LEUPHANA
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INCREASING EMOTION REGULATION SKILLS IN ORDER TO OVERCOME PROCRASTINATION

Durch Steigerung der Emotionsregulationskompetenzen Prokrastination überwinden

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1 Zusammenfassung und Abstract

1.1 Zusammenfassung

Das Aufschieben oder Vermeiden von intendierten oder relevanten Tätigkeiten ist ein weitverbreitetes Phänomen, das zu vielfältigen Nachteilen oder Problemen führen kann. Etwa die Hälfte aller Studierenden und zwischen 15 % und 20 % der Allgemeinbevölkerung berichten, ernsthaft und chronisch unter Prokrastination zu leiden.

Vorherige Forschungsarbeiten konnten zeigen, dass erstens aversive Emotionen die Tendenz zum Aufschieben verstärken und dass zweitens Prokrastination als dysfunktionale Form der Emotionsregulation betrachtet werden kann. Bislang wurde jedoch nicht systematisch untersucht, ob die Fähigkeit zum adaptiven Umgang mit Emotionen Prokrastination reduziert. In der vorliegenden publikationsbasierten Dissertation soll diese Forschungslücke geschlossen werden.

Weil Prokrastination sich negativ auf Gesundheitsverhalten auswirkt, wurde in einer ersten Studie untersucht, ob die Fähigkeit zum adaptiven Umgang mit aversiven Emotionen (emotionale Kompetenz; Moderator) den Zusammenhang zwischen gesundheitsbezogener Absicht (UV) und tatsächlichem Verhalten (AV) moderiert. Am Ende der Auftaktveranstaltung eines Stressmanagement-Trainings gaben 119 Lehrkräfte an, wie häufig sie eine zuvor gelernte Achtsamkeits- und Entspannungsübung in der darauffolgenden Woche praktizieren wollten (Trainingsabsicht). Eine Woche später wurde ihr tatsächliches Trainingsverhalten erfragt. Die Ergebnisse dieser Studie zeigen, dass emotionale Kompetenz, die vor Trainingsbeginn erfasst wurde, den Zusammenhang zwischen Absicht und Verhalten moderiert: Mit steigender emotionaler Kompetenz steigt auch der Zusammenhang zwischen Trainingsabsicht und Trainingsverhalten. Das kann als Hinweis darauf gewertet werden, dass

emotionale Kompetenz einen reduzierenden Einfluss auf Prokrastination hat. Allerdings wurde in der Studie nur eine spezifische Verhaltensweise beobachtet. Prokrastination umfasst jedoch ein breites Spektrum von Verhaltensweisen.

Deswegen wurde in drei zu einer Publikation verbundenen Studien (Studie 2.1 – 2.3) der Einfluss von emotionalen Kompetenzen auf Prokrastination untersucht: In Studie 2.1 wurde der querschnittliche Zusammenhang zwischen den neun Subskalen des Fragebogens zur standardisierten Selbsteinschätzung emotionaler Kompetenzen und akademischer Prokrastination an 172 Studierenden ermittelt. Alle neun Subskalen korrelierten signifikant negativ mit Prokrastination. In einer Regressionsanalyse dieser neun Subskalen auf Prokrastination war jedoch nur die Fähigkeit, aversive Emotionen zu tolerieren, ein signifikanter Prädiktor. In einer anschließenden Mediationsanalyse wurde gezeigt, dass der Zusammenhang zwischen jeder einzelnen Subskala und Prokrastination von der Fähigkeit, aversive Emotionen zu tolerieren, vermittelt wurde. Um die fehlende kausale Interpretierbarkeit dieser querschnittlichen Ergebnisse zu überwinden, wurde in Studie 2.2 an 79 Studierenden der prospektive Einfluss von emotionaler Kompetenz auf zeitlich nachgelagerte Prokrastination mittels cross-lagged panels ermittelt. Die Ergebnisse geben erste Hinweise auf eine kausale Interpretierbarkeit. Da kausale Aussagen jedoch nur mit einem randomisiert-kontrollierten Studiendesign ermittelt werden können, wurden 83 Teilnehmende in Studie 2.3 auf eine Trainings- oder eine Wartekontrollbedingung gelost. Die Teilnehmenden der Trainingsbedingung erlernten emotionsfokussierte Strategien, um mit emotional aversiven Aufgaben umzugehen. Die Ergebnisse zeigen einen Rückgang der Prokrastination in der Interventionsgruppe im Vergleich zu der Wartekontrollgruppe. In der Zusammenschau der Studien 2.1 bis 2.3 legen die Ergebnisse nahe, dass der reduzierende Einfluss emotionaler Kompetenz auf Prokrastination kausal interpretiert werden kann.

In Studie 3 (dritte Publikation) wurde die Wirksamkeit eines onlinebasierten Trainings zur Überwindung von Prokrastination evaluiert, das der Autor neu entwickelt hat. Die in Studie 2.3 getesteten emotionsfokussierten Strategien zum Umgang mit aversiven Aufgaben wurden in das Training integriert. Mit Blick auf die Adhärenz, die bei onlinebasierten Trainings im Allgemeinen und bei Menschen mit Prokrastinationsproblemen im Besonderen eine Herausforderung darstellt, wurde eine tägliche SMS-Unterstützung für die Teilnehmenden implementiert und evaluiert. Die Wirksamkeit und die Adhärenz wurden in einem dreiarmigen randomisiert-kontrollierten Design (WKG vs. IG vs. IG + SMS) an 161 Teilnehmenden untersucht. Das Training bewirkte einen signifikanten Rückgang der Prokrastination. Die tägliche SMS-Unterstützung schien die Wirksamkeit zu verstärken (d = .29 nur online; d = .57 online + SMS) und die Adhärenz zu verbessern. Allerdings wurde der Effekt der SMS auf die Adhärenz erst sichtbar, wenn die Teilnehmenden ausgeschlossen wurden, die kaum oder gar nicht trainiert hatten. Eine mögliche Erklärung wurde darin gesehen, dass ein Mindestmaß an Training notwendig ist, damit die SMS einen Adhärenz steigernden Effekt haben. Um weitere plausible Erklärungen ausschließen zu können, bedarf es hier weiterer Forschungsarbeit.

Die Zusammenschau der Ergebnisse aller Studien legt nahe, dass erstens emotionale Kompetenzen einen reduzierenden Einfluss auf Prokrastination haben, dass diese zweitens gezielt gefördert werden können und dass sich drittens die zusätzliche Implementation einer SMS-basierten Unterstützung förderlich auf die Adhärenz auswirkt und die Effektivität einer onlinebasierten Intervention steigert. Die Ergebnisse werden mit Blick auf weitere Forschungsarbeiten vor dem Hintergrund neuropsychologischer Erkenntnisse zu exekutiven Funktionen diskutiert.

1.2 Abstract

Postponing or avoiding intended or relevant tasks is a widespread phenomenon that can lead to various disadvantages or problems. About half of the students and between 15 % and 20 % of the general population report to suffer from procrastination seriously and chronically.

Previous research has shown that, first, aversive emotions amplify the tendency to postpone and that, secondly, procrastination can be seen as a dysfunctional form of emotion regulation. To date, it has not been researched systematically whether the ability to cope with emotions adaptively reduces procrastination. The present publication-based dissertation aims to close this research gap.

As procrastination has a negative impact on health behavior, the first study investigated whether the ability to cope adaptively with aversive emotions (emotional competence; moderator) moderates the relation between health-related intention (independent variable) and actual behavior (dependent variable). At the end of the first session of a stress management training, 119 teachers indicated how often they want to practice the mindfulness and relaxation exercise they just had learned in the following week (training intention). One week later their actual training behavior was gathered. The results of this study show that emotional competence that was recorded before the training moderated the relation between intention and behavior: The higher the emotional competence, the higher the correlation between training intention and training behavior. This can be regarded as an indicator that emotional competence has a reducing effect on procrastination. However, in this study only a specific behavior was observed. Yet, procrastination comprises a broad range of behavior.

Thus, in three studies (study 2.1 – 2.3) combined as one publication the influence of emotional competences on procrastination was analyzed: In study 2.1 the cross-sectional relation between the nine subscales of the German version of the Emotion Regulation Skills

Questionnaire and academic procrastination was determined with 172 students. All nine subscales were significantly correlated negatively with procrastination. However, in a regression analysis with these nine subscales on procrastination only the ability to tolerate aversive emotions proved to be a significant predictor. A subsequent mediation analysis showed that the relation of each subscale and procrastination was mediated by the ability to tolerate aversive emotions. In order to overcome the lacking causality of these cross-sectional results, study 2.2 tested the prospective influence of emotional competence on subsequent procrastination with 79 students by means of cross lagged panels. The results provide first indication of causality. Since causal connections can only be investigated with a randomized controlled trial, 83 participants were randomized to a training or a wait list control condition in study 2.3. The participants of the training condition learned emotion-focused strategies in order to deal with emotional aversive tasks. The results show a decrease in procrastination in the intervention group compared to the wait list control. In conclusion the results of studies 2.1 to 2.3 indicate that the reducing influence of emotional competence on procrastination can be interpreted causally.

In study 3 (third publication) the efficacy of an online-based training to overcome procrastination that the author developed was evaluated. The emotion-focused strategies for coping with aversive tasks that were tested in study 2.3 had been integrated in the training. Regarding adherence that generally poses a challenge in online-based trainings and especially in people with procrastination problems, a daily SMS-support for the participants was implemented and evaluated. The efficacy and adherence was researched in a three-armed randomized controlled design (WLC vs. IG vs. IG + SMS) with 161 participants. The training caused a significant decrease in procrastination. The daily SMS-support seemed to enhance the efficacy (d = .29 only online; d = .57 online + SMS) and adherence. However, the effect of the SMS on adherence only became visible if participants that hardly trained or did

not train at all were excluded. As a possible explanation it was considered that a minimum of training is necessary in order for the SMS to have an adherence enhancing effect. To rule out other plausible explanations further research is needed.

A synopsis of all studies' results suggests that, first, emotional competences have a reducing effect on procrastination, that, second, this can be deliberately promoted, and third, that the additional implementation of SMS-based support has an enhancing effect on adherence and increases the efficacy of an online-based intervention. The results are being discussed in regards to further research in the light of neuro-psychological findings concerning executive functions.

2 Einleitung

2.1 Prokrastination: Eine Schwierigkeit bei der Interventionsadhärenz

Prokrastination ist ein weitverbreitetes Phänomen, das im freiwilligen Aufschieben intendierter und/oder wichtiger Tätigkeiten besteht. Dieses geschieht in der Regel, obwohl der kurzfristige Vorteil des Aufschiebens die negativen Konsequenzen nicht aufwiegt (Klingsieck, 2013). In der Literatur findet sich das Phänomen Prokrastination auch unter dem Begriff der Absichts-Verhaltens-Lücke (Steel, 2007). Abzugrenzen ist Prokrastination vom intendierten Aufschieben z. B. im Sinne eines Priorisierens.

Die Prävalenz von Prokrastination unter Studierenden ist mit bis zu 70 % (Ellis & Knaus, 1977; Schouwenburg, 1995; Steel, 2007) extrem hoch. Immerhin noch etwa 50 % berichten von regelmäßigem und problematischem Aufschiebeverhalten (Day, Mensink, & O'Sullivan, 2000; Onwuegbuzie, 2000; Solomon & Rothblum, 1984). Verglichen mit der studentischen Population ist die Prävalenz chronischen und problematischen Aufschiebens in der Normalbevölkerung mit 20 bis 25 % deutlich geringer, aber immer noch sehr hoch (Ferrari, Díaz-Morales, O'Callaghan, Díaz, & Argumedo, 2007).

Lange Zeit standen in der Forschung zur Prokrastination negative Auswirkungen auf Arbeitsergebnisse und akademische Erfolge im Fokus (z. B. Steel, 2007). Auch finanzielle Konsequenzen von Prokrastination wurden beleuchtet (Akerlof, 1991; O'Donoghue & Rabin, 1999). Darüber hinaus sprechen eine Reihe von Befunden dafür, dass Prokrastination auch mit schlechterer Gesundheit und schlechterem gesundheitsbezogenen Vorsorgeverhalten einhergeht (Sirois, Melia-Gordon, & Pychyl, 2003; Stead, Shanahan, & Neufeld, 2010). Zudem scheint Prokrastination das Wohlbefinden negativ zu beeinflussen

(Lay & Schouwenburg, 1993; Tice & Baumeister, 1997).

In einer Meta-Analyse fanden Richards und Richardson (2012), dass im Vergleich zu face-to-face Interventionen die Adhärenz bei internetbasierten Interventionen deutlich niedriger ausfällt. Da Prokrastination zu schlechterem Gesundheitsverhalten führt und hohe Prokrastinationswerte ein Prädiktor für problematische Internetnutzung sind (Odaci, 2011), ist davon auszugehen, dass Prokrastination auch zu geringerer Adhärenz von internetbasierten Interventionen führt.

Bei der Behandlung psychischer Störungen, aber auch in der Prävention ist Adhärenz (z. B. in Form von Therapie-Hausaufgaben Erledigen oder kontinuierlichem Üben) ein wichtiger Erfolgsprädiktor. So konnten Neimeyer und Feixas (1990) für die Behandlung von Depression die Bedeutung von Hausaufgaben zwischen den Therapiesitzungen für den Therapieerfolg zeigen. In der Stressprävention verbessert regelmäßiges Durchführen von Entspannungsübungen die Ergebnisse (Conrad & Roth, 2007; Mausbach, Moore, Roesch, Cardenas, & Patterson, 2010). Mit Blick auf internetbasierte Interventionen zeigte sich störungsübergreifend, dass Adhärenz zu besseren Ergebnissen führt (Wing, Phelan, & Tate, 2002).

Da sich Prokrastination negativ auf die Adhärenz auswirkt, profitieren Personen mit hohen Prokrastinationswerten weniger wahrscheinlich von Interventionen bzw. von Prävention. Das Ausmaß dieses Nachteils ist besonders gravierend, weil viele klinisch oder subklinisch relevante Störungen (wie Angststörungen, Depression, stressbezogene Störungen oder ADHS) mit Prokrastination einhergehen (Rist, Pedersen, Höcker, & Engberding, 2011; Spada, Hiou, & Nikvevic, 2006; van Eerde, 2003).

Um die potentiell schädlichen Wirkungen von Prokrastination auf Arbeits- bzw.

akademische Ergebnisse, auf das Wohlbefinden und den direkten Gesundheitszustand, aber auch auf das Gesundheitsverhalten und die Interventionsadhärenz zu reduzieren, sind Ansätze zur Überwindung von Prokrastination notwendig.

2.2 Prokrastination überwinden: Ansätze zum Schließen der Absichts-Verhaltens-Lücke

Um die Adhärenz von gesundheitsbezogenen Interventionen zu erhöhen und dem Nachteil mangelnder Adhärenz vorzubeugen, wurde die Bildung von Absichten vorgeschlagen (Schwarzer, 2008). Allerdings führt das Bilden von Absichten nicht zuverlässig zu dem intendierten Verhalten (Sheeran, 2002). Die Diskrepanz wird als Absichts-Verhaltens-Lücke bezeichnet und bildet einen zentralen Bestandteil von Prokrastination. Zur Überwindung dieser Lücke entwickelte Gollwitzer (1999) sogenannte Wenn-Dann-Pläne (implementation intention), die die Umsetzung der Absichten im Vorfeld spezifizieren und konkretisieren. In vielen Studien konnte gezeigt werden, dass das Bilden von Wenn-Dann-Plänen die Absichts-Verhaltens-Lücke verkleinert.

Tice und Kollegen zeigten in experimentellen Studien, dass die Teilnehmenden bei induziertem negativen Affekt die zu erledigenden Aufgaben zugunsten angenehmer Aktivitäten aufschoben (Tice, Bratslavsky, & Baumeister, 2001). In einem weiteren Experiment gaben Tice und Kollegen Versuchspersonen nach dem Induzieren von negativem Affekt eine Mood-Freeze-Pille (Tice et al., 2001. Die Mood-Freeze-Pille war ein Placebo. Die Teilnehmenden der Studie bekamen die Information, dass diese Pille dazu dient, die aktuelle Stimmung für eine Stunde „einzufrieren“. Alle Bemühungen, die Stimmung zu verändern, wären sinnlos. Es zeigte sich, dass die Teilnehmenden, die eine

Mood-Freeze-Pille bekamen, im Vergleich zu einer Kontrollgruppe weniger nach angenehmen Ablenkungen suchten und statt dessen intendierten langweiligen Tätigkeiten nachgingen. Tice und Kollegen interpretierten die Ergebnisse dahingehend, dass Prokrastination als dysfunktionale Emotionsregulationsstrategie (im Sinne von Mood-Repair) eingesetzt wird. Obwohl die Tätigkeiten, die die Teilnehmer erledigen sollten, klar definiert waren - und damit quasi Wenn-Dann-Pläne vorlagen -, schien negative Stimmung die Teilnehmer zu stärkeren Ablenkungen zu verführen, wenn sie glaubten, damit ihre Stimmung beeinflussen zu können.

Weitere Befunde sprechen ebenfalls dafür, dass Prokrastination als dysfunktionale Emotionsregulationsstrategie genutzt wird. So wird Prokrastination zur Vermeidung aversiver oder zum Erreichen angenehmer Emotionen genutzt (Sirois & Pychyl, 2013). Personen, die Probleme mit Prokrastination haben, berichten von Langeweile, Sorgen und/oder Unlust, die zu Prokrastination führen (Schraw, Wadkins, & Olafson, 2007). Deswegen schlagen Rozental und Carlbring (2014) auch Interventionen vor, die die Emotionen günstig beeinflussen, die zu Prokrastination führen.

2.3 Emotionale Kompetenzen als Möglichkeit adaptiver Gegenregulation

Es wurde herausgearbeitet, dass Prokrastination als dysfunktionale Emotionsregulation verstanden werden kann (z.B. Tice & Bratslavsky, 2000). Deswegen sollten emotionale Kompetenzen Personen in die Lage versetzen, Prokrastination begünstigende Emotionen adaptiv zu regulieren und dadurch die Prokrastination zu reduzieren.

Unter emotionalen Kompetenzen verstehen Berking und Kollegen die Fähigkeit, (a) Emotionen bewusst wahrzunehmen, (b) emotionsbezogene Körperempfindungen wahrzunehmen, (c) Emotionen zu erkennen und zu benennen, (d) die Ursachen des aktuellen

emotionalen Erlebens zu verstehen, (e) aversive Emotionen anzunehmen und (f) sie zu tolerieren, (g) sich in emotional schwierigen Situationen selbst zu unterstützen, (h) sich mit Situationen zu konfrontieren, die aversive Emotionen auslösen können und (i) aversive Emotionen gezielt zu regulieren (Berking & Znoj, 2008). Das Rahmenmodell von Berking und Znoj (2008) geht davon aus, dass den Fähigkeiten, (e) aversive Emotionen zu akzeptieren, (f) sie zu tolerieren und (i) sie zu regulieren, wesentliche Rollen im Zusammenspiel der unterschiedlichen emotionalen Kompetenzen zufallen. Empirische Befunde unterstützen diese Annahme. So fanden beispielsweise Berking und Kollegen, dass es vor allem diese drei Teilkompetenzen waren, die sich förderlich auf mentale Gesundheit auswirkten (Berking et al., 2008).

Mit Blick auf Prokrastination scheint es erstens plausibel, dass Personen, die in der Lage sind, aversive Emotionen zu akzeptieren und zu tolerieren, Aufgabe, die solche Emotionen auslösen, weniger aufschieben müssen. Zweitens liegt es nahe, dass Personen, die ihre Emotionen regulieren können, weniger dysfunktionale Emotionsregulationsstrategien wie Prokrastination einsetzen als Personen, die ein Defizit in dieser Fähigkeit aufweisen.

Obwohl es also nahe liegt, dass die Fähigkeiten zum adaptiven Umgang mit Emotionen Prokrastination reduzieren und somit auch einen günstigen Einfluss auf die Interventionsadhärenz (= Überwindung der Verhaltens-Absichts-Lücke) haben, ist das nach bestem Wissen des Autos bislang nicht systematisch untersucht worden. Deswegen soll in der vorliegenden Arbeit systematisch und methodisch vielfältig der Zusammenhang zwischen emotionalen Kompetenzen und Prokrastination untersucht werden.

2.4 Interventionen zur Überwindung von Prokrastination

Da Prokrastination nicht als psychische Störung im Sinne des DSM-V TR (American Psychiatric Association, 2013) oder der ICD-10 (Dilling, Mombour, & Schmidt, 1991) gilt, gibt es nur wenige systematisch entwickelte und evaluierte Ansätze zur deren Überwindung. Für den deutschsprachigen Raum liegt derzeit ein manualisierter Ansatz vor (Höcker, Engberding, & Rist, 2013), in dem vor allem pünktliches Beginnen, realistisches Planen, Zeitrestriktion und Bedingungsmanagement fokussiert werden. Auch international liegen wenige standardisierte Ansätze vor. Ein recht heterogenes Bild zeichnen Rozental und Carlbring (2014) in ihrem Review und unterscheiden dabei vier Ansätze: (1) ideographische Ansätze, (2) verhaltensbezogene Ansätze (3) kognitive Ansätze und (4) klinische Ansätze.

Ideographische Ansätze zur Behandlung von Prokrastination unterstützen aufgrund der vielfältigen und individuell stark variierenden Ursachen (Steel & König, 2006) kein standardisiertes Vorgehen, sondern legen eine Behandlung auf Basis einer individuellen funktionalen Analyse nahe. Sie ermutigen und unterstützen Betroffene, ihre eigenen Wege zur Überwindung zu finden. Das geschieht vor allem unter der Perspektive, dass Prokrastination ein unveränderbares Problem ist, mit dem die Betroffenen einen Umgang finden müssen (van Essen, van den Heuvel, & Ossebaard, 2004; van Horebeek, Michielsen, Neyskens, & Depreeuw, 2004).

Im Gegensatz dazu versuchen verhaltensbezogene Interventionen Prokrastination zu reduzieren. Klassischerweise zielen die Maßnahmen auf Zeitmanagement und Prävention von Ablenkungen (van Eerde, 2000) sowie Stimuluskontrolle (Mulry, Fleming, & Gottschalk, 1994) ab. Weitere Interventionen sollen zur Routinebildung (Steel, 2007), und Prävention von Ego-Depletion und damit zur Aufrechterhaltung der Selbstkontrollfähigkeiten beitragen (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Weil die Tendenz, aversive Aufgaben zu vermeiden, zu Prokrastination führt, zielen weitere verhaltensbezogene Interventionen auf die

graduelle Exposition (im Sinne einer Konfrontation mit aversiven Aufgaben) ab (Brown, 1991). Obwohl Rozental und Carlbring (2014) diese Möglichkeiten zur Reduzierung von Prokrastination auf der Verhaltensebene in ihrem Review nennen, sind dem Autor keine randomisiert-kontrollierten Studien zu deren Wirksamkeit bekannt.

Ähnlich verhält es sich auf der Ebene kognitiver Interventionen. Nach Pychyl und Flett (2012) zielen kognitive Maßnahmen vor allem auf irrationale Überzeugungen (z. B. „Sei immer perfekt“) ab, die zu Aufschiebeverhalten führen. Als konkrete kognitive Interventionen zur Überwindung von Prokrastination nennen Rozental und Carlbring (2014) das motivationale Interview nach Treasure (2004), kognitive Umstrukturierung, Wenn-Dann-Pläne (implementation intention; Gollwitzer, 1999; Gollwitzer & Sheeran, 2006) und mentales Kontrastieren nach Oettingen (Oettingen & Mayer, 2002; Oettingen et al., 2009). Mit Blick auf Prokrastination gibt es direkte Wirksamkeitsbelege nur für das Formulieren von Wenn-Dann-Plänen[1]. So konnten Owens und Kollegen (Owens, Bowman, & Dill, 2008; Prestwich & Kellar, 2014) beispielsweise experimentell zeigen, dass Studierende der Psychologie mit einer größeren Wahrscheinlichkeit intendierte Versuchspersonenstunden ableisteten, wenn sie für die Umsetzung zuvor Wenn-Dann-Pläne formulierten. Auch van Hooft und Kollegen konnten zeigen, dass sich die Absichts-Verhaltens-Lücke in Bezug auf Bewerbungsverhalten reduzierte, wenn Teilnehmende Wenn-Dann-Pläne formulierten (van Hooft, Born, Taris, van der Flier & Blonk, 2005). Allerdings liegen bislang noch keine evaluierten kognitiven Interventionen vor, die über die hier aufgezählten Einzelmaßnahmen hinausgehen.

Mit Blick auf klinische Interventionen kommen verschiedene Autoren zu dem Schluss, dass wenig bekannt und viel Forschung notwendig ist (Pychyl & Flett, 2012; Ozer, Demir, &

[1] Für die anderen Interventionen gibt es selbstverständlich auch viele Wirksamkeitsbelege. Diese beziehen sich jedoch nicht auf Prokrastination.

Ferrari, 2013; Karas & Spada, 2009). Jedoch gibt es einige gruppenbasierte Interventionen. In einer Pilotstudie testeten Ozer und Kollegen (2013) eine gruppenbasierte Intervention im Umfang von fünf 90-minütigen Einheiten an 10 Studierenden und fanden einen Prä-Post-Rückgang der selbstberichteten Prokrastinationswerte. Ebenfalls eine gruppenbasierte Intervention führten Toker und Avci (2015) durch. Studierende erhielten auf Grundlage von CBT-Prinzipien Informationen in acht 90-minütigen Gruppensitzungen und reduzierten signifikant ihr Aufschiebeverhalten. Die Effekte wurden in einem quasi-experimentellen Pre-Post-Design an einer Stichprobe von 13 Studierenden gegen eine Kontrollgruppe von ebenfalls 13 Studierenden getestet. Des Weiteren werden positive Ergebnisse gruppenbasierter Interventionen von van Essen et al. (2004) und van Horebeek et al. (2004) sowie von Tuckman und Schouwenburg (2004) berichtet. Obgleich alle Interventionen vielversprechende Ergebnisse zeigten, liegen keine Ergebnisse aus randomisiert-kontrollierten Studien für diese Interventionen vor. Die einzige gruppenbasierte Intervention, die mit einem randomisiert-kontrollierten Design evaluiert wurde, basiert auf Ansätzen der Acceptance- und Commitment-Therapie (Wang et al., 2015). Glick und Orsillo (2015) verglichen eine akzeptanzbezogene Intervention zur Überwindung von Prokrastination mit einem Zeitmanagementtraining. Es fanden sich keine Unterschiede zwischen den Bedingungen.

Die einzige nicht gruppenbasierte Intervention, die in einer randomisiert-kontrollierten Studie evaluiert wurde, ist eine internetbasierte Intervention, die auf den Grundlagen der kognitiven Verhaltenstherapie entwickelt wurde (Rozental, Forsell, Svensson, Andersson, & Carlbring, 2015). Neben vielen Stärken weist diese Studie zwei zentrale Schwächen auf: Erstens wurden keine Follow-up-Messung durchgeführt. So können keine Aussagen über die Nachhaltigkeit der gefundenen Effekte gemacht werden. Der zweite Kritikpunkt betrifft die Drop-out-Rate: 29,3 %. Eine Erklärung könnte im Umfang der Intervention liegen. Diese umfasst 10 Module, die wöchentlich bearbeitet werden sollten. Die Teilnehmenden

berichteten, pro Modul etwa zwei Stunden gebraucht zu haben. Die *temporal motivation theory* (Steel & König, 2006) geht davon aus, dass je weiter ein Handlungsergebnis zeitlich entfernt ist, desto geringer ist der Anreiz, die Handlung auszuführen. Es ist somit zu erwarten, dass mit steigender Länge einer Intervention die Motivation, diese in Angriff zu nehmen, abnimmt. Das wirkt sich möglicherweise auch auf die Adhärenz aus.

Zusammenfassend lässt sich sagen, dass es vielversprechende Ansätze zum Überwinden oder zum Umgang mit Prokrastination gibt. Allerdings fehlt es an kurzen Interventionen für Einzelpersonen, die erstens speziell für Personen mit Prokrastinationsproblemen keine hohe Hürde darstellen und deren Wirksamkeit zweitens in randomisiert-kontrollierten Studien überprüft wurde. Deswegen soll in der vorliegenden publikationsbasierten Dissertation eine möglichst niedrigschwellige Intervention entwickelt und deren Wirksamkeit evaluiert werden.

3 Darstellung des Dissertationsvorhabens

3.1 Überblick

Im Rahmen der vorliegenden publikationsbasierten Dissertation soll auf Basis des aktuellen Forschungsstandes (vgl. 2.1 – 2.3) erstens der Einfluss von Fähigkeiten zum adaptiven Umgang mit Emotionen auf die interventionsbezogene Absichts-Verhaltens-Lücke und zweitens auf selbstberichtete Prokrastinationswerte längsschnittlich und experimentell untersucht werden. Drittens soll eine kurze internetbasierte Intervention zur Überwindung von Prokrastination in einer randomisiert-kontrollierten Studie evaluiert werden. Diese Intervention integriert emotionsfokussierte Strategien. Mit Blick auf das besondere Problem der Adhärenz soll zudem geprüft werden, ob die Adhärenz und Effektivität durch eine zusätzliche tägliche SMS-Begleitung gesteigert werden können.

3.2 Vorstellung der einzelnen Studien

3.2.1 Studie 1: Beeinflusst die Fähigkeit zum adaptiven Umgang mit Emotionen die Absichts-Verhaltens-Lücke?

Vor dem Hintergrund potentiell schädlicher Auswirkungen von Prokrastination sollten geeignete Maßnahmen zu deren Überwindung gefunden werden. Dazu müssen zuvor Einflussfaktoren ermittelt werden, die dann Ziel der angestrebten Maßnahmen werden. In der ersten Studie wird Prokrastination als Absichts-Verhaltens-Lücke (Sheeran, 2002) operationalisiert, die sich auf klar definiertes Gesundheitsverhalten (Durchführen von Entspannungsübungen) bezieht. Damit wird in dieser Studie nur ein Teilaspekt von Prokrastination berücksichtigt (Steel, 2007). Unberücksichtigt bleiben vor allem Prokrastinationsaspekte, die das Vermeiden von Intentionsbildung betreffen.

Vorangehende Forschungsarbeiten haben sich in erster Linie auf die Anwendung von Wenn-Dann-Plänen konzentriert. Es wurde aber auch vielfach der Einfluss der Handlungskontrollorientierung nach Kuhl (Lage- und Handlungsorientierung) untersucht (Blunt & Pychyl, 1998). Obgleich es nahe liegt, dass emotionale Kompetenz ein weiterer Einflussfaktor auf die Absichts-Verhaltens-Lücke ist, wurde dies bislang noch nicht systematisch geprüft. Dies soll exemplarisch an den Trainingsvorsätzen und dem nachfolgenden tatsächlichen Trainingsverhalten von 119 Teilnehmenden eines Trainings emotionaler Kompetenzen (Berking, 2014) geschehen (Studie 1). Es wird angenommen, dass die eingangs erhobene Fähigkeit zum adaptiven Umgang mit Emotionen den Zusammenhang zwischen Trainingsvorsätzen und Trainingsverhalten moderiert.

Die Studie wurde an der Leuphana Universität unter Leitung von Prof. Dr. Bernhard Sieland an einer Lehrerstichprobe durchgeführt. Die Lehrkräfte nahmen an einer blended-learning Version des Trainings emotionaler Kompetenzen teil, die aus zwei dreistündigen Präsenzveranstaltungen bestand, die im Abstand von etwa drei Wochen vor allem in NRW durchgeführt wurden. Zwischen den Präsenzveranstaltungen konnten die Teilnehmenden online trainieren. Die Größe der Trainingsgruppen variierte zwischen 10 und 22. Die emotionalen Kompetenzen wurden jeweils vor der ersten Veranstaltung erfasst, die Trainingsabsicht am Ende der ersten Veranstaltung und das tatsächliche Trainingsverhalten eine Woche später.

3.2.2 Studie 2: Reduzieren die Fähigkeiten zum adaptiven Umgang mit Emotionen Prokrastination?

Eingangs wurde angenommen, dass Defizite emotionaler Kompetenzen Prokrastination erhöhen. Die Ergebnisse von Studie 1 unterstützen diese Annahme und damit

gleichzeitig die Hypothese, dass emotionale Kompetenzen die Absichts-Verhaltens-Lücke reduzieren. Das kann als ein weiterer Hinweis darauf gewertet werden, dass diese Kompetenzen Prokrastination reduzieren. Die Ziele der zweiten Studie bestehen darin, erstens querschnittlich den Zusammenhang zwischen den Fähigkeiten zum adaptiven Umgang mit Emotionen zu untersuchen. Um das daraus resultierende Problem kausaler Rückschlüsse zu überwinden, wird zweitens die längsschnittliche Wirkung dieser Fähigkeiten auf Prokrastination in einem cross.lagged panel (CLP) getestet. Da auch längsschnittliche Studiendesigns nur Hinweise auf Kausalität geben können, wird zusätzlich der Einfluss dieser Fähigkeiten auf Prokrastination experimentell überprüft. Dazu wurden emotionsfokussierte Strategien zum Überwinden aversiver oder unlustauslösender Tätigkeiten onlinebasiert vermittelt und eingeübt. Die Teilnehmenden wurden im Rahmen einer randomisiert-kontrollierten Studie entweder auf die Trainingsbedingung oder auf eine Wartekontrollgruppe gelost. Es wurden drei separate Teilstudien durchgeführt, die zu einer Publikation zusammengefasst wurden. Im Unterschied zu Studie 1 (siehe 3.2.1) wurde Prokrastination in allen drei Teiluntersuchungen über selbstberichtsbasierte Fragebögen erfasst. Der Vorteil besteht darin, dass so auch intentionsbezogene Prokrastination eingeschlossen ist. Der Nachteil gegenüber der Erfassung als Absichts-Verhaltens-Lücke besteht darin, dass es sich um retrospektive, subjektive Schätzungen handelt, die sowohl Erinnerungsverzerrungen als auch einer Referenzverzerrung unterliegen können (Steel, 2007).

Diese Studie wurde im Rahmen des Inkubatorprojektes KT GET.ON unter der Leitung von Prof. Dr. Matthias Berking und Prof. Dr. Bernhard Sieland an der Leuphana Universität in Lüneburg durchgeführt. Ziel des Projektes war die Entwicklung internetbasierter Interventionen zur Prävention mentaler Störungen. Die im experimentellen Teil getesteten emotionsfokussierten Strategien zur Überwindung von aufgabenbezogener Unlust oder

aufgabenbezogener Aversion sind für die weitere Entwicklung von (onlinebasierten) Interventionen zur Reduzierung von Prokrastination relevant.

3.2.3 Studie 3: Entwicklung und Evaluation eines internetbasierten Trainings zur Überwindung von Prokrastination

Bislang gibt es nur eine randomisiert-kontrollierte Studie, die eine internetbasierte Intervention zur Überwindung von Prokrastination prüft. Zu den Limitationen dieser Studie zählen, dass erstens keine Follow-up-Daten berichtet werden, dass das Training zweitens für viele Personen mit Prokrastinationsproblemen ungünstig lange Bearbeitungszeit in Anspruch nimmt und dass drittens die Adhärenz zur Post-Erhebung mit nur gut 70 % niedrig ausfiel. Deswegen zielt die dritte Studie darauf ab, erstens eine Kurzintervention zur Überwindung von Prokrastination zu entwickeln und zu evaluieren. Zweitens soll geprüft werden, ob die Unterstützung durch an Trainingsinhalten orientierte SMS sowohl die Effekte als auch die Adhärenz steigert.

Es wurde ein zweiwöchiges Training zur Überwindung von Prokrastination entwickelt, in das die in Studie 2 geprüften emotionsfokussierten Strategien integriert wurden. Zusätzlich wurden 28 SMS-Impulse entwickelt, die die Teilnehmenden trainingsbegleitend zweimal täglich bekamen. Zur Überprüfung des Trainings wurde eine dreiarmige randomisiert-kontrollierte Studie entworfen, die in Kooperation der Leuphana Universität Lüneburg mit dem Verein für Innovation und Qualitätssicherung in der psychosozialen Versorgung (IQPV e.V.) unter der Leitung von Prof. Dr. Bernhard Sieland durchgeführt wurde.

3.3 Zusammenfassung der Fragestellungen

Konkret wurden im Rahmen der vorliegenden Dissertation die folgenden offenen Forschungsfragen untersucht:

1) Wirken sich die Fähigkeiten zum adaptiven Umgang mit Emotionen auf die Absichts-Verhaltens-Lücke aus? (Studie 1)

2) Gibt es querschnittliche Zusammenhänge zwischen den Fähigkeiten zum adaptiven Umgang mit Emotionen und Prokrastination? (Studie 2)

3) Sagen die Fähigkeiten zum adaptiven Umgang mit Emotionen Prokrastination vorher? (Studie 2)

4) Kann durch das Vermitteln von aufgabenbezogenen emotionsfokussierten Strategien Prokrastination reduziert werden? (Studie 2)

5) Wird die prokrastinationsreduzierende Wirkung der emotionsfokussierten Strategien über einen Anstieg emotionaler Kompetenzen vermittelt (Mediation)? (Studie 2)

6) Wirkt eine zweiwöchige internetbasierte Kurzintervention, in der neben emotionsfokussierten Strategien klassische Methoden wie mentales Kontrastieren (Oettingen & Mayer, 2002; Oettingen et al. 2009), Wenn-Dann-Pläne (Gollwitzer, 1999), Planungselemente wie Prioritätensetzen (Steel, 2007) oder Zeitmanagement (van Eerde, 2000)) eingesetzt werden, reduzierend auf Prokrastination? (Studie 3)

7) Haben zusätzliche SMS mit täglich zwei Trainingsimpulsen eine Auswirkung auf die Adhärenz der Teilnehmenden? (Studie 3)

8) Haben zusätzliche SMS mit täglich zwei Trainingsimpulsen eine Auswirkung auf die Effektivität des Trainings? (Studie 3)

4 Studie 1: Emotionale Kompetenz moderiert den Zusammenhang zwischen Trainingsintention und Trainingsverhalten

Teachers' Emotion Regulation Skills Facilitate Implementation of Health-Related Intentions

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ABSTRACT

Objectives: Many teachers report high levels of job-related stress. Successful outcomes in stress-management trainings depend on participants actively engaging in skill building exercises. However, despite good intentions to engage in such exercises on a regular basis, many participants ultimately fail to do so. The present study seeks to understand whether general emotion regulation (ER) skills moderate the relation between the *intention* to engage in skill building exercises and *actually engaging* in these exercises. **Methods:** ER skills, the intention to engage in autonomous skill building exercises and the extent of which individuals actually engaged in such exercises were assessed in a sample of 119 teachers (N = 119) participating in a stress-management training. **Results:** ER skills significantly moderated the association between the intention and engagement in skill building practice. The greater the ER skills, the more coupled was the relation between the intention and actual practices. **Conclusion:** Findings are consistent with the hypotheses. Thus, skill building trainings should support participants scoring low in ER skills in effectively coping with aversive affective states cued through skill building exercises.

Key words: stress-management training; health-behavior; intention-behavior-gap; emotion regulation; adaptively cope with stress; engaging in health-related intention

INTRODUCTION

Research indicates that teachers experience high levels of job-related stress.[1,2] Such elevated stress levels are negatively associated with work-related motivation,[3] engagement,[4] commitment to teaching,[5,6] interpersonal interaction,[7,8] and work performance in general[9]. Moreover, stress impairs teachers' well-being[10] and their physical[11-13] and mental health[10,14]. In a German sample of 949 teachers, Unterbrink and colleagues found that only 26% of teachers teach until they reach retirement age, compared to 54% of other employees in public services.[15] Similar findings have been reported in many other countries.[16,17] Finally, it is of note that health behavior of teachers may significantly influence health and health behavior of their students.[18]

Fortunately, stress can be significantly reduced through stress reduction trainings.[19] For example, the Affect Regulation Training (ART)[20,21] is a standardized training developed to enhance participants' abilities to adaptively respond to stress and other challenging affective states. [22] However, empirical evidence suggests that the outcome of such trainings depends on the extent to which participants engage in and actively train the stress-management skills taught in these programs.[23,24]

Research findings indicate that engaging participants in regular skill training is a challenging task and even participants who have decided to systematically practice relevant skills often fail to do so.[25-27] However, engaging in these skill building practices is necessary for effectively reducing stress. Thus, in order to further improve the efficacy of stress

reduction trainings, research needs to clarify why participants do not behave in accordance with their intentions and how successful intention implementation can be facilitated.

Deficits in effective emotion regulation (ER) skills have been proposed as a relevant hindrance to effective intention implementation of health behavior.[28-30] ER refers to the set of processes by which people seek to monitor, evaluate, and redirect the spontaneous flow of their emotions in accordance with their needs and goals.[31-33] Emotions cue action tendencies, which may either facilitate or impede an intended behavior.[34] In the context of stress-management skills practice, aversive affective states may interfere with scheduled skills practice in various ways. First, stress is associated with the individual appraising the demands of the current situation as exceeding available coping capacities.[35] Internal and/or external pressure to engage in skills practice (in addition to the other tasks that need to be coped with) is likely to be perceived as an additional demand, burdening already overtaxed resources. Consequently, one's intention to engage in skill building exercises may cue aversive emotions, such as fear and anxiety, of being overwhelmed by the demands of the situation. Additionally, emotions such as anger, sadness, shame, or guilt might be elicited depending on how the individual appraises the anticipated inability to cope with the demands. The action tendencies cued by these emotions may significantly impede the implementation of the intention to engage in skill building practice if the individual is unable to utilize adaptive ER skills to reduce the intensity or duration of these feelings.

Second, many elements of stress reduction trainings involve aversive experiences for participants. For example, systematically monitoring or consciously observing stress symptoms will likely enhance awareness of such symptoms and may subsequently result in an increase (even if temporary) in emotional anguish associated with these symptoms. Similarly, attempts to reduce stress symptoms (eg, through progressive muscle relaxation) may take time to lead to satisfactory results (which will vary depending on the individual and stress

intensity). Thus, it is possible that this experience may elicit negative emotions if the results do not meet the participant's expectations. Finally, addressing the problems causing elevated stress levels through active problem-solving involves becoming aware of distressing or aversive life circumstances, which may activate memories of unsuccessful attempts to cope with these problems in the past. Together, these processes cue challenging affective states (such as fear, anxiety, frustration, anger, feelings of uncertainty, hopelessness and helplessness) that are associated with problematic action tendencies (eg, avoidance, self-accusation, resignation) that are likely to interfere with the initiation or maintenance of skill building exercises. Thus, it can be hypothesized that the ability to successfully cope with such affective states and the availability of effective ER skills is crucial for successful implementation of one's intentions.

Synthesizing other theories of ER[36-40] Berking and colleagues have proposed a model of ER which defines ER as the interplay of 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 to maintain a present emotion, (4) the ability to actively modify emotions in an adaptive way, (5) the ability to accept and tolerate 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: (a) try to apply ER skills but are unable to do so successfully, (b) have never developed these ER skills and thus are unable to even try to apply them, or (c) have access to these ER skills but do not try to apply them. Preliminary support for the validity of the model comes from several studies in clinical and non-clinical populations.[41-47]

Although various authors have acknowledged the assumed relevance of adaptive ER for successful implementation of one's intentions, to date, research has yet to clarify

empirically whether ER skills indeed facilitate the implementation of one's intentions.[28,29,48-52] The present study aims to address this gap in the literature by testing the hypothesis that successful application of the ER skills would moderate the association between the intention to engage in skill building practice in a stress reduction training and the extent of which participants actually started to engage in their skill building practice.

METHODS

Participants and Procedure

In order to clarify to what extent ER skills would moderate the association between the intention to engage in skill building exercises and the extent of which individuals actually do so, we assessed ER skills in 119 individuals participating in a stress-management training. We assessed ER skills shortly before the first session of the training. At the end of the first session we asked to what extent participants intended to engage in the skill building exercises suggested in the training on their own accord (T1). One week later we assessed to what extent they had actually engaged in the proposed exercises (T2).

The training was based on the Affect Regulation Training (ART),[20,21] which is a highly structured program developed to enhance participants' abilities to adaptively respond to stress and other challenging affective states. Several studies provide evidence for the efficacy of this intervention.[20,21,53] Participants of the program are taught a set of 7 skills (progressive muscle relaxation, breathing relaxation, non-judgmental perception of emotions, acceptance and tolerance of emotions, compassionate self-support, identification of the causes of one's emotional reaction, and active modification of emotions) and requested to engage in skill building exercises on a daily basis. The first training session took 3 hours and focused on enhancing participants' ability to relax with the help of muscle and breathing relaxation and

mindfulness-based techniques.[21] At the end of the session, the importance of engaging in a daily skills building practice was discussed with participants. Participants were then provided with a MP3 file that would guide them through their daily relaxation exercises (taking about 20 minutes).

Participants were recruited between February 2012 and July 2013 from a sample of 228 teachers who participated in a stress-management program in the context of a health-promotion program for teachers of the federal state North Rhine-Westphalia in Germany (Bildung und Gesundheit; BuG). All participants of the stress-management training were invited to participate in the present study and were informed that participation was voluntary and that they were able to drop out at any time without any adverse effects. Criteria for including participants were: (a) informed consent, (b) willingness to participate in the ART-training sessions, (c) willingness to engage in the skill building exercises between the training sessions, and (d) willingness to complete the study questionnaires. Figure 1 describes the flow of participants throughout the study. Exclusion criteria for the study were: (a) not participating in the ART-trainings sessions (n = 62; these teachers completed the baseline questionnaire; for unknown reasons they did not appear in the first session), (b) not intending to engage in the skill building exercises (n = 1), and (c) being unwilling to complete the study questionnaires (*n* = 46). Of the original sample, N = 119 met the criteria and were included in the study.

All participants had a university degree as the highest achieved level of education and all reported living in Germany. This sample represented an exclusively white population (which is representative of the German population) and, on average, participants were 44.5 years old (SD = 11.3; range: 24 - 62). The majority of participants were female (86.7%, n = 104). All procedures followed internationally accepted ethical standards and were approved by the university institutional review board.

Measures

ER skills were assessed with the total score of the Emotion-Regulation Skills Questionnaire (ERSQ; German version).[42] The ERSQ is a self-report instrument with 27 items that utilizes a 5-point Likert-type scale (1 = not at all to 5 = almost always) to assess adaptive emotion-regulation skills.[42] Items are preceded by the stem, "Last week . . ." and include statements such as "… I was able to influence my negative feelings" or "… I could accept my emotions". Completing the ERSQ takes about 5 to 15 minutes. In previous studies the total score (average of all items) significantly predicted indicators of mental health[22,45,47,54-56] and health-related behavior[43]. In the present study, a Cronbach's alpha of $\alpha = .94$ indicated very good reliability of the measure.

The intention to engage in skill building practice was assessed with a 1-item measure in which participants responded to the question how often (in absolute data) they intended to do the MP3-exercises per week. Such single-item measures of health behavior intention have been used and shown to be valid in several studies.[57,58] Actual engagement in the skill building exercises was assessed by a 1-item measure asking participants to rate how often they actually engaged in the MP3 exercises by a single item in the past week. Responses were given on a scale from 0 (no times) to 8 (more than 7 times). Single-item measures of health behaviors have also been found to be sufficiently valid in previous studies.[59] Completing the 1-item measures took 5 to 10 seconds per measure.

Figure 1. Study Flow Shows the Including/Excluding of Participants to Each Assessment.

Data Analyses Strategy

To test the hypothesis that general ER skills would moderate the relation between intention and behavior, we followed the procedure recommended by Baron and Kenny[60] and tested the significance of the interaction (between intention to engage and general ER skills) on training behavior. This method allows the investigation of interaction effects between metric variables. A hierarchical regression analysis on engaging in skill building practice was performed. In the first model, the assumed predictor intention to engage in skill building practice was included. In a second model, the potential moderator variable (ER) was included. In the final model, the interaction term (intention x ER) was included. The interaction term was calculated by the product of the centered predictor and the centered moderator variable. If the third model yields a significant increase in R^2 and if the interaction term is significant, moderation is confirmed. For all statistical analyses significance level was set at $p < .05$ (one-sided). SPSS 21.0 was used for all analyses.

RESULTS

Participants reported an average intention to engage in skills practice of M = 4.48 (SD = 1.36; range: 2 - 7) and an average actual engaging in skills practice of M = 4.17 (SD = 1.88; range: 1 - 9). The average ER skills value was M = 3.63 (SD = .50; range: 2.07 - 4.96). The intention measure correlated with $r = .40$ ($p < .001$) with the actual engaging measure. The ERSQ total score correlated with r = .08 (n.s.) with the intention measure and with r = .12 (n.s.) with the indicator of actual skills practice.

At Step 1 of the hierarchical multiple analysis, intention to engage in the skill building exercises accounted for a significant proportion of the variance in engaging in skill building practice, $R^2 = .16$, $F(1,117) = 22.72$, $p < .001$. At Step 2, general ER skills accounted for no additional incremental variance ($\Delta R^2 = .02$; n.s.) of skills practice, $\Delta F(2, 116) = 3.24$. At the

third and final step, the interaction between intention and general ER skills was tested. The analysis of this interaction yielded a significant predictor of engaging in skill building practice ($\beta = .18$; $p < .05$). Entry of the interaction term accounted for a modest, yet significant, additional incremental variance ($\Delta R^2 = .03$; $p < .05$) in engaging in skill building practice, $\Delta F(3, 115) = 4.31$ (see Table 1).

Table 1

Moderated Multiple Regressions of Engaging in Skill Building Practice on Predictor Variables Intention and ER Skills.

Actual engaging	B[a]	SEB[b]	β[c]	R^2	ΔR^2	ΔF
Step 1:				.16***	.16***	22.72***
Intention	.58	.12	.40***			
Step 2:				.19**	.02	3.24
Intention	.60	.12	.42***			
ER	.56	.31	.15			
Step 3:				.22***	.03*	4.31*
Intention	.60	.12	.42***			
ER	.42	.31	.11			
Intention x ER	.34	.16	.18*			

Note. N = 119. [a]*B* = unstandardized coefficients. [b]*SEB* = standard error of unstandardized coefficients. [c]*β* =standardized coefficients. *p < .05, **p < .01, ***p < .001.

Plots of the simple slopes (see Figure 2) of the interaction indicated that intention to engage in skill building practice significantly predicted actually engaging in skill building practice in all participants, including the high (+ 1 SD) (b = .59, p < .001), middle (mean) (b = .43; p < .001), and low (- 1 SD) (b = .26; p < .01) general ER skills conditions (see Table 2).

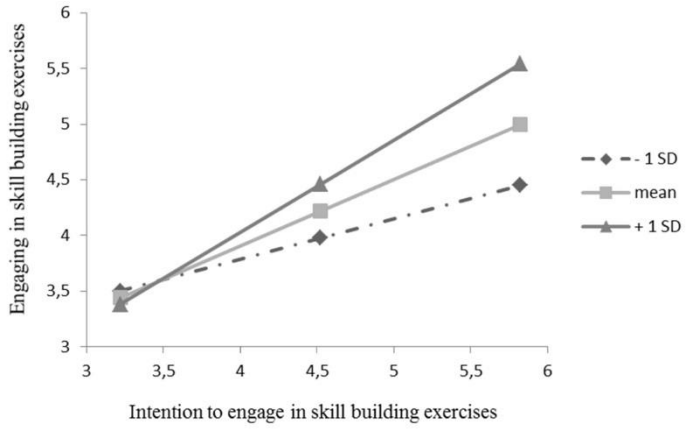

Figure 2. Plot of Moderator Analyses for the Relationship between Intention to Engage in the Skill Building Exercises and Reported Engaging Moderated by General ER Skills.

Table 2

Conditional Effect of Intention of Skill Building Exercises on Engaging in Skill Building Practice at Values of the Moderator ER (-1 *SD*, Mean, +1 *SD*).

Moderator	*B*	*SE* for *b*	*t*	p
- 1 *SD*	.26	.12	2.21	.027
Mean	.43	.09	4.91	.000
+ 1 *SD*	.59	.12	4.96	.000

Note. N =119. All variables are mean-centered.

DISCUSSION

The present study aimed to test the hypothesis that the ability to cope with aversive emotions (ER skills) would moderate the association between the intention to engage in skill building practice and the actual implementation (ie, behavior) of these intentions. Results indicated that the relation between the intention to engage in health-related exercises and

engaging in skill building practice was indeed moderated by ER. Individuals reporting greater ER skills demonstrated a stronger association between the intention to engage in skill building practice and the extent of which they actually engaged in this practice than individuals reporting lower ER skills.

As such, findings from the present study are consistent with the assumption that negative emotions cue action tendencies likely to interfere with the implementation of intentions[34,61,62] and that the ability to adaptively cope with such emotions therefore facilitates the implementation of health-related intentions. This has several important implications. First, the results of our study point to the relevance of effective ER skills for the implementation of intention, and hence, to the importance of interventions enhancing such skills when working to facilitate behavioral change. More specifically, any interventions that involve independent skills training should clarify to what extent participants will be able to cope with the aversive affective states likely to be cued through the suggested exercises. If there is reason to believe that (some) participants will not be able to cope with these aversive states (which may interfere with the intended practice), one should look for ways to enhance participants' ability to cope with these emotions.

Paradoxically, interventions aiming to enhance ER skills usually require high self-regulation skills themselves.[53,63] Thus, individuals in a particular need for more effective ER skills are less likely to benefit from the ER skills building program (at least if the latter involves independent skills practice). Therefore, when having these participants complete an ER skills building training before they start practicing the behavioral change they intended to implement in the first place, one might consider (a) changing the focus from reducing aversive affects to increasing positive affect in order to trigger constructive cognitive and physiological responses,[64] (b) reducing the intensity of negative affective states likely to be cued by the skill building exercises (ie by starting with short resource-focused exercises), or

(c) have trainers or co-participants provide significant support for the regular skills practice until the participant has learned how to cope with the negative emotions involved in such practice and can continue such practice by him or herself.

In the context of teachers such efforts might pay off in 2 ways. First, enhanced ER skills will help teachers to engage in any kind of training they need to engage in to cope with their job demands. Second, systematically enhancing teachers' ER skills would help them to successfully meet the aforementioned challenges of restoring and maintaining their work satisfaction, well-being and mental health as dysfunctional ways of responding to aversive affective states is an important factor maintaining problems in these areas.[1,7,65,66]

Limitations of the study include the exclusive use of an observational design, the exclusive use of self-reports, and the use of a specific sample so that the generalizability of our findings requires careful consideration. With regard to the design, future studies should experimentally enhance ER skills in individuals with high/low ER abilities and evaluate the effects of such training on subsequent implementation of intention in randomized controlled trials. With regards to self-report assessment, it has been argued that their validity is limited as many processes relevant for ER are inaccessible through introspection.[67] However, presently there seems to be a lack of more valid methods assessing such intrapersonal phenomena such as emotions and emotion regulations.[68] Nevertheless, in addition to self-report, future research should also employ observer-based measures or biological indicators of ER (eg, skin conduction, heart rate or cortisol level) and use multitrait-multimethod analytical approaches[69] to assess measurement invariance. Finally, future studies should test the moderating effect of ER skills on the implementation of intention in areas other than stress reduction with teachers to clarify to what extent findings and conclusions can be generalized to other target groups.

Human Subjects Statement

All procedures were approved by the university institutional review board.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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5 Studie 2: Prokrastination reduzieren durch Steigerung emotionaler Kompetenzen

Overcome Procrastination: Enhancing Emotion Regulation Skills Reduce Procrastination

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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-armed 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.

Keywords: Procrastination; Emotion Regulation; Emotion-focused Intervention; Training

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 (Harriott & Ferrari, 1996; Ferrari, Díaz-Morales, O'Callaghan, Díaz, & Argumedo, 2007; 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 (Tice, Bratslavsky, & Baumeister, 2001; Steel, 2007; 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).

As aversive affective states have been shown to cue procrastination, it can be hypothesized that the ability to adaptively cope with aversive affective states reduces the risk of procrastination. According to Berking and colleagues (2007; 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, Riper, & 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, Wupperman, Reichardt, Pejic, Dippel, & Znoj, 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). 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, Jazaieri, Sieland, & 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.

5.1 Studie 2.1: Querschnittliche Zusammenhänge zwischen emotionaler Kompetenz und Prokrastination

Study 2.1

Materials and Methods

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 %).

Measures

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 (α_{total} = .91) was good.

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).

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 $p < .05$ (two-sided). SPSS 22.0 and AMOS 22.0 (SPSS, 2013) were used for all analyses.

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 ($APSI_{total:}$ $F_{9, 152} = 7.63$, $p < .001$, $R^2 = 0.31$; $APSI_{procrastination:}$ $F_{9,152} = 4.28$, $p < .001$, $R^2 = 0.20$; $APSI_{fear\ for\ failure:}$ $F_{9, 152} = 5.70$, $p < .001$, $R^2 = 0.25$ and $APSI_{lack\ of\ motivation:}$ $F_{9, 152} = 5.37$, $p < .001$, $R^2 = 0.23$). 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.

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. 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.

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

	M	SD	1	2	3	4	5	6	7	8.	9	10	11	12	13
1 $APSI_{total}$	58.0	14.52		.86***	.80***	.69***	-.15	-.27**	-.34***	-.32***	-.40***	-.53***	-.43***	-.26**	-.29***
2 $APSI_{Academic\text{-}Procrast.}$	33.9	8.33			.48***	.35***	-.11	-.20*	-.27***	-.21**	-.32***	-.42***	-.33***	-.17*	-.22**
3 $APSI_{Fear\text{-}for\text{-}Failure}$	13.6	4.94				.63***	-.10	-.17*	-.21**	-.23**	-.33***	-.49***	-.42***	-.25**	-.26**
4 $APSI_{Lack\text{-}of\text{-}Motivation}$	3.7	1.97					-.19*	-.28***	-.34***	-.35***	-.28***	-.40***	-.31***	-.30***	-.21**
5 $ERSQ_{awareness}$	3.5	,81	.05	.02	.06	.03		.56***	.59***	.64***	.50***	.32***	.35***	.49***	.46***
6 $ERSQ_{sensation}$	3.8	.70	-.01	.02	-.01	-.03	-.02		.79***	.75***	.63***	.39***	.40***	.34***	.50***
7 $ERSQ_{clarity}$	3,9	.76	-.04	-.10	.06	-.04	-.02	-.50***		.84***	.64***	.50***	.47***	.41***	.56***
8 $ERSQ_{understanding}$	3.9	.79	-.04	.05	-.06	-.12	-.27**	-.11	-.48***		.68***	.52***	.45***	.44***	.59***
9 $ERSQ_{acceptance}$	3.7	.69	.05	-.01	.05	.15	-.13	-.25**	-.01	-.12		.76***	.58***	.50***	.63***
10 $ERSQ_{resilience}$	3.7	.77	-.28***	-.22**	-.26**	-.25**	.21**	.18*	-.07	-.03	-.52***		.66***	.51***	.61***
11 $ERSQ_{self\text{-}support}$	3.8	.75	-.10	-.07	-.15	-.01	-.05	-.05	-.12	.12	-.09	-.33***		.53***	.46***
12 $ERSQ_{r.t.confront}$	3.6	.82	.04	.07	.01	-.09	-.25**	-.03	.01	-.02	.02	-.19*	-.19*		.49***
13 $ERSQ_{modify}$	3.4	.76	.034	.03	.02	.10	-.14	.01	.08	-.21**	-.10	-.24**	.02	-.07	

Note. $N = 162$; $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$; ASPI = Academic State Procrastination Inventory (Schouwenburg, 1995; German version: Helmke & Schrader, 2000); ERSQ = Emotion Regulation Skills Questionnaire (Berking & Znoj, 2008); R.t.Confr. = Readiness to Confront with aversive emotions.

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*
$ERSQ_{awareness}$	.08	.85	.40	.07	.67	.50	.10	1.04	.30	.07	.71	.48
$ERSQ_{sensation}$	-.05	-.44	.66	-.07	-.56	.58	-.01	-.06	.95	-.06	-.48	.63
$ERSQ_{clarity}$	-.16	-.80	.42	-.15	-1.00	.32	.10	.66	.51	-.12	-.83	.41
$ERSQ_{understanding}$	-.03	-.20	.84	.10	.65	.52	-.15	-1.10	.27	-.24	-1.74	.08
$ERSQ_{acceptance}$	,20	.74	.46	.00	.02	.99	.10	.78	.44	.25	1.88	.06
$ERSQ_{resilience}$	-.50	-4.03	.00	-.35	-2.71	.01	-.46	-3.58	.00	-.41	-3.23	.00
$ERSQ_{self\text{-}support}$	-.15	-1.58	.12	-.15	-1.52	.13	-.16	-1.64	.10	.00	-.01	.99
$ERSQ_{r.t.confront}$	.04	.42	.68	.06	.60	.55	-.01	-.15	.88	-.14	-1.54	.13
$ERSQ_{modify}$	.07	.74	.46	.07	.67	.50	.04	.37	.71	.16	1.69	.09

Note. $N = 162$

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: $ERSQ_{resilience}$																
$ERSQ_{awareness}$	**-.17**	**.05**	**-.2797**	**-.0919**	**-.13**	**.04**	**-.2247**	**-.0654**	**-.16**	**.05**	**-.2607**	**-.0773**	**-.12**	**.04**	**-.2144**	**-.0475**
$ERSQ_{sensation}$	**-.19**	**.05**	**-.2836**	**-.1061**	**-.15**	**.04**	**-.2342**	**-.0776**	**-.19**	**.05**	**-.3007**	**-.1067**	**-.13**	**.04**	**-.2337**	**-.0638**
$ERSQ_{clarity}$	**-.24**	**.05**	**-.3588**	**-.1575**	**-.18**	**.04**	**-.2742**	**-.1023**	**-.25**	**.05**	**-.3613**	**-.1587**	**-.14**	**.05**	**-.2409**	**-.0574**
$ERSQ_{understanding}$	**-.26**	**.05**	**-.3725**	**-.1716**	**-.21**	**.04**	**-.2968**	**-.1262**	**-.24**	**.05**	**-.3712**	**-.1575**	**-.14**	**.05**	**-.2422**	**-.0436**
$ERSQ_{acceptance}$	**-,42**	**.08**	**-.5694**	**-.2749**	**-,29**	**.07**	**-.4289**	**-.1399**	**-,41**	**.08**	**-.5787**	**-.2619**	**-,31**	**.08**	**-.4709**	**-.1659**
$ERSQ_{self\text{-}support}$	**-.28**	**.05**	**-.3973**	**-.1862**	**-.22**	**.05**	**-.3313**	**-.1482**	**-.24**	**.05**	**-.3495**	**-.1570**	**-.16**	**.05**	**-.2714**	**-.0668**
$ERSQ_{r.t.confront}$	**-.29**	**.05**	**-.4078**	**-.1938**	**-.20**	**.06**	**-.3110**	**-.0939**	**-.26**	**.05**	**-.3589**	**-.1513**	**-.22**	**.06**	**-.3578**	**-.1078**
$ERSQ_{modify}$	**-.34**	**.05**	**-.4623**	**-.2580**	**-.26**	**.05**	**-.3887**	**-.1777**	**-.30**	**.05**	**-.4116**	**-.1993**	**-.25**	**.05**	**-.3675**	**-.1519**
Mediator: $ERSQ_{modify}$																
$ERSQ_{awareness}$	**-.13**	**.05**	**-.2340**	**-.0545**	**-.10**	**.04**	**-.1868**	**-.0250**	**-.12**	**.05**	**-.2494**	**-.0404**	-.07	.05	-.1539	.0213
$ERSQ_{sensation}$	**-.11**	**.04**	**-.2071**	**-.0280**	-.07	.04	-.1409	.0197	**-.10**	**.04**	**-.2022**	**-.0332**	-.04	.04	-.1226	.0602
$ERSQ_{clarity}$	-.09	.05	-.1920	.0090	-.05	05	-.1424	.0432	**-.10**	**.05**	**-.2036**	**-.0139**	-.01	.05	-.0993	.0929
$ERSQ_{understanding}$	-.10	.06	-.2163	.0111	-.07	05	-.1741	.0323	-.10	.05	-.2082	.0045	.01	.06	-.0968	.1404
$ERSQ_{acceptance}$	-.05	.06	-.1857	.0568	-.01	.06	-.1246	.1009	-.05	.06	-.1852	.0566	-.03	.06	-.1434	.0849
$ERSQ_{resilience}$	.03	.05	-.0747	.1195	.03	.05	-.0664	.1381	.03	.05	-.0817	.1210	.03	.05	-.0586	.1342
$ERSQ_{self\text{-}support}$	**-.11**	**.04**	**-.2186**	**-.0337**	-.08	.04	-.1634	.0019	-.04	.04	-.1357	.0176	-.03	.04	-.1192	.0458
$ERSQ_{r.t.confront}$	-.06	.04	-.1578	.0067	-.03	.04	-.1039	.0361	**-.08**	**.04**	**-.1838**	**-.0006**	-.04	.03	-.1150	.0308

Note. *Independent variables 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 ($ERSQ_{resilience}$).*

5.2 Studie 2.2: Der prospektive Einfluss emotionaler Kompetenz auf Prokrastination (längsschnittlich)

Study 2.2

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. Om 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.

Materials and Methods

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.

Measures

Emotion regulation skills: As in Study 1, we assessed ER skills with the Emotion Regulation Skills Questionnaire (ERSQ; German version: Berking & Znoj, 2008). The internal consistency of the $ERSQ_{total}$ was good (α_{t1} = .93; α_{t2} = .94).

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 α = .86 (Klingsieck & Fries, 2012). The internal consistency of the GPS in the present study was also good (α_{t1} = .93; α_{t2} = .94).

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 $p < .05$ (two-sided). SPSS 22.0 and AMOS 22.0 (SPSS, 2013) were used for all analyses.

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 Table 5 and Table 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 ($\beta = -.09$, $p < .05$), whereas procrastination measured at pre-assessment seemed to have no impact on subsequent $ERSQ_{modify}$ ($\beta = .07$, 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 ($ERSQ_{resilience}$; $\beta = -.19$, $p < .05$).

Table 4

Correlations between ER sub-skills and procrastination

	Correlations on Procrastination T1		*Correlations on Procrastination T2*	
	r	*p*	r	*p*
$ERSQ_{awareness}$	.17	.14	.10	.40
$ERSQ_{sensation}$	-.11	.24	-.16	.16
$ERSQ_{clarity}$	-.23	.04	-.25	.03
$ERSQ_{understanding}$	-.07	.95	-.03	.79
$ERSQ_{acceptance}$	-,03	.79	-.05	.69
$ERSQ_{resilience}$	-.24	.03	-.26	.02
$ERSQ_{self\text{-}support}$	-.17	.14	-.22	.06
$ERSQ_{r.t.confront}$	-.35	.00	.43	.00
$ERSQ_{modify}$	-.14	.22	.22	.05
$ERSQ_{total}$	-.18	.11	-.25	.03
GPS_t1	1.00	.00	.93	.00
$ERSQ_{awareness}$	.06	.61	-.03	.77
$ERSQ_{sensation}$	.07	.55	-.03	.80
$ERSQ_{clarity}$	-.06	.59	-.16	.16
$ERSQ_{understanding}$	.06	.59	-.01	.91
$ERSQ_{acceptance}$	-.07	.54	-.15	.18
$ERSQ_{resilience}$	-.35	.02	-.43	.00
$ERSQ_{self\text{-}support}$	-.13	.24	-.25	.03
$ERSQ_{r.t.confront}$	-.40	.00	-.48	.00
$ERSQ_{modify}$	-.03	.82	-.13	.25
$ERSQ_{total}$	-.13	.26	-.25	.03

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	.11	.99	.96	.143	.000	.369
GPS$_{t1}$	GPS$_{t2}$	.93	.00							
ERSQ$_{total_t1}$	ERSQ$_{total_t2}$	.73	.00							
ERSQ$_{total_t1}$	GPS$_{t2}$	-.08	.05							
GPS$_{t1}$	ERSQ$_{total_t2}$	.00	.97							
CLP 2: ERSQ$_{awareness}$ - GPS				2.20	.14	.99	.97	.12	.000	.354
GPS$_{t1}$	GPS$_{t2}$	.93	.00							
ERSQ$_{awareness_t1}$	ERSQ$_{awareness_t2}$	.70	.00							
ERSQ$_{awareness_t1}$	GPS$_{t2}$	-.06	.47							
GPS$_{t1}$	ERSQ$_{awareness_t2}$	-.06	.15							
CLP 3: ERSQ$_{sensation}$ - GPS				.93	.33	1.00	1.00	.00	.000	.295
GPS$_{t1}$	GPS$_{t2}$	.93	.00							
ERSQ$_{sensation_t1}$	ERSQ$_{sensation_t2}$	.66	.00							
ERSQ$_{sensation_t1}$	GPS$_{t2}$	-.06	.15							
GPS$_{t1}$	ERSQ$_{sensation_t2}$	-.14	.10							
CLP 4: ERSQ$_{clarity}$ - GPS				4.10	.04	.98	.97	.20	.029	.415
GPS$_{t1}$	GPS$_{t2}$	,93	.00							
ERSQ$_{clarity_t1}$	ERSQ$_{clarity_t2}$	.57	.00							
ERSQ$_{clarity_t1}$	GPS$_{t2}$	-.05	.47							
GPS$_{t1}$	ERSQ$_{clarity_t2}$	-.07	.29							
CLP 5: ERSQ$_{understanding}$ - GPS				.004	.95	1.00	1.00	.00	.000	.000
GPS$_{t1}$	GPS$_{t2}$	,93	.00							
ERSQ$_{understanding_t1}$	ERSQ$_{understanding_t2}$	.53	.00							
ERSQ$_{understanding_t1}$	GPS$_{t2}$	-.02	.56							
GPS$_{t1}$	ERSQ$_{understanding_t2}$	-.07	.50							

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				.08	.78	1.00	1.00	.000	.000	.197
GPS$_{t1}$	GPS$_{t2}$	,93	.00							
ERSQ$_{acceptance_t1}$	ERSQ$_{acceptance_t2}$	.66	.00							
ERSQ$_{acceptance_t1}$	GPS$_{t2}$	-.02	.66							
GPS$_{t1}$	ERSQ$_{acceptance_t2}$	-.05	.56							
CLP 7: ERSQ$_{resilience}$ - GPS				4.74	.03	.98	.90	.219	.056	.433
GPS$_{t1}$	GPS$_{t2}$	,93	.00							
ERSQ$_{resilience_t1}$	ERSQ$_{resilience_t2}$	.66	.00							
ERSQ$_{resilience_t1}$	GPS$_{t2}$	-.03	.44							
GPS$_{t1}$	**ERSQ$_{resilience_t2}$**	**-.19**	**.02**							
CLP 8: ERSQ$_{self\text{-}support}$ - GPS				2.19	.14	.99	.96	.123	.000	.354
GPS$_{t1}$	GPS$_{t2}$	,93	.00							
ERSQ$_{self\text{-}support._t1}$	ERSQ$_{self\text{-}support_t2}$	.54	.00							
ERSQ$_{self\text{-}support_t1}$	GPS$_{t2}$	-.06	.13							
GPS$_{t1}$	ERSQ$_{self\text{-}support_t2}$	-.04	.64							
CLP 9: ERSQ$_{R.t.confront.}$ - GPS				10.10	.00	.96	.73	.342	.174	.546
GPS$_{t1}$	GPS$_{t2}$	,92	.00							
ERSQ$_{R.t.confr_t1}$	ERSQ$_{R.t.confr_t2}$	.49	.00							
ERSQ$_{R.t.confr_t1}$	**GPS$_{t2}$**	**-.13**	**.00**							
GPS$_{t1}$	**ERSQ$_{R.t.confr_t2}$**	**-.25**	**.01**							
CLP 10: ERSQ$_{modify.}$ - GPS				1.56	.21	1.00	.98	.085	.000	.328
GPS$_{t1}$	GPS$_{t2}$	,93	.00							
ERSQ$_{modify_t1}$	ERSQ$_{modify_t2}$	.69	.00							
ERSQ$_{modify_t1}$	**GPS$_{t2}$**	**-.09**	**.03**							
GPS$_{t1}$	ERSQ$_{modify_t2}$	.07	.38							

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.

5.3 Studie 2.3: Experimentelle Prüfung, ob eine Steigerung der emotionalen Kompetenz Prokrastination reduziert

Study 2.3

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.

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.

Materials and Methods

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.

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 Whiltey (2015), 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 minutes and was repeated daily for two weeks.

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 (α_{t1} = .80, α_{t2} = .85).

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 α_{t1} = .77 and α_{t2} = .82 for acceptance, α_{t1} = .77 and α_{t2} = .77 for resilience, and α_{t1} = .80 and α_{t2} = .77 for modification.

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. For all analyses we used SPSS 22.0 (SPSS, 2013).

Results

An ANOVA indicated no significant differences between the treatments regarding age (F = .025, p > .05), procrastination (F = .289, p > .05), and all nine ER skills (F = .038 - 3.436, p > .05) in pre-measurements. With regard to gender a chi-square-test was conducted, no differences (χ^2 = 1.411, p > .05) between treatments were found.

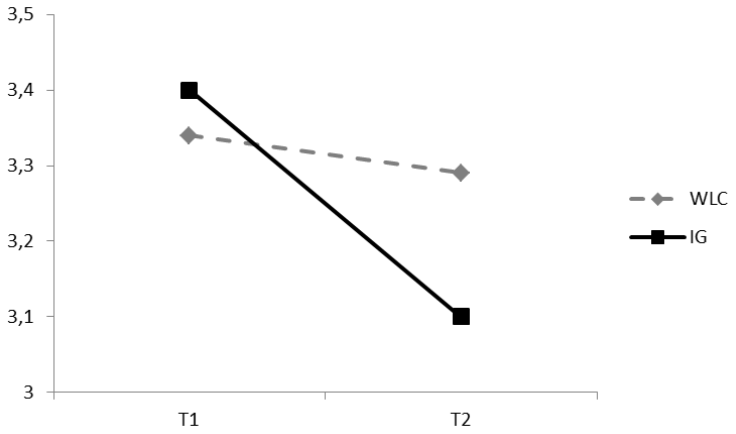

Figure 1. Comparison of intervention group (IG) and waiting list control (WLC) group on development of procrastination from baseline (T1) to post-measurement (T2).

In line with our assumption, an ANCOVA indicated that the training of emotion-focused strategies reduced procrastination ($F_{1, 81}$ = 8.979, p < .01, $d_{between}$ = .34). Figure 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 = .40, M_{t2} = 3.29, SD = .48)

did not differ significantly (t = 1.099, p > .50), whereas the reduction in means of the IG (M_{t1} = 3.40, SD = .48, M_{t2} = 3.10, SD = .54) was significant (t = 5.113, p < .001, $d_{withing}$ = .59).

Participants of the IG group reported a significant increase in their abilities to tolerate aversive emotions ($F_{1, 80}$ = 4.424, p < .05) and modify aversive emotions ($F_{1, 80}$ = 14.109, p < .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 ($\Delta ERSQ_{resilience:}$ β = -.06, 95% *CI* [-.152, -.005], and $\Delta ERSQ_{modify}$: β = -.08, 95% *CI* [-.202, -.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).

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 (.40)	3.29 (.48)	3.40 (.48)	3.10 (.54)	8.979	.004
$ERSQ_{awareness}$	3.42 (.84)	3.51 (.83)	3.02 (.84)	3.91 (4.92)	.963	.329
$ERSQ_{sensation}$	3.16 (.80)	3.04 (.91)	3.47 (.89)	3.59 (.93)	4.465	.038
$ERSQ_{clarity}$	3.36 (.77)	3.22 (.88)	3.61 (.89)	3.79 (.84)	6.606	.012
$ERSQ_{understanding}$	3.24 (.75)	3.22 (.73)	3.41 (.78)	3.65 (.79)	5.527	.021
$ERSQ_{acceptance}$	3.13 (.76)	3.07 (.80)	2.85 (.82)	3.29 (.82)	4.318	.041
$ERSQ_{resilience}$	2.95 (.99)	2.86 (.89)	2.89 (.98)	3.20 (.88)	4.424	.039
$ERSQ_{self\text{-}support}$	3.21 (.73)	3.09 (.77)	3.32 (.84)	3.49 (.80)	6.513	.013
$ERSQ_{r.t.confront}$	2.77 (.79)	2.88 (.90)	2.68 (.86)	3.19 (.83)	3.100	.083
$ERSQ_{modify}$	2.75 (.74)	2.70 (.74)	2.81 (.76)	3.21 (.82)	14.109	.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:				
$\Delta ERSQ_{awareness}$	.02	.02	-.0323	.0441
$\Delta ERSQ_{sensation}$	-.02	.02	-.0803	.0166
$\Delta ERSQ_{clarity}$	-.03	.03	-.1159	.0092
$\Delta ERSQ_{understanding}$	-.01	.02	-.0761	.0302
$\Delta ERSQ_{acceptance}$	**-.05**	**.04**	**-.1406**	**-.0003**
$\Delta ERSQ_{resilience}$	**-,06**	**.04**	**-.1522**	**-.0047**
$\Delta ERSQ_{self\text{-}support}$	.00	.02	-.0439	.0545
$\Delta ERSQ_{r.t.confront}$	**-.05**	**.04**	**-.1787**	**-.0001**
$\Delta ERSQ_{modify}$	**-.08**	**.05**	**-.2017**	**-.0012**

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	.25	2.28	.03	.23	2.05	.04	.18	1.63	.11	.36	3.41	.01
(II) Regression on GPS_{t2}												
Treatment	-.22	-2.91	.01	-.22	-2.91	.01	-.22	-2.91	.01	-.22	-2.91	.01
(III) Regression on GPS_{t2}												
Mediator	-.15	-1.91	.06	-.20	-2.66	.01	-.21	-2.85	.01	-.16	-2.08	.04
Treatment	-.18	-2.39	.02	-.18	-2.34	.02	-.18	-2.47	.02	-.16	-2.03	.05

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.*

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 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 β = -.09; indirect effects on procrastination in Study 3 resilience, (β = -.06), and modification (β = -.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.

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.

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6 Studie 3: Entwicklung und Evaluation eines Trainings zur Überwindung von Prokrastination

Does SMS-Support Make a Difference? Efficacy of the two-week Online-Training to Overcome Procrastination (ON.TOP). A Randomized Controlled Trail.

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Abstract

Object: The primary purpose of this randomized controlled trial (RCT) was to evaluate the efficacy of an unguided two-week internet-based training to overcome procrastination (ON.TOP). However, it is well known that treatment adherence is a typical problem of procrastinators, especially with regard to internet-based interventions. Thus, the secondary purpose of the present study is to investigate whether SMS-support increases the frequency of engaging in the training as well as efficacy.

Method: In a three-armed RCT (N = 161), the effects of ON.TOP and ON.TOP with daily SMS-support were compared to a wait list control condition (WLC) on the basis of intention-to-treat analyses in a sample of students. The primary outcome measure was procrastination. The secondary outcome measure was the frequency of engaging in the training. Pre-, post-, and 8-week-follow-up assessments were conducted.

Results: Separate ANOVAs with repeated measures revealed that procrastination decreased significantly in each intervention group. With regard to both intervention groups and the WLC, post-hoc tests indicated that only in the intervention group with SMS-support procrastination decreased significantly at follow-up measure. Regarding the frequency of engaging, no significant difference between both intervention groups was found. Excluding participants engaging not at all or rarely, an ex post analysis indicated a greater frequency of engaging in the intervention group with SMS-support.

Discussion: Results indicated that ON.TOP (1) reduced procrastination and that SMS-support (2) increased efficacy as well as (3) frequency of engaging. Given the cost-efficient opportunity of SMS-support, internet-based interventions should be enriched in order to enhance efficacy.

Introduction

Procrastination is a common self-regulatory failure that refers to the inability to initiate or pursue a given goal. It is defined as the voluntary delay of an important activity, although this activity is intended and/or necessary as well as despite expecting potential negative consequences (Klingsieck, 2013). Procrastination includes traits like weak impulse control, lack of persistence, lack of work discipline, lack of time management skills, and the inability to work methodically (Schouwenburg, 2004).

Prevalence of procrastination is extremely high. Findings indicate that up to 70% of college students procrastinate (Ellis & Knaus, 1977; Schouwenburg, 1995; Steel, 2007), and almost 50% procrastinate consistently and problematically (Day, Mensink, & O'Sullivan, 2000; Onwuegbuzie, 2000; Solomon & Rothblum, 1984). In addition to being endemic during college, procrastination is also widespread in the general population, chronically affecting 15% – 20% of the adult population (Harriott & Ferrari, 1996).

Procrastination is a common issue in work-related or academic contexts (e.g., Steel, 2007). For many people, procrastination results in various negative consequences (Pychyl & Flett, 2012) including poor academic and overall performance (e.g., Steel, 2007), negative health behavior, such as postponed seeking care for health problems (e.g., Sirois, Melia-Gordon, & Pychyl, 2003; Stead, Shanahan, & Neufeld, 2010), financial disadvantages with regard to filing taxes (Kasper, 2004), and providing financially for retirement (Akerlof, 1991; O'Donoghue & Rabin, 1999). Furthermore, studies have found that procrastination decreases well-being (Lay & Schouwenburg, 1993; Tice & Baumeister, 1997). For example, a lot of adults have regrets due to their chronic procrastination in various life domains (Ferrari, Barnes, & Steel, 2009). Thus, interventions to overcome procrastination are needed.

There are only few clinical trials, which examine the efficacy of treatment interventions for procrastination (Höcker, Engberding, & Rist, 2013; Rozental, Forsell,

Svensson, Andersson, & Carlbring, 2015). With regard to internet-based interventions in this field, there is only one study reporting pre- and post-data (Rozental, et al., 2015). To the best of our knowledge, no randomized controlled trials have been carried out previously examining effects of pre-, post-, and follow-up data of an intent-based intervention to overcome procrastination. This study aims to evaluate the internet-based intervention "Online-Training to Overcome Procrastination" (ON.TOP).

Most internet-based interventions have a lower treatment adherence than face-to-face interventions (Christensen, Griffiths, & Farrer, 2009). Typically, procrastinators lack adherence in any kind of treatment (Ferrari, Johnson, & McCown, 1995). Thus, despite all advantages of internet-based interventions, including easy access, independence of time and place as well as anonymity, procrastinators may especially lack adherence with those interventions. However, the outcome of such interventions depends on the extent to which participants engage in an active training. Therefore, the second aim of this study is to find intervention elements to enrich ON.TOP in order to increase adherence and efficacy.

Factors affecting procrastination

There is evidence that procrastination is caused and maintained by a variety of factors including lack of intention building (Owens, Bowman & Dill, 2008), planning, and time management (Lay & Schouwenburg, 1993; Specter & Ferrari, 2000). Above this, affective obstacles (Sirois, 2014) like distress (Tice, Bratslavsky, & Baumeister, 2001; Pychyl, Lee, Thibodeau, & Blunt, 2000), anxiety (Rothblum, Solomon, & Murakami, 1986), low positive affect (Ferrari & Díaz-Morales, 2007, Sirois & Pychyl, 2013), time discounting as well as need of immediate gratification (e.g., Tice & Bratslavsky, 2000) increase the probability of postponing the task (Howell, Watson, Powell, & Buro, 2006). Time discounting refers to the

tendency of individuals to discount future rewards depending on the interval between activity and reward. A greater interval reduces the motivational value of the reward (Steel & König, 2006). Moreover, research found that lack of self-forgiveness for procrastination increases subsequent procrastination (Wohl, Pychyl, & Bennett, 2010). Another equally important factor that is considered to increase procrastination is lack of self-reinforcement (e.g., Ferrari, & Emmons, 1995). Thus, improving these aforementioned factors should subsequently decrease procrastination.

It can be summarized that (1) lack of intention building, (2) lack of planning and time management, (3) difficulties to initiate and keep up a certain action caused by of emotional obstacles, poor mood or delay of gratification, and (4) missing self-reinforcement or negative self-evaluation including low self-efficacy expectation predict procrastination. Consequently, in order to develop interventions to overcome procrastination, these factors should be considered. The Rubicon-Model is a theory of action regulation (Heckhausen & Gollwitzer, 1997) that considers these factors by saying that (a) intention-building, (b) planning with respect to time management, (c) shielding the intended action from distraction, and (d) evaluating the process and results of completed activities (including self-reinforcement) are crucial for successful action taking and preventing procrastination. Thus, we use the Rubicon-Model as the framework of the online-based training to overcome procrastination.

Findings indicate that procrastinators postpone activities, if they first have to overcome obstacles before they can start with the activity (Steel, 2007). For example, procrastinators are more likely to postpone writing a letter if they have to clean up the desk beforehand. Taking this into consideration for the development of an intervention to overcome procrastination, the threshold to start this intervention should be low. With respect to the time-discounting effect, it could be beneficial to offer a short intervention with

immediate noticeable effects. Moreover, the accessibility of an internet-based intervention may also lower the threshold.

Unfortunately, internet-based interventions often involve problems of adherence (Richards & Richardson, 2012). Thus, the development of an internet-based intervention should consider factors to increase adherence.

Factors affecting adherence

Research has determined factors that increase adherence in internet-based interventions including tailored feedback by e-coaches (Cugelman, Thelwall, & Dawes, 2011), interactivity of the program (Hurling, Fairley & Dias, 2006), enrichment of the training environment, e.g., multimedia presentations or audio-exercises (Webb, Joseph, Yardley, & Michie, 2010), and text messages as reminders (Fjeldsoe, Marshall, & Miller, 2009; Krishna, Boren, & Balas, 2009).

To increase adherence and efficacy, participants of ON.TOP received short exercises via text messages (SMS-support). These exercises aim to enrich the training environment and reminding participants, in order to increase the frequency of engaging in training exercises.

Hypotheses

We hypothesize that (1) ON.TOP will lead to a greater reduction in procrastination complaints at post-test and eight-weeks follow-up compared with a WLC. (2) Additionally, we assume that participants receiving SMS-support report a higher frequency of engaging in training than participants without SMS-support. (3) Moreover, we suppose that ON.TOP

combined with daily SMS-support will lead to a greater reduction in procrastination than ON.TOP without SMS-support.

Method

Design and timeframe

This study was a three-armed randomized controlled trial (RCT) comparing an internet-based unguided intervention group (IG_1) and an internet-based intervention group receiving guidance via SMS (IG_2) with a WLC group. Outcomes were measured pre-treatment, post-treatment (two weeks), and at an eight-week follow-up.

Based on findings of Rozental et al. (2015) and due to the fact that the intervention was newly developed, we expected an effect of medium size (Cohen's $d = 0.50$). Accordingly, a sample size of N=161 was required to detect a difference between the IG_1, IG_2, and WLC groups. This estimate was based on intention-to-treat analyses with $\alpha = 0.05$ and $1 - \beta = 0.95$ in a two-tailed test.

Interested individuals were included and randomized from October to December 2014. No excluding criteria were defined. All procedures were approved by the university institutional review board of the Leuphana University Lueneburg.

Procedure and sample

Due to the fact that half of the students report serious procrastination problems (Day, et al., 2000), we decided to recruit in a student population. To recruit participants, we distributed information (a) via the internal communication system of the Leuphana University

in Lueneburg (Germany), (b) via several helplines for students (at three German universities), and (c) via the Moodle-Communication-System of the correspondence university in Hagen (Germany). In order to conduct a universal prevention study, all individuals completing the first online survey (pre-treatment) and providing informed consent were included. After completing the pre-treatment measure, participants were randomized. For randomization a computer program (Excel, randbetween-function) was used. It automatically assigned 0, 1, or 2 to each ID number, indicating allocation to IG_1, IG_2, or WLC group.

Participants who were randomized into the IG_1 or IG_2 got access to the internet-training via e-mail. Participants of the WLC got information about the progress of the study. Additionally to the training-access, participants of IG_2 got two text-massages daily (SMS-support). Two weeks after completing pre-measurement, all participants were asked to complete the post measure. Ten weeks after completing pre-treatment measure, all participants were asked to complete the follow-up measure. Then, participants of the WLC got access to ON.TOP.

A total of 161 students were randomized to either the IG_1 (N = 58; 67.2 % female), the IG_2 (N = 55; 74.5 % female), or the WLC group (N = 48; 81.3 % female). One hundred nineteen participants (73.9 %) were women and the average age was 28.4 years (SD = 8.9), ranging from 19 to 62 years. With regard to the distribution of gender between the groups, a chi-square test indicated no significant difference (χ^2 = 2.69; p = .26). With regard to age, the groups did not differ significantly either (F = 1.049; p = .35).

Intervention

ON.TOP combines already available and well established therapeutic techniques in order to overcome procrastination. As theoretical framework the Rubicon-Model

(Heckhausen & Gollwitzer, 1987) was applied, including the following phases: (a) motivational phase (intention building), (b) pre-actional phase (planning), (c) actional phase (realizing), and (d) post-actional phase (evaluating).

The two-week intervention comprises four sessions. In the first session (*intention building*), participants learned about the relevance of decision-making (Steel, 2007). They were invited to commit themselves to goals, in order to increase the value of these goals (van Eerde, 2000; Howell & Watson, 2007; Göpel & Steel, 2008; Fisher, Minbashian, Beckmann, & Wood, 2013). Practically, participants were asked to choose and write down one of their daily tasks they were most likely to procrastinate. They learned to apply techniques (e.g. mental contrasting (Oettingen, Mayer, Sevincer, Stephens, Pak, & Hagenah, 2009)), aiming to underpin the value of long-term goals. By considering the possibility to decide against the task, perceived self-determination should be increased (Senécal, Julien, & Guay, 2003). This decreases the probability of reactance against the task (Pavey & Sparks, 2009) and fosters potential goal commitment (Deci, & Ryan, 2000). If individuals decide against the task, procrastination is transformed into prioritizing.

In the second session (*planning*), participants learned to plan the task they were most likely to procrastinate. Two principals were focused. First, realistic goal setting in terms of sub-goals increases the probability to execute the intended tasks (van Eerde, 2000). Second, implementation intentions are simple if-then-plans determining when and how to execute the task and reduce the gap between intention and behavior (Gollwitzer, 1999). It has been proven that applying implementation intentions reduces procrastination (Gollwitzer & Sheeran, 2006; van Hooft, Born, Taris, van der Flier, & Blonk, 2005).

In the third session (*realization*), participants learned how to overcome affective obstacles gaping between intentions and behavior (Eckert, Ebert, Lehr, Sieland, Jazaieri, &

Berking, 2015). Two classes of affective obstacles increasing procrastination were identified. First, some tasks lack positive affect (e.g., boredom) whereas potential distractors are more attractive (Tice et al., 2001). Second, some tasks trigger fear or anxiety, which cue task avoidance (McCown, Petzel & Rupert, 1987). In the intervention, participants learned relaxation techniques (Ferrari et al., 1995), cognitive strategies (Pychyl & Flett, 2012; Rozental et al., 2015), and techniques to accept and tolerate aversive emotions (Berking & Whitley, 2014; Glick & Orsillo, 2015; Scent & Boes, 2014) in order to overcome affective obstacles cueing procrastination.

In the fourth session (*evaluating*), self-efficacy expectation was fostered, as self-efficacy expectation is a relevant negative predictor of procrastination (Steel, 2007). Hence, participants evaluated situations in which they were able to overcome procrastination successfully (Sirois, 2004). This may increase self-efficacy expectation and self-reinforcement to overcome procrastination. Additionally, they reflected unsuccessful strategies in order to improve them.

All sessions included videos, audio-exercises (i.e., relaxation exercises or imagination exercises), and written material. In order to lower a potential threshold, (1) all text-based information was also provided as audios and (2) the duration of each session did not exceed 30 minutes. In order to reduce time discounting effects, participants were supposed to reinforce themselves every evening for every small success regarding overcoming procrastination.

SMS-support

IG_2 participants were supported by two small exercises per day via SMS. Each exercise took no longer than 30 seconds. The content of these exercises was aligned with the

content of the intervention session. Therefore, participants of both intervention groups followed a timetable when to start and when to end each session (session 1: day 1 to 3; session 2: day 4 to 7; session 3: day 8 to 12, and session 4: day 13 and 14). Participants of the IG_2 got reminders to start the next session via SMS.

Examples for SMS-content are: "Which task are you most likely going to postpone today? What are the consequences if you decide not to do the task? Are there any good reasons against this decision?" (session 1). "Which task are you most likely going to postpone today? If you have decided to do this task, then already set the time when you will begin now." (session 2). "Remember a situation in which you overcame procrastination successfully. Try to remember this feeling of success before you will start another aversive task." (session 3). "In this training you have learned how to overcome procrastination. Now it´s time to look back and acknowledge your own success." (session 4).

Measure

Procrastination. Procrastination was measured with the German short version of the General Procrastination Scale (GPS; Lay, 1986; German version: Klingsieck & Fries, 2012) and with the KRAS (Schwarzer & Jerusalem, 1999). 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. Due to the lack of psychometric validity, Klingsieck and Fries (2012) revised the original scale factor-analytically. A total score was obtained by summing all items, divided by nine (number of items). In the present study, the internal consistency of the GPS was good ($\alpha = .83$). KRAS is a German 10-item-inventory to measure procrastination utilizing a 4-point Likert-type scale (1 = *not at all* to 4 = *almost always*). Half of the items are inversed. The total score was calculated by summing all items. In the present study, the internal consistency of the KRAS was acceptable ($\alpha = .75$).

Depression. Depression is highly associated with procrastination (Steel, 2007). Thus, we investigated whether the training had any influence on depression. To assess symptoms of depression, we used an abbreviated version of the Center of Epidemiological Studies Depression Scale (CES–D; original version: Radloff, 1977, 1991; German version: Hautzinger & Bailer, 1993). The German short-version of the CES–D includes 15 items utilized a 4-point Likert-type scale. In the present sample, the internal consistency was good ($\alpha = .89$).

Frequency of Engaging. Participants rated their frequency of engaging on a 6-point Likert-type scale by answering the question, "How often did you engage in practicing exercises of ON.TOP (1 = *not at all*; 2 = *rarely*; 3 = *sometimes*; 4 = *often*; 5 = *very often*; 6 = *daily*).

Statistical analyses

In this study, we present the results from intention-to-treat (ITT) analyses performed with SPSS, version 22 (IBM Corp, Armonk. NY, USA). Due to the dropout rates of 18.6 % (post) and 34.8 % (follow-up), we decided to additionally present per-protocol analyses. Reported *p*-values are two-sided with a significance level of .05.

Missing data. All participants completed the post-treatment measure. A Markov Chain Monte Carlo multivariate imputation algorithm (SPSS 22) with ten estimations per missing value was used to replace any missing post-treatment and follow-up data (Schafer & Graham, 2002). In multiple imputation (MI), predictors are defined which lead to estimations for the missing values. We used all pre-, post-, and 8-weeks follow-up values of all outcome measures as well as age and gender as predictors.

Treatment efficacy. To assess treatment efficacy, the IG_1 and IG_2 were compared with WLC on procrastination. We conducted an ANOVA with repeated measures (pre, post, follow-up). We report *p*-values and Cohen's *d* for the between-group effect size (follow-up). We repeated this analysis four times. In the first two analyses, we compared each treatment (IG_1 and IG_2) with WLC separately (2 x 3 ANOVA). In a third analysis, we compared both treatments with each other (2 x 3 ANOVA). Finally, we included both treatments and the WLC in a 3 x 3 ANOVA. In order to contrast the effects of the treatment compared to the WLC, we conducted post hoc tests (LSD; Bonferroni and Dunnett-T (< WLC)). We determined differences separately for post measure and for follow-up measure.

Frequency of engaging. Due to the fact that frequency of engaging was measured by a single-item self-rating scale we analyzed differences between both intervention groups with a Kruskal-Wallis-Test (non-parametric test). Considering that the SMS-content refers to the online-content, we had to be sure that participants engaged (at least to a minimum) in the training in order to answer the question whether the group (IG_1 or IG_2) had any impact on treatment adherence. Thus, we had to exclude 8 participants ex-post in each group as they did not engage in ON.TOP at all. All analyses concerning frequency of engaging were per-protocol analyses.

Results

Missing data. At post-treatment, 17.4 % (*N* = 13 (22.4 %) in the IG_1, *N* = 11 (20.0 %) in the IG_2 and *N* = 5 (10.4 %) in the WLC) of the data had to be replaced. At 8-weeks follow-up, it was 35.4% (*N* = 26 (44.8 %) in the IG_1, *N* = 20 (36.4 %) in the IG_2 and *N* = 11 (22.9 %) in the WLC) for the questionnaires. For post-treatment, no differences between the groups were found ($\chi^2 = 2.668$; $p = .26$). For follow-up measure, only a marginal significant overall difference was found ($\chi^2 = 5.547$; $p = .06$). Comparing both groups separately with the WLC,

a chi-square test indicated a significant difference between IG_1 and WLC ($\chi^2 = 5.549$; $p = .02$), whereas no significant difference between IG_2 and WLC was found ($\chi^2 = 2.203$; $p = .20$).

Treatment efficacy. Conducting 2 x 3 ANOVAs for each intervention group separately, the interaction terms for IG_1 ($F_{2, 104} = 6.14$, $p < .01$) as well as for IG_2 ($F_{2, 101} = 18.31$, $p < .001$) were significant. The 2 x 3 ANOVA including only the two intervention groups indicate a significant difference in decrease of procrastination ($F_{2, 104} = 3.67$, $p < .05$). Means of both ON.TOP intervention groups revealed a reduction of procrastination (GPS) relative to the WLC (see Table 1). Comparing WLC and both interventions groups at T3, we found a small effect size for IG_1 ($d = 0.29$) and a medium effect size for IG_2 ($d = 0.57$). Similar effects we found for the second procrastination inventory KRAS. The interaction between group and time was also significant ($F_{4, 316} = 4.78$, $p < .01$). The effect sizes at T3 were also small for IG_1 ($d = 0.32$) and small to medium for IG_2 ($d = 0.44$). No significant interaction term was found for depression ($F = 1.78$, $p > .10$). Table 1 shows the means and standard deviations for all outcome measures separately for baseline (T1), post-treatment (T2) and 8-weeks follow-up (T3). Additionally, Table 1 reveals the results for the per-protocol analyses.

Per-protocol analyses indicated a significant interaction term between IG_1 and WLC ($F_{2, 63} = 7.06$, $p < .01$), between IG_2 and WLC ($F_{2, 66} = 26.13$, $p < .001$) and between between IG_1 and IG2 ($F_{2, 64} = 4.7$, $p < .05$). Including both intervention groups and the WLC, the interaction term was also significant ($F_{2, 196} = 9.65$, $p < .001$).

Table 1

Means and standard deviations of the General Procrastination Scale (GPS; Lay, 1986), the KRAS (Schwarzer, 1999), ant the CES-D (Radloff, 1979)

	WLC (N = 48/ 34)						IG1 (N = 58/ 32)						IG2 (N = 55/ 35)					
	pre		post		follow-up		pre		post		follow-up		Pre		pre		follow-up	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Intention-to-treat analyses																		
GPS	3.11	.56	3.02	.57	3.00	.61	3.23	.45	2.97	.49	2.82	.51	3.28	.46	2.85	.61	2.64	.64
KRAS	28.73	4.91	27.72	4.48	27.67	4.91	28.83	4.16	27.43	4.12	26.20	4.25	29.36	4.28	26.34	5.08	25.35	5.57
Intention-to-treat analyses																		
GPS	3.05	.60	3.02	.63	3.03	.61	3.26	.35	3.01	.47	2.90	.51	3.23	.47	2.80	.65	2.50	.63
KRAS	28.12	4.76	27.73	4.21	27.82	4.63	28.84	3.42	27.82	3.85	26.59	3.92	28.69	4.11	25.60	5.03	24.17	5.49

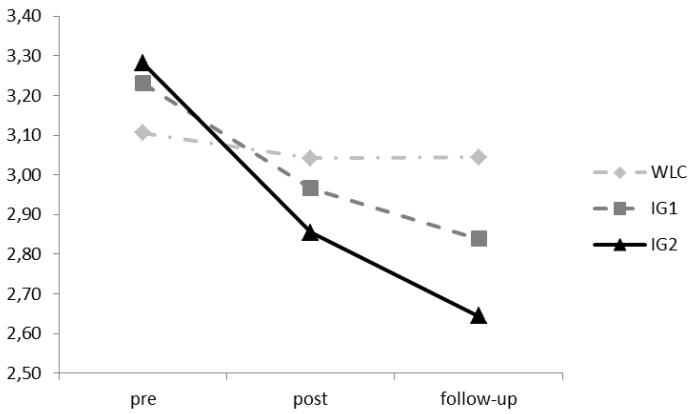

Figure 1. Comparison of intervention groups (IG_1 and IG_2) and waiting list control (WLC) group on development of procrastination (GPS) from pre-measurement (T1) to eight-week follow-up via post-measurement (T2).

Differences in treatment efficacy. With regard to the GPS and KRAS, post hoc tests at post measure showed no significant differences between the groups. At follow-up measure, all tests (LSD, Bonferroni and Dunnett-T) indicated a significant difference between WLC and IG_2, but no significant difference between WLC and IG_1 (see Table 2).

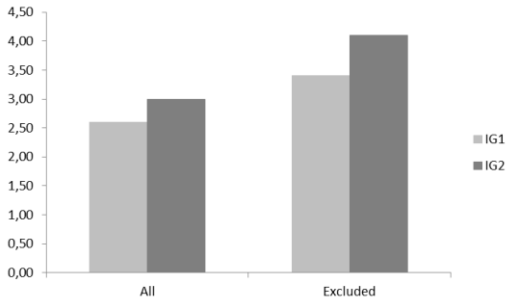

Figure 2. Differences in frequency of engaging in training. The left diagram displays findings for all participants; the right diagram displays findings after excluding participants engaging rarely or not all.

Frequency of engaging. Regarding descriptive statistics, frequency of engaging of the IG_2 (M = 3.0; SD = 1.60) was a little higher than in IG_1 (M = 2.6; SD = 1.17), but no significant differences between both intervention groups were found (*Kruskal-Wallis* = .57, $p > .10$). After excluding participants engaging rarely or not at all, we found significant differences between IG_1 (M = 3.4; SD = 0.87; N=24) and IG_2 (M = 4.1; SD = 1.25; N = 25) in an ex post analysis (*Kruskal-Wallis* = 4.08, $p < .05$). Figure 2 displays these findings.

Table 2

Post hoc tests.

Post hoc test	Group I	Group J	Difference I - J	*p*
GPS				
LSD	WLC	IG_1	.16	.17
	WLC	IG_2	.35	.00
	IG1	IG2	.19	.08
Bonferroni	WLC	IG_1	.16	.50
	WLC	IG_2	.35	.00
	IG1	IG2	.19	.24
Dunnett-T (< WLC)	WLC	IG_1	.16	.14
	WLC	IG_2	.35	.00
KRAS				
LSD	WLC	IG_1	1.46	.13
	WLC	IG_2	2.34	.02
	IG1	IG2	.85	.36
Bonferroni	WLC	IG_1	1.46	.39
	WLC	IG_2	2.34	.06
	IG1	IG2	.85	.24
Dunnett-T (< WLC)	WLC	IG_1	1.46	.11
	WLC	IG_2	2.34	.02

Discussion

The present study evaluated the efficacy of an internet-based training to overcome procrastination. Two intervention groups were compared to a WLC. Results indicate that both intervention groups were more effective in reducing procrastination than the WLC condition with a small to middle effect size (for IG_1: d_{GPS} = 0.33; d_{KRAS} = 0.32; for IG_2: d_{GPS} = 0.57; d_{KRAS} = 0.44).

Similar to other unguided internet-based interventions (i.e., interventions to reduce stress or depression) ON.TOP showed small to medium effect sizes (Richards & Richardson, 2012). In line with the theoretical assumption and empirical findings of Webb et al. (2010) concerning enrichment of internet-based interventions, we found a significantly higher reduction of procrastination in IG_2 than in IG_1. Rozental et al. (2015) found for a ten-week internet-based cognitive behavior therapy (CBT-I) for procrastination effect sizes between d = 0.50 and d = 0.81 for post-treatment measurement. Compared to these findings and in relation to the duration of the interventions (10-weeks vs. 2-weeks), our findings are very good.

Although descriptive statistics indicate that frequency of engaging was higher in IG_2 than in IG_1 for post measure and follow-up, these differences were not significant. These findings are not in line with findings of Webb et al. (2010) indicating that program enrichment increases adherence. Moreover, our results are in contrast to finding of Fjeldsoe et al. (2009) showing that reminders via text massages increased adherence. This may be understandable when considering the assumed impact of the SMS-support of ON.TOP. The content of the SMS referred to the content of the online-based training. If participants did not engage in the training at all, they were not able to follow the instructions in the SMS. Thus, we assume that the efficacy of SMS-support could depend on a certain extent of engaging to exercises presented online. The ex-post analysis, in which we excluded participants engaging

rarely or not at all, supports this assumption. Future research is needed to systematically analyze pre-conditions of the efficacy of SMS-support in a sample of procrastinators and quantify the minimum engagement that is necessary to successfully apply impulses of SMS-support.

The present study has several strengths and limitations. First, in the present study a three-armed RCT was conducted to investigate differences in efficacy and adherence between an internet-based intervention (IG_1) and an internet-based intervention with SMS-support (IG_2). To date, no study tested the efficacy of SMS-support in a sample of procrastinators. Second, the efficacy study of Rozental et al. (2015) was the first RCT evaluating an internet-based intervention to overcome procrastination, but this study did not report follow-up measures. The present study overcame this research gap by reporting follow-up measurements. Moreover, these follow-up measurements indicated that procrastination in IG_2 decreased eight weeks after completing the intervention compared to post-treatment.

As a first limitation, we address that procrastination was only assessed with a self-report inventory but not with behavioral observations. Although a large body of literature indicates that procrastination often leads to poorer performance (Steel, Brothen, & Wambach, 2001), a few researchers suggest that some individuals use procrastination as a performance-enhancing strategy (Chissom & Iran-Nejad, 1992; Tice & Baumeister, 1997). Thus, future research should replicate this study and assess procrastination by observing behavior and rating the harm of the consequences. Second, by conducting an ex post analysis, we found effects of SMS-support only for those who actually engaged in the exercises. Ex post analyses are weak evidence. Thus, for a better understanding of the effects of SMS-support a study design considering a minimum engaging is needed. Third, with regard to external validity as well as generalizability, our findings are constrained to students. Fourth, an eight-week follow-up is rather short; a longer follow-up period would have been much more meaningful.

However, with respect to the low threshold, individuals may participate in and benefit from the online-training whenever they need to overcome procrastination (i.e., in preparation of examinations). However, replications of this evaluation study should be conducted with longer follow-up periods.

In conclusion, the study shows that an internet-based intervention may help students to reduce procrastination. SMS-support increases the effects of the intervention. In internet-based interventions, e-coaching is often provided in order to increase efficacy and adherence (Ebert et al., 2014). With regard to cost efficiency, SMS-support could be a good alternative. However, a couple of questions concerning mediating mechanisms of SMS-support on procrastination are still remaining. For example, Fjeldsoe et al. (2009) investigated the reminder function of text messages, but the present findings suggest that the effects of the SMS-support are not completely mediated by the reminder function. Moreover, Cugelman, Thelwall and Dawes (2011) assume that interactive elements in online interventions may evoke feelings of real social interaction. Unsystematic feedback of our participants receiving daily SMS implied this assumption. However, further research is needed to systematically investigate the mechanisms mediating the additional impact of SMS-support on procrastination.

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7 Zusammenfassende Diskussion und Ausblick

Im Rahmen der vorliegenden publikationsbasierten Dissertation sollte der Einfluss von Fähigkeiten zum adaptiven Umgang mit Emotionen auf Prokrastination untersucht werden. Dies geschah mit den Zielen, den Einfluss erstens zu verstehen und ihn zweitens für die Entwicklung von Interventionen zur Überwindung von Prokrastination zu nutzen. Zusätzlich sollte geklärt werden, ob sich tägliche SMS-Impulse, mit denen ein onlinebasiertes Training gegen Prokrastination angereichert wurde, auf die Adhärenz und die Effektivität auswirken. Dafür wurden insgesamt fünf Studien durchgeführt, die in drei Publikationen veröffentlicht wurden.

Die Ergebnisse der ersten Studie zeigen, dass der Zusammenhang zwischen Absicht und Verhalten durch allgemeine emotionale Kompetenzen moderiert wird. Je höher der Summenwert bei der Erfassung emotionaler Kompetenzen ausgeprägt war, desto enger war der Zusammenhang zwischen Absicht und Verhalten. Die Autoren der Studie interpretierten dieses Ergebnis dahin gehend, dass emotionale Kompetenzen für die Überwindung emotionaler Hindernisse und damit für die Umsetzung von gesundheitsbezogenen Verhaltensabsichten hilfreich sind. Als vermittelnder Mechanismus nahmen die Autoren an, dass intendiertes, neu zu erlernendes Verhalten (in diesem Fall das regelmäßige Ausführen von Entspannungsübungen) unter dem Einfluss von Stress und aversiven Emotionen älteren Verhaltensgewohnheiten (z.B. zur Entspannung fernzusehen) unterlegen ist (z.B. Schwabe & Wolf, 2009).

Es wurde in der ersten Publikation also darauf fokussiert, dass emotionale Kompetenz einen Einfluss auf die Ausführung von Intentionen hat. Aus Platzgründen wurde die Möglichkeit, dass emotionale Kompetenz bereits bei der Intentionsbildung eine Rolle spielt,

in der Publikation nicht diskutiert. Das soll an dieser Stelle nachgeholt werden. Das Ergebnis, dass bei niedriger emotionaler Kompetenz der Zusammenhang zwischen Intention und tatsächlichem Verhalten weniger stark ausgeprägt ist, könnte auch bedeuten, dass bei der Intentionsbildung Faktoren eine Rolle spielen, die sowohl zu überhöhten als auch zu zu niedrigen Intentionen führen. Das HAPA-Modell (Schwarzer, 2004) stellt drei Variablen heraus, die hauptsächlich die gesundheitsbezogene Intentionsbildung beeinflussen: (1) Risikowahrnehmung (Sinne einer IST-SOLL-Diskrepanz), (2) Handlungs-Ergebnis-Erwartung (Es gibt Handlungen, die die IST-SOLL-Diskrepanz reduzieren können) und (3) motivationale Selbstwirksamkeit („Ich bin in der Lage, diese Handlungen auszuführen!“). Zu stärkerer (und möglichweise auch unrealistischer) Intentionsbildung könnte im Kontext des Trainings die induzierte Risikowahrnehmung der Teilnehmer geführt haben. Eine erhöhte Risikowahrnehmung (im Sinne einer IST-SOLL-Diskrepanz) führt in der Regel zu aversiven Emotionen (Loewenstein, Weber, Hsee, & Welch, 2001). Eine Möglichkeit der sofortigen (aber dysfunktionalen) Emotionsregulation könnte in der Bildung unrealistisch hoher Intentionen bestehen („Ab jetzt tue ich ganz viel für mich!“). Befunde, die zeigen, dass Personen, die unter Prokrastination leiden, Schwierigkeiten damit haben, wenn Handlungsergebnisse zeitlich weiter entfernt sind (z.B. Hariri et al., 2006), unterstützen diese Annahme: Im Sinne einer sofortigen Reduktion der IST-SOLL-Diskrepanz nehmen sie sich vor, möglichst schnell möglichst viel zu trainieren. Zu zu niedrigen Intentionsbildungen könnte eine niedrig ausgeprägte Selbstwirksamkeitserwartung geführt haben. Berking und Znoj (2008) konnten zeigen, dass emotionale Kompetenz und allgemeine Selbstwirksamkeit negativ zusammenhängen. Ob und inwieweit diese weiterführenden Erklärungen zutreffen, müssen zukünftige Forschungsarbeiten zeigen.

Mit Blick auf die Relevanz von Trainingsadhärenz, schlugen die Autoren differentielle Unterstützung vor. Zum Beispiel könnten Teilnehmende mit schwach ausgeprägten

emotionalen Kompetenzen eine trainingsbegleitende SMS-Unterstützung empfohlen bekommen. Werden die weiteren Erklärungsmöglichkeiten (s.o.) berücksichtig, so können Teilnehmer mit niedrig ausgeprägter emotionaler Kompetenz bereits bei Intentionsbildung unterstützt werden.

Sheeran (2002) fand in seiner Metaanalyse heraus, dass es einen Unterschied für die Interpretation macht, ob die Absichts-Verhaltens-Lücke in Bezug auf ein Einzelverhalten oder in Bezug auf generelles Verhalten untersucht wird. Die Ergebnisse der ersten Studie beziehen sich nur auf das Durchführen einer bestimmten Übung, also auf ein Einzelverhalten. Deswegen wurde in der zweiten Publikation (Studie 2.1 bis 2.3) der Fokus auf Prokrastination als allgemeinere Lücke zwischen Absicht und Verhalten gelegt.

Die in der zweiten Publikation berichteten Ergebnisse setzen sich aus drei Teilergebnissen (Studien 2.1 bis 2.3) zusammen: In der Studie 2.1 konnte gezeigt werden, dass die neun Subskalen emotionaler Kompetenzen des Fragebogens zur Selbsteinschätzung emotionaler Kompetenzen (SEK-27; Berking & Znoj, 2008) signifikant mit akademischer Prokrastination korrelieren. Dabei zeigte sich, dass die jeweiligen Zusammenhänge zwischen den einzelnen Subskalen emotionaler Kompetenzen und Prokrastination durch die Subskala Resilienz (negative Emotionen tolerieren können) mediiert werden. In der Studie 2.2 zeigten die prospektiven Analysen, dass die Fähigkeit, aversive Emotionen zu verändern (SEK-Subskala Regulation), einen reduzierenden Einfluss auf zeitlich nachgelagerte Prokrastination hatte. Zugleich wirkte Prokrastination negativ auf die zeitlich nachgelagerte Fähigkeit, aversive Emotionen tolerieren zu können (SEK-Subskala Resilienz). In der Studie 2.3 konnte experimentell gezeigt werden, dass vermittelte Strategien zum Tolerieren und Regulieren von aversiven Emotionen, die durch Aufgaben induziert wurden, Prokrastination reduzieren. Mediationsanalysen deuten darauf hin, dass der Rückgang von Prokrastination

über den Anstieg in den Subskalen Resilienz und Regulation vermittelt wurde. In der Zusammenschau deuten die Ergebnisse darauf hin, dass die Fähigkeiten, aversive Emotionen tolerieren und regulieren zu können, reduzierend auf Prokrastination wirken. Diese Ergebnisse sind im Einklang mit dem Rahmenmodell von Berking und Znoj (2008), das diesen beiden Fähigkeiten eine Schlüsselrolle im Konzert emotionaler Kompetenzen zuschreibt. Mit den Ergebnissen dieser Studien lassen sich die Befunde der ersten Studie systematisch erweitern und generalisieren. Zudem diskutierten die Autoren der Studien einen möglichen Einsatz emotionsfokussierter Strategien in Interventionen zur Überwindung von Prokrastination.

In der dritten Veröffentlichung (Studie 3) wurde eine onlinebasierte Kurzintervention zur Überwindung von Prokrastination evaluiert. In dieser Intervention wurden erstens die in Studie 4 entwickelten emotionsfokussierten Strategien genutzt, die auf das Tolerieren und Regulieren aversiver Emotionen abzielen. Zweitens wurde untersucht, ob eine SMS-basierte Trainingsbegleitung, so wie sie von den Autoren der Studie 1 vorgeschlagen wurde, die Adhärenz und die Effektivität steigert. Dazu wurde ein dreiarmiges randomisiert-kontrolliertes Studiendesign mit Prä-, Post-, und 8-Wochen-Follow-up-Erhebung genutzt. Die Ergebnisse zeigten erstens einen Rückgang der Prokrastinationswerte in beiden Interventionsgruppen (mit und ohne SMS-Begleitung), wenn diese separat gegen eine Wartekontrollgruppe getestet wurden. Das deutet auf eine generelle Wirksamkeit der onlinebasierten Kurzintervention hin. Zweitens zeigten sich in Post-Hoc-Tests bei einer gemeinsamen Analyse beider Interventionsgruppen nur für die Intervention mit, aber nicht für die Intervention ohne SMS-Begleitung signifikante Unterschiede zur Kontrollgruppe. Adhärenz bezogene Unterschiede zwischen den beiden Interventionsgruppen fanden sich zunächst nicht. Erst als nachträglich die Teilnehmer exkludiert wurden, die kaum oder gar nicht trainiert hatten, fanden sich Unterschiede zwischen den beiden Interventionsgruppen.

Die Autoren vermuteten, dass es eines Mindestmaßes an Training bedarf, bevor die SMS-Begleitung einen Effekt auf die Adhärenz hat.

Die Ergebnisse aller drei Publikationen unterstützen konsistent die Annahme, dass emotionale Kompetenzen Prokrastination reduzieren. Dabei unterstützen die Studien 2.1 bis 2.3 und die Studie 3 die zentrale Rolle der beiden Fähigkeiten, aversive Emotionen tolerieren und regulieren zu können. Berking und Kollegen haben die Bedeutung dieser Fähigkeiten für den Rückgang von depressiven Symptomen und negativem Affekt gezeigt (Berking et al., 2008). Die Autoren fanden, dass die Fähigkeiten (a) aversive Emotionen zu akzeptieren, (b) sie zu tolerieren und (c) sie zu regulieren am stärksten mit mentaler Gesundheit einhergingen. Während die Arbeit von Berking und Kollegen die Relevanz aller drei Fähigkeiten für mentale Gesundheit zeigt, deuten die Ergebnisse der vorliegenden Studien darauf hin, dass die Fähigkeit, aversive Emotionen zu akzeptieren, für die Reduzierung von Prokrastination keine bedeutsame Rolle spielt. Trotzdem lassen sich die Befunde der vorliegenden Studien gut in ein Gesamtbild integrieren, das in den letzten Jahren in der klinischen Forschung zur Emotionsregulation entstanden ist: So betonen akzeptanz- und commitmentbasierte Ansätze die Bedeutung einer akzeptierenden und tolerierenden Haltung gegenüber aversiven Emotionen (z. B. Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Darüber hinaus sehen emotionsfokussierte Ansätze (z. B. Greenberg, 2002) und der Ansatz der dialektisch-behavioralen Therapie (z. B. Linehan, 1993) die Dialektik der beiden Fähigkeiten, aversive Emotionen tolerieren und diese regulieren zu können, als Schlüssel psychischer Gesundheit an.

Obwohl theoretische Annahmen und Befunde das Wahrnehmen und Erkennen von Emotionen im Zusammenhang mit mentaler Gesundheit sehen (Feldman-Barrett, Gross, Christensen, & Benvenuto, 2001), unterstützen die vorliegenden Studien deren Relevanz für

das Überwinden von Prokrastination nicht vollständig.

Im Einklang mit den Ergebnissen dieser Arbeit sind ebenfalls Befunde aus der bildgebenden Hirnforschung. So fanden beispielsweise McClure, Laibson, Loewenstein und Cohen (2004), dass an der Entscheidung, ob eine Aufgabe aufgeschoben wird, zwei Systeme beteiligt sind: Das doperminerge limbische System und der präfrontale Kortex. Das doperminerge limbische System ist mit Lust, Bedürfnissen und Emotionen assoziiert. Der präfrontale Kortex wird mit strategischen Entscheidungen und langfristigen Zielen in Zusammenhang gebracht (Banich, 2009). Hariri, et al. (2006) konnten zeigen, dass die Präferenz für sofortige Befriedigung von Bedürfnissen gegenüber einem Befriedigungsaufschub mit einer dominierenden Aktivität des doperminergen limbischen Systems (ventrales Striatum) einhergeht. In ihrem neuropsychologischen Modell zu den Exekutivfunktionen postulierte Banich (2009) eine Kaskade von Teilprozessen, die bei der Ausführung einer zielgerichteten Handlung notwendig sind: (1) Um die Aufmerksamkeit von schwer zu ignorierenden aber zielirrelevanten Prozessen (z. B. ablenkende Emotionen oder Bedürfnisse) abzuschirmen, werden Prozesse in posterioren Bereichen des dorsolateralen Präfrontalen Cortex (PFC) angenommen, die die Aufmerksamkeit auf zielrelevante Informationen lenken (Banich et al., 2000). (2) Im mittleren dorsolateralen PFC werden hingegen zielrelevante Reize ausgewählt (z. B. Aspekte einer Literaturrecherche). (3) Posteriore Bereiche des anterioren cingulären Cortex (ACC) kommen bei der nachgelagerten Reaktionsauswahl und Abschirmung ins Spiel. Steel (2007) nimmt an, dass es Personen mit einer Tendenz zur Prokrastination schwer fällt, Impulse des limbischen Systems (emotionale Handlungstendenzen und Bedürfnisse) hinreichend zu kontrollieren, um mittel- bis langfristige Ziele gegen sofortige Befriedigung bzw. Impulshandlungen durchzusetzen. Hierfür sollten die oben beschriebenen Exekutivfunktionen dienen.

Unterschiedliche Studien fanden Zusammenhänge zwischen Exekutivfunktionen und Emotionsregulation. Zelazo und Cunningham (2007) postulieren beispielsweise, dass hinter der Herabregulation von Emotionen Prozesse der Exekutivfunktionen liegen. Eine spannende Möglichkeit, die konsistenten Befunde der vorliegenden Arbeit zu interpretieren, besteht darin, anzunehmen, dass erstens die hinter emotionalen Kompetenzen liegenden Exekutivfunktionen für die Moderation des Zusammenhangs zwischen Trainingsabsicht und Trainingsverhalten verantwortlich sind (Studie 1). Zweitens könnten die gefundenen Zusammenhänge (querschnittlich wie längsschnittlich) zwischen der Fähigkeit zum Tolerieren und dem Regulieren aversiver Emotionen auf die gemeinsame Kovariation von dahinterliegenden Exekutivfunktionen zurückzuführen sein (Studien 2.1 und 2.2). Drittens ist es wahrscheinlich, dass die systematische Verbesserung der Fähigkeit zum adaptiven Umgang mit Emotionen (Tolerieren und Regulieren) die dafür benötigten Exekutivfunktionen stärkt (Studie 2.3), so dass viertens das Training (Studie 3) ebenfalls zu einer Verbesserung der Exekutivfunktionen führt. Zukünftige Studien sollten klären, ob diese Vermutungen zutreffen.

Eingangs wurden Forschungsfragen formuliert, die den Zusammenhang zwischen den emotionalen Kompetenzen und Prokrastination bzw. den Einfluss emotionaler Kompetenzen auf Prokrastination betreffen. Nach ausgiebiger Diskussion der Befunde scheint eine (zumindest vorläufige) Antwort auf diesen Fragekomplex zu sein, dass es vor allem die Fähigkeiten, aversive Emotionen zu tolerieren und diese zu regulieren, sind, die sich reduzierend auf Prokrastination auswirken.

Eine besondere Rolle scheint dabei die Fähigkeit zu haben, aversive Emotionen tolerieren zu können: Erstens mediiert sie den querschnittlichen Zusammenhang aller anderen emotionalen Kompetenzen und Prokrastination. Zweitens wird sie durch zeitlich

vorgelagerte Prokrastination negativ beeinflusst. In der dritten Studie wurde angenommen, dass sich dieser Befund durch negative Verstärkung erklären lässt: Prokrastination wird als eine Form der Vermeidung von aversiven Emotionen verstanden, die mit Aufgaben einhergehen (z. B. Tice et al., 2001). Der Wegfall erwarteter negativer Emotionen durch das Vermeiden der Aufgabe (Prokrastination) sollte einerseits verstärkend auf das Vermeidungsverhalten (Prokrastination) wirken. Andererseits wird wahrscheinlich durch dieses Vermeiden das Gegenteil der Fähigkeit, aversive Emotionen tolerieren zu können, eingeübt und so das Ausmaß dieser Fähigkeit reduziert. Allerdings müssen zukünftige Studien den hier angenommenen Wirkmechanismus noch empirisch untermauern.

Drittens scheint eine gezielte Steigerung dieser Fähigkeit im Rahmen einer Intervention einen Rückgang der Prokrastination zu bewirken. Hier wurde als vermittelnder Mechanismus eine Konfrontation mit Reaktionsverhinderung angenommen: Die Teilnehmer der Intervention waren aufgefordert, sich der Aufgabe, die sie typischerweise vermeiden würden, zu stellen und sich gleichzeitig klarzumachen, dass sie auftretende aversive Emotionen aushalten können. Dabei sollten sie auf biographische Erfahrungen zurückgreifen, in denen ihnen das Aushalten gelungen ist. Durch ein solches Vorgehen wird möglicherweise emotionale Selbstwirksamkeitserwartung aktiviert (z. B. Berking, 2014). Ist es den Teilnehmern bewusst, dass sie die auftretenden aversiven Emotionen aushalten können, werden sie diese wahrscheinlich weniger stark beachten.

Die Annahmen über diesen Wirkmechanismus sind im Einklang mit den oben referierten Befunden der bildgebenden Hirnforschung: Aversive Emotionen, die durch die gedankliche Beschäftigung mit der aversiven Aufgabe entstehen, aktivieren die Amygdala im limbischen System (Phelps et al., 2001). Das Vermeiden dieser emotionsbesetzten Aufgabe reduziert die aversive Spannung und führt zu einer Aktivierung des doperminergen

limbischen Systems, das mit positivem Affekt einhergeht (Belohnung) (Pauli, Rau, & Birbaumer, 2009). Durch das Nicht-Vermeiden der Aufgabe (Reaktionsverhinderung) zugunsten langfristiger Ziele und durch bewusstes Aktivieren der Fähigkeit, die aversiven Emotionen tolerieren zu können, wird der PFC aktiviert: Die Aufmerksamkeit kann von schwer zu ignorierenden Sensationen (z. B. von aversiven Emotionen) abgezogen werden (posteriore Bereiche des dorsolateralen PFC), kann dann auf zielrelevante Informationen gelenkt (mittlerer dorsolateraler PFC) und entsprechende Verhaltensweisen zur Aufgabenerledigung können ausgewählt werden (posteriore Bereiche des ACC). Um zu prüfen, ob dieser hier postulierte Mechanismus tatsächlich so stattfindet, könnte zukünftige Forschung Teilnehmer mit bildgebenden Verfahren untersuchen, während sie die emotionsfokussierte Strategie zur Überwindung von Prokrastination anwenden.

Mit Blick auf die zweiwöchige onlinebasierte Intervention wurde eingangs gefragt, ob die beschriebenen emotions-fokussierten Strategien zusammen mit anderen Maßnahmen wirken, die typsicherweise zum Überwinden von Prokrastination eingesetzt werden (wie beispielsweise mentales Kontrastieren (Oettingen et al., 2009) oder das Erstellen von Wenn-Dann-Plänen (Gollwitzer, 1999)). Weiter wurde gefragt, welchen Einfluss trainingsbegleitende SMS auf die Effektivität und die Adhärenz haben. Die Ergebnisse der dritten Publikation zeigen, dass das Training, in dem die verschiedenen Strategien angewandt werden, Prokrastination reduziert. Werden beide Trainingsgruppen (mit und ohne SMS) in einer gemeinsamen Analyse untersucht, weisen die Ergebnisse der post-hoc-Analysen darauf hin, dass nur die Trainingsgruppe mit begleitender SMS (verglichen mit einer Wartekontrollgruppe) einen signifikanten Rückgang von Prokrastination zeigt. In dieser Trainingsgruppe war auch die Adhärenz höher, wenn die Teilnehmer aus der Analyse ausgeschlossen wurden, die kaum oder gar nicht trainiert haben. Es wurde vermutet, dass ein Mindestmaß an Training notwendig ist, damit die SMS wirken. Das scheint plausibel, weil

die SMS sich auf Trainingsinhalte beziehen. Sind diese Trainingsinhalte durch zu geringes Trainingsverhalten nicht bekannt, bleiben die SMS möglicherweise wirkungslos. Um zu klären, ob diese Annahme zutrifft, braucht es weitere Studien.

Die größere Effektivität der SMS-Trainingsbedingung im Vergleich mit der Trainingsgruppe ohne SMS kann möglicherweise auf drei Effekte der SMS zurückgeführt werden: Erstens wirken die SMS eventuell durch ein Mehr an Trainingsverhalten (mehr Adhärenz) auf die Effektivität. Zweitens wurden durch die SMS kleine Impulse und Übungen in den Alltag der Teilnehmer geschickt. Diese könnten zu einem zusätzlichen Effekt geführt haben, der über das Mehr an Trainingsverhalten hinausgeht. Drittens konnten vorangegangene Forschungsarbeiten zeigen, dass zusätzliche und/oder interaktive Elemente in Onlinetrainings die Motivation der Teilnehmer erhöhen (Webb, Joseph, Yardley, & Michie, 2010). Cugelman, Thelwall und Dawes (2011) konnten sogar zeigen, dass interaktive Elemente von Onlinetrainings von Teilnehmern wie soziale Interaktionen wahrgenommen werden. Möglicherweise trifft das auch auf die SMS zu, da diese die Teilnehmer sehr persönlich ansprachen. Bedenkt man, dass einer der unspezifischen Wirkfaktoren von Psychotherapie die therapeutische Beziehung ist (Grawe, 2007), könnten die SMS, wenn sie wie soziale Interaktionen wahrgenommen werden, ähnlich wie die Beziehung auf die Symptomreduktion wirken. Dies muss jedoch durch weitere Forschungsarbeiten geklärt werden.

5.1 Einschränkungen

Im Rahmen dieser publikationsbasierten Dissertation müssen einige Einschränkungen benannt werden. Erstens wurde außer in Studie 1, in der Prokrastination über die Absichts-

Verhaltens-Lücke operationalisiert wurde, Prokrastination in allen anderen Untersuchungen nur über Selbsteinschätzungsmaße erfasst. Obwohl diese deutlich weniger verhaltensnahe sind, wurden sie mit validen Instrumenten erhoben. Trotzdem sollten zukünftige Studien die vorliegenden Ergebnisse mit objektiven Maßen oder Fremdeinschätzungen replizieren. Vergleichbares gilt für das Erfassen der Fähigkeiten zum adaptiven Umgang mit Emotionen. Obwohl es gute Belege dafür gibt, dass Selbsteinschätzungen emotionaler Kompetenzen genauso valide wie Fremdeinschätzungen sind (z. B. Brackett & Mayer, 2003), könnten in zukünftigen Studien objektive Maße wie psychophysiologische Messungen herangezogen werden. Auch die bereits oben vorgeschlagenen bildgebenden Verfahren wären sinnvoll.

Obwohl die Autoren von Studie 1 eine differentielle Unterstützung von Trainingsteilnehmenden per SMS vorschlugen, wurde zweitens in Studie 2 nur die Wirkung der SMS-Begleitung auf die Effektivität und die Adhärenz für alle Teilnehmenden untersucht. Nicht untersucht wurde, ob die SMS-Begleitung differentielle Effekte hat. Das heißt, ob sie besonders für Teilnehmende mit schwach ausgeprägter Fähigkeit zum adaptiven Umgang mit Emotionen adhärenz- und wirksamkeitsfördernd ist. Hierfür müssten kritische Cut-off-Werte zuvor ermittelt werden.

Drittens konnte in Studie 3 nur ein Effekt der SMS-Begleitung auf die Trainingsadhärenz gezeigt werden, nachdem Teilnehmende, die kaum oder gar nicht trainiert hatten, ex-post ausgeschlossen wurden. Allerdings konnten Eckert und Kollegen in einer vergleichbaren Evaluationsstudie der Kurzform des Trainings emotionaler Kompetenzen (nach Berking, 2014), die ebenfalls in einem dreiarmigen randomisiert-kontrollierten Design durchgeführt wurde, zeigen, dass die SMS-Begleitung auch ohne Ausschluss von nicht trainierenden Teilnehmenden deutliche Effekte auf die Adhärenz hat (Eckert et al.; in Vorbereitung).

5.2 Implikation für die Interventionsentwicklung

Aus den Befunden der vorliegenden Studien lassen sich drei praktische Implikationen ableiten. Erstens scheint die Fähigkeit zum adaptiven Umgang mit Emotionen einen begünstigenden Einfluss auf die Interventionsadhärenz zu haben. Da einerseits internetbasierte Interventionen prinzipiell stärker von Adhärenzproblemen betroffen sind als vergleichbare face-to-face-Interventionen (Richards & Richardson, 2012), und da andererseits die Länge einer Intervention eine zusätzliche Hürde für die Adhärenz darstellen kann, könnten längere internetbasierte Interventionen möglicherweise davon profitieren, wenn die Teilnehmenden zu Beginn emotionsfokussierte Strategien zur Adhärenzförderung vermittelt bekämen. Diese Strategien sollten besonders auf die Stärkung bzw. Aktivierung der Fähigkeiten, aversive Emotionen tolerieren und regulieren zu können, abzielen. Solche adhärenzfördernde Teilinterventionen könnten dann bei Bedarf abgerufen werden. Welche Effekte integrierte emotionsfokussierte Strategien tatsächlich auf die Adhärenz haben, müssen zukünftige Studien zeigen.

Besonders betroffen von Prokrastination sind Studierende (Pychyl, Lee, Thibodeau, & Blunt, 2000). Im Rahmen dieser Arbeit konnte gezeigt werden, dass emotionsfokussierte Strategien einen reduzierenden Einfluss auf Prokrastination haben. Es konnte in der vorliegenden Arbeit gezeigt werden, dass sowohl das Vermitteln dieser Strategien (Studie 2.3) als auch das Integrieren dieser Strategien in eine internetbasierte Kurzintervention (Studie 3) Prokrastination reduziert. Es scheint also zweitens sinnvoll, Studierenden bereits zu Beginn ihres Studiums die Möglichkeit zu geben, durch kleinere onlinebasierte Maßnahmen der Prokrastination präventiv zu begegnen. Möglicherweise könnte es sinnvoll

sein, bereits Schülern emotionsfokussierende Strategien im Sinne der Berufs- und Studierfähigkeit zu vermitteln.

Drittens wurde die adhärenz- und wirksamkeitsfördernde Wirkung der SMS-Begleitung mit obengenannten Einschränkungen gezeigt. Die Ergebnisse aus Studie 3 und von Eckert et al. (in Vorbereitung) legen zudem nahe, dass die SMS-Begleitung generell förderlich für die Adhärenz ist. Da die SMS-Begleitung durch Apps ersetzt werden kann, fallen keine teilnehmerbezogenen Kosten für die täglichen Trainingsimpulse an. Onlinebasierte Trainings sollten die kostengünstige Möglichkeit einer Impuls-Begleitung zur Förderung der Adhärenz (und ggf. auch der Wirksamkeit) generell nutzen, wenn weitere Studien die Generalisierbarkeit der Effekte nahelegen.

5.3 Fazit

Die vorliegende Arbeit hat systematisch den Einfluss emotionaler Kompetenzen auf Prokrastination untersucht. Es konnten Zusammenhänge geklärt und Möglichkeiten für die Interventionsentwicklung aufgezeigt werden. Es wurden Impulse für die Verwendung emotionsfokussierter Strategien aufgezeigt, die sich nicht im eigentlichen Sinne auf Interventionsentwicklung beziehen (z. B. Implementation in die Curricula der Schule oder in die Lehre der Universität). Zudem wurde eine Verbindung zum Bereich der (neuropsychologischen) Exekutivfunktions-Forschung diskutiert. Es wird damit deutlich, welchen Stellenwert die systematische Betrachtung emotionale Kompetenzen und Prokrastination hat. Es gibt kaum Bereiche, die nicht von der Tendenz zum Aufschieben berührt werden. Die Vermittlung emotionsfokussierter Strategien können niederschwellige Möglichkeiten darstellen, dieser Tendenz zu begegnen. Allerdings sind weitere

Forschungsarbeiten notwendig, um optimale und möglichst niederschwellige Interventionen für verschiedene Zielgruppen zu entwickeln.

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APPENDIX

Informationen zu den in dieser Dissertation enthaltenen Artikeln

An dieser Stelle werden die relevanten Informationen bezüglich Autorenschaft, Publikationsstatus und zugehörigen Konferenzpräsentationen beschrieben (Promotionsordnung §14, Kumulative Promotion der Fakultät Bildung, Leuphana Universität Luneburg).

Erster Artikel

Teachers' Emotion Regulation Skills Facilitate Implementation of Health-Related Intentions

Publikation	Journal	Position
Eingereicht: 28.05.2015 **Akzeptiert: 09.08.2015** **Publiziert: November 2015**	**American Journal of Health Behavior (IF=1.31)**	**Erst-Autor in Ko-Autorenschaft**

Präsentationen auf Konferenzen

Eckert, M & Sieland, B. (2012, Mai). *Das Selbstregulationsdilemma beim Training emotionaler Kompetenzen für Lehrkräfte Möglichkeiten und Grenzen eines internetbasiertes Trainings.* Präsentation auf der 9. Tagung Psychologiedidaktik und Evaluation, Münster, Deutschland.

Zweiter Artikel

Overcome Procrastination: Enhancing Emotion Regulation Skills Reduce Procrastination

Publikation	Journal	Position
Eingereicht: 15.01.2016 **Abgelehnt mit Auflagen zum Neueinreichen[2]: 21.04.2016** **Neu eingereicht: 01.07.2016**	**Learning and Individual Differences (IF=1.62)**	**Erst-Autor in Ko-Autorenschaft**

[22] Die Anmerkungen der Gutachter des Journals finden sich im Abschnitt Anmerkungen der Gutachter und Antworten der Autoren.

Dritter Artikel

Does SMS-Support Make a Difference? Efficacy of the Online-Training to Overcome Procrastination (ON.TOP). A Randomized Controlled Trail.

Publikation	Journal	Position
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AUTHOR´S DECLARATIONS

Eidesstattliche Erklärung

„Ich versichere, dass alle in diesem Anhang gemachten Angaben jeweils einzeln und insgesamt vollständig der Wahrheit entsprechen."

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Ort, Datum Marcus Eckert

Vorherige Prüfungen

„Ich versichere, dass ich mich zu keiner anderen Doktorprüfung angemeldet habe und keine andere Doktorprüfung bereits abgelegt habe. Ich versichere, dass die Dissertation in der gegenwärtigen oder einer anderen Fassung noch keiner anderen Hochschule zur Begutachtung vorgelegen hat."

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Ort, Datum Marcus Eckert

Anmerkungen der Gutachter und Antworten der Autoren (Studie 2)

Gutachter 1 (Major)

I.1: Procrastination is a well-known phenomenon and something that most people, especially university students, can relate to. This should be true even though their difficulties are not severe enough to be regarded as a clinical condition - most people would probably agree that they procrastinate. This could affect how and for what reason individuals are recruited for investigations on this issue. Disclosing means of recruitment is therefore important, but the manuscript currently lacks details in terms of how the authors came across their samples. Were university students informed about the focus of the studies, i.e., procrastination? In that case, this may have influenced which participants consented, that is, those with more severe problems, resulting in a skewed distribution. This needs to be clarified, and the implications of the recruitment process also have to be addressed as a potential limitation.

Antwort der Autoren:

Thank you for this important advice.

In study 1, university students were recruited in lectures. They were informed that the focus of the study was their study behavior. Most of them completed the questionnaires.

This has led to the following changes in the manuscript (page 5; paragraph 2):

"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."

As in study 1, in study 2 university students were also recruited in lectures. They were informed that the focus of the study was their study behavior. This time, they were encouraged to participate by a raffle of four Amazon-vouchers at the value of 20 Euro as incentives.

This has led to the following changes in the manuscript (page 9; paragraph 5):

"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."

Study 3 offers a short training of strategies to overcome procrastination. Thus, we expected that those who chose to participate appraise their procrastination as problematic. In similar clinical trials (e.g., for depression) cut-off-values are often defined, in order to exclude participants without a problematic score. However, because no cut-off-value for clinical relevance in procrastination exists (Klingsieck & Fries, 2012), we defined no excluding criterion (e.g., a cut-off procrastination value). We therefore premised that the sample's distribution in Study 3 is skewed.

I.2: A main tenet in one of studies is the link between depression and procrastination. Albeit highly plausible given the fact that major depressive disorder is related to decreased motivation, prior research is not clear in this regard. According to Steel (2007), meta-analytic finding suggest that the connection between mood and procrastination is not definite, stating that "…those in poorer moods are more likely to indicate that they procrastinate, regardless of their actual behavior." (p. 79). Furthermore, it could also be a reversed relationship, indicating that procrastination results in lower mood. The different perspectives on this issue should be considered in the discussion.

Antwort der Autoren:

In response to Reviewer 1's observation that the link between procrastination and depression was not clear in the manuscript, we decided to cancel depression form or analyses in order to focus more on the link between ER skills and procrastination. Future studies should clarify the role of depression and its impact on the relationship between procrastination and ER skills. However, mood affects the self-report of procrastination and vice versa. Thus, we discuss this limitation on page 13 paragraph 1:

"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."

I.3: The randomized controlled trial investigates the effect of an intervention based on emotion regulation. However, given the fact that it was delivered online and was short in duration (10 minutes per day for two weeks), adherence might become an issue, particularly if the sample, in this case university students, are stressed by other commitments in their lives. In what way was adherence assessed in the current study? Could this have affected the results?

Antwort der Autoren:

This is a very important question. Unfortunately, we did not assess the adherence to the treatment. We supplement the discussion section as follows (p. 20; paragraph 2):

"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) the application of which strategies are linked to the reduction of procrastination."

I.4: The authors have used repeated-measures ANOVA for the purpose of their statistical analysis in the randomized controlled trial. However, given the fact that they do not present any hypotheses made a priori, the reviewer assumes multiple post-hoc tests were used instead. This could affect the risk of Type I-Error unless they also correct for multiple comparisons, e.g., Bonferroni-adjustments. If this is the case it has to be included under methods in the manuscript. If not, it is a limitation that needs to be addressed in the discussion.

Antwort der Autoren:

With regard to the limited manuscript length, we did not explicitly formulate our hypotheses of the third study. In order to clarify this in the manuscript we amend it by formulating independent hypotheses (p. 13; paragraph 3):

"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 assumed that the training of emotion-focused strategies reduces procrastination. Furthermore, we hypothesized that the training of emotion-focused strategies increases ER skills. The emotion-focused strategies included tolerating as well as modifying aversive emotions. Moreover, we supposed that the effects on procrastination are mediated by an increase of these ER skills."

I.5: Also, how did the authors deal with missing values? Assuming that not all participants completed all of the assessments, which is highly reasonable in situations like these, information on how this issue was dealt with is appropriate, e.g., per-protocol analysis?

Antwort der Autoren:

We decided to conduct per-protocol analysis, because we intended to investigate the de facto influence of training emotion-focused strategies. We added this information in the manuscript (p. 17 paragraph 1):

"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 (SPSS, 2013)."

I.6: The intervention used in the randomized controlled trial is short in duration and might be affected by other factors, e.g., regression to the mean, repeated measures, or just being included in a research setting. This is deemed a major limitation given the fact that the authors do not include and follow-up assessments, indicating a possibility of the effects being transient. This issue warrants a lengthier discussion and has to be addressed properly

Antwort der Autoren:

We agree that the present study is not meaningful with regard to long-term effects, because it lacks the follow-up assessment. However, with regard to the randomized controlled study design, we did not expect that other factors (e.g., regression to the mean, repeated measures, or just being included in a research setting) did affect the results. The act of participating in a research setting may always bias the results. Thus, it may affect the intervention group as well as the waiting list control in the same magnitude. In order to illustrate the plausibility of this expectation, we add diagrams of the means (pre and post). In order to prevent effects like regression to the mean, Maruish (2004) suggested RCT study-designs. The lacking follow-up assessment we discuss in the manuscript (p. 20; paragraph 2):

"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."

Gutacher 1 (Minor)

I.7: The authors present their results based on two self-report measures of procrastination; one related to academic procrastination (APSI) and one general procrastination (GPS). Both have been used extensively in the research of procrastination, but have also been criticized for not being associated with the more current definition of procrastination as a voluntary delay of an intended course of action. Steel (2010) has for instance derived a novel self-report measure with better psychometric properties compared to several old ones, the Pure Procrastination Scale (PPS), using both meta-analytic procedures and confirmatory factor analysis. It would be interesting to see a discussion on this and if there are any limitations in using the APSI and GPS.

Antwort der Autoren:

With respect to the limitation of the manuscript length, we did not discuss limitations of the scales. In response to Reviewer 1's concerns, we would like to explain why we did not used the Pure Procrastination Scale; (1) No German validation of this scale exists; (2) Klingsieck and Fries (2013) improved the psychometrics of the German version of the General Procrastination Scale in the validity study.

I.8: The intervention of emotion regulation seems to consist of two parts; relaxation and cognitive restructuring/reappraisal. It would be interesting to hear the authors discuss which one of these two aspects might affect the outcome - relaxation as a way of regulating negative

emotions or seeing things from a different perspective using cognitive restructuring/reappraisal

Antwort der Autoren:

This is a very interesting question. Unfortunately, we assessed no data to answer this question profoundly. But we suppose that both – relaxation and cognitive strategies – affected the outcome. If a task is related to aversive outcome expectation, it may lead to a high anxiety induced strain. The avoidance of the task may decrease the aversive strain and has the impact of a negative reinforcement. Thus, procrastination may be stabilized. If one reduces strain by relaxation, (a) aversive emotional states (e.g., anxiety) and the subsequent tendency to avoid the task may be reduced and (b) the negative reinforcement effect of avoidance is lower.

If individuals reappraise the expected threat (aversive outcome expectation of a task), the aversive emotional state (e.g. anxiety) and subsequent avoidance tendencies may be decreased.

These are two possible explanations, but we were unsure how they relate to our results. We decided to offer both ways of regulation, because a body of research as well as our experience indicate that individuals differ in the extent to which they benefit from relaxation or cognitive strategies. Further research is needed to investigate these mediating processes.

Gutachter 2

II.1: One general comment is that I'm not sure the length of this manuscript is appropriate given the amount of information the authors need to communicate. Namely, as I discuss below, I think that each individual study warrants some discussion as to the limitations and contribution of each study before moving to the next section. The authors do deal with many limitations well in the general discussion, but I think the manuscript would benefit from discussion along the way.

Antwort der Autoren:

Thank you for this general comment. We agree and revised the manuscript by discussing the results and limitation of each study before moving to the next section.

Discussion of Study 1 (p. 8, paragraph 3):

"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. 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."

Discussion Study 2 (p. 12 , paragraph 2):

"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."

Discussion of Study 3 was integrated in the general discussion. This has led to the following changes in the manuscript (page 18 ; paragraph 2):

"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 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 β = -.09; indirect effects on procrastination in Study 3 resilience, (β = -.06), and modification (β = -.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.

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."

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II.2: Another broad comment I have is that it was difficult to understand which components of emotion regulation mattered the most for procrastination. For example, many of the subcomponents seemed to be related to emotion processing (awareness, clarity, and understanding), but do not seem theoretically the same as the ability to regulate emotions. The latter components actually seem more akin to the ability to actually regulate emotions (resilience, modification, readiness to confront distressing situations). Of course, these two aspects are correlated, but some discussion of the extent to which these abilities rely on one factor, or may be separable (emotional awareness and comprehension vs. the actual ability to regulate and confront emotional situations) seems warranted, as some of these abilities may be more closely related to procrastination than others. If these effects are observed across all subscales, can we really say it is emotion regulation rather than emotional processing as a whole?

Antwort der Autoren:

This is a very relevant comment. In order to clarify the different roles of the ER subcomponents, we realized a set of changes in the manuscript.

Instead of eliminating the common variation of the ER subscales, for the revised manuscript we conducted mediation analyses (Study 1). The concepts of Berking and colleagues as well as previous findings indicated that the ability to tolerate and the ability to modify aversive emotions are core abilities in the interplay of the subscales. For example, Berking and colleagues found that theses subcomponents mediated the impact of the other subcomponents on relevant clinical changes in depression (Berking, Wupperman, Reichardt, Pejic, Dippel, & Znoj, 2008). Thus, we tested whether these two subscales mediate the impact of the other ER subscales on procrastination. We found that (a) the ability to tolerate aversive emotions mediated the relation between all other subscales and procrastination, but (b) that the ability to modify aversive emotions mediated only some subscales related to emotional processing.

This has led to the following changes in the manuscript:

(page 4; paragraph 1):

"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, Wupperman, Reichardt, Pejic, Dippel, & Znoj, 2008)."

(page 5; paragraph 1):

"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."

(page 7; paragraph 3):

"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)."*

(page 8; paragraph 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."*

(page 8; paragraph 4):

"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. 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."

Second, in line with the suggestion of reviewer 2, we distinguish two broader categories of ER subcomponents: emotional processing and emotion regulation. This has led to the following changes in the manuscript (page 11, paragraph 3):

"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 Table 5 and Table 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 (β = -.09, $p < .05$), whereas procrastination measured at pre-assessment seemed to have no impact on subsequent $ERSQ_{modify}$ (β = .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 ($ERSQ_{resilience}$; β = -.19, $p < .05$)."

II.3: Study 1 Results: Similarly, it was confusing that the authors broke up ER into many subcomponents, but did not discuss which were most related to procrastination. It was quite confusing why almost none of the ER scales were correlated with procrastination as a whole (except resilience), but all of their unique effects were significant. Although this suggests that some unique variation to each subscale is associated with procrastination, the fact that they didn't correlate as a whole suggests that the vast majority of the variation in ER is not correlated with procrastination. What is actually left to each of these measures after pulling out the common variation? Some discussion of how to interpret these alternative measures seems needed given the strong differences compared to the simple correlations.

<u>Antwort der Autoren:</u>

In order to clarify this, we conducted the mediation analyses described above.

II.4: Study 2 Results: The authors spend some time motivating controlling for age in this analysis. They talk about Steel & Ferrari (2013), in which age was a very weak correlate of procrastination, but in this study the sample was drawn from wide ranges across the lifespan

(SD of 14 - 20 years in two studies discussed in that article). In this sample, the standard deviation of age was 2.3, which clearly was not a wide enough age range (or large enough sample) to observe a negative correlation between age and procrastination. Given the lack of association, I do not think that age should be included in these analyses (even though it was correlated with ER, it cannot account for covariation between ER and procrastination as it is not correlated with procrastination). If the authors chose to keep age in their analyses, they should also describe what happens when they do not include age in the model (i.e., do any of the associations in Figure 1 depend on age being included, and if so why does that make sense given no effect of age on procrastination?) and why age was not included in the other two studies.

Antwort der Autoren:

In order to focus on the relation between ER skills and procrastination, we decided not to control age and depression. Moreover, we conducted separate CLP-analyses for each subscale, as reviewer 2 suggested as minor. Analyses indicated that (a) only the model fits for the CLPs of the ability to tolerate aversive emotions (resilience) and of the ability to modify aversive emotions were acceptable and (b) the relation between the ER subscales and procrastination was significant. But, not in line with our assumption, we found that procrastination reduced the subsequent ability to tolerate aversive emotions and not vice versa. Although we did not expect this, it seems to be plausible: Given that individuals procrastinate in order to avoid aversive emotions which they expect, the reduction of the expected aversive emotion is negative reinforcement. Individuals learn not to stand aversive emotions.

This had led to a couple of changes in the manuscript:

(page 11, paragraph 2):

"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 $p < .05$ (two-sided). SPSS 22.0 and AMOS 22.0 (SPSS, 2013) were used for all analyses."

(page 11, paragraph 3):

"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 Table 5 and Table 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 ($\beta = -.09$, $p < .05$), whereas procrastination measured

at pre-assessment seemed to have no impact on subsequent $ERSQ_{modify}$ *(*β *= .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 (*$ERSQ_{resilience}$*;* β *= -.19, p < .05).''*

II.5: Finally, Table 3 reveals that the correlation between ER and the GPS scale is not significant, suggesting that some of the correlations between ER and procrastination only exist after accounting for depression and/or age. This also warrants some discussion (they say that they did not expect large effects in the general discussion, but this is not just a small effect, it can't even be observed until removing other correlates).

<u>Antwort der Autoren:</u>

This is a relevant issue. As described above, we now include all ER subscales. Table 4 reveals that a couple of significant associations were found between ER skills and procrastination. Additionally, we relinquish to control age and depression (see above).

Gutachter 2 (Minor)

II.6: Study 1 Method: How widely used is the APSI as a measure of procrastination? I was confused as to why the authors did not use a more frequent measure of procrastination such as the General Procrastination Scale (GPS) in this initial study, but they switched to that measure for later work. Some justification seems needed if there is room.

Antwort der Autoren:

In 2013, in Germany, the validation study for the German version of the GPS was published. The psychometrics of the GPS were better than the psychometrics of the APSI. Thus, we decided to use the GPS.

II.7: More importantly, however, I didn't understand why the authors used the total score of the APSI rather than only the procrastination subscale. Given high internal consistency and the reporting in Table 1, this distinction may not affect the results, but the most direct comparison between procrastination and ER seems to be the academic procrastination subscale only, rather than the combination of other related constructs like fear of failure or motivation. Why report the total score and these other subscales if this measure does not solely measure procrastination?

Antwort der Autoren:

This is a good question. We now included findings for the three subscales of the APSI (see Table 2 and 3).

II.8: Study 2 Results: Why didn't the authors look at subscales of ER again, like in the first study? If they did, can they briefly report whether the results were consistent?

Antwort der Autoren:

We now include the subscales (see above; see also in the manuscript: page 11, paragraph 2 and page 11, paragraph 3).

II.9: There is also an error in Figure 1: GPSt1 is labelled twice, and I assume the label on the right should be GPSt2.

Antwort der Autoren:

Thank you. We replaced the figures by Table 5 and 6.

II.10: Page 12 Intervention Introduction: The labelling is confusing in this section. There is an (a), (b), (c), and (b). Is the b supposed to be a d or part of c? More generally, the wording if this entire section made it very unclear how many intervention conditions there actually were (and whether all subjects completed all or only some aspects of the intervention). Please clarify

Antwort der Autoren:

Thank you for this advice. We clarify the intervention description as followed (p. 15, paragraph 1):

"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 Whiltey (2015), 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 minutes and was repeated daily for two weeks."

II.11: In Figure 2a, 2b, and 2c, it was difficult to tell which path corresponded to which beta value. Can this be made more clear (perhaps by stacking B above p values and/or having the loading cover the path)

Antwort der Autoren:

Thank you. We replaced the figures by Table 9.

Gutachter 3

III.1: There are no operational definitions of emotional regulation and procrastination in the Introduction. These should be addressed.

Antwort der Autoren:

We define emotions regulation skills as followed (page 4, paragraph 1):

"According to Berking and colleagues (2007; 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, Riper, & 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, Wupperman, Reichardt, Pejic, Dippel, & Znoj, 2008)."

In line with Klingsieck (2013), we define procrastination as followed (page 3, paragraph 1):

"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)."

This definition includes relevant aspects research lined out (Klingsieck, 2013):
(1) intention-action gap as core aspect of the procrastination phenomenon (Lay, 1986; Steel, 2007),
(2) individuals feel they procrastinate if they delay necessary or important acts (e.g., Schraw et al., 2007),
(3) the act of procrastination is deliberate (Ferrari, 2010),
(4) the delay in procrastination is indeed irrational (e.g., Ferrari, Barnes, & Steel, 2009), because procrastinators are aware of the potential negative consequences of the delay (e.g., Wohl, Pychyl, & Bennett, 2010), and because procrastination is accompanied by negative consequences (e.g., Sirois, 2004; Tice & Baumeister, 1997; van Eerde, 2003).

III.2: It is needed to supplement introduction and theoretical background of emotional regulation and procrastination. The introduction does not deeply consider the authors' research aims. It is hard to understand why this study is necessary and why the study should be divided into three parts.

Antwort der Autoren:

In order to overcome this limitation we clarify the research aims (page 4, paragraph 2).

"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). 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, Jazaieri, Sieland, & 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."

III.3: Rationale of the emotional regulation is also insufficient in this study. In particular, it is hard to find prior studies about the relationship between emotional regulation and procrastination. Authors mentioned that the association between the general ability to adequately respond to one's feelings and procrastination has not yet been empirically

investigated. But not a few studies which examined the relationship between procrastination and self-regulation including emotional regulation, mood regulation, or emotional intelligence have been published.

Antwort der Autoren:

We agree with this point and improve the rational by a different view how ER subskills affect procrastination or are affected by procrastination. In order to improve the rational, we consider that the abilities to tolerate and to modify aversive emotions play key roles in the framework of ER sub-skills (as described above and page 4, paragraph 2).

"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."

III.4: It is not persuasive why the authors chose depression and age among many factors which impair ER skills in Study 2.

The 'age' in the negative association between age and procrastination should be interpreted the difference of childhood and adulthood in the developmental systems perspective. So, the factor 'age' is not appropriate in study 2 of which all the participants are college students.

Antwort der Autoren:

This point is in line with comments of the other reviewers. In order to avoid confusions and to prevent artefacts, we decided not to control age and depression in the revised version of this manuscript (as described above: Comment 2/ Reviewer 1).

III.5: The authors intended to evaluate prospective effects of ER on procrastination under stress. The process of realizing the intention seems vague. It is also hard to understand the relation between the authors' intention and depression and age.

Antwort der Autoren:

We assumed that the feeling of stress cued by tasks increases the probability of procrastination, a probable mechanism to avoid the related aversive emotions. Furthermore, we assumed that the higher the ER skills are the smaller the probability of procrastination is, because individuals are able to modify or to tolerate aversive emotions adaptively. We aimed to test this in a prospective study design in which the probability of feeling stressed should increase.

We operationalized this by increasing workload of the participants because it is evident that high workload increases the probability of perceived stress. In Germany, the workload of students increases in the first week of the non-lectures period. In order to be sure that workload increased, we only included students who reported that their workload was higher than in the last week of the lecture period.

III.6: And why is the study 2 longitudinal study?

Antwort der Autoren:

In study 3, we experimentally vary ER skills by a minimal intervention. This allowed concluding how increases of ER skills affect procrastination. This study did not clarify the prospective covariation of ER skills and procrastination. Therefore, we conducted study 2.

7) Self-report of procrastination is not reliable. So it is the limitation of the study.

Antwort der Autoren:

We agree that the validity of self-reported procrastination may be a limitation. We consider this in the discussion (page 13, paragraph 1).

"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."

But we do not have any doubts about the reliability of self-reported procrastination scales. The prospective correlations of procrastination in study 2 was r = .93, the internal

consistencies of the procrastination scales in all studies ranged between α = .80 and α = .94. Findings in the validity studies (e.g., Klingsieck & Fries, 2013) support this.

III.8: The effect of ER intervention might be just the effect of **Hawthorne effect** which individuals modify or improve an aspect of their behavior in response to their awareness of being observed.

Antwort der Autoren:

We tried to prevent the Hawthorne effect by conducting a RCT. Several researchers suggested using RCTs, in order to prevent the Hawthorne effect (e.g., Maruish, 2004). However, waiting list control designs have some limitations, placebo controls may overcome. Thus, we now discuss this limitation (page 20, Paragraph 2):

"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."

III.9: Rationale of the development of ER intervention should be supplemented. Even though authors insisted that no procrastination interventions incorporate increasing ER skills until today, many programs about procrastination already included ER.

Antwort der Autoren:

In order to supplement the rationale of the development of ER intervention, we clarify our focus and research aim in this study (see above). In the intervention section, we described the role of the ability to tolerate and the ability to modify aversive emotion, on which we focused, more clearly (page 15, paragraph 1):

"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 Whiltey (2015), 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 minutes and was repeated daily for two weeks."

III.10: ER intervention is mixed with the procrastination overcoming program. The intervention included "choosing one of their daily tasks in all likelihood they were most likely to procrastinate".

It might be appropriate to use ANCOVA rather than ANOVA in study 3.

Antwort der Autoren:

Follow-up to this suggestion has led to changes in the section data analyses (page 16, paragraph 3) and in the section results (page 17, paragraph 2).

Changes in the data analyses section:

"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."

Changes in the results-section:

"In line with our assumption, an ANCOVA indicated that the training of emotion-focused strategies reduced procrastination ($F_{1, 81} = 8.979$, $p < .01$, $d_{between} = .34$). Figure 1 displays the development of procrastination from baseline (T1) to post-measurement (T2). Reported means of procrastination in the WLC ($M_{t1} = 3.34$, $SD = .40$, $M_{t2} = 3.29$, $SD = .48$) did not differ significantly ($t = 1.099$, $p > .50$), whereas the reduction in means of the IG ($M_{t1} = 3.40$, $SD = .48$, $M_{t2} = 3.10$, $SD = .54$) was significant ($t = 5.113$, $p < .001$, $d_{withing} = .59$).

- Please insert Figure 1 about here -

Participants of the IG group reported a significant increase in their abilities to tolerate aversive emotions ($F_{1, 80} = 4.424$, $p < .05$) and modify aversive emotions ($F_{1, 80} = 14.109$, $p < .001$) 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."

ABOUT THE AUTHOR

Marcus Eckert was born on November 29th 1974 in Bremen, Germany. After graduating from school he studied to becoming a teacher (in Lueneburg, Germany). In 2003, he began the practical teacher traineeship. Until July 2010, he was working as teacher. In 2008, he started to study Psychology and received his Bachelor Degree in 2011. From 2013 to 2015 he studied Psychology in order to get the Master Degree, which he received in 2015. In August 2010 he began to transform the Affect Regulation Training (ART; Berking, 2010) into a blended learning Training for teachers. From September 2012 until September 2014 he was working at Leuphana University Lueneburg in the project "Health.Training Online", a large research project mostly funded by the European Union. In the context of his PhD he developed an Internet-based training to overcome procrastination, and parallely he started giving stress management workshops for teachers in schools. In April 2015 he founded the Institut LernGesundheit GbR in cooperation with Torsten Tarnowski and Bernhard Sieland.

He is currently working as a director. Marcus Eckert lives in Bremen, Germany, with his wife Lotta and his children Theo and Pauline.

Über den Autor:

Marcus Eckert wurde am 29. November 1974 in Bremen geboren. Er studierte zuerst Lehramt (GHR) in Lüneburg und machte dort 2003 sein erstes Staatsexamen. Anschließend trat er in die zweite Phase der Lehrerbildung, die er im Oktober 2004 mit dem zweiten Staatsexamen abschloss. Bis Juli 2010 arbeitete er als Lehrer an einer Haupt- und Realschule. Berufbegleitend begann er 2008 das Studium der Psychologie, das er 2015 als Master of Science erfolgreich beendete.

Im Sommer 2010 begann er, das Training emotionaler Kompetenzen von Berking (2010) für Lehrkräfte zu adaptieren und in einer blended-learning-Version zu transformieren. Von September 2012 bis September 2014 arbeitete er als wissenschaftlicher Mitarbeiter im Inkubator KT Gesundheitstrainings.Online (GET.ON) an der Leuphana Universität Lüneburg. Im Kontext seiner Promotion entwickelte und evaluierte er ein onlinebasiertes Training zur Überwindung von Prokrastination. Parallel dazu führte er Stressmanagement-Trainings für Lehrkräfte durch. Im April 2015 gründete er zusammen mit Torsten Tarnowski das Institut LernGesundheit GbR.

Derzeit arbeitet er als Geschäftsführer des Instituts und lebt mit seiner Frau Lotta und seinen beiden Kindern Theo und Pauline in Bremen (Deutschland).

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Seit 2011	Leiter von Fortbildungen im Bereich Stress- und Emotionsmanagement für Lehrerinnen und Lehrer
09/ 2012 – 09/2014	Wissenschaftlicher Mitarbeiter an der Leuphana Universität Lüneburg im Innovations-Inkubator
Seit 10/2010	Doktorand an der Leuphana Universität Lüneburg
11/2004 – 07/2010	Grund-, Haupt- und Realschullehrer an der Haupt- und Realschule (HRS) in Sottrum (Beamter auf Lebenszeit)
08/2006 – 07/2010	Leitung der Fachkonferenz Deutsch
08/2003 – 07/2009	Aufbau und Leitung des Schulmusicals an der HRS Sottrum
11/2006 – 05/2009	Anleitung und schulseitige Ausbildung von Lehramtsanwärtern
08/2007 – 07/2010	Beauftragter zur Entwicklung des Schulprogramms und des pädagogischen Profils an der HRS Sottrum
09/1997 – 01/2003	Pflege- und Betreuungstätigkeit in einem Wohnheim für Menschen mit geistigen Behinderungen in Bremen (Teilzeit; studienbegleitend)

Ausbildung

10/2012 – 03/2015	Masterstudium der Psychologie an der Fernuniversität in Hagen
10/2008 – 07/2011	Bachelorstudium der Psychologie an der Fernuniversität in Hagen
05/2003 – 10/2004	Zweite Phase der Lehrerausbildung (Vorbereitungsdienst) am Studienseminar in Verden und an der Haupt- und Realschule (HRS) in Sottrum
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08/2014 – 09/2014	Zertifizierung zum Stresstrainer „Gelassen und sicher im Stress“ nach Prof. Gert Kaluza
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2016

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