Jazaieri & Berking, 2015). Although there is a body of evidence that emotional self-regulation is associated with procrastination, little is known about the association between the different abilities to adequately process and respond to one's feelings and procrastination. Thus, the aim of the present study is to clarify the role of emotion regulation skills in order to reduce the tendency of procrastination. With regard to the ER subcomponents, the framework of Berking and colleagues (e.g., Berking & Znoj, 2008) as well as findings of previous ER studies indicate that (1) the ability to tolerate and (2) the ability to modify aversive emotions mediate the relations between all other sub-skills and mental health (Berking et al., 2008). But with regard to procrastination, little is known about the role of these two sub-skills. Thus, we aim to clarify the roles of the ER skills resilience and modification in the interplay of ER skills. For this purpose we first tested the hypothesis that the availability of adaptive emotion regulation skills would be cross-sectionally associated with procrastination. In a second study, we clarified whether the prospective effects of ER skills would negatively predict subsequent procrastination. In a third study, we tested the hypothesis that a systematic training of adaptive ER skills would reduce procrastination in a randomized controlled trial of 83 employees of different professions.

2. Study 1

2.1. Materials and methods

2.1.1. Participants and procedures

Participants were recruited among students from the Leuphana University in Lueneburg (Germany) during February 2011. They were asked to complete questionnaires about their study behavior in lectures. Consenting participants completed a paper-and-pen-based survey that included the questionnaires described in this section below. All procedures of the study were approved by the Institutional Review Board and complied with APA ethical standards.

The final sample consisted of 172 students (108 were women and 64 were men). Average age was 22.1 years ($SD = 3.0$). Regarding the sample's career choice, 86 participants (50%) studied economy, 84 (48.8%) studied to become teachers, one studied psychology (0.6%), and another studied education sciences (0.6%).

2.1.2. Measures

2.1.2.1. Procrastination. Procrastination was measured by the Academic Procrastination State Inventory (APSI), which is a self-report instrument with 23 items that utilizes a 5-point Likert-type scale (1 = *not* to 5 = *always*) to assess procrastination in academic domains (Schouwenburg, 1995; German version: Helmke & Schrader, 2000). Participants were asked to rate how often they engaged in the behavior stated by the items during the previous week. An example of an item is: "Gave up studying because you did not feel well". The inventory includes three subscales (*academic procrastination*, *fear of failure*, and *lack of motivation*). Relevant for the present study is the $APSI_{total}$ score that is computed as the average of all items. Internal consistency of the total score ($\alpha_{total} = 0.91$) was good.

2.1.2.2. Emotion regulation. ER skills were assessed using the *Emotion Regulation Skills Questionnaire* (*ERSQ*; German version: Berking & Znoj, 2008). The ERSQ is a self-report instrument that includes 27 items and utilizes a 5-point Likert-type scale (1 = *not at all to* 5 = *almost always*) to assess adaptive emotion regulation skills (Berking & Znoj, 2008). The ERSQ assesses nine specific ER skills (awareness, sensations, clarity, understanding, acceptance of aversive emotions, resilience, self-support in distressing situations, readiness to confront distressing situations, and modification) with subscales composed of three items each.

The items 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 was clear about what emotions I was experiencing" (clarity); "I was aware of why I felt the way I felt" (understanding); "I accepted my emotions" (acceptance of aversive emotions); "I felt I could cope with even intense negative feelings" (resilience); "I did what I had planned, even if it made me feel uncomfortable or anxious" (readiness to confront distressing situations); and "I was able to influence my negative feelings" (modification). Emotion regulation was successfully assessed by averaging all of the items and computing a total score (Berking & Znoj, 2008).

2.1.3. Data analyses

In a first step, we conducted four regression analyses, first on $APSI_{total}$, second on $APSI_{procrastination}$, third on $APSI_{fear\ for\ failure}$, and fourth on $APSI_{lack\ of\ motivation}$. We calculated the explained variance of all subscales and the standardized regression weights of each subscale.

In order to clarify the roles of the ER skills resilience and modification in the interplay of ER skills, we conducted mediating analyses. We investigated whether the association of each ER skill and procrastination is mediated by the Subscale $ERSQ_{resilience}$ or by $ERSQ_{modify}$. For these analyses we used the SPSS MACRO PROCESS (Hayes, 2013).

For all statistical analyses, significance level was set at $p < 0.05$ (two-sided). SPSS 22.0 and AMOS 22.0 (IBM Corp., 2013) were used for all analyses.

2.2. Results

Table 1 shows descriptive statistics and intercorrelations of the variables.

Consistent with our hypothesis, the $APSI_{total}$ score and all APSI subscales were significantly predicted by the ERSQ subscales ($APSI_{total}$: $F_{9, 152} = 7.63$, $p < 0.001$, $R^2 = 0.31$; $APSI_{procrastination}$: $F_{9152} = 4.28$, $p < 0.001$, $R^2 = 0.20$; $APSI_{fear\ for\ failure}$: $F_{9, 152} = 5.70$, $p < 0.001$, $R^2 = 0.25$ and $APSI_{lack\ of\ motivation}$: $F_{9, 152} = 5.37$, $p < 0.001$, $R^2 = 0.23$). Although all ERSQ subscales (except awareness) were correlated with the APSI sum score and the subscales (see Table 1), only $ERSQ_{resilience}$ was a significant predictor in the four regression analyses (see Table 2).

In line with our assumption, the mediation analyses outline that $ERSQ_{resilience}$ mediated the association of all other ERSQ subscales on the procrastination scales (see Table 3). Although Berking and colleagues conceptualized $ERSQ_{resilience}$ and $ERSQ_{modify}$ as key variables (Berking & Znoj, 2008; Berking et al., 2008), in the present study $ERSQ_{modify}$ moderates only a link between procrastination and ER skills. For details see Table 3.

2.3. Discussion

Findings indicate that ER skills were associated with procrastination (all subscales and sum score). But surprisingly regression analyses including all ERSQ subscales revealed that only $ERSQ_{resilience}$ is a significant predictor for procrastination (all subscales and sum score). These findings indicated that most of the common variation of the ERSQ subscales on procrastination was explained by $ERSQ_{resilience}$. In the light of the mediation-hypotheses, these findings are not that surprising. In line with the framework of Berking and colleagues (Berking et al., 2008), results of the mediation analyses outlined, that $ERSQ_{resilience}$ mediated the connection between the other ERSQ subscales and procrastination. Contrary to this framework, $ERSQ_{modifiy}$, results were very inconsistent.

Considering the results shown in Table 3, it may be suggested that the ability to modify aversive emotions may be important for emotional processing (like awareness or sensation), whereas the ability to tolerate aversive emotions seems to be necessary for all adaptive emotional responses and processes, in order to deal with aversive or boring tasks.

Table 1
Descriptive statistics and intercorrelations between procrastination (APSI) and the subscales of the ERSQ of Study 1.

	M	SD	1	2	3	4
1 $APSI_{total}$	58.0	14.52*		0.86***	0.80***	0.69***
2 $APSI_{academic\ procrastination.}$	33.9	8.33**			0.48***	0.35***
3 $APSI_{fear\ for\ failure}$	13.6	4.94				0.63***
4 $APSI_{lack\ of\ motivation}$	3.7	1.97				
5 $ERSQ_{awareness}$	3.5	0.81	−0.15***	−0.11***	−0.10***	−0.19***
6 $ERSQ_{sensation}$	3.8	0.70	−0.27***	−0.20***	−0.17***	−0.28***
7 $ERSQ_{clarity}$	3,9	0.76	−0.34***	−0.27***	−0.21***	−0.34***
8 $ERSQ_{understanding}$	3.9	0.79	−0.32***	−0.21***	−0.23***	−0.35***
9 $ERSQ_{acceptance}$	3.7	0.69	−0.40***	−0.32***	−0.33***	−0.28***
10 $ERSQ_{resilience}$	3.7	0.77	−0.53***	−0.42***	−0.49***	−0.40***
11 $ERSQ_{self\text{-}support}$	3.8	0.75	−0.43***	−0.33***	−0.42***	−0.31***
12 $ERSQ_{r.t.confront}$	3.6	0.82	−0.26***	−0.17***	−0.25***	−0.30***
13 $ERSQ_{modify}$	3.4	0.76	−0.29***	−0.22***	−0.26***	−0.21***

Note. N = 162; APSI = Academic Procrastination State Inventory (Schouwenburg, 1995; German version: Helmke & Schrader, 2000); ERSQ = Emotion Regulation Skills Questionnaire (Berking & Znoj, 2008); r.t.confront = readiness to confront aversive emotions.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

This is highly plausible, because individuals, who are not able to tolerate aversive emotions, will postpone or avoid aversive or boring tasks. Then they will have no reason to become aware of these emotional states, to understand, nor to modify them.

Despite the high plausibility, Study 1 is very limited by the cross-sectional design. No causal interpretation of the results is possible. In order to overcome this limitation, the prospective impact of ER skills on procrastination and vice versa was investigated in Study 2.

3. Study 2

To further clarify whether cross-sectional associations between ER skills and procrastination result from a causal effect of ER skills on procrastination, we conducted a second study to test prospective associations between ER skills and procrastination.

Increasing workload leads to more perceived stress and aversive emotions (Ross, Niebling, & Heckert, 1999). If, in addition to the increasing workload, no fixed timetable exists, procrastinators are likely to regulate the aversive emotions and the perceived stress by postponing or avoiding aversive tasks. DeArmond, Matthews, and Bunk (2014) found an indirect impact from increasing workload on procrastination. On the other hand, ER skills increase the probability to regulate aversive emotions adaptively. Thus, we assume that ER skills prevent individuals from procrastinating when workload increases. With regard to the key role of the ability to tolerate (resilience) and the ability to modify aversive emotions, we particularly expect that deficits in these sub-skills are coupled with a rise of subsequent procrastination.

3.1. Materials and methods

3.1.1. Participants and procedure

As in the previous study, participants were recruited among students from the Leuphana University (Germany; no overlap between the samples from Study 1 and Study 2). They also were asked to complete questionnaires about study behavior. Assessments were conducted in the last week of lecture period (T 1) and one week later, during the first week of the non-lecture period (T 2). Typically, the deadline for assignments and examinations comes to its closing point during the first week of the non-lecture period (the second measurement), which usually implies an increase in student workload. In order to evaluate prospective effects of ER on procrastination under stress, we assessed increased workload in the first week of the non-lecture period compared to the last week of the lecture period and excluded participants if they did not report an increase. To encourage students to participate in the present study in spite of their already heavy workload, we raffled four Amazon-vouchers at the value of 20 Euro as incentives. At both assessment points, consenting participants completed the Emotion Regulation Skills Questionnaire and General Procrastination Scale as described in the previous study. All procedures were approved by the university's Institutional Board and complied with APA ethical standards.

The final sample consisted of 79 students, of which 76 were female (92.4%). The average age was 23.1 years ($SD = 2.3$). The first assessment was completed by 190 participants. Forty-two (22.1%) of them were excluded because they reported a decreased work load for the non-lecture period (excluding criterion). The second assessment was completed by 79 students (53.5%). Of the final sample population 63 participants (79.7%) were studying to become teachers, 7 (8.9%) studied education science, 3 (3.8%) studied environmental and sustainability studies, 2 (2.5%) studied human resources management, and one participant (1.3%) studied in each one of the following careers: cultural sciences, politics, English studies, and economics.

3.1.2. Measures

3.1.2.1. Emotion regulation skills. As in Study 1, we assessed ER skills with the *Emotion Regulation Skills Questionnaire* (*ERSQ*; German version:

Table 2
Regression of the ERSQ-subscales on the sum score and the subscales of the Academic Procrastination State Inventory ($APSI_{total}$, $APSI_{procrastination}$, $APSI_{fear\ for\ failure}$, and $APSI_{lack\ of\ motivation}$).

	Regression on $APSI_{total}$			Regression on $APSI_{procrastination}$			Regression on $APSI_{fear\ for\ failure}$			Regression on $APSI_{lack\ of\ motivation}$		
	β	*T*	*p*	β	*T*	*p*	β	*T*	*p*	β	*T*	*p*
$ERSQ_{awareness}$	0.08	0.85	0.396	0.07	0.67	0.502	0.10	1.04	0.301	0.07	0.71	0.477
$ERSQ_{sensation}$	−0.05	−0.44	0.657	−0.07	−0.56	0.577	−0.01	−0.06	0.953	−0.06	−0.48	0.633
$ERSQ_{clarity}$	−0.16	−0.80	0.424	−0.15	−1.00	0.320	0.10	0.66	0.512	−0.12	−0.83	0.411
$ERSQ_{understanding}$	−0.03	−0.20	0.843	0.10	0.65	0.518	−0.15	−1.10	0.272	−0.24	−1.74	0.083
$ERSQ_{acceptance}$	0.20	0.74	0.458	0.00	0.02	0.986	0.10	0.78	0.438	0.25	1.88	0.062
$ERSQ_{resilience}$	−0.50	−4.03	0.000	−0.35	−2.71	0.008	−0.46	−3.58	0.000	−0.41	−3.23	0.001
$ERSQ_{self\text{-}support}$	−0.15	−1.58	0.116	−0.15	−1.52	0.132	−0.16	−1.64	0.103	0.00	−0.01	0.990
$ERSQ_{r.t.confront}$	0.04	0.42	0.677	0.06	0.60	0.548	−0.01	−0.15	0.879	−0.14	−1.54	0.125
$ERSQ_{modify}$	0.07	0.74	0.460	0.07	0.67	0.503	0.04	0.37	0.709	0.16	1.69	0.093

Note. $N = 162$.

Berking & Znoj, 2008). The internal consistency of the $ERSQ_{total}$ was good ($\alpha_{t1} = 0.93$; $\alpha_{t2} = 0.94$).

3.1.2.2. Procrastination. Procrastination was measured with the German short version of the *General Procrastination Scale* (*GPS*; Lay, 1986; German version: Klingsieck & Fries, 2012). The GPS is a self-report instrument with 9 items that utilizes a 4-point Likert-type scale (1 = *extremely uncharacteristic* to 4 = *extremely characteristic*). Four items are inversed. A total score was obtained by summing all items and then dividing them by nine (number of items). The authors report an internal consistency of $\alpha = 0.86$ (Klingsieck & Fries, 2012). The internal consistency of the GPS in the present study was good ($\alpha_{t1} = 0.93$; $\alpha_{t2} = 0.94$).

3.1.3. Data analyses

To clarify the direction that prospective effects of ER skills might have on procrastination, we conducted cross-lagged regression analyses based on path analysis modeling. This method allows to investigate time-lagged reciprocal effects of two variables, while, at the same time, controlling for autoregression effects (Cole & Maxwell, 2003). We conducted nine cross-lagged panels (CLP) to investigate the reciprocal effects of each ERSQ subscale and procrastination. For all statistical analyses, significance level was set at $p < 0.05$ (two-sided). SPSS 22.0 and AMOS 22.0 (IBM Corp., 2013) were used for all analyses.

3.2. Results

Correlations between ER sub-skills and procrastination are presented in Table 4. To investigate the prospective effect of ER skills on procrastination, nine CLP were conducted (see Tables 5 and 6). The model fit for the path analyses of three emotional processing models ($ERSQ_{awareness}$, $ERSQ_{sensation}$, $ERSQ_{understanding}$; see Table 4), for the sum score, and for three regulation-orientated subscales ($ERSQ_{acceptance}$, $ERSQ_{self\text{-}support}$, $ERSQ_{modify}$; see Table 5) were very good. Good to acceptable were the model fits for $ERSQ_{clarity}$ (Table 4) and $ERSQ_{resilience}$ (Table 5). Regarding the fit indices, the model including $ERSQ_{readiness\ to\ confront}$ did not fit (Table 5).

In line with our assumption, individuals scoring high on $ERSQ_{modify}$ at pre-assessment decreased subsequent procrastination ($\beta = -0.09$, $p < 0.05$), whereas procrastination measured at pre-assessment seemed to have no impact on subsequent $ERSQ_{modify}$ ($\beta = 0.07$, n.s.). Contrary to our expectations, no other ERSQ subscale predicted a reduction of subsequent procrastination. Surprisingly, findings indicated that a high procrastination level decreased subsequent ability to tolerate aversive emotions ($ERSQ_{resilience}$; $\beta = -0.19$, $p < 0.05$).

Table 3
Indirect effects on procrastination ($APSI_{total}$, $APSI_{procrastination}$, $APSI_{fear\ for\ failure}$, and $APSI_{lack\ of\ motivation}$; Schouwenburg, 1995).

	Indirect effects on $APSI_{total}$				Indirect effects on $APSI_{procrastination}$				Indirect effects on $APSI_{fear\ for\ failure}$				Indirect effects on $APSI_{lack\ of\ motivation}$			
			CI(95%)				CI(95%)				CI(95%)				CI(95%)	
	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI
Mediator:																
$ERSQ_{resilience}$																
$ERSQ_{awareness}$	**−0.17**	**0.05**	**−0.2797**	**−0.0919**	**−0.13**	**0.04**	**−0.2247**	**−0.0654**	**−0.16**	**0.05**	**−0.2607**	**−0.0773**	**−0.12**	**0.04**	**−0.2144**	**−0.0475**
$ERSQ_{sensation}$	**−0.19**	**0.05**	**−0.2836**	**−0.1061**	**−0.15**	**0.04**	**−0.2342**	**−0.0776**	**−0.19**	**0.05**	**−0.3007**	**−0.1067**	**−0.13**	**0.04**	**−0.2337**	**−0.0638**
$ERSQ_{clarity}$	**−0.24**	**0.05**	**−0.3588**	**−0.1575**	**−0.18**	**0.04**	**−0.2742**	**−0.1023**	**−0.25**	**0.05**	**−0.3613**	**−0.1587**	**−0.14**	**0.05**	**−0.2409**	**−0.0574**
$ERSQ_{understanding}$	**−0.26**	**0.05**	**−0.3725**	**−0.1716**	**−0.21**	**0.04**	**−0.2968**	**−0.1262**	**−0.24**	**0.05**	**−0.3712**	**−0.1575**	**−0.14**	**0.05**	**−0.2422**	**−0.0436**
$ERSQ_{acceptance}$	**−,42**	**0.08**	**−0.5694**	**−0.2749**	**−,29**	**0.07**	**−0.4289**	**−0.1399**	**−,41**	**0.08**	**−0.5787**	**−0.2619**	**−,31**	**0.08**	**−0.4709**	**−0.1659**
$ERSQ_{self\text{-}support}$	**−0.28**	**0.05**	**−0.3973**	**−0.1862**	**−0.22**	**0.05**	**−0.3313**	**−0.1482**	**−0.24**	**0.05**	**−0.3495**	**−0.1570**	**−0.16**	**0.05**	**−0.2714**	**−0.0668**
$ERSQ_{r.t.confront}$	**−0.29**	**0.05**	**−0.4078**	**−0.1938**	**−0.20**	**0.06**	**−0.3110**	**−0.0939**	**−0.26**	**0.05**	**−0.3589**	**−0.1513**	**−0.22**	**0.06**	**−0.3578**	**−0.1078**
$ERSQ_{modify}$	**−0.34**	**0.05**	**−0.4623**	**−0.2580**	**−0.26**	**0.05**	**−0.3887**	**−0.1777**	**−0.30**	**0.05**	**−0.4116**	**−0.1993**	**−0.25**	**0.05**	**−0.3675**	**−0.1519**
Mediator: $ERSQ_{modify}$																
$ERSQ_{awareness}$	**−0.13**	**0.05**	**−0.2340**	**−0.0545**	**−0.10**	**0.04**	**−0.1868**	**−0.0250**	**−0.12**	**0.05**	**−0.2494**	**−0.0404**	−0.07	0.05	−0.1539	0.0213
$ERSQ_{sensation}$	**−0.11**	**0.04**	**−0.2071**	**−0.0280**	−0.07	0.04	−0.1409	0.0197	**−0.10**	**0.04**	**−0.2022**	**−0.0332**	−0.04	0.04	−0.1226	0.0602
$ERSQ_{clarity}$	−0.09	0.05	−0.1920	0.0090	−0.05	05	−0.1424	0.0432	**−0.10**	**0.05**	**−0.2036**	**−0.0139**	−0.01	0.05	−0.0993	0.0929
$ERSQ_{understanding}$	−0.10	0.06	−0.2163	0.0111	−0.07	05	−0.1741	0.0323	−0.10	0.05	−0.2082	0.0045	0.01	0.06	−0.0968	0.1404
$ERSQ_{acceptance}$	−0.05	0.06	−0.1857	0.0568	−0.01	0.06	−0.1246	0.1009	−0.05	0.06	−0.1852	0.0566	−0.03	0.06	−0.1434	0.0849
$ERSQ_{resilience}$	0.03	0.05	−0.0747	0.1195	0.03	0.05	−0.0664	0.1381	0.03	0.05	−0.0817	0.1210	0.03	0.05	−0.0586	0.1342
$ERSQ_{self\text{-}support}$	**−0.11**	**0.04**	**−0.2186**	**−0.0337**	−0.08	0.04	−0.1634	0.0019	−0.04	0.04	−0.1357	0.0176	−0.03	0.04	−0.1192	0.0458
$ERSQ_{r.t.confront}$	−0.06	0.04	−0.1578	0.0067	−0.03	0.04	−0.1039	0.0361	**−0.08**	**0.04**	**−0.1838**	**−0.0006**	−0.04	0.03	−0.1150	0.0308

Note. Independent variables were subscales of the Emotion Regulation Skills Questionnaire (Berking & Znoj, 2008); dependent variable was procrastination (General Procrastination Scale; Lay, 1986) and the mediator was the ability to tolerate aversive emotions ($ERSQ_{resilience}$). The bolded effects were included in a 95%-confidence interval.

Table 4
Correlations between ER sub-skills and procrastination.

	Correlations on Procrastination T1		Correlations on Procrastination T2	
	r	*p*	*r*	*p*
$ERSQ_{awareness}$	0.17	0.142	0.10	0.396
$ERSQ_{sensation}$	−0.11	0.339	−0.16	0.157
$ERSQ_{clarity}$	−0.23	0.045	−0.25	0.025
$ERSQ_{understanding}$	−0.07	0.953	−0.03	0.788
$ERSQ_{acceptance}$	−,03	0.785	−0.05	0.677
$ERSQ_{resilience}$	−0.24	0.031	−0.26	0.023
$ERSQ_{self\text{-}support}$	−0.17	0.143	−0.22	0.056
$ERSQ_{r.t.confront}$	−0.35	0.002	0.43	0.000
$ERSQ_{modify}$	−0.14	0.216	0.22	0.056
$ERSQ_{total}$	−0.18	0.110	−0.25	0.029
GPS_t1	1.00	0.000	0.93	0.000
$ERSQ_{awareness}$	0.06	0.608	−0.03	0.765
$ERSQ_{sensation}$	0.07	0.553	−0.03	0.798
$ERSQ_{clarity}$	−0.06	0.590	−0.16	0.163
$ERSQ_{understanding}$	0.06	0.593	−0.01	0.911
$ERSQ_{acceptance}$	−0.07	0.544	−0.15	0.180
$ERSQ_{resilience}$	−0.35	0.002	−0.43	0.000
$ERSQ_{self\text{-}support}$	−0.13	0.243	−0.25	0.028
$ERSQ_{r.t.confront}$	−0.40	0.000	−0.48	0.000
$ERSQ_{modify}$	−0.03	0.818	−0.13	0.253
$ERSQ_{total}$	−0.13	0.257	−0.25	0.026

3.3. Discussion

Study 2 was conducted in order to investigate the prospective reciprocal effects of ER skills and procrastination. We assumed that ER skills were negatively associated with subsequent procrastination. Indeed, the ability to modify aversive emotions was negatively associated with subsequent procrastination. But all other subscale of the ERSQ did not cue a decrease of procrastination. Moreover, procrastination seemed to reduce the subsequent ability to tolerate aversive emotions ($ERSQ_{resilience}$) but not vice versa.

Although we supposed that the ability to tolerate aversive emotions reduces subsequent procrastination, the present findings seem to be plausible. If someone procrastinates in order to avoid aversive emotions or boredom, it is a kind of negative reinforcement. If the individual postpones or avoids the task, the expected undesired affective state disappears. Instead of standing the aversive affect the individual learns not to tolerate the aversive emotional state. Thus, the decrease of $ERSQ_{resilience}$ may be a result of such a learning process.

Several limitations of Study 2 need to be addressed. First, it has been argued that the validity of self-reports of emotional competence is limited (e.g., Stankov, 1999). However, subjective appraisals of emotion regulation may often be at least as valid as alternative measures of emotion regulation (e.g., Brackett & Mayer, 2003). Nevertheless, it is important that future studies replicate the analyses using alternative instruments such as observer ratings or physiological measurements. Second, self-reported procrastination estimates may be also a problem. Meta-analytic findings suggest that "…those in poorer moods are more likely to indicate that they procrastinate, regardless of their actual behavior." (Steel, 2007, p. 79). Future research should overcome this limitation by external assessment. Third, the increase of workload was assessed by a self-report item. The response may also depend on the mood of the participants. However, the dates of the two assessments (last week of the lecture period and the first week of non-lecture period) were chosen because workload typically increases in the beginning of the non-lecture period for German students.

4. Study 3

The results of Study 2 suggest that the ability to modify aversive emotions has a unidirectional negative effect on subsequent procrastination. In Study 3, we aim to replicate this finding in an experimental design. We assume that individuals, who train their ability to modify aversive emotions cued by tasks, reduce procrastination. Additionally, we suppose that the decrease in procrastination is mediated by an increase in the ability to modify aversive emotions.

Table 5
Cross lagged panels: Emotional Processing Subscale of the Emotion Regulation Skills Questionnaire (Berking & Znoj, 2008) on GPS.

				Model fit						
				χ^2	*p*	CFI	TLI	RMSEA	90% CI_{RMSEA}	
T1	T2	β	*p*						LLCI	ULCI
CLP 1: $ERSQ_{total}$ - GPS				2.60	0.11	0.99	0.96	0.143	0.000	0.369
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{total\_t1}$	$ERSQ_{total\_t2}$	0.73	0.000							
$ERSQ_{total\_t1}$	GPS_{t2}	−0.08	0.052							
GPS_{t1}	$ERSQ_{total\_t2}$	0.00	0.971							
CLP 2: $ERSQ_{awareness}$ - GPS				2.20	0.14	0.99	0.97	0.12	0.000	0.354
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{awareness\_t1}$	$ERSQ_{awareness\_t2}$	0.70	0.000							
$ERSQ_{awareness\_t1}$	GPS_{t2}	−0.06	0.467							
GPS_{t1}	$ERSQ_{awareness\_t2}$	−0.06	0.152							
CLP 3: $ERSQ_{sensation}$ - GPS				0.93	0.33	1.00	1.00	0.00	0.000	0.295
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{sensation\_t1}$	$ERSQ_{sensation\_t2}$	0.66	0.000							
$ERSQ_{sensation\_t1}$	GPS_{t2}	−0.06	0.146							
GPS_{t1}	$ERSQ_{sensation\_t2}$	−0.14	0.099							
CLP 4: $ERSQ_{clarity}$ - GPS				4.10	0.04	0.98	0.97	0.20	0.029	0.415
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{clarity\_t1}$	$ERSQ_{clarity\_t2}$	0.57	0.000							
$ERSQ_{clarity\_t1}$	GPS_{t2}	−0.05	0.471							
GPS_{t1}	$ERSQ_{clarity\_t2}$	−0.07	0.290							
CLP 5: $ERSQ_{understanding}$ - GPS				0.004	0.95	1.00	1.00	0.00	0.000	0.000
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{understanding\_t1}$	$ERSQ_{understanding\_t2}$	0.53	0.000							
$ERSQ_{understanding\_t1}$	GPS_{t2}	−0.02	0.561							
GPS_{t1}	$ERSQ_{understanding\_t2}$	−0.07	0.500							

Note. Significant effects (except auto-regression effects) were bolded.

Table 6
Cross lagged panels: Subscales concerning regulation of the Emotion Regulation Skills Questionnaire (Berking & Znoj, 2008) on GPS.

				Model fit						
				χ^2	*p*	CFI	TLI	RMSEA	90% CI_{RMSEA}	
T1	T2	β	*p*						LLCI	ULCI
CLP 6: $ERSQ_{acceptance}$ - GPS				0.08	0.78	1.00	1.00	0.000	0.000	0.197
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{acceptance\_t1}$	$ERSQ_{acceptance\_t2}$	0.66	0.000							
$ERSQ_{acceptance\_t1}$	GPS_{t2}	−0.02	0.658							
GPS_{t1}	$ERSQ_{acceptance\_t2}$	−0.05	0.565							
CLP 7: $ERSQ_{resilience}$ - GPS				4.74	0.03	0.98	0.90	0.219	0.056	0.433
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{resilience\_t1}$	$ERSQ_{resilience\_t2}$	0.66	0.000							
$ERSQ_{resilience\_t1}$	GPS_{t2}	−0.03	0.444							
GPS_{t1}	**$ERSQ_{resilience\_t2}$**	**−0.19**	**0.018**							
CLP 8: $ERSQ_{self\text{-}support}$ - GPS				2.19	0.14	0.99	0.96	0.123	0.000	0.354
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{self\text{-}support.\_t1}$	$ERSQ_{self\text{-}support\_t2}$	0.54	0.000							
$ERSQ_{self\text{-}support\_t1}$	GPS_{t2}	−0.06	0.129							
GPS_{t1}	$ERSQ_{self\text{-}support\_t2}$	−0.04	0.636							
CLP 9: $ERSQ_{R.t.confront.}$ - GPS				10.10	0.00	0.96	0.73	0.342	0.174	0.546
GPS_{t1}	GPS_{t2}	0.92	0.000							
$ERSQ_{R.t.confr\_t1}$	$ERSQ_{R.t.confr\_t2}$	0.49	0.000							
$ERSQ_{R.t.confr\_t1}$	**GPS_{t2}**	**−0.13**	**0.002**							
GPS_{t1}	**$ERSQ_{R.t.confr\_t2}$**	**−0.25**	**0.007**							
CLP 10: $ERSQ_{modify.}$ - GPS				1.56	0.21	1.00	0.98	0.085	0.000	0.328
GPS_{t1}	GPS_{t2}	0.93	0.000							
$ERSQ_{modify\_t1}$	$ERSQ_{modify\_t2}$	0.69	0.000							
$ERSQ_{modify\_t1}$	**GPS_{t2}**	**−0.09**	**0.026**							
GPS_{t1}	$ERSQ_{modify\_t2}$	0.07	0.383							

Note. Significant effects (except auto-regression effects) were bolded.

Therefore, Study 3 focused on the implementation of a randomized control trial (RCT) to test the impact of an online-training focusing on ER strategies in order to overcome procrastination of aversive tasks. We assume that the training of emotion-focused strategies reduces procrastination. Furthermore, we hypothesize that the training of emotion-focused strategies increases ER skills. The emotion-focused strategies included tolerating as well as modifying aversive emotions. Moreover, we suppose that the effects on procrastination are mediated by an increase of these ER skills.

4.1. Materials and methods

4.1.1. Participants and procedures

The participants of this third study were recruited through newspaper articles about the current study and through the website www.training-geton.de, which was a platform for internet-based trainings and training research of the Leuphana University Lueneburg (Germany). Interested individuals applied to participate by writing an email to the primary study investigator (first author).

Individuals were asked to (i) provide an informed consent and (ii) complete an online baseline questionnaire (www.soscisurvey.de). Then, participants were randomized to an intervention group (IG) or a waiting list control (WLC) using the online tool RANDOM.ORG. A list of participants was entered in the tool which then changed the listing order randomly. Participants with an even listing number were allocated to the IG and got access to the online intervention. Participants with an uneven number were allocated to the WLC. They were asked to wait about two weeks for the post-assessment and subsequent access to the online training by email. Two weeks later, all participants were invited to complete the same questionnaire as a post-assessment. All procedures were approved by the university's Institutional Review Board and complied with APA ethical standards.

From 215 individuals who were interested in the online training, 83 provided the informed consent and completed the pre- and post-questionnaires. Fifty-seven participants (68.7%) were women and the average age was 40.8 years ($SD = 11.9$). Four individuals (4.8%) reported to be unemployed, six were students (7.2%), and one person was retired (1.2%). All other participants (86.7%) were employed. Forty-four participants (53.0%) of the final sample were allocated to the IG and 39 participants (47.0%) were randomized to the WLC.

4.1.2. Intervention

The two-week web-based intervention promoted emotion-focused strategies to overcome procrastination. The strategies tolerate and modify aversive emotions, are appropriate to cope adaptively with emotions (Berking et al., 2008). Thus, the intervention focused on these two strategies. In the intervention, participants were asked to (1) choose one of their daily tasks which they were most likely to procrastinate and (2) identify whether the task characteristics are associated with aversive emotions or with a lack of positive affect.

Depending on this, (3) participants were encouraged to tolerate the lack of positive affect (e.g., boredom) or the aversive emotions (e.g., fear for failure). Following Berking and Whitley (2014), the strategy to tolerate aversive emotions included intentionally permitting aversive emotions to be present, then reminding oneself of one's toughness and resilience, and finally reminding oneself of (or increasing) the affective commitment with task.

On this basis, (4) participants could try to modify their emotions. In order to do that, they either tried to increase positive affect or to reduce aversive emotions. The strategy to modify aversive emotions consisted of first practicing a short relaxation-exercise, then reappraising the harm and the probability of the potential threat, and lastly deciding whether to execute the task.

After completing the chosen task, participants (5) evaluated how successfully they coped with aversive emotions or with a lack of positive affect. This procedure took about 10 min and was repeated daily for two weeks.

4.1.3. Measures

We assessed procrastination as our primary outcome with the German short version of the *General Procrastination Scale* (Lay, 1986; German short version: Klingsieck & Fries, 2012) as described in Study 2. In this study, Crombach's alpha of the GPS was acceptable ($\alpha_{t1} = 0.80$, $\alpha_{t2} = 0.85$).

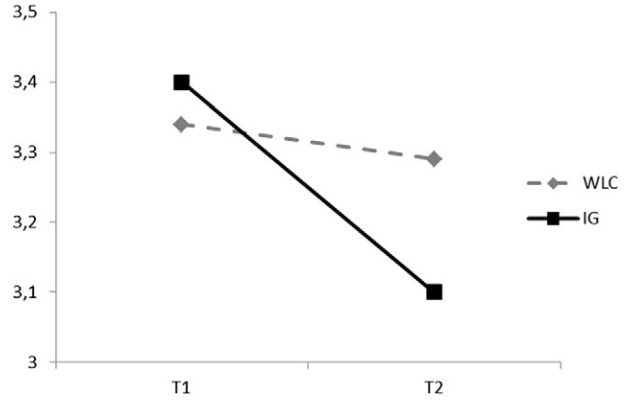

Fig. 1. Comparison of intervention group (IG) and waiting list control (WLC) group on development of procrastination from baseline (T1) to post-measurement (T2).

To evaluate to what extent the intervention actually enhances ER, we also assessed the effects of the intervention on ER. As the intervention primarily focused on acceptance, resilience, and modification of aversive emotions, we focused on these three aspects of ER and included the ERSQ scales acceptance, resilience, and modification as secondary outcomes. Reliability of these subscales in the present study were subscales of $\alpha_{t1} = 0.77$ and $\alpha_{t2} = 0.82$ for acceptance, $\alpha_{t1} = 0.77$ and $\alpha_{t2} = 0.77$ for resilience, and $\alpha_{t1} = 0.80$ and $\alpha_{t2} = 0.77$ for modification.

4.1.4. Data analyses

Our hypothesis was that the training increases the abilities to tolerate and to modify aversive emotions. Therefore, in a first step, we checked whether the training influenced those ER skills by conducting ANCOVAs, by controlling the respective pre-measured ER skills.

In a second step, we tested if the training of emotion-focused strategies to cope with aversive tasks reduces procrastination. Therefore, we conducted another ANCOVA by controlling pre-measured procrastination. The effect size was calculated.

In a third step, we investigated if the effects on procrastination were mediated by the increase of ER strategies. We conducted a mediation analysis by applying the SPSS MACRO PROCESS (Hayes, 2013). First, we tested the direct effects of the independent variable treatment on procrastination (t2). Then, we tested the indirect effects of the change in the ERSQ subscales $ERSQ_{resilience}$ and $ERSQ_{modify}$. Therefore, we conducted separate analyses. To calculate the change of each ERSQ subscale we subtracted the pre-measure from the post-measure. In each analysis, we controlled pre-measured procrastination statistically.

We aimed to investigate the de facto influence of applying ER strategies on aversive emotional states that were triggered by tasks. Thus, we conducted per-protocol analyses, using SPSS 22.0 for all analyses (IBM Corp., 2013).

4.2. Results

An ANOVA indicated no significant differences between the treatments regarding age ($F = 0.025$, $p > 0.05$), procrastination ($F = 0.289$, $p > 0.05$), and all nine ER skills ($F = 0.038$–3.436, $p > 0.05$) in pre-measurements. With regard to gender a chi-square-test was conducted, no differences ($\chi^2 = 1.411$, $p > 0.05$) between treatments were found.

In line with our assumption, an ANCOVA indicated that the training of emotion-focused strategies reduced procrastination ($F_{1, 81} = 8.979$, $p < 0.01$, $d_{between} = 0.34$). Fig. 1 displays the development of procrastination from baseline (T1) to post-measurement (T2). Reported means of procrastination in the WLC ($M_{t1} = 3.34$, $SD = 0.40$, $M_{t2} = 3.29$, $SD = 0.48$) did not differ significantly ($t = 1.099$, $p > 0.10$), whereas the reduction in means of the IG ($M_{t1} = 3.40$, $SD = 0.48$, $M_{t2} = 3.10$, $SD = 0.54$) was significant ($t = 5.113$, $p < 0.001$, $d_{withing} = 0.59$).

Participants of the IG group reported a significant increase in their abilities to tolerate aversive emotions ($F_{1, 80} = 4.424$, $p < 0.05$) and modify aversive emotions ($F_{1, 80} = 14.109$, $p < 0.001$) compared to the WLC group. Table 7 shows the means, SDs for baseline (t1) and post-treatment (t2), and the test-statistics for all outcome measurements separately.

To test whether the effect of the training on procrastination (t2) was mediated by increasing the ER skills $ERSQ_{resilience}$ and $ERSQ_{modify}$, an analysis of indirect effects was conducted. Procrastination (t1) was controlled. There were significant indirect effects of the ER treatment on procrastination through the change in both ER subscales ($\Delta ERSQ_{resilience}$: $\beta = -0.06$, 95% *CI* [−0.152, −0.005], and $\Delta ERSQ_{modify}$: $\beta = -0.08$, 95% *CI* [−0.202, −0.001]). Additional, analyses indicated that the ER subscales $\Delta ERSQ_{acceptance}$ and $\Delta ERSQ_{readiness\ to\ confront}$ were also significant indirect pathways between treatment and reduction in procrastination (see Table 8). Following Baron and Kenny (1986), a mediation effect needs a significant pathway from the independent variable on the dependent variable before including the mediator, a significant pathway from the independent variable on the mediator, and a significant pathway from the mediator on the dependent variable. Mediation analyses outline that only for $\Delta ERSQ_{resilience}$ and $\Delta ERSQ_{modify}$ all pathways were significant (see Table 9).

5. General discussion and conclusion

Results of Study 3 indicated that the online-based training reduced procrastination and increased all ER skills, including the ability to modify and to tolerate aversive emotions. Regarding the mediation hypotheses, Table 8 indicated that indirect pathways from treatment on procrastination via $ERSQ_{acceptance}$, $ERSQ_{resilience}$, $ERSQ_{readiness\ to\ confront}$, and $ERSQ_{modify}$ were significant. However, the path from $ERSQ_{acceptance}$ (mediator) on procrastination was only marginal significant and the path from treatment on $ERSQ_{readiness\ to\ confront}$ (mediator) was not significant (see Table 9). Following Baron and Kenny (1986), the significance of all pathways is a premise of mediation. Thus, the

Table 7
Means, standard deviations, and test-statistics of IG and WLC for procrastination (GPS), depression (CES-D) and for the nine ERSQ-Subscales.

	WLC		IG		Test-statistics	
	M_{t1} (SD)	M_{t2} (SD)	M_{t1} (SD)	M_{t2} (SD)	*F*	*p*
Procrastination	3.34 (0.40)	3.29 (0.48)	3.40 (0.48)	3.10 (0.54)	8.979	0.004
$ERSQ_{awareness}$	3.42 (0.84)	3.51 (0.83)	3.02 (0.84)	3.91 (4.92)	0.963	0.329
$ERSQ_{sensation}$	3.16(0.80)	3.04 (0.91)	3.47 (0.89)	3.59 (0.93)	4.465	0.038
$ERSQ_{clarity}$	3.36 (0.77)	3.22 (0.88)	3.61 (0.89)	3.79 (0.84)	6.606	0.012
$ERSQ_{understanding}$	3.24 (0.75)	3.22 (0.73)	3.41 (0.78)	3.65 (0.79)	5.527	0.021
$ERSQ_{acceptance}$	3.13 (0.76)	3.07 (0.80)	2.85 (0.82)	3.29 (0.82)	4.318	0.041
$ERSQ_{resilience}$	2.95 (0.99)	2.86 (0.89)	2.89 (0.98)	3.20 (0.88)	4.424	0.039
$ERSQ_{self\text{-}support}$	3.21 (0.73)	3.09 (0.77)	3.32 (0.84)	3.49 (0.80)	6.513	0.013
$ERSQ_{r.t.confront}$	2.77 (0.79)	2.88 (0.90)	2.68 (0.86)	3.19 (0.83)	3.100	0.083
$ERSQ_{modify}$	2.75 (0.74)	2.70 (0.74)	2.81 (0.76)	3.21 (0.82)	14.109	0.000

Table 8
Indirect effects on procrastination. Independent variable was the treatment; dependent variable was procrastination at post-assessment (General Procrastination Scale; GPS_{t2}; Lay, 1986) and the mediators are the differences of subscales of post- and pre-assessment of the Emotion Regulation Skills Questionnaire (Berking & Znoj, 2008). In each mediation analysis, procrastination at pre-assessment was controlled.

			CI (95%)	
	β	*SE*	LLCI	ULCI
Mediators:				
$\Delta ERSQ_{awareness}$	0.02	0.02	−0.0323	0.0441
$\Delta ERSQ_{sensation}$	−0.02	0.02	−0.0803	0.0166
$\Delta ERSQ_{clarity}$	−0.03	0.03	−0.1159	0.0092
$\Delta ERSQ_{understanding}$	−0.01	0.02	−0.0761	0.0302
$\Delta ERSQ_{acceptance}$	**−0.05**	**0.04**	**−0.1406**	**−0.0003**
$\Delta ERSQ_{resilience}$	**−,06**	**0.04**	**−0.1522**	**−0.0047**
$\Delta ERSQ_{self\text{-}support}$	0.00	0.02	−0.0439	0.0545
$\Delta ERSQ_{r.t.confront}$	**−0.05**	**0.04**	**−0.1787**	**−0.0001**
$\Delta ERSQ_{modify}$	**−0.08**	**0.05**	**−0.2017**	**−0.0012**

Note. Effects which were included in the 95%-confidence interval were bolded.

reduction of the procrastination level seems to be mediated by the increase in $ERSQ_{resilience}$ and $ERSQ_{modify}$.

Concerning the ability to modify aversive emotions, the results of studies 1–3 were quite consistent. The ability to modify aversive emotions seems helpful in order to overcome procrastination. Understanding procrastination as dysfunctional emotion regulation, this finding is very plausible. However, results of Study 1 indicated that the association between $ERSQ_{modify}$ and procrastination is mediated by the ability to tolerate aversive emotions ($ERSQ_{resilience}$). Moreover, the association of all other subscales and procrastination is also mediated by the subscale $ERSQ_{resilience}$. It seems that the ability to tolerate aversive emotions plays a key role in the interplay of ER sub-skills. Yet, the results concerning $ERSQ_{resilience}$ look like they were inconsistent. Thus, we had to discuss the ostensive discrepancy concerning the subscale $ERSQ_{resilience}$ in Study 2 and Study 3 in order to understand the relation between the ability to tolerate aversive emotions and procrastination.

Results of Study 2 indicated that procrastination has a unidirectional negative effect on the subsequent ability to tolerate aversive emotions. We suggested negative reinforcement as an explanation. To overcome disorders caused by negative reinforcement (i.e., anxiety disorders), a classical intervention in cognitive behavioral therapy (CBT) is confrontation with response prevention (Deacon & Abramowitz, 2004). If individuals train to tolerate aversive emotions cued by aversive or boring tasks, they may increase their ability to tolerate aversive emotions as this intervention is similar to response prevention. The training of ER-focused strategies may operate like response prevention. The participants were encouraged to bear aversive emotions, before they tried to modify them. If they were not able to modify aversive emotions cued by the task, they had to remind themselves that they were able to tolerate these feelings.

Although the effects of ER skills on procrastination were comparatively small (in Study 2 $ERSQ_{modify}$ on procrastination $\beta = -0.09$; indirect effects on procrastination in Study 3 resilience, ($\beta = -0.06$), and modification ($\beta = -0.08$)), they were significant. As procrastination (i) has multiple causes and (ii) is stable over time (Steel, 2007; see also our results), we did not expect large effects, neither as direct prospective effects (Study 2) nor as indirect effects (Study 3). The small effect size between intervention group and waiting list control (Study 3) is in line with this assumption. According to previous findings showing that procrastination is a kind of short-term mood repair (Tice et al., 2001), the results of Study 3 suggested that individuals applying ER skills resilience and modification were able to overcome the temptation to regulate their mood by procrastination.

Several limitations need to be addressed. First, comparing a treatment with a waiting list control results may be confounded by a placebo effect. Therefore, future research should overcome this limitation by applying a placebo control. Second, it is important to investigate the treatment adherence in order to analyze the effects of adherence on the findings. Unfortunately, we did not assess the adherence to the treatment or to specific ER strategies. Future research should investigate (a) how often participants choose which ER strategies and (b) which strategies were linked to the reduction of procrastination. Third, Study 3 is lacking a follow-up assessment. Thus, no interpretation with regard to long-term effects is possible. In order to obtain information about the stability of these effects, future research should replicate this study with follow-up assessments. The fourth limitation concerns the measure of procrastination across the studies. In Study 1, procrastination was measured by the Academic State Procrastination Inventory (ASPI; Schouwenburg, 1995; German version: Helmke & Schrader, 2000) which assesses academic procrastination. In Study 2 and Study 3 general procrastination - instead of academic procrastination - was measured by the General Procrastination Scale (GPS; Lay, 1986; German version: Klingsieck & Fries, 2012). This change is grounded in better psychometric properties of the German version of the GPS, which did not exist when Study 1 was conducted. Although there is a difference between academic and general procrastination, the associations between emotion regulation and both forms of procrastination seem to hold across studies. However, future studies should clarify the association between ER skills and different domains of procrastination.

A practical implication of our results is to integrate ER strategies in already existing procrastination interventions, in order to find additional ways to overcome procrastination. To the best of our knowledge, no procrastination interventions incorporate increasing different ER skills, until today. With regard to the potential economic damage for individuals as well as companies that is subsequent to procrastination, a plausible strategy to counterbalance this could be to provide employees a service that would teach them to use the same ER skills that were applied in the above mentioned training and that showed to be beneficial to avoid procrastination. Additionally, courses to cope with aversive emotions (induced by tasks) seem to be highly relevant for students.

Table 9
Mediated effect of the treatment on procrastination at post-assessment (GPS_{t2}) by mediators (a) increased ability to accept aversive emotions ($\Delta ERSQ_{acceptance}$), (b) increased ability to tolerate aversive emotions ($\Delta ERSQ_{resilience}$), (c) increased readiness to confront with aversive emotions ($\Delta ERSQ_{r.t.confront}$), and (d) increased ability to modify aversive emotions ($\Delta ERSQ_{modify}$). In each mediation analysis, procrastination at pre-assessment was controlled.

	Mediator: $\Delta ERSQ_{acceptance}$			Mediator: $\Delta ERSQ_{resilience}$			Mediator: $\Delta ERSQ_{r.t.confront}$			Mediator: $\Delta ERSQ_{modify}$		
	B	*T*	*p*	*B*	*T*	*p*	*B*	*T*	*p*	*B*	*T*	*p*
(I) Regression on mediator												
Treatment	0.25	2.28	0.026	0.23	2.05	0.044	0.18	1.63	0.108	0.36	3.41	0.001
(II) Regression on GPS_{t2}												
Treatment	−0.22	−2.91	0.005	−0.22	−2.91	0.005	−0.22	−2.91	0.005	−0.22	−2.91	0.005
(III) Regression on GPS_{t2}												
Mediator	−0.15	−1.91	0.060	−0.20	−2.66	0.010	−0.21	−2.85	0.006	−0.16	−2.08	0.041
Treatment	−0.18	−2.39	0.019	−0.18	−2.34	0.022	−0.18	−2.47	0.016	−0.16	−2.03	0.046

Note. Model I is the path from treatment on the mediator ($\Delta ERSQ_{acceptance}$, $\Delta ERSQ_{resilience}$, $\Delta ERSQ_{r.t.confront}$, or $\Delta ERSQ_{modify}$). Model II is the direct path from treatment on procrastination (GPS_{t2}) and Model III shows path from the mediator on procrastination and the chance in the direct path after including the mediator.

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