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Selbstmitgefühl bei akutem und chronischem Schmerz – die spezifische Rolle zu der Bewältigung von Ärger

Vom Promotionsausschuss des Fachbereichs 8: Psychologie der Universität Koblenz-Landau zur Verleihung des akademischen Grades Doktor der Philosophie (Dr. phil.) genehmigte Dissertation

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"Everyone you meet is fighting a battle you know nothing about.

Be kind. Always."

(Ian MacLaren)

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Abkürzungsverzeichnis

A = Vermeidung (Faktor PIPS)

ABCT = Attachment-Based Compassion Therapy

ACT = Akzeptanz- und Commitment Therapie

CFA = Konfirmatorische Faktorenanalyse

CS = compassionate self-responding

EM = Endurer-Modell

FAM = Fear-Avoidance-Modell

FESV = Fragebogen zur Erfassung der Schmerzverarbeitung

IASP = International Association for the Study of Pain

ICD-11 = International Classification of Diseases 11

IEQ = Injustice Experience Questionnaire

IMMPACT = Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials

KVT = Kognitive Verhaltenstherapie

MANOVA = Multivariate Varianzanalyse

PASS-20 = Pain Anxiety Symptom Scale 20

PCS = Pain Catastrophizing Scale

PDI = Pain Disability Index

PHQ-9 = Patient Health Questionnaire 9

PIPS = Psychological Inflexbility in Pain Scale

RSES = Rosenberg-Self-Esteem Scale

RUS = reduced uncompassionate self-responding

SCS = Self-Compassion Scale

STAXI = State-Trait Anger Expression Inventory

1. Zusammenfassung und Abstract

Zusammenfassung

Im Kontext chronischer Schmerzerkrankungen sind neben dem physischem Schmerzerleben auch Emotionen, wie Depressivität, Angst, Scham und Ärger von großer Relevanz. So leiden beispielsweise ca. 70 % der Menschen mit chronischen Schmerzen unter wiederkehrendem Ärger. Die Forschung zu spezifischen emotionsfokussierten psychologischen Behandlungsansätzen ist jedoch begrenzt. Eine Möglichkeit der Behandlung könnten sogenannte mitgefühlsbasierte Ansätze darstellen. So ist Selbstmitgefühl bei chronischem Schmerz beispielsweise assoziiert mit einer geringeren Schmerzintensität sowie geringerer physischer und emotionaler Beeinträchtigung, wie Depressivität, Angst und Ärger. In der vorliegenden Dissertation wurde die Relevanz von Selbstmitgefühl im Kontext von akutem und chronischem Schmerz unter der besonderen Berücksichtigung von Ärger evaluiert.

Zunächst wuden in einem Überblicksartikel Interventionsstudien (N = 19) zu Behandlungsansätzen von chronischen Schmerzen zusammengefasst, welche Veränderungen in Ärger oder verwandten Aspekten berichteten (Studie 1). Nur zwei der eingeschlossenen Studien untersuchten spezifische Interventionen zur Bewältigung von Ärger. Insgesamt wiesen die Studien große Unterschiede hinsichtlich der Qualität, Stichprobe, Intervention (Art, Dauer, Setting) wie auch der Messinstrumente für Ärger auf. Die vielversprechendsten Ergebnisse zeigten sich für akzeptanz- und mitgefühlsbasierte Ansätze. Als mögliche Fundierung zukünftiger Forschung wurde zudem das „Prozess Modell der Ärger-Regulation bei chronischem Schmerz“ vorgeschlagen und diskutiert.

Da sich mitgefühlsbasierte Ansätze als potentiell wirksam zur Bewältigung von Ärger erwiesen, wurde die Relevanz von Selbstmitgefühl im Kontext von chronischem Schmerz anhand einer kontrollierten Längsschnittstudie (t1: N_{T1} = 1228; t2: N_{T2} = 376) evaluiert (Studie 2 & 3). In Studie 2 wurde Selbstmitgefühl anhand der zwei Faktoren „compassionate self-responding (CS)“ und „reduced uncompassionate self-responding (RUS)“ definiert. Hierbei erwies sich CS als distinktes Konstrukt im Vergleich zu Psychologischer Inflexibilität und Selbstwert. RUS und Selbstwert schienen das gleiche latente Konstrukt zu repräsentieren. Die Relevanz dieser Konzepte für schmerzbezogene Konzepte, wie auch Depressivität und Ärger wurde in Studie 3 überprüft. Nur RUS und nicht CS stellte hierbei einen eigenständigen Prädiktor für schmerzbezogene Aspekte dar. Psychologische Inflexibilität, genauer

Vermeidungsverhalten, erwies sich zudem als Prädiktor mit breiterer Relevanz, jedoch konnte keiner der untersuchten Prädiktoren eigenständig Ärger vorhersagen.

Die Relevanz von Selbstmitgefühl zur Bewältigung von akutem Schmerz wurde in einer experimentellen Studie evaluiert (Studie 4). Die Emotionsregulationsstrategien Selbstmitgefühl, Akzeptanz und Ablenkung erwiesen sich als vergleichbar hilfreich hinsichtlich Schmerztoleranz, -Intensität und –Aversion.

Selbstmitgefühl scheint demnach auch im Kontext von Schmerz vor allem in spezifischen Kontexten oder für bestimmte Subgruppen von Bedeutung zu sein. Zukünftige Forschung sollte sich daher auf einen adaptiven Einsatz der Emotionsregulationsstrategie Selbstmitgefühl konzentrieren. Im Speziellen sollte die Wirkung von mitgefühlsbasierten Interventionen auf Ärger bei Schmerz genauer evaluiert werden.

Abstract

In the context of chronic pain disorders, in addition to the physical experience of pain, emotions such as depression, anxiety, shame and anger and their regulation are of great relevance. For example, approximately 70% of people suffering from chronic pain also suffer from recurrent anger. However, research on specific emotion-focused psychological treatment approaches is limited. So-called compassion-based approaches could represent one possibility for treatment. Recent research depicted that self-compassion in chronic pain is associated with lower pain intensity as well as lower physical and emotional impairment, such as depression, anxiety, and anger. In the present dissertation, the relevancee of self-compassion in the context of acute and chronic pain was evaluated with a special focus on anger.

First, a scoping review summarized interventional studies (N = 19) on treatment approaches for chronic pain which reported changes in anger or related aspects (Study 1). Only two of the included studies examined specific interventions for managing anger. Overall, the studies showed wide variation in terms of quality, sample, intervention (type, duration, setting) and anger measurement tools. The most promising results emerged for acceptance-based and compassion-based approaches. In addition, the “"Process Model of Anger Regulation in Chronic Pain" was proposed and discussed as a possible foundation for future research.

Since compassion-based approaches proved to be potentially effective in coping with anger, the relevance of self-compassion in the context of chronic pain was evaluated using a controlled longitudinal study (t1: NT1 = 1228; t2: NT2 = 376) (Study 2 & 3). In Study 2, self-compassion

was defined by the two factors compassionate self-responding (CS) and reduced uncompassionate self-responding (RUS). Here, CS proved to be a distinct construct compared to psychological inflexibility and self-esteem. RUS and self-esteem seemed to represent the same latent construct. The relevance of these concepts for pain-related concepts, as well as depression and anger, was examined in study 3. Only RUS and not CS represented an independent predictor for pain-related aspects. Psychological inflexibility, more precisely avoidance behavior, also proved to be a predictor with broader relevance. However, none of the predictors examined could independently predict anger.

The relevance of self-compassion for coping with acute pain was evaluated in an experimental study (Study 4). The emotion-regulation-strategies self-compassion, acceptance and distraction proved to be comparably beneficial with respect to pain tolerance, pain intensity and pain unpleasantness.

Thus, self-compassion seems to be important in the context of pain, especially in specific contexts or for certain subgroups. Future research should therefore focus on an adaptive use of the emotion regulation strategy self-compassion. In particular, the effect of compassion-based interventions on anger in pain should be evaluated in more detail.

2. Theoretischer Hintergrund

2.1. Chronischer Schmerz

2.1.1. Definition und Epidemiologie

Die *International Association for the Study of PAIN (IASP)* definiert Schmerz als ein

> *"unangenehmes Sinnes- und Gefühlserlebnis, welches mit aktueller oder potentieller Gewebeschädigung in Verbindung steht oder mit Begriffen einer solchen Schädigung beschrieben wird."* (Merskey, 1994)

Diese Definition kann durch einen Zusatz von Williams und Craig (2016) erweitert werden, welche Schmerz wie folgt definieren:

> *„Pain is a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components."*

Demnach besteht die Schmerzerfahrung aus der sensorischen aber auch einer emotionalen, einer kognitiven, wie auch einer sozialen Komponente. Zudem kann Schmerz als akut oder chronisch klassifiziert werden. Diese Unterscheidung wird maßgeblich durch die Dauer der Schmerzen bestimmt, wobei chronischer Schmerz gemäß der internationalen statistischen Klassifikation der Krankheiten und verwandter Gesundheitsprobleme (ICD-11) charakterisiert ist durch ein andauerndes Schmerzerleben über mindestens drei Monate (Nicholas et al., 2019). Chronischer Schmerz ist zudem oftmals assoziiert mit Funktionseinschränkungen, sowie emotionalen Beeinträchtigungen (Nicholas et al., 2019). Aktuell leiden ca. 25-35 % der Erwachsenen in Europa unter chronischen Schmerzen (Breivik, Eisenberg, & O'Brien, 2013). Das Vorhandensein chronischer Schmerzen hat einen sehr starken, negativen Einfluss auf das alltägliche Leben der Betroffenen. Neben physischen und psychischen Einschränkungen, führen chronischen Schmerzen häufig zu Arbeitsunfähigkeit und einer stark reduzierten Lebensqualität (Breivik et al., 2013). Laut ICD-11 werden Funktionseinschränkungen in den folgenden Bereichen als besonders relevant bei chronischem Schmerz eingestuft: Ausführen täglicher Routinen, Heben und Tragen von Objekten, Gehen, Bewegung, intime Beziehungen, Erwerbstätigkeit wie auch Erholung und Freizeit (Nugraha et al., 2019). Das Behandlungsangebot für chronische Schmerzerkrankungen ist groß, leider jedoch nicht für alle effektiv (Turk, Swanson & Tunks, 2008). Daher ist die Verbesserung der Schmerztherapie ein wichtiges Ziel für unsere Gesellschaft. Um dies erreichen zu können, ist es zunächst wichtig, die Entstehung und Aufrechterhaltung chronischer Schmerzen genauer zu verstehen.

2.1.2. Entstehungsmodelle chronischer Schmerzen

Für die Entstehung und Aufrechterhaltung chronischer Schmerzen nimmt die Bewertung, das resultierende emotionale Erleben sowie der Umgang mit der individuellen Schmerzerfahrung eine zentrale Rolle ein. Im Rahmen empirischer Schmerzforschung ewiesen sich hierbei zwei spezifische Gruppen von Erwartungen als besonders zentral: die Bewertung der Bewegung als potentielle Gefahr, verglichen mit der Annahme Schmerz, aushalten zu müssen. Daraus abgeleitet lassen sich zwei zentrale theoretische Modelle beschreiben, welche die Entstehung und Aufrechterhaltung chronischer Schmerzen erklären: das Fear-Avoidance-Modell (FAM)(Vlaeyen, Crombez, & Linton, 2016; Vlaeyen & Linton, 2000) und das Endurer-Modell (EM) (Hasenbring & Verbunt, 2010). Diese solle im Folgenden kurz genauer erläutert werden.

Das Fear-Avoidance-Modell geht von einer ursprünglichen (Gewebe-)Schädigung aus, welche zu einer initialen Schmerzerfahrung führt (*Abbildung 1 Fear-Avoidance-Modell*).

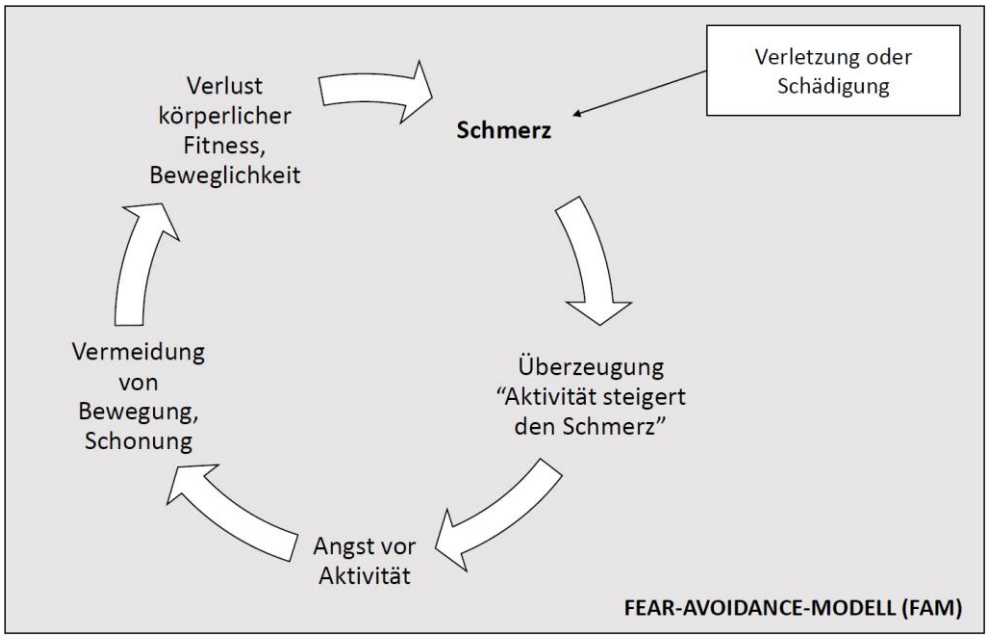

Abbildung 1 Fear-Avoidance-Modell

Im Zuge dessen entstehen katastrophisierende Annahmen bezüglich des Schmerzes beziehungsweise möglicher Schädigung („Der Schmerz wird niemals wieder aufhören.“; „Bestimmte Bewegungen sind für mich sehr gefährlich.“; „Ich kann den Schmerz nicht aushalten.“; „Ich werde verrückt vor Schmerz.“). Diese wiederum führen zur Entwicklung und dem emotionalen Erleben von Angst vor (dem Schmerz und) bestimmten Bewegungen. Aus diesem Grund werden Bewegungen vermieden und es kommt zu Schonverhalten und Hypervigilanz. Rückzug und Schonung führen jedoch zu Muskelatrophie und Bewegungseinschränkungen und somit zu größerer Beeinträchtigung bis hin zu komorbiden Depressionen. Im Sinne eines Teufelskreismodells führt dies zu einer verstärkten

Schmerzwahrnehmung und der Aufrechterhaltung des Schmerzerlebens, somit langfristig zur Entstehung einer chronischen Schmerzerkrankung.

Eine andere Möglichkeit der Chronifizierung von Schmerz wird im Endurer-Modell beschrieben (*Abbildung 2 Endurer-Modell*).

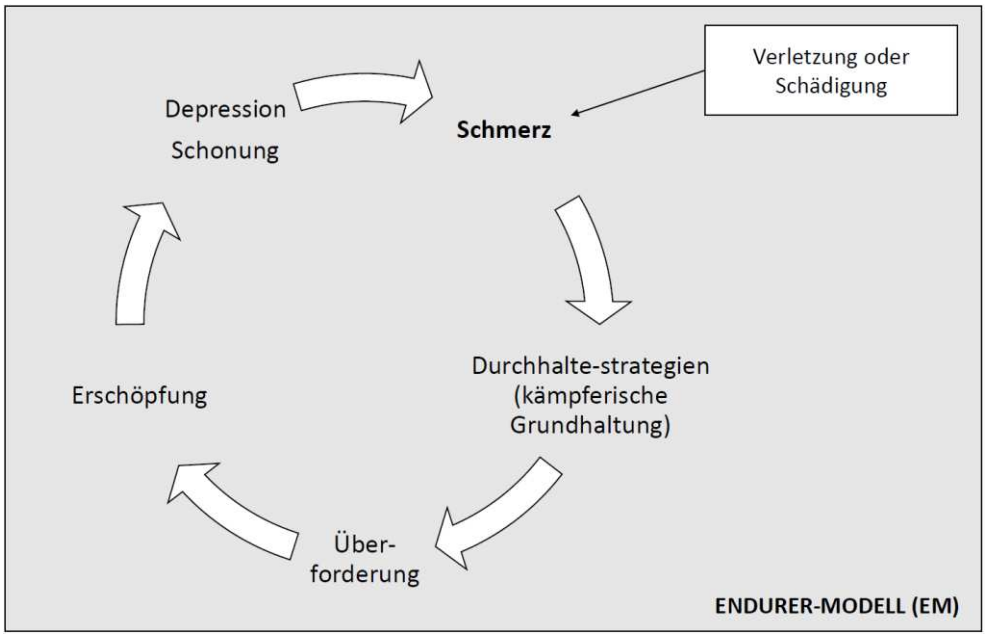

Abbildung 2 Endurer-Modell

Im Gegensatz zum FAM nimmt das Endurer-Modell an, dass auf die initiale Schmerzerfahrung mit einer kämpferischen Grundhaltung („Ich muss das aushalten.“, „Ein Indianer kennt keinen Schmerz.“, „Ich muss weitermachen, weiterkämpfen.“, „Augen zu und durch!“, „Ich habe keine Zeit um an mich selbst zu denken.“) reagiert wird. Eine emotionale Reaktion wird hierbei zumeist unterdrückt beziehungsweise vermieden. Langfristig führt diese Einstellung jedoch zu einer Überforderungssituation. Wird die Überforderung zu groß, führt sie wiederum zu völliger Erschöpfung. Die Erschöpfung mündet letztendlich ebenfalls in Schonung und komorbider Depression. Auch hier kommt es im Sinne eines Teufelskreismodells zu einer verstärkten Schmerzwahrnehmung, der Aufrechterhaltung des Schmerzerlebens und damit der Entstehung einer chronischen Schmerzerkrankung.

Für die Chronifizierung von Schmerz sind demnach kognitive Bewertungsprozesse, die emotionale Reaktion sowie das resultierende Verhalten von zentraler Wichtigkeit.

2.1.3. Psychologische Behandlungsansätze bei chronischem Schmerz

Basierend auf den theoretischen Annahmen der Erklärungsmodelle gibt es verschiedene psychotherapeutische Ansätze zur Bewältigung chronischer Schmerzen. Wirksame Behandlungsansätze sind bespielsweise die Kognitive Verhaltenstherapie (KVT), die

Acceptanz- und Commitment-Therapie (ACT), wie auch die explizit auf dem FAM basierende Expositionstherapie (Glombiewski et al., 2018; Veehof, Trompetter, Bohlmeijer, & Schreurs, 2016; Williams, Eccleston, & Morley, 2012). Die durchschnittlichen Effektstärken dieser Behandlungen liegen jedoch nur im kleinen bis mittleren Bereich (Veehof et al., 2016; Williams et al., 2012). Zudem gibt es eine bedeutsame Anzahl an Menschen mit chronischen Schmerzen, welche von diesen therapeutischen Interventionen nicht profitieren (Williams et al., 2012). Aus diesem Grund besteht seit ca. zwei Jahrzehnten die Forderung nach sogenannten „tailored-treatments", adaptiven und individualisierten Behandlungen, welche die Wirksamkeit von Schmerztherapie verbessern sollen (Greenwood, Thurston, Rumble, Waters, & Keefe, 2003; Hasenbring & Verbunt, 2010). Bisher gibt es jedoch nur eingeschränkte Fortschritte auf diesem Gebiet. Zunächst ist es somit wichtig, spezifische Aspekte der chronischen Schmerzerkrankung auszuwählen, welche in bestimmten Kontexten oder für bestimmte Subgruppen zusätzliche Beeinträchtigung bedingen oder Therapieerfolge verhindern.

2.2. Emotionen und Emotionsregulation bei Schmerz

Einen möglichen Ansatzpunkt für adaptive Behandlungen stellen Emotionen sowie deren Regulation im Rahmen von chronischem Schmerz dar. So ist das Erleben von Schmerz gekoppelt an das Erleben negativer Emotionen (Linton, 2013; Lumley et al., 2011). Die Relevanz von Emotionsregulation zur Bewältigung chronischer Schmerzen wird zudem in einem aktuellen Review genauer erläutert (Koechlin, Coakley, Schechter, Werner, & Kossowsky, 2018). Emotionen und ihre Regulation bieten somit einen hilfreichen Ansatzpunkt psychologischer Schmerztherapie, welcher explizit adressiert werden sollte (Koechlin et al., 2018). Im Folgenden wird zunächst Emotionsregulation im Allgemeinen anhand des Prozessmodells der Emotionsregulation (Gross, 2015) diskutiert. Anschließend wird spezifischer auf die Emotion Ärger im Kontext chronischer Schmerzerkrankungen sowie damit verbundener Auswirkungen eingegangen. Zudem wird die Forschungslage zu wirksamen Emotionsregulationsstrategien bei Schmerz genauer erläutert.

2.2.1. Definition von Emotionen und Emotionsregulation

Im Rahmen des Prozessmodells der Emotionsregulation (Gross, 2015) werden Emotion und Emotionsregulation als mehrstufiger Bewertungsprozess beschrieben (siehe *Abbildung 3 Prozess Modell der Emotionsregulation*).

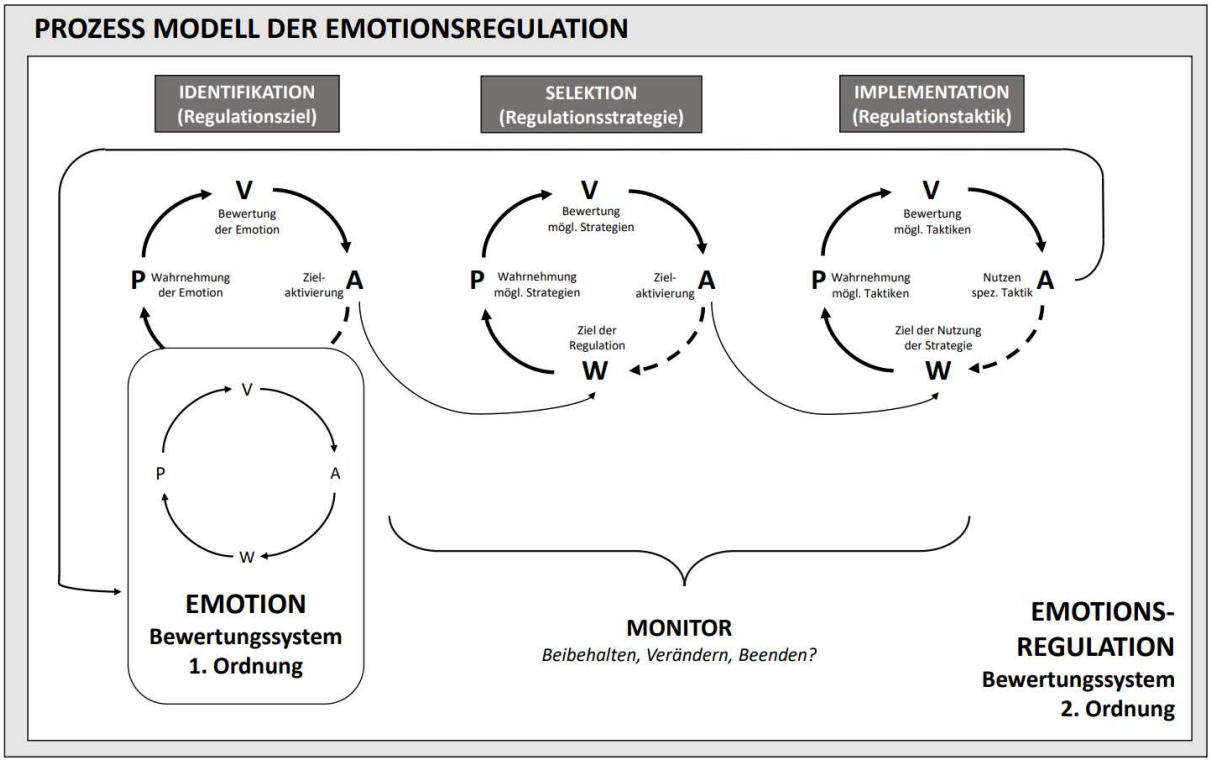

Abbildung 3 Prozess Modell der Emotionsregulation

Die Emotion stellt das Bewertungsystem erster Ordnung dar, auf dessen Basis die Emotionsregulation als Bewertungssystem zweiter Ordnung erfolgt. Genauer bedeutet dies, dass sich eine Emotion auf die Bewertung des aktuellen inneren und äußeren Erlebens bezieht. Dieser Bewertungsprozess beginnt mit der aktuellen Situation oder Umwelt (W = world), welche wahrgenommen (P = perception) und in Relation zum eigentlichen Wunschzustand bewertet (V = valuation) wird. Daraus resultiert die Handlung oder Reaktion (A = action). Dieser Bewertungsprozess erster Ordnung stellt die Grundlage beziehungsweise den Ausgangspunkt (W) für die nachfolgende Emotionsregulation dar. Emotionsregulation wird hierbei als dynamischer mehrstufiger Prozess beschrieben. Zunächst erfolgt die Identifikation eines Regulationszieles. Im Anschluss wird eine Regulationsstrategie ausgewählt und im Anschluss eine bestimmte Regulationstaktik implementiert. Verändert sich daraufhin die ursprüngliche Emotion, kann diese wiederum neu bewertet werden. Der gesamte Prozess der Emotionsregulation wird währenddessen überwacht und je nach Bedarf beibehalten, verändert oder beendet.

2.2.2. Emotionen und chronischer Schmerz – spezifisch Ärger

Depressivität, Angst, Scham und Ärger stellen die relevantesten bzw. am häufigsten erlebten Emotionen im Rahmen chronischer Schmerzerkrankungen dar. Aktuelle Meta-Analysen beschreiben jedoch ausschließlich Depressivität und Angst im Rahmen emotionaler

Beeinträchtigung (Veehof et al., 2016; Williams et al., 2012). Laut den Empfehlungen der „Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT)" bezüglich Behandlungsstudien bei chronischem Schmerz sollte die Messung des emotionalen Funktionsniveaus auch Ärger einschließen (Dworkin et al., 2008). Nichtsdestotrotz wird Ärger in der Behandlung von Menschen mit chronischen Schmerzen häufig vernachlässigt (Burns, Johnson, Devine, Mahoney, & Pawl, 1998). Aus diesem Grund wurde in der vorliegenden Arbeit der Fokus auf Ärger gewählt. Auf die Facetten und Auswirkungen von Ärger bei chronischem Schmerz soll im Folgenden genauer eingegangen werden.

Circa 70 % der Menschen, die unter chronischen Schmerzen leiden, geben an, häufig Ärger zu erleben (Okifuji, Turk, & Curran, 1999). Wie auch Angst und Ekel, kann Ärger als eine Emotion definiert werden, die im Rahmen von wahrgenommenen Bedrohungen auftritt (Gilbert, 2009). Ärger entsteht als eine Reaktion auf das Erleben von Ungerechtigkeit, Unfairness oder Grenzverletzungen (Fernandez, 2005). Somit kann Ärger auch als adaptiv beschrieben werden, da diese Emotion als Hinweis für persönliche Bedürfnisse fungiert (Greenwood et al., 2003). Neben Ärger als emotionalem Zustand werden in der Forschung zu chronischem Schmerz verschiedene verwandte Konstrukte beschrieben. Diese umfassen Trait-Ärger als Persönlichkeitseigenschaft, wie auch die Tendenz zur Ärger Expression oder Inhibition sowie das Ausmaß der Kontrolle hinsichtlich des erlebten Ärgers (Greenwood et al., 2003).

Die verschiedenen Aspekte von Ärger sind mit diversen negativen Folgen in Bezug auf chronischen Schmerzen verbunden. Diese Folgen können schmerz-spezifisch sein: so sind beispielsweise State-Ärger, Ärger-Expression und Ärger-Inhibition mit einer höheren Schmerzintensität oder einem geringeren Funktionsniveau assoziiert (Burns et al., 2015; Burns et al., 2008; Quartana, Bounds, Yoon, Goodin, & Burns, 2010). Ärger kann sich in Form von Schuldzuweisungen (Cedraschi et al., 2013) und Selbstkritik (Rudich, Lerman, Gurevich, Weksler, & Shahar, 2008) sowohl gegen sich selbst als auch gegen andere richten. So geht beispielsweise der Verlust wichtiger persönlicher Rollen mit einem hohen Ausmaß an Selbstkritik und Selbsthass einher (Vlaeyen, Morley & Crombez, 2016; Purdie & Morley, 2016). Nach außen gerichteter Ärger kann wiederum langfristig zu Konflikten in partnerschaftlichen Beziehungen (Schwartz, Slater, Birchler, & Atkinson, 1991) und somit auch zu einer mangelden sozialen Unterstüzung führen. Auch kann sich nach außen gerichteter Ärger negativ auf die Behandlung chronischer Schmerzen auswirken – beispielsweise in einem reduzierten Ansprechen auf die Therapie oder auch einer beeinträchtigten therapeutischen

Beziehung und damit einhergehend einer Frustration und Hilflosigkeit seitens der BehandlerInnen (Burns et al., 1998; Burns, Higdon, Mullen, Lansky, & Wei, 1999; Matthias et al., 2010). Auch aktivierte ärgerbezogene Kognitionen, wie die wahrgenommene Ungerechtigkeit („perceived injustice“) der Schmerzerkrankung, können den therapeutischen Prozess behindern (Eccleston, Williams, & Rogers, 1997). Wahrgenommene Ungerechtigkeit ist das am häufigsten diskutierte Konzept in Bezug auf Ärger bei chronischen Schmerzen. Sie ist mit einer Beeinträchtigung der physiologischen und psychologischen Gesundheit bei chronischen Schmerzen assoziiert (Sullivan, Scott, & Trost, 2012). Der Zusammenhang wahrgenommener Ungerechtigkeit und Schmerzintensität wird zudem durch das aktuelle Ärger-Erleben mediiert (Scott, Trost, Bernier, & Sullivan, 2013). Dies unterstreicht die Relevanz der Betrachtung der verschiedenen Facetten von Ärger bei Schmerz – in diesem Fall die kognitive Dimension „wahrgenomme Ungerechtigkeit“ sowie das emotionale Erleben von Ärger.

Die Bedeutung von Ärger bei chronischem Schmerz wurde auch in Übersichtsarbeiten hervorgehoben und Forschung zu Interventionen wurde dringend empfohlen (Fernandez & Turk, 1995; Greenwood et al., 2003). Gleichwohl ist die Forschungslage derzeit sehr begrenzt (Darnall, 2015). Es bleibt unklar, wer von Interventionen zu Ärger bei chronischem Schmerz profitieren würde und welche Interventionen erforderlich sind, um die verschiedenen ärgerbezogenen Beeinträchtigungen zu behandeln. Ein Grund dafür könnte das Fehlen eines theoretischen Modells zu Ärger bei chronischen Schmerzen sein (McCracken, 2013).

Es gibt demnach viele Menschen mit chronischen Schmerzen, welche unter intensiven aversiven Emotionen leiden beziehungsweise Schwierigkeiten bei der Emotionsregulation aufweisen. Dies gilt insbesondere in Bezug auf Ärger. Um eine adaptive Behandlung zu ermöglichen, sollten somit therapeutische Ansätze identifiziert werden, welche auf die Regulation von Emotionen abzielen.

2.2.3. Emotionsregulationsstrategien bei Schmerz

Hinsichtlich der Emotionsregulation im Bereich der Behandlung chronischer Schmerzen ist die Wirksamkeit von Akzeptanz- und Ablenkungsstrategien am besten empirisch belegt. Hierbei bezieht sich Akzeptanz auf eine offene, einladende Haltung gegenüber eigenen Erfahrungen. Diese umfasst sowohl Kognitionen, Emotionen wie auch physische Erfahrungen (Hayes, 2004). Im Rahmen von Schmerz kann davon ausgegangen werden, dass die Akzeptanz von Schmerz zu einer verbesserten Schmerztoleranz beziehungsweise einem geringeren Vermeidungsverhalten führen kann. So erwiesen sich Akzeptanzstrategien beispielsweise als

wirksam zur Bewältigung akuter Schmerzen in experimentellen Studien (Braams, Blechert, Boden, & Gross, 2012; Kohl, Rief, & Glombiewski, 2013; Masedo & Esteve, 2007). Auch Ablenkung stellt eine weitere gut belegte Bewältigungsstrategie dar (z.B. Georgescu, Dobrean, & Predescu, 2018; Gutiérrez, Luciano, Rodríguez, & Fink, 2004; Kohl et al., 2013). Durch die gezielte Umlenkung der Aufmerksamkeit weg vom wahrgenommenen Schmerz kann eine Verringerung der subjektiven Schmerzintensität erreicht werden. Studien, welche die Ablenkungs- und Akzeptanzstrategien hinsichtlich ihrer Wirksamkeit bei Schmerz verglichen haben, wiesen widersprüchliche Befunde auf. In einer Meta-Analyse beschreiben Kohl und KollegInnen eine Überlegenheit von Akzeptenzstrategien bezogen auf Verbesserungen der Schmerztoleranz, jedoch keine Unterschiede in der Wirksamkeit auf die subjektive Schmerzintensität (Kohl, Rief, & Glombiewski, 2012). Im Gegensatz dazu legen die Ergebnisse anderer Studien eine Überlegenheit von Ablenkungsstrategien zur Reduzierung der Schmerzintensität nahe (Gutiérrez et al., 2004; Kohl et al., 2013). Bezüglich chronischer Schmerzen bestätigt eine aktuelle Meta-Analyse die Wirksamkeit von Akzeptanz- und Commitment-Therapie (Veehof et al., 2016). Hingegen gibt es aktuell nur wenig empirische Befunde zur Wirksamkeit von Ablenkungsstrategien als Interventionen bei chronischem Schmerz (Subnis, Starkweather, & Menzies, 2016). Überdies zeigte eine Meta-Analyse zu experimenteller Forschung hinsichtlich Ablenkungsstrategien bei Menschen mit chronischen Schmerzen keine Überlegenheit dieser Strategien zu Kontroll-Interventionen (Van Ryckeghem, Van Damme, Eccleston, & Crombez, 2018).

Zusammenfassend lässt sich demnach festhalten, dass es hinsichtlich Emotionsregulationsstrategien bei Schmerz für Akzeptanz und Ablenkung empirische Wirksamkeitsbelege bei akutem Schmerz gibt. In der Behandlung chronischer Schmerzen scheint vor allem Akzeptanz beispielsweise im Rahmen der ACT relevant.

Andere wirksame Emotionsregulationsstrategien sind unter anderem: kognitive Umstrukturierung, Entspannung oder Exposition. Auf diese soll an dieser Stelle nicht genauer eingegangen werden.

Einen weiteren hilfreichen Ansatz zur Bewältigung von intensiven Emotionen stellen (selbst)mitgefühls-basierte Interventionen dar (Purdie & Morley, 2016). Empirische Befunde belegen die Wirksamkeit solcher selbstmitgefühls-basierter Interventionen zur Bewältigung verschiedener psychischer Beeinträchtigungen, welche mit negativen affektiven Zuständen einhergehen (Graser & Stangier, 2018; Hofmann, Grossman, & Hinton, 2011; Kirby, Tellegen, & Steindl, 2017; Macbeth & Gumley, 2012). Dies legt den Schluss nahe, dass Selbstmitgefühl

auch eine hilfreiche Emotionsregulationsstrategie im Rahmen chronischer Schmerzerkrankungen sein könnte.

2.3. Selbstmitgefühl

Selbstmitgefühl könnte einen wichtigen, ergänzenden Ansatzpunkt der psychologischen Behandlung chronischer Schmerzen darstellen. Hierbei liegt der Fokus spezifisch auf dem Umgang mit intensivem emotionalen Erleben sowie starker Selbstkritik. Dies soll in den folgenden Abschnitten genauer erläutert werden.

2.3.1. Definition von Selbstmitgefühl

Mitgefühl wird grundlegend beschrieben als

> *„a sensitivity to the suffering of the self and others, with a deep commitment to alleviate it. "* (Gilbert, 2009)

Selbstmitgefühl beschreibt demnach eine unterstützende Haltung sich selbst gegenüber. Kristin Neff hat Selbstmitgefühl erstmals für die psychologische Forschung definiert (Neff, 2003a) als ein Konzept, bestehend aus drei Komponenten und deren Gegenpolen: Achtsamkeit (Mindfulness) vs. Überidentifikation, Verbindende Humanität (common humanity) vs. Isolation und Selbstbezogene Freundlichkeit (self-kindness) vs. Selbstkritik. Diese Komponenten sind in Abbildung 4 am Beispiel einer Person mit chronischen Schmerzen dargestellt und werden im Folgenden genauer erläutert (*Abbildung 4 Modell der Basiskomponenten von Selbstmitgefühl*).

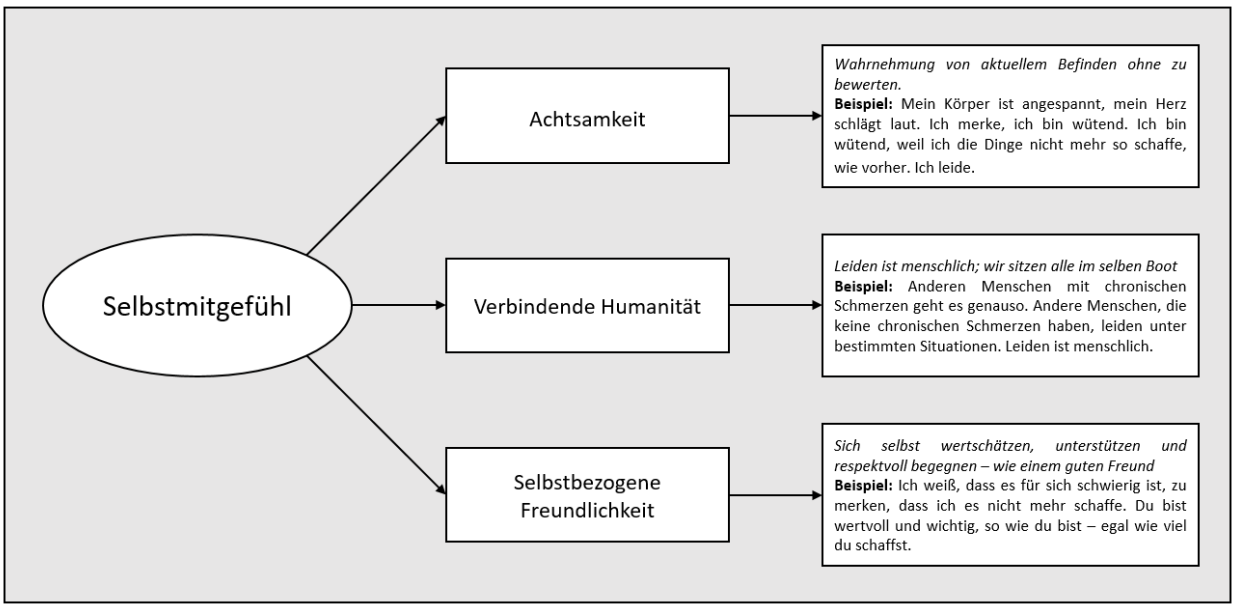

Abbildung 4 Modell der Basiskomponenten von Selbstmitgefühl

Für einen mitfühlenden Umgang mit sich selbst ist es demnach unerlässlich, zunächst das eigene Leiden im gegenwärtigen Moment bewusst wahrzunehmen (Achtsamkeit). Dies bezieht sich darauf, belastende Kognitionen, Emotionen und Erfahrungen mit einer offenen und akzeptierenden Haltung wahrzunehmen, ohne diese zu vermeiden oder sich darin zu verlieren. Der Komponente Achtsamkeit stehen somit sowohl Vermeidung als auch Überidentifikation gegenüber (Neff & Tirch, 2013). Sobald das eigene Leiden bewusst wahrgenommen wurde, ist es hilfreich Versagen, Herausforderungen und Leiden als Teil des menschlichen Lebens anzuerkennen (Verbindene Humanität). Das persönliche Leiden wird somit zu einer gemeinsamen, menschlichen Erfahrung, zu einem integralen Bestandteil der menschlichen Existenz. Verbindene Humanität steht somit dem Erleben von Isolation entgegen. Sobald das eigene Leiden als etwas Normales bzw. Natürliches erlebt wird, ist es möglich, sich selbst mit einer freundlichen, wohlwollenden und unterstützenden Haltung zu begegnen (Selbstbezogene Freundlichkeit). Dies bezieht sich vor allem auf Situationen, die geprägt sind von Misserfolg, Versagen, persönlichen Unzulänglichkeiten und Schmerz. Anstelle von Selbstkritik und Verurteilung wird mit Freundlichkeit und Geduld reagiert. Selbstbezogene Freundlichkeit steht somit im Gegensatz zu Selbstverurteilung.

Basierend auf dem Konzept der drei Komponenten (Achtsamkeit, Verbindende Humanität, Selbstbezogene Freundlichkeit) und deren Gegenpolen (Überidentifikation, Isolation, Selbstkritik) hat (Neff, 2003b) zudem die Self-Compassion Scale entwickelt. Diese wird vielfach eingesetzt, um Selbstmitgefühl als globales Konstrukt, wie auch die sechs Unterfacetten zu erfassen. Derzeit wird die angemessene Anwendung der Self-Compassion Scale in der Literatur stark diskustiert (Muris, Broek, Otgaar, Oudenhoven, & Lennartz, 2018; Muris et al., 2016, 2019; Muris & Otgaar, 2020; Neff, 2016, 2019; Neff, Tóth-Király, & Colosimo, 2018; Neff, Whittaker, & Karl, 2017; Pfattheicher et al., 2017). Gerade die ursprüngliche 6-Faktoren-Struktur mit dem Generalfaktor „Selbstmitgefühl“ ist umstritten (Muris & Otgaar, 2020; Muris et al., 2016).

2.3.2. Abgrenzung von Selbstmitgefühl von verwandten Konstrukten

Zu einer klaren Definition von Selbstmitgefühl ist zudem eine Abgrenzug von anderen verwandten Konstrukten unerlässlich. An dieser Stelle soll daher zunächst auf Selbstmitleid, dann auf Selbstwert sowie auf Psychologische Flexibilität, als grundlegendes Konzept der Akzeptanz- und Commitment-Therapie, eingegangen werden.

Selbstmitleid

Selbstmitleid lässt sich anhand der drei Komponenten von Selbstmitgefühl, von diesem klar abgrenzen. Im Rahmen von Selbstmitleid erfolgt zumeist kein achtsames Wahrnehmen, sondern eine Überidenfikation mit dem persönlichen Leiden. Eine Distanzierung davon ist kaum möglich. Auch wird das individuelle Leiden beziehungsweise die eigene Person als isoliert von anderen Menschen wahrgenommen. Eine wirkliche freundlich, wohlwollende Unterstützung der eigenen Person kann nicht erfolgden (Neff & Tirch, 2013).

Selbstwert

Die Forschung bietet verschiedene Definitionen des Selbstwertgefühls. In der vorliegenden Arbeit wird es als eine Bewertung des Selbst definiert, die sich auf die eigenen Qualitäten und Fähigkeiten bezieht (McCrae & Costa, 1992). Im Gegensatz zu Selbstwert bezieht sich eine selbstmitfühlende Haltung darauf, einen positiven Bezug zu sich selbst zu haben, nicht aufgrund von Einzigartigkeit oder Überdurchschnittlichkeit, sondern aufgrund der Tatsache des „Menschseins". Aktueller Forschung zufolge erweist sich Selbstmitgefühl als stabiler und weniger abhängig von sozialem Vergleich, öffentlichem Selbstbewusstsein und der Verteidigung des „Egos" als Selbstwert (Leary, Tate, Adams, Allen, & Hancock, 2007; Neff & Vonk, 2009). In Bezug auf ein hohes Ausmaß an Selbstkritik und Scham erscheint es demnach realistischer, Selbstmitgefühl anhand der Akzeptanz menschlicher Grenzen aufzubauen, anstatt Selbstbewertungen zu verändern (Neff & Tirch, 2013).

Psychologische Flexibilität

Psychologische Flexibilität wird definiert als

> *"being consciously present and changing or persisting in valued behavior"* (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

Im Zuge der Akzeptanz- und Commitment-Therapie (ACT) wurde Psychologische Flexibilität beschrieben als bestehend aus sechs Dimensionen: Defusion, Akzeptanz, Achtsamkeit, Selbst-als-Kontext, Engagement und Werte. Bei chronischem Schmerz haben sich vor allem zwei Facetten als besonders relevant herausgestellt: Vermeidung (als Gegenpol zu Akzeptanz) sowie Defusion. Dies wird in der Schmerzforschung anhand der Psychological Inflexibility in Pain Scale (PIPS) abgebildet. Wie oben beschrieben, zeigte eine aktuelle Meta-Analyse kleine bis mittlere Effektstärken für ACT bei chronischem Schmerz auf (Veehof et al., 2016). Neff und Tirch (2013) beschreiben konzeptuelle Überschneidungen zwischen Selbstmitgefühl und den sechs ACT-Dimensionen. Selbstmitgefühl jedoch beinhalte zusätzlich die bewusste Absicht, menschliches Leiden zu lindern. Empirische Belege für diese Annahmen sind derzeit jedoch noch nicht verfügbar.

Aktuelle Forschungslage zur Abgrenzung der Konstrukte

Forschung, welche sich mit der Abgrenzung der oben beschriebenen Konstrukte beschäftigt, ist rar und weist teils widersprüchliche Ergebnisse auf. In einer querschnittlichen Studie an Studierenden wurden Selbstmitgefühl und Psychologische Flexibilität in ihrer Relevanz zur Erklärung von emotionalem Wohlbefinden überprüft. Hierbei zeigte sich, dass Selbstmitgefühl und Psychologische Flexibilität signifikant korreliert waren und Selbstmitgefühl einen signifikanten eigenständigen Prädiktor darstellte (Marshall & Brockman, 2016). Gleichwohl zeigte sich bei Menschen mit Posttraumatischer Belastungsstörung, dass Achtsamkeit, Selbstmitgefühl und Psychologische Flexibilität einen gemeinsamen latenten Faktor abbildeten (Meyer et al., 2018a). In einer randomisiert-kontrollierten Studie zu ACT bei Studierenden wiederum wurden die Veränderungen in Selbstmitgefühl signifikant durch Psychologische Flexibilität mediiert (Yadavaia, Hayes, & Vilardaga, 2014).

Auf Basis der bisherigen Forschung erscheint somit eine klare Abgrenzung von Selbstmitgefühl zu verwandten Konstrukten schwierig. Es lässt sich vor allem zu Psychologischer Flexibilität eine konzeptuelle Überschneidung vermuten.

2.3.3. Selbstmitgefühl und Emotionsregulation

Selbstmitgefühl in der klinischen Forschung:

Psychische Erkrankungen gehen sehr häufig mit emotionalen Beeinträchtigungen einher. Selbstmitgefühls-basierte Interventionen können an dieser Stelle einen wirksamen Behandlungsansatz darstellen. Dies ist bereits für verschiedenste Störungbilder, wie beispielsweise Angsterkrankungen, depressive Störungen oder aber auch für allgemeines Stresserleben anhand von aktuellen Meta-Analysen und Reviews verdeutlicht worden (Hofmann et al., 2011; Macbeth & Gumley, 2012; Stefan & Hofmann, 2019). Auch für eine Vielzahl anderer psychischer Erkrankungen (u.a. Persönlichkeitsstörungen, schizophrene Erkrankungen, Essstörungen) gibt es Belege für die Wirksamkeit von mitgefühlsbasierten Interventionen (Graser & Stangier, 2018). So kommen beispielsweise therapeutische Ansätze wie die Compassion Focused Therapy (Gilbert, 2009), Trainings wie das „Mindful Self-Compassion Training“ (Germer & Neff, 2019) oder „Compassion Cultivation Training“ (Chapin et al., 2014) oder aber auch Interventionsbausteine wie Metta-Meditation oder „Loving Kindness-Meditation“ zum Einsatz. Hierbei konnten unter anderem Verbesserungen in Bezug auf Schamerleben, Selbstkritik oder Essverhalten erzielt werden.

Experimentelle Forschung zu Selbstmitgefühl als Emotionsregulationsstrategie:

Auch Ergebnisse aus experimenteller Forschung können bezüglich der Einschätzung der Relevanz von Selbstmitgefühl als Emotionsregulationsstrategie herangezogen werden. So gibt

es beispielsweise mehrere Studien zur Bewältigung negativer Stimmung im Kontext von affektiven Störungen. Die Befunde sind jedoch widersprüchlich. In einer Studie erwies sich Selbstmitgefühl effektiver als die Akzeptanz-Strategie bei der Bewältigung von induzierter negativer Stimmung. Dies galt sowohl für Menschen, die aktuell depressiv erkrankt waren, Menschen in Remission einer depressiven Erkrankung, wie auch für Menschen ohne depressive Vorerkrankung. Bei allen Menschen, die nicht aktuell unter einer Depression litten, erwies sich Selbstmitgefühl zudem als überlegen in Bezug auf kognitive Umstrukturierung (Ehret, Joormann, & Berking, 2018). Im Gegensatz dazu fanden sich in einem weiteren Experiment keine Unterschiede zwischen den Strategien Selbstmitgefühl, kognitive Umstrukturierung und Akzeptanz bei der Regulation von negativer Stimmung (Diedrich, Grant, Hofmann, Hiller, & Berking, 2014). Ein anderes Experiment legte nahe, dass Selbstmitgefühl möglicherweise als vorbereitende Emotionsregulationsstrategie hilfreich sein könnte, um den Effekt anderer Strategien zu optimieren (Diedrich, Hofmann, Cuijpers, & Berking, 2016). Diesbezüglich wurde geschlussfolgert, dass Selbstmitgefühl eine adäquate Strategie zur Bewältigung intensiver negativer Emotionen sein und zudem den Einsatz nachfolgender Strateigen wie kognitive Umstrukturierung oder Akzeptanz erleichtern könnte (Diedrich et al., 2014, 2016).

Zusammenfassend lässt sich festhalten, dass (Selbst)mitgefühls-basierte Interventionen für die Bewältigung verschiedenster psychischer Erkrankungen hilfreich scheinen, die experimentelle Forschung zu Selbstmitgefühl als Emotionsregulationsstrategie jedoch bislang eine geringe Datenlage und widersprüchliche Befunde aufweist.

2.3.4. Selbstmitgefühl in der Schmerzforschung

Purdie & Morley gaben in einem Übersichtsartikel 2016 die Empfehlung ab, Mitgefühls-basierte Ansätze bei Schmerz genauer zu untersuchen. Hierbei wurde vor allem darauf verwiesen, dass die Entwicklung einer freundlichen, bedingungslos wertschätzenden Haltung und Reaktion gegenüber dem eigenen Schmerz, persönlicher Schwierigkeiten und eigenem Versagen besonders für Menschen, die unter chronischen Schmerzen leiden, von besonderer Relevanz sein könnte (Purdie & Morley, 2016). Bisherige empirische Studien zeigen vielversprechende Ergebnisse. So war Selbstmitgefühl in querschnittlichen Studien zu chronischem Schmerz assoziiert mit den folgenden schmerzbezogenen Aspekten: besseres Funktionsniveau, geringere schmerzbezogene Katastrophisierung und schmerzbezogene Angst sowie höhere Schmerzakzeptanz (Edwards et al., 2019; Wren et al., 2012). Hinsichtlich negativer Emotionen und Emotionsregulation war Selbstmitgefühl assoziiert mit positivem und negativem Affekt, Depressivität, Angst und Stress (Costa & Pinto-Gouveia, 2011; Edwards et

al., 2019; Wren et al., 2012). Des Weiteren konnte ein signifikanter Zusammenhang zwischen Vermeidungs-verhalten und Selbstmitgefühl aufgezeigt werden (Costa & Pinto-Gouveia, 2013).

In einer aktuellen längsschnittlichen Studie sagte Selbstmitgefühl zukünftige depressive Symptome von Menschen mit chronischen Schmerzen vorher, wohingegen achtsames Bewusstsein (mindful awareness) keine signifikante Vorhersagekraft aufwies (Carvalho, Trindade, Gillanders, Pinto-Gouveia, & Castilho, 2019). In experimentellen Studien wurde zudem die Relevanz von Selbstmitgefühl bei Menschen mit chronischen Schmerzen (N = 60) im Kontext sozialer Situationen anhand von Fallvignetten untersucht (Purdie & Morley, 2015). Selbstmitgefühl zeigte signifikante Zusammenhänge mit geringerem negativen Affekt, einer geringeren Wahrscheinlichkeit für Vermeidung, Katastrophisierung und Grübeln als Reaktion auf unangenehme Ereignisse sowie einer höheren Zufriedenheit mit sozialer Beteiligung. Experimente zu akut induziertem Schmerz bei gesunden Studierenden zeigten widersprüchliche Befunde. So war Selbstmitgefühl in einer Studie mit N = 58 Studierenden weder assoziiert mit Schmerzintensität noch mit Katastrophisierung bei einer einmaligen Testung mithilfe des Cold Pressor Task (Talbot, Basque, & French, 2018). In einer anderen Studie (N = 30) zeigte sich im Anschluss an eine mitgefühlsbasierte Intervention eine geringere Schmerzintensität sowie eine größere Herzratenvariabilität im Vergleich zur within-subjects Kontrollbedingung (Luo, Liu, & Che, 2019).

Insgesamt gibt es bisher nur wenige Studien, welche die Wirksamkeit von mitgefühlsbasierten Interventionen bei chronischem Schmerz untersucht haben. Hierbei handelt es sich zudem ausschließlich um Pilotstudien oder unkontrollierte Designs. Diese Interventionsstudien zeigten verbesserte schmerzbezogene Resultate hinsichtlich Schmerzintensität, Funktionsniveau, schmerzbezogenem Stress und Schmerzakzeptanz (Armitage & Malpus, 2019; Carson et al., 2005; Chapin et al., 2014; Montero-Marín et al., 2018; Parry & Malpus, 2017; Penlington, 2018). Des Weiteren führten mitgefühlsbasierte Ansätze zu einer Reduktion des erlebten Ärgers (Carson et al., 2005; Chapin et al., 2014).

Selbstmitgefühl erwies sich ebenfalls als signifikanter Mediator für Veränderung bei der Behandlung von chronischem Schmerz mit Akzeptanz- und Commitment-Therapie (ACT), wie auch Attachment-Based Compassion Therapy (ABCT) hinsichtlich Beeinträchtigung, Depressivität und (schmerzbezogener) Angst (Montero-Marin et al., 2020; Vowles, Witkiewitz, Sowden, & Ashworth, 2014) .

Zusammenfassend zeigten sich somit sowohl Verbesserungen oder positive Zusammenhänge bezogen auf Schmerz-spezifische Variablen wie Beeinträchtigung, Katastrophisierung und schmerzbezogene Angst, wie auch bezogen auf emotionales Erleben (Ärger, Depressivität, Angst oder allgemeine emotionale Reaktionen). Es lässt sich demnach aus den vorliegenden Studien schließen, dass Selbstmitgefühl für die Behandlung von Menschen mit chronischen Schmerzen von Relevanz sein könnte.

3. Darstellung des Dissertationsvorhabens

3.1. Relevanz und Herleitung der Fragestellungen

Menschen mit chronischen Schmerzen weisen neben der physiologischen Beeinträchtigung ein hohes Maß emotionaler Beeinträchtigung auf (Nicholas et al., 2019). Für die Entstehung und Aufrechterhaltung von chronischen Schmerzen sind neben sensorischen Veränderungen zudem kognitive Bewertungsprozesse, die emotionale Reaktion sowie die Reaktion auf Verhaltensebene von zentraler Relevanz (Williams & Craig, 2016). Auf diese Ebenen zielen die verschiedenen psychotherapeutischen Ansätze zur Bewältigung chronischer Schmerzen wie Kognitive Verhaltenstherapie (KVT), die Acceptanz- und Commitment-Therapie (ACT) Expositionstherapie ab, erreichen jedoch nur Effektstärken im kleinen bis mittleren Bereich (Glombiewski et al., 2018; Veehof et al., 2016; Williams et al., 2012). Auch sind die Interventionen nicht für alle Menschen wirksam. Mithilfe von adaptiven, individualisierten Behandlungen soll dieses Problem gelöst werden. Zunächst müssen dafür spezifische Aspekte identifiziert werden, welche in bestimmten Kontexten oder für bestimmte Subgruppen zusätzliche Beeinträchtigung bedingen oder Therapieerfolge verhindern.

Einen möglichen Ansatzpunkt für adaptive Behandlungen stellen Emotionen und ihre adäquate Regulation dar, welche auch für die Bewältigung chronischer Schmerzen essentiell sind (Koechlin et al., 2018). Die relevantesten Emotionen im Kontext chronischer Schmerzerkrankungen sind Depressivität, Angst und Ärger. Spezifisch die Bedeutung von Ärger bei chronischem Schmerz wurde u. a. in Übersichtsarbeiten hervorgehoben und Forschung zu Interventionen wurde dringend empfohlen (Fernandez & Turk, 1995; Greenwood et al., 2003). Dennoch ist die Forschungslage zu Behandlungsansätzen von Ärger bei chronischem Schmerz sehr begrenzt (Darnall, 2015). Um eine adaptivere Behandlung von Menschen mit chronischen Schmerzen zu ermöglichen, sollten somit therapeutische Ansätze identifiziert werden, welche auf die Regulation von Emotionen, insbesondere von Ärger abzielen.

Einen hilfreichen Ansatz für den Umgang mit intensiven Emotionen sowie starker Selbstkritik stellen Mitgefühls-basierte Interventionen dar (Purdie & Morley, 2016). Empirische Befunde belegen deren Wirksamkeit zur Bewältigung verschiedener psychischer Beeinträchtigungen (Graser & Stangier, 2018; Hofmann et al., 2011; Kirby et al., 2017; Macbeth & Gumley, 2012). Auch im Kontext chronischer Schmerzen existieren empirische Belege für die Relevanz von Selbstmitgefühl. So zeigten sich sowohl Zusammenhänge zwischen Selbstmitgefühl und

Schmerz-spezifischen Variablen (Beeinträchtigung, Katastrophisierung und schmerzbezogene Angst), als auch emotionalem Erleben (Ärger, Depressivität, Angst oder allgemeine emotionale Reaktionen), wie auch Verbesserungen in den jeweiligen Variablen im Anschluss an Mitgefühls-basierte Interventionen (u.a. Armitage & Malpus, 2019; Carson et al., 2005; Carvalho et al., 2019; Chapin et al., 2014; Costa & Pinto-Gouveia, 2011; Edwards et al., 2019; Wren et al., 2012). Es lässt sich demnach aus den vorliegenden Studien schließen, dass Selbstmitgefühl für die Behandlung von Menschen mit chronischen Schmerzen hilfreich sein könnte. Dennoch fehlen eine klare Definition des Konstrukts im Bereich chronischen Schmerzen, die Abgrenzung von verwandten Konstrukten und damit verbunden auch eine Einschätzung der eigenständigen Relevanz von Selbstmitgefühl. Zudem sind weitere empirische Belege aus längschnittlichen Studien mit großen Stichproben, experimentellen Untersuchungen sowie randomisiert-kontrollierten Interventionsstudien nötig.

3.2. Fragestellungen des Dissertationsvorhabens

Abgeleitet aus der empirischen Befundlage wurden der vorliegenden Dissertationsarbeit folgende Fragestellungen und spezifischen Hypothesen zu Grunde gelegt.

Studie 1:

Welche wirksamen psychotherapeutischen Ansätze zur Bewältigung von Ärger bei chronischem Schmerz gibt es?

Studie 2:

Wie kann Selbstmitgefühl im Rahmen chronischer Schmerzen definiert werden? Wie lässt sich Selbstmitgefühl von den verwandten Konstrukten, Psychologische Flexibilität und Selbstwert, abgrenzen?

- *Hypothese 2a:* Selbstmitgefühl kann auch bei chronsichem Schmerz anhand der drei Aspekte Achtsamkeit, Verbindende Humanität und Selbstbezogene Freundlichkeits, sowie deren Gegenfacetten definiert werden.
- *Hypothese 2b:* Für Selbstmitgefühl, Psychologische Flexibilität und Selbstwert lassen sich Zusammenhänge finden, jedoch in einem Ausmaß, das auf Unabhängigkeit der Konstrukte schließen lässt.

Studie 3:

Welche prädiktive Relevanz weist Selbstmitgefühl im Vergleich zu Selbstwert und Psychologischer Flexibilität hinsichtlich Schmerz-spezifischer Aspekte, sowie Depressivität und Ärger im Rahmen chronischer Schmerzen auf?

- *Hypothese 3a:* Selbstmitgefühl stellt einen eigenständigen Prädiktor hinsichtlich Schmerz-spezifischer Aspekte dar.
- *Hypothese 3b:* Selbstmitgefühl stellt einen eigenständigen Prädiktor für Depressivität dar.
- *Hypothese 3c:* Selbstmitgefühl stellt einen eigenständigen Prädiktor hinsichtlich Ärger-spezifischer Aspekte dar.

Studie 4:

Wie wirksam ist eine Selbstmitgefühls-Intervention bezogen auf die Bewältigung akuter Schmerzen, verglichen mit anderen relevanten Interventionsansätzen wie Akzeptanz und Ablenkung?

- *Hypothese 4a – explorativ*: Führt die Selbstmitgefühls-Intervention zu einer Verbesserung der Schmerztoleranz, sowie einer Verringerung der subjektiven Schmerz-intensität und Schmerzaversion?
- *Hypothese 4b – explorativ*: Sind die Ergebnisse der Selbstmitgefühls-Intervention auf Schmerztoleranz, Schmerzintensität und Schmerzaversion mit den Ergebnissen der Akzeptanzbedingung sowie jenen der Ablenkungsbedingung vergleichbar, über- oder unterlegen?

4. Zusammenfassung der Studien

Studie 1: Die Behandlung von Ärger bei chronischen Schmerzen – ein Scoping-Review und Modell der Ärger-Regulation

Emmerich, A.C., Lischetzke, T. & Glombiewski, J.A. (submitted). Anger and its treatment in chronic pain – a scoping review and conceptual model. *Scandinavian Journal of Pain*.

Hintergrund: Im Rahmen von chronischen Schmerzerkrankungen zählt das Erleben und Bewältigen von Ärger zu den relevantesten emotionalen Beeinträchtigungen. Die empirische Befundlage zu therapeutischen Ansätzen zur Behandlung von Ärger bei Schmerz ist gering. Das Ziel dieses Reviews war es somit, einen Überblick über Interventionsstudien zu geben, welche (1) direkt den Ärger von Menschen mit chronischen Schmerzen adressieren oder (2) Ärger als primäres oder sekundäres Outcome-Maß erfassen.

Methode: Es wurde eine umfangreiche Literatursuche über die Datenbanken PsychINFO, Pubmed und Web of Science durchgeführt. Studien wurden eingeschlossen, wenn sie die folgenden Kriterien erfüllten: (1) die Stichprobe bestand aus Menschen mit chronischen Schmerzen, ihren Ehepartnern oder medizinischem Personal, welches mit Menschen mit chronischen Schmerzen arbeitete, (2) es wurde eine psychologische Intervention durchgeführt, (3) eine Facette von Ärger wurde erfasst, (4) es gab ein Peer-review-Verfahren, (5) die Publikationen waren auf Englisch oder Deutsch erhältlich.

Ergebnisse: Für das Review wurden N = 19 Studien mit einer Gesamtzahl an N = 1710 TeilnehmerInnen, eingeschlossen. Die Studien wiesen starke Unterschiede hinsichtlich des therapeutischen Ansatzes, des Studiendesigns, der Stichprobengröße, der ärger-spezifischen Messinstrumente wie auch der allgemeinen Qualität auf. Nur in zwei der Studien zielten die Interventionen auf eine Reduzierung des Ärgers ab. Alle anderen Studien erfassten Ärger als sekundäres Outcome-Maß. Für Emotions- oder Ärger-Expression-Interventionen konnte im Rahmen von randomisiert-kontrollierten Studien keine Reduzierung von Ärger nachgewiesen werden. Die Befunde zur Wirksamkeit von klassischer kognitiver Verhaltenstherapie oder auch multimodaler Schmerztherapie hinsichtlich des Ärgers waren begrenzt. Die aussichtsreichsten Ergebnisse wiesen Studien zu akzeptanz- oder mitgefühlsbasierten Interventionen auf. Achtsamkeitsbasierte Ansätze zeigten widersprüchliche Resultate. Der Einbezug von Partnern

in die Therapie erschien hilfreich zur Bewältigung von Ärger. Dies galt auch für spezifische Schulungen des medizinischen Personals beziehungsweise der Behandler.

Diskussion: Die geringe Anzahl der eingeschlossenen Studien stellte eines der wichtigsten Ergebnisse des Reviews dar. Dies galt ebenso für die starke Diversität sowie teils mangelnde Qualität der dargestellten Studien. Weitere Forschung zur Bestätigung der gefundenen Befunde ist nötig, v. a. hinsichtlich mitgefühlsbasierter Ansätze, dem Einbezug von Partner*innen und Schulungen des medizinischen Personals. Zudem sollten wirksame psychotherapeutische Ansätze zur Behandlung von chronischem Schmerz (KVT, ACT, Expositionstherapie) hinsichtlich ihrer Wirksamkeit auf Ärger überprüft werden. Selbiges gilt für spezifische Programme zur Ärger-Reduktion, welche bisher nicht im Schmerzbereich evaluiert wurden. Das „Prozess Modell der Ärger-Regulation bei chronischem Schmerz", welches vorgeschlagen und diskutiert wurde, stellt eine Möglichkeit zur theoretischen Fundierung zukünftiger Forschung dar. Zudem ist es nötig, dieses durch empirische Befunde zu bestätigten.

Studie 2: Alles ein und dasselbe? Selbstmitgefühl, Psychologische Inflexibilität und Selbstwert bei chronischem Schmerz

Emmerich, A.C., Friehs, T. & Glombiewski, J.A. (submitted) A rose by any other name? Self-compassion, psychological inflexibility, and self-esteem in chronic pain. *Journal of Contextual Behavioral Science.*

Hintergrund: In der Literatur finden sich zunehmend Befunde, welche die Relevanz von Selbstmitgefühl bei Schmerz belegen. Hierbei wurde Selbstmitgefühl jedoch immer unabhängig von verwandten Konstrukten wie Psychologischer Inflexibilität oder Selbstwert erfasst. Es bleibt somit unklar, ob Selbstmitgefühl ein weiteres unabhängiges Konzept im Rahmen von Schmerz darstellt. Demnach sollte in der vorliegenden Studie Selbstmitgefühl von Psychologischer Inflexibilität und Selbstwert differenziert werden.

Methode: Menschen mit chronischen Schmerzen (t1: N_{CP1} = 872; t2 N_{CP2} = 316) wie auch Menschen ohne chronische Schmerzen (t1: N_{NP1} = 356; t2: N_{NP2} = 60) nahmen an einer längsschnittlichen Studie teil. Die Teilnahme bestand im Ausfüllen verschiedener Messinstrumente, welche verschiedene schmerzbezogene Konstrukte erfassten, wie auch Selbstmitgefühl (Self-Compassion Scale - SCS), Psychologische Inflexibilität (Psychological Inflexibility in Pain Scale - PIPS) und Selbstwert (Rosenberg Self-Esteem Scale - RSES). Beide Messzeitpunkte lagen circa acht Wochen auseinander. Die Faktorenstruktur des SCS wurde zunächst mithilfe von konfirmatorischen Faktorenanalysen (CFA) untersucht. Nachfolgend wurden die Faktoren der SCS, PIPS und RSES gemeinsam in einer konfirmatorischen Faktorenanalyse überprüft.

Ergebnisse: Die postulierte Sechs-Faktoren-Struktur mit Generalfaktor der SCS konnte in der vorliegenden Studie nicht repliziert werden. Weitere Analysen wurden daher auf Basis einer adaptierten Zwei-Faktoren-Lösung durchgeführt. Diese wies den besten Modell-Fit bezogen auf die aktuellen Daten auf (RMSEA = .047, CFI = .951, SRMR = .045). Die beiden interkorrelierten Faktoren „compassionate self-responding" (CS) und „reduced uncompassionate self-responding" (RUS) wurden in einer konfirmatorischen Faktorenanalyse gemeinsam mit dem Generalfaktor der RSES wie auch den zwei Faktoren „Vermeidung" (A) und „kognitive Fusion" (F) der PIPS modelliert. Diese konfirmatorische Faktorenanalyse wurde zunächst an der Gesamtstichprobe zu t1 (N_{T1}) durchgeführt. Nachfolgend wurden die Analysen an folgenden Stichproben wiederholt: Gesamtstichprobe zu t2 (N_{T2}), Stichprobe von Menschen mit chronischem Schmerz zu t1 (N_{CP1}) und t2 (N_{CP2}) sowie Stichprobe von Menschen ohne

chronische Schmerzen zu t1 (N_{NP1}). Die Ergebnisse wiesen über alle CFA hinweg akzeptable Modell-Fits auf. CS wies moderate bis hohe Interkorrelation mit den anderen Faktoren auf. Für RUS und Selbstwert zeigten sich sehr hohe Interkorrelationen (>.8).

Diskussion: Die Ergebnisse der vorliegenden Studie weisen darauf hin, dass die SCS zwei Faktoren von Selbstmitgefühl darstellt. CS kann als distinktes Konstrukt zu Psychologischer Inflexibilität und Selbstwert angesehen werden. Es ist jedoch davon auszugehen, dass RUS und Selbstwert das gleiche latente Konstrukt repräsentieren. Zukünftige Forschung sollte die Relevanz dieser Konzepte für schmerzbezogene wie auch emotionale Beeinträchtigungen bei chronischem Schmerz überprüfen.

Studie 3: Die Relevanz von Selbstmitgefühl als Prädiktor von Schmerz, Depression und Ärger bei Menschen mit chronischen Schmerzen – eine prospektive Studie

Emmerich, A.C., Friehs, T., Crombez, G. & Glombiewski, J.A. (2020) The role of self-compassion in predicting pain, depression and anger in patients with chronic pain: a prospective study. *European Journal of Pain*, 24, 10, 1902-1914.

Hintergrund: Bei Menschen, die unter chronischen Schmerzen leiden ist Selbstmitgefühl u. a. mit physischer Beeinträchtigung, schmerzbezogener Angst wie auch Depressivität und Ärger assoziiert. Gleichwohl wurde der eigenständige Beitrag von Selbstmitgefühl, verglichen mit verwandten Konstrukten wie Selbstwert und Psychologischer Inflexibilität, bisher nicht überprüft. Die vorliegende Studie zielte darauf ab, die Relevanz von Selbstmitgefühl als eigenständigen Prädiktor zu überprüfen.

Methode: In einer längsschnittlichen Studie mit zwei Messzeitpunkten (t1: N_{T1} = 1228; t2: N_{T2} = 376) wurden Menschen mit chronischen Schmerzen (t1: N_{CP1} = 872; t2 N_{CP2} = 316) und Menschen ohne chronische Schmerzen (t1: N_{NP1} = 356; t2: N_{NP2} = 60) untersucht. Alle TeilnehmerInnen beantworteten verschiedene Selbstbeurteilungsfragebogen: Pain Disability Index (PDI), Pain Catastrophizing Scale (PCS), Pain Anxiety Symptom Scale (PASS-20), Patient-Health-Questionnaire (PHQ-9), State-Trait-Anger-Expression Inventory (STAXI), Self-Compassion Scale (SCS), Psychological Inflexibility in Pain Scale (PIPS) und Rosenberg Self-Esteem Scale (RSES). Die Erhebung wurde nach acht Wochen wiederholt. Die Relevanz der einzelnen Prädiktoren für die jeweiligen Outcome-Maße wurde mittels Pfad-Analysen überprüft.

Ergebnisse: Die Pfad-Analyse wurde zunächst nur für Personen mit chronischen Schmerzen (N_{CP}) durchgeführt. Sie untersuchte die prädiktiven Werte von „compassionate self-responding“ (CS) und „reduced uncompassionate self-responding“ (RUS) auf schmerz-spezifische Variablen (PDI, PCS, PASS) sowie Depression (PHQ-9) und Ärger (STAXI) im Vergleich zu Vermeidung (PIPS-A), kognitiver Fusion (PIPS-F) und Selbstwertgefühl (RSES). Unabhängige Variablen waren alle eingeschlossenen Variablen zu T1 und abhängige Variablen waren alle eingeschlossenen Variablen zu T2. Um das Modell zu vereinfachen, wurden für die relevanten Prädiktoren (CS, RUS, A, F, RSES) nur Autoregressionen einbezogen. A erwies sich als signifikanter eigenständiger Prädiktor für PDI, PCS, PASS und PHQ-9. RUS hatte

signifikante eigenständige prädiktive Relevanz bezüglich PCS und PASS. RSES war ein signifikanter eigenständiger Prädiktor für PHQ-9. CS und F wiesen keinen eigenständigen prädiktiven Wert auf. Das Pfad-Modell erklärte 65.4%-72.1% der Varianz der schmerzbezogenen Variablen, 68.7% der Varianz in Depressivität sowie 38.7%-60.7% der Varianz in ärgerbezogenen Variablen. Die Pfad-Analysen wurden nachfolgend an der Gesamtstichprobe repliziert (N_T). Dies führte zu vergleichbaren Ergebnissen.

Diskussion: Hinsichtlich Selbstmitgefühl bei Schmerz lässt sich schlussfolgernd sagen, dass nur RUS, jedoch nicht CS einen relevanten Prädiktor für schmerzbezogene Variablen darstellt. Psychologische Inflexibilität, genauer Vermeidungsverhalten, weist zudem eine breitere Relevanz auf als RUS. Bezogen auf Depressivität erwiesen sich Vermeidungsverhalten und Selbstwert als relevante Prädiktoren. Jedoch konnte keiner der relevanten Prädiktoren Ärger-spezifische Aspekte vorhersagen. Diese Ergebnisse sollten an weiteren Stichproben repliziert werden. Zudem sollte zukünftige Forschung Unterschiede in spezifischen Subgruppen addressieren. Langfristig sollte hierbei das Ziel der Entwicklung von „tailored-treatment"-Ansätzen verfolgt werden.

Studie 4: Selbstmitgefühl bei akutem Schmerz – eine experimentelle Evaluation von Emotionsregulationsstrategien

Emmerich, A.C. & Glombiewski, J.A. (submitted) Self-compassion and acute pain – an experimental investigation. *European Journal of Pain.*

Theorie: Physiologischer Schmerz geht mit negativen Affekten einher. Daher sind Emotionsregulationsstrategien zur Bewältigung chronischer Schmerzen relevant. Akzeptanz- und Ablenkungsstrategien sind am besten empirisch belegt, zur Überlegenheit zeigen sich jedoch widersprüchliche Befunde. Selbstmitgefühl gilt im Bereich affektiver Störungen als hilfreiche Emotionsregulationsstrategie. Im Kontext von Schmerz zeigen sich Zusammenhänge mit Schmerzakzeptanz sowie schmerzbezogener Depression oder Ärger. Ziel dieser Studie war die experimentelle Evaluation einer Selbstmitgefühls-basierten Intervention zur Bewältigung akuter Schmerzen im Vergleich zu anderen relevanten Strategien wie Ablenkung und Akzeptanz.

Methode: Das Experiment umfasste einen Online-Prätest sowie zwei Labortermine (1. Termin: Prätest, Posttest; 2. Termin: 1-wöchiges Follow-Up). Es wurde ein mixed between-within design mit zwei Faktoren (Bedingung, Zeit) genutzt. Die ProbandInnen (N = 120 Studierende, 70,8 % weiblich) wurden den Interventions-Bedingungen (Selbstmitgefühl, Akzeptanz, Ablenkung) randomisiert zugeteilt. Im Rahmen des ersten Labortermins wurde abhängig von der Bedingung eine Schmerzbewältigungsstrategie vermittelt. Diese wurde anhand von täglichen Audioinstruktionen während der einwöchigen Übungsphase vertieft. Im Zuge der Labortermine wurde akuter Schmerz anhand einer TSA-II-Thermode appliziert. Es wurden jeweils Schmerztoleranz, Schmerzintensität sowie Schmerzaversion erfasst. Dies wurde anhand einer 3 (Bedingung) x 3 (Zeit) Multivariaten Varianzanalyse (MANOVA) ausgewertet.

Ergebnisse: Für die MANOVA zeigte sich ein signifikanter within-subjects effect (Zeit) ($F(2) = 6.450$; $p < .001$), jedoch kein between-subjects effect (Bedingung) oder Interaktionseffekt (Zeit x Bedingung). Für alle Instruktionen zeigte sich eine Erhöhung der Schmerztoleranz, ein vergleichbarer Verlauf der Schmerzintensität sowie eine Reduktion der Schmerzaversion.

Diskussion: Selbstmitgefühl ist ebenso hilfreich wie Akzeptanz und Ablenkung zur Bewältigung von akutem Schmerz. Zukünftig gilt es, zu identifizieren, welche Strategien sich für bestimmte Subgruppen oder in bestimmten Situationen als wirksamer erweisen. Ziel ist eine höhere Flexibilität und Adaptivität von Emotionsregulation in der Schmerztherapie.

5. Zusammenfassende Diskussion und Ausblick

5.1. Zusammenfassung der Ergebnisse

Im Rahmen der vorliegenden Dissertation sollte Selbstmitgefühl bei akutem und chronischem Schmerz sowie die spezifische Relevanz dieses Konzepts für die Bewältigung von Ärger untersucht werden. In einem Überblicksartikel wurden hierfür zunächst wirksame psychotherapeutische Ansätze zur Bewältigung von Ärger bei Schmerz dargestellt (Studie 1). Die Studien wiesen starken Unterschiede hinsichtlich Design, Stichprobe, Messinstrumente, Behandlungsansatz und Qualität auf. Die vielversprechendsten Ergebnisse zeigten sich bei Interventionen aus dem Bereich der Akzeptanz- und Commitment-Therapie. Mitgefühls-basierte Ansätze führten in ersten Pilot-Studien zur Reduktion von Ärger. Forschung zu KVT, multimodaler Schmerztherapie und achtsamkeitsbasierten Ansätzen hinsichltich Ärger ist begrenzt oder zeigte widersprüchliche Befunde. Trainings zur emotionalen Expression zeigten in randomisiert, kontrollierten Studien keine eigenständige Auswirkung auf Ärger. Hingegen könnten der Einbezug von PartnerInnen in die Therapie sowie Trainings für Behandler ärger-bedingte interaktionelle Schwierigkeiten reduzieren. Zusammenfassend existieren demnach hilfreiche Behandlungsansätze, weitere empirische Belege für deren Wirksamkeit stehen jedoch noch aus. Das „Prozessmodell der Ärgerregulation bei chronischen Schmerzen“ stellt eine theoretische Konzeptualisierung der ärgerbezogenen Aspekte bei chronischen Schmerzen zur Diskussion.

Bisherhige Studien zu Mitgefühl beziehungsweise Selbstmitgefühl bei Schmerz unterstützen die Relevanz hinsichtlich physiologischer und emotionaler Beeinträchtigung, wie beispielsweise Ärger (e.g. Carson et al., 2005; Chapin et al., 2014; Edwards et al., 2019; Parry & Malpus, 2017; Wren et al., 2012). In der vorliegenden Arbeit wurde Selbstmitgefühl nun erstmalig in einer kontrollierten, länggschnittlichen Studie mit verwandten Konstrukten verglichen (Studien 2 & 3). Zunächst wurde die postulierte Faktorenstruktur der Self-Compassion Scale überprüft, welche in der vorliegenden Arbeit nicht bestätigt werden konnte (Studie 2). Daher wurde Selbstmitgefühl bei Schmerz über die zwei Faktoren „compassionate self-responding (CS)“ und „reduced uncompassionate self-responding (RUS)“ definiert. Hierbei kann CS als distinktes Konstrukt zu Psychologischer Inflexibilität und Selbstwert angesehen werden. RUS scheint jeodch das gleiche latente Konstrukt zu repräsentieren wie Selbstwert. Die Relevanz dieser verschiedenen Konzepte für schmerzbezogene wie auch emotionale Beeinträchtigungen wurde nachfolgend genauer überprüft (Studie 3). Es wurde deutlich, dass nur der Faktor RUS einen relevanten Prädiktor für schmerzbezogene Variablen

darstellt. Einflüsse auf emotionale Aspekte wie Depressivität und Ärger konnten nicht gefunden werden. Gleichzeitig erklärte Psychologische Inflexibilität, spezifischer Vermeidungsverhalten, ein breiteres Spektrum an Variablen.

Im Rahmen der Dissertation wurde zudem erstmalig die Wirksamkeit von Selbstmitgefühl, verglichem mit Akzeptanz und Ablenkung, als Emotionsregulationsstrategie bei akutem Schmerz experimentell untersucht (Studie 4). Hierbei erwies sich Selbstmitgefühl als ebenso wirksam wie Akzeptanz und Ablenkung zur Bewältigung von thermischem Schmerz, bezogen auf Schmerztoleranz, -intensität und -aversion. Die Befunde waren über eine Woche stabil.

5.2. Bezug zur aktuellen Literatur

Die Relevanz von Ärger bei chronischem Schmerz wurde vielfach in der Literatur diskutiert (Fernandez, 2005; Greenwood et al., 2003). Forschung zu therapeutischen Ansätzen zur Bewältigung von Ärger bei Schmerz ist jedoch begrenzt. Die Ergebnisse von Studie 1 können demnach vor allem auf Literatur bezogen werden, die sich allgmein mit der Bewältigung von Ärger beschäftigt. Im Gegensatz zu den in Studie 1 gefundenen, widersprüchlichen Ergebnissen in Bezug auf die Wirksamkeit von KVT beschreibt ein aktueller Überblicksartikel über Meta-Analysen KVT als wirksame Behandlungsmöglichkeit von Ärger bei verschiedenen erwachsenen Populationen (e.g. Straftäter, Erwachsene mit geistigen Behinderungen, Menschen mit psychischen Erkrankungen und College-Studenten) (Lee & Digiuseppe, 2018). Im Einklang mit einem aktuellen Überblicksartikel zum Einsatz von ACT-Interventionen zur Behandlung von Ärger, Feindseligkeit und Aggression (Berkout, Tinsley, & Flynn, 2019) erwiesen sich ACT- wie auch mitgefühlsbasierte Interventionen bei chronischem Schmerz als am vielversprechendsten. Gerade solche Behandlungsansätze versuchen, spezfisch individuelle Bedürfnisse und Werte zu identifizieren (Hayes et al., 2006; Neff, 2003a). Sie nutzen vor allem auch den motivationalen und funktionalen Aspekt von Wut – persönliche Grenzen aufzuzeigen. Für viele Menschen mit chronischem Schmerz ist ein mitfühlender Umgang insbesondere mit sich selbst und bei gleichzeitigem Erleben von Ärger oder Scham besonders schwer. Lumley und Schubinger (2019) empfehlen demnach, jene Aspekte in die Behandlung von chronischem Schmerz einzubeziehen.

In Bezug auf Selbstmitgefühl bei chronischem Schmerz tragen die Ergebnisse der Dissertation (Studie 2 & 3) zudem zu der laufenden Debatte über die angemessene Anwendung der SCS bei. Die Faktorstruktur der SCS und ihre Konsequenzen für die psychologische Forschung ist aktuell stark umstritten (Muris, Broek, Otgaar, Oudenhoven, & Lennartz, 2018; Muris et al., 2016, 2019; Muris & Otgaar, 2020; Neff, 2016, 2019; Neff, Tóth-Király, & Colosimo, 2018;

Neff, Whittaker, & Karl, 2017; Pfattheicher et al., 2017). Die vorliegenden Ergebnisse stehen im Einklang mit Untersuchungen von Muris und Kollegen, die die ursprüngliche hierarchische 6-Faktoren-Struktur mit dem Generalfaktor „Selbstmitgefühl“ in Frage stellten (Muris & Otgaar, 2020; Muris et al., 2016). Bezogen auf die Abgrenzung der Konstrukte Selbstmitgefühl, Selbstwert und Psychologische Flexibilität stehen die vorliegenden Ergebnisse im Widerspruch zu der bisherigen Forschung. So wird in der Literatur eine konzeptuelle Überschneidung zwischen Selbstmitgefühl und psychologischer Flexibilität beschreiben (K. Neff & Tirch, 2013). Empirisch wird dies durch die bisherigen Studien gestützt, die alle ein gewisses Maß an theoretischer Überschneidung vermuten lassen (Carvalho, Gouveia, Gillanders, & Castilho, 2018; Duarte & Pinto-Gouveia, 2017; Marshall & Brockman, 2016; Meyer et al., 2018b; Woodruff et al., 2014; Yadavaia et al., 2014). Diese Befunde stehen jedoch im Gegensatz zu den Ergebnissen aus Studie 2. In Bezug auf die Abgrenzung von Selbstmitgefühl und Selbstwert können die Ergebnisse aus Studie 2 mögliche Erklärungen für die bisherige Forschung lieferen. So könnten die einerseits bisher gefundenen hohen Zusammenhänge zwischen einem globalen Selbstmitgefühls-Faktor und Selbstwert (u.a. Hwang, Kim, Yang, & Yang, 2016; Leary et al., 2007; Neff, 2003b; Neff & Vonk, 2009) vermutlich anhand der Überschneidung zwischen RUS und Selbstwert erklärt werden. Die Unterschiede in Bezug auf Zusammenhänge mit anderen Konstrukten könnten zudem anhand der Differenzierung zwischen CS und Selbstwert erklärt werden (Neff & Vonk, 2009).

Bezogen auf die Relevanz von Selbstmitgefühl im Kontext von Schmerz stehen die Ergebnisse von Studie 3 nur teilweise im Einklang mit früherer Forschung. Es gilt hierbei zu beachten, dass alle bisherigen Studien sich auf einen Generalfaktor „Selbstmitgefühl“ bezogen und auf den Einbezug verwandter Konstrukte verzichteten. In Übereinstimmung mit den aktuellen Erkenntnissen zeigte sich, dass Selbstmitgefühl schmerzbezogene Katastrophisierung (Wren et al., 2012) oder schmerzbedingte Angst (Edwards et al., 2019) vorhersagte. Hingegen erwies sich Selbstmitgefühl in diesen Studien auch als Prädiktor für physische Funktionsfähigkeit, Depressivität sowie positiven und negativen Affekt (Edwards et al., 2019; Wren et al., 2012). Gleichzeitig beruhen die bisherigen Ergebnisse auf querschnittlichen Daten, wodurch eine Interpretation der Kausalität unzulässlich ist. In Pilot-Studien zu mitgefühlsbasierten Ansätzen erwisen sich diese als wirksam bezüglich der Reduktion von Ärger (Carson et al., 2005; Chapin et al., 2014). Im Gegensatz dazu konnte Selbstmitgefühl Ärger in der vorliegenden Studie nicht vorhersagen. Vermeidungsverhalten erwies sich in der aktuellen Studie als relevantester Prädiktor im Kontext chronischer Schmerzen. Dies steht im Einklang mit dem „Fear-Avoidance-Modell“ (Vlaeyen et al., 2016), in welchem Vermeidungsverhalten als einer der

wichtigsten Einflussfaktoren für die Entstehung und Aufrechterhaltung chronischer Schmerzen beschrieben wird (Vlaeyen & Linton, 2000). Sowohl bei ACT als auch bei der Expositionstherapie stellt die Reduktion von Vermeidungsverhalten einen wichtigen Wirkmechanismus dar (Hedman-Lagerlöf et al., 2019; Wicksell et al., 2013). Dies führt zu der Schlussfolgerung, dass psychologische Flexibilität, genauer gesagt Vermeidungsverhalten als Gegenpol zu Akzeptanz, im Kontext chronischer Schmerzen relevanter zu sein scheint als Selbstmitgefühl.

In Studie 4 wurde nachfolgend die Wirksamkeit von Akzeptanz und Selbstmitgefühl als Emotionsregulationsstrategien zur Bewältigung von akutem Schmerz mit einer weiteren wirksamen Strategie, Ablenkungen, verglichen. Die bisherige Forschung zeigte hierbei widersprüchliche Befunde zum Vergleich verschiedener anderer Emotionsregulationsstrategien bei akutem Schmerz (Georgescu et al., 2018; Gutiérrez et al., 2004; Kohl et al., 2012, 2013; Kohl, Rief, & Glombiewski, 2014). Die Ergebnisse aus Studie 4 stehen demnach im Einklang mit einem Teil der bisherigen Forschung, welche keine Unterschiede zwischen den verschiedenen Emotionsregulationsstrategien in Bezug auf Schmerzintensität und –toleranz aufzeigen konnte.

5.3. Kritische Würdigung

Zur kritischen Betrachtung der Dissertation im Allgemeinen sollen zunächst einige Stärken der Arbeit hervorgehoben werden. So wiesen alle durchgeführten Studien einen hohen Neuigkeitswert auf. Studie 1 stellt den ersten Überblicksartikel zur Wirksamkeit psychologischer Behandlung von Ärger bei Schmerz dar. Die Studien 2 und 3 haben erstmalig Selbstmitgefühl bei Schmerz im Rahmen einer kontrollierten, längsschnittlichen Erhebung im Kontrast zu den verwandten Konstrukten Psychologische Inflexibilität und Selbstwert als Prädiktor bewertet. Auch in Studie 4 wurde erstmalig die Wirksamkeit von Selbstmitgefühl als Emotionsregulationsstrategie bei akutem Schmerz untersucht. Weitere Stärken der Dissertation zeigen sich durch die Vielfalt der eingesetzten Methodik und Datenstruktur (Review, Fragebogen-Studie, Experiment) sowie die Diversität der erfassten Stichproben. So wurden Menschen mit chronischen Schmerzen (Studien 1-3) und ohne chronische Schmerzen (Studien 2-4) untersucht. Auch wurden unterschiedliche chronische Schmerzerkrankungen (Studien 1-3) sowie akuter Schmerz (Studie 4) berücksichtigt. Daraus resultieren unterschiedliche Blickwinkel für die Einschätzung der Relevanz von Selbstmitgefühl bei Schmerz.

Gleichwohl gilt es, die Ergebnisse der dargestellten Studien unter Berücksichtigung diverser Einschränkungen zu interpretieren. Aufgrund der Unterschiede zwischen den verwendeten Methoden werden diese Limitationen im Folgenden separat für die einzelnen Studien erläutert.

Die wichtigste Einschränkung von Studie 1 betrifft die liberalen Einschlusskriterien des Reviews. Es wurde jede Interventions-Studie einbezogen, welche Ärger oder verwandte Konstrukte in irgendeiner Weise erfasste. Die resultierende Auswahl an Studien ist sehr heterogen, hinsichtlich des Behandlungsansatzs, der Dosierung, des Settings, aber auch der Art der Schmerzerkrankung, Erkrankungs-dauer, Stichprobengröße, des Studiendesigns und der -qualität, der Kontrollgruppen sowie der Messung von Ärger. Daher wurde auf die Durchführung einer Meta-Analyse verzichtet. Auch der Vergleich der einbezogenen Studien liefert nur eingeschränkte Erkenntnisse. Dennoch ist bereits die begrenzte Anzahl von Studien zur Behandlung von Ärger im Kontext von Schmerz eines der wichtigsten Studienergebnisse. Um einen klaren Fokus des Reviews zu gewährleisten, bezog sich dieses ausschließlich auf Veränderungen hinsichtlich des Ärgers. Schmerzbezogene Auswirkungen der Interventionen wurden nicht berücksichtigt. Somit können keinerlei Rückschlüsse auf den Zusammenhang zwischen solchen Veränderungen gezogen werden. Darüber hinaus ist die Diversität der Messinstrumente zur Erfassung von Ärger potenziell problematisch. Es bleibt unklar, ob das gleiche zugrunde liegende Konstrukt erfasst wird. Zudem messen nur die Subskala des Fragebogen zur Erfassung der Schmerzverarbeitung (FESV) (Geissner, 2001) sowie der Injustice Expierence Questionnaire (IEQ) (Sullivan, 2008) spezifisch schmerzbezogenen Ärger. Es kann demnach keine Aussage über den relevantesten Aspekt von Ärger im Kontext chronischer Schmerzen getroffen werden. Außerdem kann argumentiert werden, dass eine Differenzierung zwischen negativen Emotionen unnötig sei. Linton empfiehlt diesbezüglich einen transdiagnostischen Ansatz bei Emotionen und Schmerz (Linton, 2013). Zudem könnten bereits bestehende Modell zu Emotionen und Emotionsregulation auch für chronische Schmerzen ausreichend sein, wodurch ein weiteres Modell obsolet wird. Es wurde jedoch ein theoretisches Modell für den spezifischen Ärger bei chronischem Schmerz gefordert, um zukünftige Forschung über Ärger-bezogene Konstrukte anzuregen und Behandlungsprozesse zu identifizieren (McCracken, 2013). Um zu definieren, ob die Erfassung von allgemeinem negativen Affekt oder spezifisch von Ärger notwendig ist, sollten beide Aspekte gemeinsam im Kontext von Interventionen überprüft werden.

Auch bezogen auf die Studien 2 und 3 sollten verschiedene Einschränkungen berücksichtigt werden. Zum Einen zeigte die Stichprobe zwar eine Vielfalt an Alters- und Schmerzdiagnosen,

jedoch waren die TeilnehmerInnen überwiegend weiblich. Daher kann die Generalisierbarkeit eingeschränkt sein. Zweitens umfasste die Studie nur Instrumente mit Selbstauskunft. Drittens wurden aufgrund des Studiendesigns keine gültigen klinischen Diagnosen bezüglich der Schmerzen gestellt. Die Entscheidung, ob es sich um chronische Schmerzen handle, beruhte ausschließlich auf der Selbsteinschätzung der Schmerzbelastung. Andere physiologische oder psychologische Beeinträchtigungen der TeilnehmerInnen wurden nicht berücksichtigt. Viertens wurden andere Konzepte im Zusammenhang mit Selbstmitgefühl wie Achtsamkeit oder Optimismus im aktuellen Forschungsprojekt nicht berücksichtigt. Dies führte zu einer Vernachlässigung weiterer relevanter Einflüsse von Ergebnisvariablen. Aus Gründen der Ökonomie wurde ausschließlich psychologische Inflexibilität, gemessen durch PIPS, erfasst. Dieses Konstrukt wie auch der Fragebogen ist derzeit in der Forschung und Behandlung chronischer Schmerzen von großer Relevanz. Akzeptanz im Rahmen chronischer Schmerzen kann als Gegenpol zu Vermeidung betrachtet werden. Vermeidung wurde anhand des PIPS erfasst. Dieser misst jedoch nur zwei der sechs Dimensionen Psychologischer Flexibilität. Auf Item-Ebene wird erkennbar, dass Items der Vermeidungs-Subskala spezifisch Vermeidungsverhalten abfragen, was bekanntermaßen bei chronischen Schmerzen besonders relevant ist (Fear-Avoidance-Modell). Schließlich waren die psychometrischen Eigenschaften der verwendeten Messungen teilweise beeinträchtigt. Dies betrifft vor allem den PDI sowie die SCS, welche in der aktuellen Stichprobe angepasst wurde. Die Qualität der Ergebnisse und Prädiktoren war daher eingeschränkt. Aufgrund dieser Einschränkungen wurde kein Strukturgleichungsmodell angewendet. Außerdem wurden weder Mediatoren noch Moderatoren in der Modellstruktur berücksichtigt. Es kann auch kritisiert werden, dass das State-Trait-Anger Expression Inventory (STAXI) nicht auf schmerzspezifischen Ärger eingeht. Das STAXI ist jedoch das am häufigsten verwendete Instrument in der Schmerzforschung (Sommer, Lukic, Rössler, & Ettlin, 2019).

Im Rahmen von Studie 4 wurden nur gesunde Studierende eingeschlossen. Daher sind die Ergebnisse nur schwer auf andere Alterskohorten beziehungsweise auf Menschen mit chronischen Schmerzen übertragbar. Akute Schmerzreize weisen einen anderen emotionalen Wert auf als eine chronischen Schmerzerkrankung (Kohl et al., 2013). Die Wahl der Emotionsregulationsstrategien beschränkte sich in Studie 4 auf Ablenkung, Akzeptanz und Selbstmitgefühl, während eine echte Kontrollbedingung fehlte. Auch wären andere Bedingungen wie Entspannung, Achtsamkeit, kognitive Umstrukturierung oder Exposition denkbar gewesen. Eine weitere Einschränkung bezieht sich auf Deckeneffekte hinsichtlich der Schmerztoleranz. Die maximale Schmerztoleranz wurde in mehreren Fällen unterschätzt. Dies

führte zu einer Unterschätzung der therapeutischen Wirkung und zu einer eingeschränkten Interpretierbarkeit. Auch bezogen auf die Übungen während der Praxis-Phase gibt es Einschränkungen. Die Adhärenzraten konnten aufgrund des Designs nur durch Selbstauskunft der ProbandInnen erfasst werden. Auch kann argumentiert werden, dass die Inhalte der Ablenkungsbedingung eher als Entspannungsübungen zu werten sind.

Eine gemeinsame Limitation aller aufgeführten Studien stellt die Vernachlässigung von kulturellen und genderspezifischen Unterschieden hinsichtlich Selbstmitgefühl, Ärger aber auch Schmerz dar.

5.4. Perspektiven für zukünftige Forschung

Aufbauend auf Studie 1 erscheint es wichtig, zunächst neue und konsistente Instrumente zur Erfassung von Ärger bei Schmerz zu entwickeln und zu evaluieren. Diese sollten verschiedene Aspekte des Ärgers umfassen, wie das emotionale Erleben, relevante Kognitionen, Ärger-bezogenes Verhalten, Ausdruck und Regulation. Die resultierenden Messinstrumente könnten dann dazu genutzt werden, die relevantesten Aspekte des Ärger-Regulationsprozesses im Rahmen chronischer Schmerzen zu identifizieren. Hierbei sollten sowohl allgemeine als auch individuell unterschiedliche Aspekte beachtet werden, um Empfehlungen für den Behandlungsverlauf abgeben zu können. Insbesondere die Entwicklng Prozess-orientierter Methoden gerade in Kombination mit ambulanten Erhebungsmethoden bietet Vorteile zur Untersuchung des Zusammenhangs zwischen Ärger und Schmerz über den Verlauf der Therapie. Des Weiteren sollten auch Verhaltensbeobachtungen oder psycho-physiologische Methoden als objektivere Verfahren zur Erfassung von Ärger in Erwägung gezogen werden. Zukünftige Studien sollten zudem Ärger wie auch generellen negativen Affekt erfassen. Bislang ist nicht belegt, ob eine Betrachtung der unterschiedlichen Aspekte von Ärger bei chronischem Schmerz notwendig ist beziehungsweise der Erhebung von allgemeinem negativen Affekt überlegen ist.

Bestehende evidenzbasierte Behandlungansätze für chronische Schmerzen wie Kognitive Verhaltenstherapie, Expositionstherapie oder Akzeptanz- und Kommitment-Therapie sollten hinsichtlich ihrer Wirksamkeit auf Ärger neu evaluiert werden. Darüber hinaus sollten Ärger-spezifische therapeutische Ansätze, welche bei anderen Störungen wirksam sind, im Rahmen chronischer Schmerzerkrankungen überprüft werden. Weitere Studien sollten zudem Mitgefühls-basierte wie auch paartherapeutische Interventionen und Trainings für Behandelnde umfassen. Diese sollten in randomisiert, kontrollierten Studien oder auch Einzelfallstudien evaluiert werden. Auch sollten neue Behandlungen oder Behandlungs-komponenten, welche

speziell auf Ärger bei chronischen Schmerzen abzielen, entwickelt und empirisch getestet werden. Kurzversionen solcher therapeutischen Interventionen könnten anhand experimenteller Designs evaluiert werden. Über die Untersuchung von Veränderungsmechanismen sollten wirksame Komponenten identifiziert werden. Nachfolgend können Empfehlungen abgegben werden, ob die Behandlung von Ärger additiv oder exklusiv erfolgen sollte. Im Rahmen dieser Studien könnte das „Prozessmodell der Ärger-Regulation bei chronischem Schmerz“ diskutiert und die definierten Prozesse empirisch überprüft werden. Es gilt, zu ermitteln, welcher Behandlungsansatz auf welchem Aspekt des Ärger-regulationsprozesses beruht und welcher Aspekt für die individuelle Person am relevantesten ist.

Die Relevanz von Selbstmitgefühl im Vergleich zu anderen Emotionsregulationsstrategien sollte anhand von experimentellen Designs bei akuten und chronischen Schmerzen weiter untersucht werden. Zum einen sollten die Ergebnisse der vorliegenden Studie 4 repliziert werden und durch physiologische Parameter ergänzt werden. Bei der Verwendung von akuten Schmerzstimuli sollten hierbei die gefundenen Deckeneffekte berücksichtigt werden. So könnte beispielsweise mit Capsaicin Creme zusätzlich zur thermischen Stimulation gearbeitet werden oder auch mit anderen Schmerzmodalitäten, Reizlängen oder Stimuli (z. B. elektrisch). Zudem könnten Selbstmitgefühls-basierte Interventionen hinsichtlich ihrer Wirksamkeit auf induzierten Ärger oder andere Emotionen im Rahmen von Schmerzexperimenten untersucht werden.

Zur Evaluation des therapeutischen Potenzials sollten Selbstmitgefühls-basierte Interventionen zudem in der Behandlung chronischer Schmerzen eingesetzt werden. Hierbei könnte vor allem die Verwendung von Einzelfallanalysen darüber Aufschluss geben, ob solche Interventionen schmerzbezogene oder emotionale Beeinträchtigung reduzieren. Darüber hinaus sollte evaluiert werden, wie bestehende psychologische Schmerzbehandlungen CS und RUS beeinflussen. Dies könnte weitere Erkenntnisse für die Diskussion zu RUS und Psychopathologie liefern. CS wiederum sollte im Hinblick auf die Relevanz als Resilienzfaktor untersucht werden. Hierbei wäre vor allem auch die Betrachtung von nicht-beeinträchtigenden Schmerzen hilfreich.

Darüber hinaus sollten zukünftige Studien genderspezifische wie auch kulturellen Unterschiede in Bezug auf Selbstmitgefühl, Ärger und Schmerz berücksichtigen.

5.5. Implikationen für die klinische Praxis

Ärger und der damit verbundene Umgang kann bei Menschen mit chronischen Schmerzen zu eingeschränkten Behandlungsergebnissen führen. Daher ist es notwendig, Ärger im Rahmen

psychologischer Schmerzbehandlung zu beachten. Allgemein scheinen insbesondere Ansätze aus der Akzeptanz- und Commitment-Therapie sowie (Selbst-)Mitgefühlsbasierte Techniken, gut bei der Bewältigung von Ärger zu helfen. Spezifischer könnten bspw. kognitive Umstrukturierung oder Defusionstechniken genutzt werden, um Bewertungen von Ungerechtigkeit, Schuldzuweisungen und Frustration bezogen auf eigene Ziele zu adressieren. Aus dem Ärger resultierende interaktionelle Schwierigkeiten könnten anhand von Kommunikationstrainings, paartherapeutischen Interventionen, aber auch Empathietrainings auf Seiten der Behandler verbessert werden. Allerdings gibt es für diese Empfehlungen nur begrenzte empirische Belege. Hinsichtlich der Behandlungsdauer und zu erwartenden Effektstärken der unterschiedlichen Ansätze können keine Aussagen getroffen werden.

Psychologische Flexibilität, spezifischer Vermeindungsverhalten, scheint bei Menschen mit chronsichen Schmerzen eine entscheidende Rolle zu spielen. Somit wäre es hilfreich, dieses Verhalten explizit zu addressieren, wie es bereits bei der Expositionstherapie wie auch der Akzeptanz- und Commitment-Therapie durchgeführt wird. Zudem erscheint es hilfreich, vor allem die Selbstkritik von Menschen mit chronischen Schmerzen abzumildern (bspw. mit mitgefühlsbasierten Ansätzen oder aber auch mithilfe von klassischer Kognitiver Umstrukturierung). Das Aufbauen von einem explizit sehr positiven Umgang mit sich selbst erscheint nachrrangig.

Grundsätzlich lassen sich Ergebnisse aus experimenteller Schmerzforschung nur eingeschränkt auf den klinischen Alltag übertragen. Da sich Selbstmitgefühl als Strategie als ebenso wirksam erwies wie Ablenkung und Akzeptanz, liefert die vorliegende Arbeit Hinweise für die vermeindliche Wirksamkeit von Selbstmitgefühls-basierten Interventionen im Kontext von Schmerzen. Vermutlich könnte diese Emotionsregulationsstrategie besonders für Menschen geeignet sein, die unter sehr stark ausgeprägten Emotionen leiden beziehungsweise in Kontexten, in denen solche Emotionen auftreten. Selbstmitgefühl könnte zudem eine auch langfristig hilfreiche Alternative, verglichen mit Ablenkungsstrategien, darstellen. Grundsätzlich ist es zur Verbesserung der Flexibilität zu empfehlen, möglichst diverse Strategien zur Emotionsregulation zu vermitteln. Menschen mit chronischen Schmerzen können dann je nach Kontext und Präferenz adaptiv eine bestimmte Strategie auswählen. Darüber hinaus soll erwähnt werden, dass bei gleicher Wirksamkeit verschiedener Strategien auch behandelnde TherapeutInnen, Strategien der eigenen Präferenz vermitteln könnten, um gleichzeitig potenzielle Erwartungseffekte bzw. Placebo-Reaktionen zu erhöhen.

5.6. Fazit

Die empirische Forschung zur Behandlung von Ärger bei chronischen Schmerzen ist nach wie vor begrenzt. Bestehende Studien sind aufgrund verschiedener Diskrepanzen in den Behandlungsansätzen, im Design und in der Qualität schwer zu vergleichen. Die Ergebnisse sind vielversprechend, auch wenn weitere Forschung erforderlich ist. Das „Prozessmodell der Ärgerregulation bei chronischen Schmerzen“ stellt eine theoretische Konzeptualisierung der ärgerbezogenen Aspekte bei chronischen Schmerzen zur Diskussion.

Selbstmitgefühl wurde im Rahmen einer längschnittlichen Studie von verwandten Konstrukten wie Selbstwert und Psychologische Inflexibilität abgegrenzt. Basierend auf den vorliegenden Daten wurde Selbstmitgefühl im Kontext chronischer Schmerzen zudem als bestehend aus den Faktoren CS und RUS definiert. CS stellte hierbei ein eigenständiges Konstrukt dar, RUS hingegen scheint das gleiche latente Konstrukt zu repräsentieren wie Selbstwert. Im Vergleich dieser Konstrukte als Prädiktoren hinsichtlich schmerzbezogener und emotionaler Beeinträchtigungen wies nur RUS und nicht CS einen eigenständigen Erklärungswert auf. Dies bezog sich jedoch nur auf Schmerzkatastrophisierung und schmerzbezogene Angst. Weder CS noch RUS sagten emotionale Beeinträchtigung in Form von Depressivität oder Ärger vorher. Den relevantesten Prädiktor stellte Vermeidungsverhalten als Teil von Psychologischer Inflexibilität dar.

Zur Bewältigung akuter Schmerzen erwies sich Selbstmitgefühl im experimentellen Setting als ebenso wirksam wie Akzeptanz und Ablenkung. Dies zeigte sich stabil für Schmerztoleranz, -intensität und –aversion.

Nachfolgend sollte nun ein adaptiver Einsatz der Emotionsregulationsstrategie Selbstmitgefühl untersucht werden. Demnach sollte sich zukünftige Forschung explizit mit der Auswirkung von mitgefühlsbasierten Interventionen auf Ärger bei Schmerz konzentrieren. Zudem sollten neue Behandlungen oder Behandlungskomponenten, die speziell auf Ärger bei chronischen Schmerzen abzielen, entwickelt und empirisch getestet werden. Bestehende Behandlungen sollten hinsichtlich der Auswirkungen auf Ärger neu bewertet werden. Randomisiert, kontrollierte Interventions-Studien, Einzelfallsdesign oder experimentelle Designs stellen sinnvolle methodische Ansätze zur Überprüfung dieser Fragestellungen dar.

6. Literaturverzeichnis

Armitage, L., & Malpus, Z. (2019). Compassion Focused Therapy for Strivers in Pain. *Clinical Journal of Pain*, (47).

Berkout, O. V, Tinsley, D., & Flynn, M. K. (2019). A review of anger, hostility, and aggression from an ACT perspective. *Journal of Contextual Behavioral Science*, *11*, 34–43. https://doi.org/10.1016/j.jcbs.2018.12.001

Braams, B. R., Blechert, J., Boden, M. T., & Gross, J. J. (2012). The effects of acceptance and suppression on anticipation and receipt of painful stimulation. *Journal of Behavior Therapy and Experimental Psychiatry*, *43*, 1014–1018. https://doi.org/10.1016/j.jbtep.2012.04.001

Breivik, H., Eisenberg, E., & O'Brien, T. (2013). The individual and societal burden of chronic pain in Europe: the case for strategic prioritisation and action to improve knowledge and availability of appropriate care. *BMC Public Health*, *13*, 1229.

Burns, J. W., Johnson, B. J., Devine, J., Mahoney, N., & Pawl, R. (1998). Anger management style and the prediction of treatment outcome among male and female chronic pain patients. *Behaviour Research and Therapy*, *36*(11), 1051–1062. https://doi.org/10.1016/S0005-7967(98)00080-1

Carson, J. W., Keefe, F. J., Lynch, T. R., Carson, K. M., Goli, V., Fras, A. M., & Thorp, S. (2005). Loving-Kindness Meditation for Chronic Low Back Pain - Results From a Pilot Trial. *Journal of Holistic Nursing*, *23*(3), 287–304. https://doi.org/10.1177/0898010105277651

Carvalho, S. A., Gouveia, J. P., Gillanders, D., & Castilho, P. (2018). Mindfulness , selfcompassion , and depressive symptoms in chronic pain : The role of pain acceptance, (January), 1–13. https://doi.org/10.1002/jclp.22689

Carvalho, S. A., Trindade, I. A., Gillanders, D., Pinto-Gouveia, J., & Castilho, P. (2019). Self-Compassion and Depressive Symptoms in Chronic Pain (CP): A 1-Year Longitudinal Study. *Mindfulness*. https://doi.org/10.1007/s12671-019-01292-7

Chapin, H. L., Darnall, B. D., Seppala, E. M., Doty, J. R., Hah, J. M., & Mackey, S. C. (2014). Pilot study of a compassion meditation intervention in chronic pain. *Journal of*

Compassionate Health Care, *1*(4), 1–12.

Costa, J., & Pinto-Gouveia, J. (2011). Acceptance of Pain, Self-Compassion and Psychopathology: Using the Chronic Pain Acceptance Questionnaire to Identify Patients' Subgroups. *Clinical Psychology and Psychotherapy*, *18*, 292–302.

Costa, J., & Pinto-Gouveia, J. (2013). Experiential avoidance and self-compassion in chronic pain. *Journal of Applied Social Psychology*, *43*, 1578–1591. https://doi.org/10.1111/jasp.12107

Diedrich, A., Grant, M., Hofmann, S. G., Hiller, W., & Berking, M. (2014). Self-compassion as an emotion regulation strategy in major depressive disorder. *Behaviour Research and Therapy*, *58*, 43–51. https://doi.org/10.1016/j.brat.2014.05.006

Diedrich, A., Hofmann, S. G., Cuijpers, P., & Berking, M. (2016). Self-compassion enhances the efficacy of explicit cognitive reappraisal as an emotion regulation strategy in individuals with major depressive disorder. *Behaviour Research and Therapy*, *82*, 1–10. https://doi.org/10.1016/j.brat.2016.04.003

Duarte, J., & Pinto-Gouveia, J. (2017). Mindfulness, self-compassion and psychological inflexibility mediate the effects of a mindfulness-based intervention in a sample of oncology nurses. *Journal of Contextual Behavioral Science*, *6*(2), 125–133. https://doi.org/10.1016/j.jcbs.2017.03.002

Dworkin, R. H., Turk, D. C., Wyrwich, K. W., Beaton, D., Cleeland, C. S., Farrar, J. T., … Zavisic, S. (2008). Interpreting the Clinical Importance of Treatment Outcomes in Chronic Pain Clinical Trials: IMMPACT Recommendations. *The Journal of Pain*, *9*(2), 105–121. https://doi.org/10.1016/j.jpain.2007.09.005

Edwards, K. A., Pielech, M., Hickman, J., Ashworth, J., Sowden, G., & Vowles, K. E. (2019). The relation of self - compassion to functioning among adults with chronic pain. *European Journal of Pain*, *23*, 1538–1547. https://doi.org/10.1002/ejp.1429

Ehret, A. M., Joormann, J., & Berking, M. (2018). Self-compassion is more effective than acceptance and reappraisal in decreasing depressed mood in currently and formerly depressed individuals. *Journal of Affective Disorders*, *226*, 220–226. https://doi.org/10.1016/j.jad.2017.10.006

Fernandez, E. (2005). The Relationship Between Anger and Pain. *Current Pain and Headache Reports*, *9*, 101–105.

Geissner, E. (2001). *Fragebogen zur Erfassung der Schmerzverarbeitung (FESV)*. Göttingen: Hogrefe.

Georgescu, R., Dobrean, A., & Predescu, E. (2018). Benefits of Cognitive Restructuring, Acceptance and Distraction for Pain Intensity and Pain Tolerance. *Journal of Evidance-Based Psychotherapies*, *18*(2), 143–159.

Germer, C. K., & Neff, K. D. (2019). Mindful Self-Compassion (MSC). In I. Itvzan (Ed.), *The handbook of mindfulness-based programs: Every established intervention, from medicine to education* (pp. 357–367). London: Routledge.

Gilbert, P. (2009). *The compassionate mind: a new approach to life's challenges*. London: Constable-Robinson.

Glombiewski, J. A., Holzapfel, S., Riecke, J., Vlaeyen, J. W. S., de Jong, J., Lemmer, G., & Rief, W. (2018). Exposure and CBT for Chronic Back Pain: An RCT on Differential Efficacy and Optimal Length of Treatment. *Journal of Consulting and Clinical Psychology*, *86*(6), 533–545.

Graser, J., & Stangier, U. (2018). Compassion and Loving-Kindness Meditation: An Overview and Prospects for the Application in Clinical Samples. *Harvard Review of Psychiatry*, *26*(4), 201–215. https://doi.org/10.1097/HRP.0000000000000192

Greenwood, K. A., Thurston, R., Rumble, M., Waters, S. J., & Keefe, F. J. (2003). Anger and persistent pain : current status and future directions, *103*, 1–5. https://doi.org/10.1016/S0

Gross, J. J. (2015). Emotion Regulation: Current Status and Future Prospects. *Psychological Inquiry*, *26*, 1–26. https://doi.org/10.1080/1047840X.2014.940781

Gutiérrez, O., Luciano, C., Rodríguez, M., & Fink, B. C. (2004). Comparison Between an Acceptance-Based and a Cognitive-Control-Based Protocol for Coping With Pain. *Behavior Therapy*, *35*(4), 767–783. https://doi.org/10.1016/S0005-7894(04)80019-4

Hasenbring, M. I., & Verbunt, J. A. (2010). Fear-avoidance and Endurance-related Responses to Pain: New Models of Behavior and Their Consequences for Clinical Practice. *Clinical Journal of Pain*, *26*(9), 747–753.

Hayes, S. C. (2004). Acceptance and Commitment Therapy, Relational Frame Theory, and the Third Wave of Behavioral and Cognitive Therapies. *Behavior Therapy*, *35*, 639–665.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and

Commitment Therapy: Model, processes and outcomes. *Behavior Research and Therapy*, *44*, 1–25. https://doi.org/10.1016/j.brat.2005.06.006

Hedman-Lagerlöf, M., Andersson, E., Hedman-Lagerlöf, E., Wicksell, R. K., Flink, I., & Ljótsson, B. (2019). Approach as a key for success: Reduced avoidance behaviour mediates the effect of exposure therapy for fibromyalgia. *Behaviour Research and Therapy*, *122*, 103478. https://doi.org/10.1016/j.brat.2019.103478

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2011). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical Psychology Review*, *31*, 1126–1132. https://doi.org/10.1016/j.cpr.2011.07.003

Hwang, S., Kim, G., Yang, J. W., & Yang, E. (2016). The Moderating Effects of Age on the Relationships of Self-Compassion, Self-Esteem, And Mental Health. *Japanese Psychological Research*, *58*(2), 194–205. https://doi.org/10.1111/jpr.12109

Kirby, J. N., Tellegen, C. L., & Steindl, S. R. (2017). A Meta-Analysis of Compassion-Based Interventions: Current State of Knowledge and Future Directions. *Behavior Therapy*, *48*, 778–792. https://doi.org/10.1016/j.beth.2017.06.003

Koechlin, H., Coakley, R., Schechter, N., Werner, C., & Kossowsky, J. (2018). The role of emotion regulation in chronic pain: A systematic literature review. *Journal of Psychosomatic Research*, *107*(February), 38–45. https://doi.org/10.1016/j.jpsychores.2018.02.002

Kohl, A., Rief, W., & Glombiewski, J. A. (2012). How effective are acceptance strategies? A meta-analytic review of experimental results. *Journal of Behavior Therapy and Experimental Psychiatry*, *43*, 988–1001. https://doi.org/10.1016/j.jbtep.2012.03.004

Kohl, A., Rief, W., & Glombiewski, J. A. (2013). Acceptance, Cognitive Restructuring, and Distraction as Coping Strategies for Acute Pain. *The Journal of Pain*, *14*(3), 305–315. https://doi.org/10.1016/j.jpain.2012.12.005

Kohl, A., Rief, W., & Glombiewski, J. A. (2014). Do fibromyalgia patients benefit from cognitive restructuring and acceptance? An experimental study. *Journal of Behavior Therapy and Experimental Psychiatry*, *45*, 467–474. https://doi.org/10.1016/j.jbtep.2014.06.006

Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-Compassion and Reactions to Unpleasant Self-Relevant Events: The Implications of Treating Oneself

Kindly. *Journal of Personality and Social Psychology*, *92*(5), 887–904. https://doi.org/10.1037/0022-3514.92.5.887

Lee, A. H., & Digiuseppe, R. (2018). Anger and aggression treatments: a review of meta-analyses. *Current Opinion in Psychology*, *19*, 65–74. https://doi.org/10.1016/j.copsyc.2017.04.004

Linton, S. J. (2013). A Transdiagnostic Approach to Pain and Emotion. *Journal of Applied Biobehavioral Research*, *18*(2), 82–103. https://doi.org/10.1111/jabr.12007

Lumley, M. A., Cohen, J. L., Borszcz, G. S., Cano, A., Radcliffe, A. M., Porter, L. S., … Keefe, F. J. (2011). Pain and Emotion: A Biopsychosocial Review of Recent Research. *Journal of Clinical Psychology*, *67*(9), 942–968. https://doi.org/10.1002/jclp.20816

Luo, X., Liu, J., & Che, X. (2019). Investigating the Influence and a Potential Mechanism of Self-compassion on Experimental Pain: Evidence from a Compassionate Self-talk Protocol and Heart Rate Variability. *The Journal of Pain*. https://doi.org/10.1016/j.jpain.2019.11.006

Macbeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review*, *32*, 545–552. https://doi.org/10.1016/j.cpr.2012.06.003

Marshall, E. J., & Brockman, R. N. (2016). The Relationships Between Psychological Flexibility , Self-Compassion , and Emotional Well-Being. *Journal of Cognitive Psychotherapy*, *30*(1), 60–72. https://doi.org/10.1891/0889-8391.30.1.60

Masedo, A. I., & Esteve, M. R. (2007). Effects of suppression, acceptance and spontaneous coping on pain tolerance, pain intensity and distress. *Behavior Research and Therapy*, *45*, 199–209. https://doi.org/10.1016/j.brat.2006.02.006

McCracken, L. M. (2013). Anger, injustice, and the continuing search for psychological mechanisms of pain, suffering, and disability. *Pain*, *154*(9), 1495–1496. https://doi.org/10.1016/j.pain.2013.05.042

Merskey, H. (1994). Part III: Pain Terms, A Current List with Definitions and Notes on Usage. In H. Merskey & N. Bogduk (Eds.), *Classification of Chronic Pain, IASP Task Force on Taxonomy* (Second Edi, pp. 209–214). Seattle: IASP Press.

Meyer, E. C., Frankfurt, S. B., Kimbrel, N. A., Debeer, B. B., Gulliver, S. B., & Morrisette, S.

B. (2018a). The influence of mindfulness, self-compassion, psychological flexibility, and posttraumatic stress disorder on disability and quality of life over time in war veterans. *Journal of Clinical Nursing*, *74*, 1272–1280. https://doi.org/10.1002/jclp.22596

Meyer, E. C., Frankfurt, S. B., Kimbrel, N. A., Debeer, B. B., Gulliver, S. B., & Morrisette, S. B. (2018b). The influence of mindfulness, self-compassion, psychological flexibility, and posttraumatic stress disorder on disability and quality of life over time in war veterans. *Journal of Clinical Psychology*, 1–9. https://doi.org/10.1002/jclp.22596

Montero-Marín, J., Navarro-Gil, M., Puebla-Guedea, M., Luciano, J. V., Van Gordon, W., Shonin, E., & García-Campayo, J. (2018). Efficacy of "Attachment-Based Compassion Therapy" in the Treatment of Fibromyalgia: A Randomized Controlled Trial. *Frontiers in Psychistry*, *8*(January), 1–11. https://doi.org/10.3389/fpsyt.2017.00307

Montero-Marin, J., Van Gordon, W., Shonin, E., Navarro-Gil, M., Gasión, V., López-del-Hoyo, Y., … Garcia-Campayo, J. (2020). Attachment-Based Compassion Therapy for Ameliorating Fibromyalgia: Mediating Role of Mindfulness and Self-Compassion. *Mindfulness*, *11*(3), 816–828. https://doi.org/10.1007/s12671-019-01302-8

Muris, P., Broek, M. Van Den, Otgaar, H., Oudenhoven, I., & Lennartz, J. (2018). Good and Bad Sides of Self-Compassion: A Face Validity Check of the Self-Compassion Scale and an Investigation of its Relations to Coping and Emotional Symptoms in Non-Clinical Adolescents. *Journal of Child and Family Studies*, *27*, 2411–2421. https://doi.org/10.1007/s10826-018-1099-z

Muris, P., & Otgaar, H. (2020). The Process of Science: A Critical Evaluation of more than 15 Years of Research on Self-Compassion with the Self-Compassion Scale. *Mindfulness*, *11*, 1469–1482. https://doi.org/10.1007/s12671-020-01363-0

Muris, P., Otgaar, H., & Petrocchi, N. (2016). Protection as the Mirror Image of Psychopathology: Further Critical Notes on the Self-Compassion Scale. *Mindfulness*, *7*, 787–790. https://doi.org/10.1007/s12671-016-0509-9

Muris, P., Otgaar, H., & Pfattheicher, S. (2019). Stripping the Forest from the Rotten Trees: Compassionate Self-Responding Is a Way of Coping, but Reduced Uncompassionate Self-Responding Mainly Reflects Psychopathology. *Mindfulness*, *10*, 196–199.

Neff, K. D. (2003a). Self-Compassion: An Alternative Conceptualization of a Healthy Attitude Toward Oneself. *Self and Identity*, *2*, 85–101.

https://doi.org/10.1080/15298860390129863

Neff, K. D. (2003b). The Development and Validation of a Scale to Measure Self-Compassion. *Self and Identity*, 223–250. https://doi.org/10.1080/15298860390209035

Neff, K. D. (2016). The Self-Compassion Scale is a Valid and Theoretically Coherent Measure of Self-Compassion. *Mindfulness*, *7*(1), 264–274. https://doi.org/10.1007/s12671-015-0479-3

Neff, K. D. (2019). Setting the Record Straight About the Self-Compassion Scale. *Mindfulness*, *10*(1), 200–202. https://doi.org/10.1007/s12671-018-1061-6

Neff, K. D., Tóth-Király, I., & Colosimo, K. (2018). Self-compassion Is Best Measured as a Global Construct and Is Overlapping with but Distinct from Neuroticism: A Response to Pfattheicher, Geiger, Hartung, Weiss, and Schindler (2017). *European Journal of Personality*, *32*(4), 371–392. https://doi.org/10.1002/per.2148

Neff, K. D., & Vonk, R. (2009). Self-Compassion Versus Global Self-Esteem : Two Different Ways of Relating to Oneself. *Journal of Personality*, *77*(1), 23–50. https://doi.org/10.1111/j.1467-6494.2008.00537.x

Neff, K. D., Whittaker, T. A., & Karl, A. (2017). Examining the Factor Structure of the Self-Compassion Scale in Four Distinct Populations: Is the Use of a Total Scale Score Justified? *Journal of Personality Assessment*.

Neff, K., & Tirch, D. (2013). Self-- Compassion and ACT. In T. B. Kashdan & J. V Ciarrochi (Eds.), *Mindfulness & Acceptance for Positive Psychology*. Oakland: New Harbinger.

Nicholas, M., Vlaeyen, J. W. S., Rief, W., Barke, A., Aziz, Q., Benoliel, R., … Treede, R. D. (2019). The IASP classification of chronic pain for ICD-11: Chronic primary pain. *Pain*, *160*(1), 28–37. https://doi.org/10.1097/j.pain.0000000000001390

Nugraha, B., Gutenbrunner, C., Barke, A., Karst, M., Schiller, J., Schäfer, P., … Treede, R. D. (2019). The IASP classification of chronic pain for ICD-11 : functioning properties of chronic pain. *Pain*, *160*, 88–94.

Okifuji, A., Turk, D. C., & Curran, S. L. (1999). Anger in chronic pain: Investigations of anger targets and intensity. *Journal of Psychosomatic Research*, *47*(1), 1–12. https://doi.org/10.1016/S0022-3999(99)00006-9

Parry, S., & Malpus, Z. (2017). Reconnecting the Mind and Body: A Pilot Study of Developing

Compassion for Persistant Pain. *Patient Experience Journal*, *4*.

Penlington, C. (2018). Exploring a compassion-focused intervention for persistent pain in a group setting. *British Journal of Pain*, 204946371877214. https://doi.org/10.1177/2049463718772148

Pfattheicher, S., Geiger, M., Hartung, J., Weiss, S., & Schindler, S. (2017). Old Wine in New Bottles? The Case of Self-compassion and Neuroticism. *European Journal of Personality*, *31*, 160–169. https://doi.org/10.1002/per.2097

Purdie, F., & Morley, S. (2015). Self-Compassion, pain, and breaking a social contract. *PAIN*, *156*, 2354–2363.

Purdie, F., & Morley, S. (2016). Compassion and chronic pain. *PAIN*, *157*(12), 2625–2627.

Sommer, I., Lukic, N., Rössler, W., & Ettlin, D. A. (2019). Measuring anger in patients experiencing chronic pain - A systematic review. *Journal of Psychosomatic Research*, *125*, 109778. https://doi.org/10.1016/j.jpsychores.2019.109778

Stefan, S., & Hofmann, S. G. (2019). Integrating Metta Into CBT : How Loving Kindness and Compassion Meditation Can Enhance CBT for Treating Anxiety and Depression Loving Kindness and Compassion Meditation in Psychotherapy. *Clinical Psychology in Europe*, *1*(3).

Subnis, U. B., Starkweather, A., & Menzies, V. (2016). A current review of distraction-based interventions for chronic pain management. *European Journal of Integrative Medicine*, *8*, 715–722. https://doi.org/10.1016/j.eujim.2016.08.162

Sullivan, M. J. L. (2008). User Manual for the Injustice Experience Questionnaire IEQ Copyright 2008, 1–14.

Talbot, F., Basque, D., & French, D. J. (2018). Relationship Between Self-Compassion and pain resilience in the context of acute experimental pain. In *Annals of Behavioral Medicine*.

Van Ryckeghem, D., Van Damme, S., Eccleston, C., & Crombez, G. (2018). The efficacy of attentional distraction and sensory monitoring in chronic pain patients: A meta-analysis. *Clinical Psychology Review*, *59*, 16–29.

Veehof, M. M., Trompetter, H. R., Bohlmeijer, E. T., & Schreurs, K. M. G. (2016). Acceptance- and mindfulness-based interventions for the treatment of chronic pain : a meta-analytic

review. *Cognitive Behaviour Therapy*, *45*, 5–31. https://doi.org/10.1080/16506073.2015.1098724

Vlaeyen, J. W. S., Crombez, G., & Linton, S. J. (2016). The fear-avoidance model of pain. *Pain*, *157*, 1588–1589. https://doi.org/10.1097/j.pain.0000000000000574

Vlaeyen, J. W. S., & Linton, S. J. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain - a state of the art. *Pain*, *85*, 317–332. https://doi.org/10.1145/2994143

Vowles, K. E., Witkiewitz, K., Sowden, G., & Ashworth, J. (2014). Acceptance and commitment therapy for chronic pain: Evidence of mediation and clinically significant change following an abbreviated interdisciplinary program of rehabilitation. *The Journal of Pain*, *15*(1), 101–113. https://doi.org/10.1016/j.jpain.2013.10.002

Wicksell, R. K., Kemani, M., Jensen, K., Kosek, E., Kadetoff, D., Sorjonen, K., … Olsson, G. L. (2013). Acceptance and commitment therapy for fibromyalgia: A randomized controlled trial. *European Journal of Pain*, *17*, 599–611. https://doi.org/10.1002/j.1532-2149.2012.00224.x

Williams, A. C. D. C., & Craig, K. (2016). Updating the definition of pain. *PAIN*, *157*(11), 2420–2423. https://doi.org/10.1097/j.pain.0000000000000613

Williams, A. C. D. C., Eccleston, C., & Morley, S. (2012). Psychological therapies for the management of chronic pain (excluding headache) in adults (Review). *Cochrane Database of Systematic Reviews*, (11). https://doi.org/10.1002/14651858.CD007407.pub3.www.cochranelibrary.com

Woodruff, S. C., Glass, C. R., Arnkoff, D. B., Crowley, K. J., Hindman, R. K., & Hirschhorn, E. W. (2014). Comparing Self-Compassion, Mindfulness, and Psychological Inflexibility as Predictors of Psychological Health. *Mindfulness*, *5*, 410–421. https://doi.org/10.1007/s12671-013-0195-9

Wren, A. A., Somers, T. J., Wright, M. A., Goetz, M. C., Leary, M. R., Fras, A. M., … Keefe, F. J. (2012). Self-Compassion in Patients With Persistent Musculoskeletal Pain: Relationship of Self-Compassion to Adjustment to Persistent Pain. *Journal of Pain and Symptom Management*, *43*(4), 759–770. https://doi.org/10.1016/j.jpainsymman.2011.04.014

Yadavaia, J. E., Hayes, S. C., & Vilardaga, R. (2014). Using acceptance and commitment

therapy to increase self-compassion: A randomized controlled trial. *Journal of Contextual Behavioral Science*, *3*, 248–257. https://doi.org/10.1016/j.jcbs.2014.09.002

Anhang A: Studie 1

Anger and its treatment in chronic pain – a scoping review and conceptual model.

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Anger and its Treatment in Chronic Pain – a Scoping Review and Conceptual Model

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Abstract:

Objectives: Anger is one of the most prominent emotions in chronic pain. However, little research has been done on the psychological treatment of anger in pain. This review aims to provide an overview of pain-treatment-studies (1) specifically targeting anger or (2) measuring anger while conducting some kind of intervention.

Methods: The literature was searched via PsychINFO, Pubmed and Web of Science.

Results: N = 19 studies relevant studies, with n = 1710 participants, were identified. The studies varied greatly regarding treatment approach, study design, sample size, anger measurements, and quality. Only two studies specifically addressed anger in chronic pain. The other studies assessed anger as a secondary outcome. RCTs on anger or emotional expression did not reduce anger in chronic pain. The evidence on the effect of classical CBT or multimodal pain treatment regarding anger is limited. Acceptance- and compassion-based treatments delivered the most promising results. Mindfulness approaches led to contradictory findings. The inclusion of partners seems vital, as does training for health care professionals.

Conclusions: Nevertheless, further research is needed. Existing pain treatments and new therapeutic approaches should be evaluated regarding anger. To offer a theoretical foundation for future research, we propose and discuss the "Process Model of Anger Regulation in Chronic Pain".

Keywords: anger, chronic pain, psychological treatment, scoping review

Introduction:

Chronic pain is often associated with significant emotional distress and/or functional disability (1). The experience of recurrent pain has a strong negative impact on individuals' daily lives such as physiological and psychological impairments, inability to work, and a reduced quality of life (2). Psychological treatments such as Cognitive Behavioral Therapy (CBT), Acceptance- and Commitment Therapy (ACT) or Exposure Therapy (3–5) are effective in alleviating chronic pain. However, the average effects of psychological treatments have only proven to be small to moderate (3,4). A considerable number of patients fails to benefit (3). There has been a call for "tailored" treatments for chronic pain for two decades to raise treatment effectiveness (6,7). However, the progress made has been limited. One approach might be to address specific aspects of pain disorders, such as the emotional suffering. Emotions and their regulation are of high relevance in chronic pain (8). Hence, this should be explicitly addressed in pain treatments (8). Depression, anxiety, and anger are the most prominent emotions accompanying pain disorders. However, current meta-analyses on the treatments of chronic pain only partly inform us about emotional functioning, because they focus exclusively on depression and anxiety (3,4). According to the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT), the measurement of anger, as part of emotional functioning, for treatment studies on chronic pain is explicitly suggested (9). However, anger is often neglected when it comes to treatments (10).

To provide an overview on existing research on the treatment of anger in the context of chronic pain, this scoping review focuses on treatments addressing anger-related constructs in chronic pain. About 70% of people suffering from recurrent pain also experience anger (11). State-anger can be defined as a threat-based emotion like fear and disgust (12). It emerges as a reaction to the experience of injustice, unfairness, or violation of boundaries (13). It can therefore also be depicted as a signal of one's personal needs. Hence, the experience of anger

can have adaptive value (7). However, research on anger-related aspects in chronic pain comprises the anger experience as well as trait anger, anger expression or inhibition, and anger regulation (7). Trait anger describes a relatively stable personality trait to perceive situations as disruptive or frustrating and to react to them with the experience of anger (14). Such feelings of anger can be either inhibited (anger inhibition) or expressed (anger expression) (15). These aspects are associated with several negative outcomes in chronic pain. These may be specifically pain-related such as greater levels of pain intensity which are e.g. associated with state-anger, anger expression and anger inhibition or poorer physiological functioning (16–18). Anger might be directed at oneself via self-blame (19) and self-criticism (20) or directed at others resulting in damaged relationships with spouses (21). Moreover, other directed anger affects pain treatment, resulting in a compromised treatment response, impaired therapeutic relationships and frustration on behalf of health care professionals (10,22,23). Individuals in chronic pain, being frustrated by several prior treatments that failed to deliver pain relief, may display less treatment engagement (24). Activated anger-related cognitions such as perceived injustice may also impede the therapeutic process (25). Perceived injustice is the most discussed concept in terms of anger in chronic pain. It is associated with impaired physiological and psychological health in chronic pain (26). Concerning pain-specific aspects: state-anger mediated the relationship between perceived injustice and pain intensity (27). However, it remains unclear who would benefit from interventions addressing anger-related concepts and which interventions are needed to address the different anger-related impairments.

Prior reviews highlighted the importance of anger in chronic pain and recommend research on interventions (7,28), although such research is currently very limited (29). One reason might be the absence of a theoretical framework concerning anger in chronic pain (30). The current paper is the first review on treatment studies of anger in chronic pain. The aim of this scoping review is to provide an overview of (1) interventions specifically targeting anger in chronic pain and

(2) treatment studies with anger as the primary or secondary outcome. Moreover, anger and anger regulation in chronic pain will be conceptualized in a theoretical model.

Methods:

Search procedure

We decided to conduct a scoping review instead of a systematic review due to the broadness of the underlying research aim that is the provision an overview of current research (31). Our scoping review was conducted according to PRISMA Extension for Scoping Reviews (PRISMA-ScR), using the definition of scoping reviews to be "*a type of knowledge synthesis* [that] *follow a systematic approach to map evidence on a topic and identify main concepts, theories, sources, and knowledge gaps."* (32). The review protocol is available upon request. Articles were extracted from several databases: Web of Science, PubMed and PsychoINFO. All studies ever published until January, 1, 2020 were taken into account. Extensive search terms are depicted in Table 1. Reference lists of during database searches identified relevant studies and review papers were searched manually. Moreover, studies were identified via searches on existing anger instruments (Table 2). In total, we identified 1678 unique articles. Abstracts were screened by the first author. Eligibility was checked.

Inclusion and exclusion criteria

Studies were included if they met the following criteria:

(1) The sample consisted of individuals in chronic pain or their spouses or health care professionals working with individuals in chronic pain (ICP)
(2) There was some kind of psychological intervention
(3) Anger or hostility levels were assessed and reported
(4) Publications were peer-reviewed
(5) Publications were available in English or German.

Data collection

Data on sample size, number of participants, age, gender, target population, pain duration, study design, type of treatment, treatment dosage, anger measurement and anger-related outcomes were collected. Moreover, information on study quality such as the description of interventions, definition of outcome measures, drop-out rates, baseline characteristics, inclusion and exclusion criteria, manualization of interventions and blinding were gathered. Data was gathered and charted by the first author. Studies were grouped according to the used treatment approach.

Process Model of Anger Regulation in Chronic Pain

One reason for the relative lack of research might be a missing theoretical framework on anger in chronic pain. Therefore, we present a model of anger and anger regulation in chronic pain as portrayed in Fig. *1*. This model relies on the extended Process Model of Emotion Regulation by Gross (33,34). It delineates the points at which chronic pain should have an impact on the process of anger generation and anger regulation. Below we discuss the proposed mechanisms by referring to the numbers depicted in Fig. *1*.

Anger

First, we need to understand how momentary anger develops (1). The experience of pain may directly lead to the experience of state anger (35). This might be explained through physiological mechanisms such as common neural circuits of the experience of physical pain and the emotional anger reaction (36,37). However, chronic pain also causes the experience of specific, commonly occurring situations (e.g., inability to participate in routine activities, deficient social or emotional support). These commonly occurring situations display specific situational characteristics (negative valence, self-esteem threats, goal blockages). They may increase the likelihood for state anger via perceptional processes and specific anger-related appraisals. The attention of ICPs is apt to be drawn towards pain and pain-related situational

characteristics (38). The appraisals of these commonly occurring situations comprise three cognitive dimensions of anger in pain: goal frustration, external attribution/blame, and/or perceived injustice (24). These appraisals then activate the emotional experience of anger. The physiological response to this feeling of distress or threat, in turn, directly triggers a heightened pain experience. This can be attributed to neural (36,37), physiological (39,40) and psychological mechanisms (39,41). To some degree, the tendency to appraise situations as frustrating, as caused by others and as unjust and to experience anger is characteristic of individuals across situations and time (i.e., it represents a trait). High levels of trait anger in ICPs might result from a pessimistic outlook on the future as well as lowered anger thresholds due to elevated negative mood and pain intensity (42,43).

Anger Regulation

Anger regulation can be conceived of as a multistage process: To regulate state anger that is triggered in a specific situation (1), the experienced anger has to be identified and evaluated as a candidate for regulation (2). If the goal to regulate the experienced state anger is activated, an anger-regulation strategy must be selected (3), and an anger-regulation tactic that is tailored to the specific situation has to be implemented (4). This process may change the anger experience (as well as anger-related behavior) and hence, change the situation the individual is experiencing (5), which in turn may undergo re-evaluation (1). Throughout the anger regulation process, individuals monitor their progress (6) and decide whether to maintain, alter, or stop their regulatory behavior.

Due to the suffering chronic pain causes, several of these processes may be impaired: Activating the goal to regulate anger requires a clear perception of anger as the momentary emotion being experienced. Emotional awareness is thus fundamental; it may be impaired in chronic pain due to alexithymia, which is prominent in ICPs (44). The selection and implementation processes should be flexibly adapted to personal goals or values and adjusted to contextual demands (45).

However, individuals suffering from chronic pain often either express or suppress anger rigidly. This in turn exacerbates the pain experience, disability, and depression (46,47). The maladaptive or hostile expression of anger can also alter the momentary situation, especially leading to interpersonal conflicts (e.g., with partner, colleagues, practitioners, or health care providers). Interpersonal conflicts are associated with impaired relationships (21), retracing also the pain experience and confirmation of anger-specific cognitions. When a strategy is implemented successfully, it will impact on the momentary emotion being experienced (5). All these processes need to be monitored (6) to potentially adjust the regulation depending on the feedback. However, ICPs often display compromised executive functioning (48), a factor that detracts from their monitoring skills.

The recurrent experience of pain, anger, and rigid anger regulation may also be associated with long-term changes in the life circumstances of ICPs (e.g., unemployment or premature pension, conflicts with health care systems or providers). This may also involve altered cognitive patterns of interpretation (e.g., fostering further beliefs of injustice and self-criticism). Moreover, thresholds for experiencing state anger may be decreased, leading to the maintenance of the vicious circle of pain and hence, further loss of quality of life.

Results:

Study selection and characteristics

Our selection procedure is depicted in Fig. 2. 209 articles were initially identified as potentially relevant. 19 met our selection criteria. In sum, 1710 individuals suffering from chronic pain were included in the review, about two-thirds were female. Studies' characteristics are displayed in Table 3. Chronic pain diagnoses varied among studies. Several studies included individuals with specific diagnoses: back pain (n = 5), fibromyalgia (n = 2), headache (n = 1), irritable bowel syndrome (n = 1), osteoarthritis (n = 1) or HIV-related neuropathic pain (n = 1),

other studies included individuals with differentiating/mixed diagnoses (n = 8). The following measurements were undertaken to assess anger in chronic pain: State Trait Anger Expression Inventory (STAXI or STAXI-II) (49) (n = 4), hostility subscale of the Brief Symptom Inventory (BSI) (50) (n = 4), Profile of Mood States (POMS) (51) (n = 4), "Fragebogen zur Erfassung der Schmerzverarbeitung" FESV- anger subscale (52) (n = 2), Single-item measurement (n = 2), Patient-Reported Outcomes Measurement Information System (PROMIS-Anger Scale) (53) (n = 1), Injustice Experience Questionnaire (IEQ) (54) (n = 1), the Constructive Anger-Behavior-Verbal Scale (55) and West Haven-Yale Multidimensional Pain Inventory – punishing responses subscale (WHYMPI) (56) (n =1). Only the FESV-subscale and IEQ specifically address anger or injustice in pain.

Psychological treatments in the studies included encompassed cognitive-behavioral therapy, psychoeducation, mindfulness or compassion-focused approaches, forgiveness or positive psychology interventions, and emotional expression as well as couples' therapy or training for health care professionals. Individuals received group treatment in eight studies, whereas individual treatment was applied in nine studies; the treatment format was vague in two studies. Treatment dose ranged from 1 hour of group workshop up to 24h of weekly individual therapy. Most of the studies (n = 17) were controlled, with either waitlist-control, treatment as usual, or active control interventions. Only two studies applied uncontrolled pretest-posttest-designs. We categorized all the studies according to their treatment approach: emotional expression approaches (n = 3), CBT or multimodal pain treatment (n = 3), ACT (n = 2), Mindfulness (n = 3), compassion and gratitude interventions (n = 4), couples therapy (n = 2) or interventions intended for health care professionals (HCP) (n = 2).

Critical appraisal of studies included

Detailed information on the quality of the studies we included is provided in Table 4. Sixteen of those studies provided detailed descriptions of the interventions applied. Fourteen studies

explicitly stated the use of manualized or standardized interventions. Thirteen studies stated adequate inclusion and exclusion criteria, three studies only described inclusion criteria, whereas three studies described none. Fifteen studies defined their outcome measures appropriately Seventeen reported their baseline characteristics. Outcomes were assessed blindly in six treatment studies. Only one study failed to report drop-out rates.

Included Studies

The studies we included can be divided into treatments addressing the ICP without (n = 14) or with the intimate partner (n = 2) or addressing the HCP (n = 2).

Emotional Expression

Two randomized, controlled trials explicitly addressed anger expression (57,58). Graham and colleagues (58) compared constructive anger expression writing-tasks with writing tasks on non-emotional goal reflection. Participants were outpatients from a chronic pain center. They were included independent of their amount of experienced anger before the first writing task. The writing task was repeated after approximately 2.5 weeks. Letters written by participants were coded for the amount of expressed anger. Researchers detected no significant differences between groups in anger levels, but the amount of expressed anger predicted greater perceived pain-control. Another study compared Anger Awareness and Expression Training (AAET) to relaxation and a waitlist control-group in college students suffering from clinical or subclinical headaches (57). Individuals received three group sessions lasting 1 hour per week. However, this study did not assess anger as a therapeutic outcome. Regarding other outcomes like alexithymia and emotional processing, AAET was superior, yet headache-related outcomes revealed no significant differences between relaxation and AAET - both were superior to waitlist-control. Another RCT with individuals suffering from irritable bowel syndrome compared Emotional Awareness and Expression Training (EAET) to relaxation and a waitlist

control-group (59). Each participant underwent three individual therapeutic sessions. No differences were revealed in hostility levels between groups. In conclusion, emotional or anger-expression approaches failed to uniquely influence anger levels in ICPs.

CBT and multimodal pain treatments

One RCT compared general CBT to supportive therapy in HIV-related neuropathic pain. Their CBT-group showed significant decreases in anger levels (60). However, this study's impact is impaired by its very high drop-out rates (~57%; Table 4). A quasi-experimental trial compared relaxation to a combination of rational emotive therapy and relaxation (61), and showed no significant differences in hostility levels after treatment. Another study examined the effectiveness of a multimodal pain treatment in the elderly (62). Treatment included psychoeducational elements in groups as well as individual therapeutic sessions. There were no significant differences between anger levels pre- and post-treatment. In sum, the evidence for classical CBT or multimodal pain treatments is limited on the anger-related efficacy of these treatment approaches.

ACT

Another study tested a CBT-treatment enriched with several ACT techniques (63). They conducted a one-group, pretest-posttest-follow-up trial, and their results indicated substantial, but non-significant changes in ICPs hostility. Drop-out rates were 27.5%.

Yet another study applied interdisciplinary Acceptance and Commitment Therapy in group-format (64). Theirs was an observational, one group, pretest-posttest-design, examining a large study cohort (N=300). The authors claimed that they had no specific focus on perceived injustice, but the issue was targeted if it came up. Strategies applied were cognitive defusion, awareness, or mindfulness, as well as acceptance of the experience of pain and unwanted emotions. Furthermore, partners and family were invited to join one session, focusing on the

impact of chronic pain on relationships. The results indicated a significant decrease in the ICPs' perceived injustice after treatment. In sum, treatments employing ACT-techniques have delivered limited but promising results. This might be a worthwhile approach to target perceived injustice.

Mindfulness

One article reported on a quasi-experimental design comparing mindfulness-based cognitive therapy (MBCT) with virtual-reality enhanced CBT and treatment as usual, which was physiotherapy (65). No differences in anger levels between or within groups were reported.

A mindfulness-based training program for women suffering from fibromyalgia led to significant differences in anger levels at posttest and three-month follow-up compared to waitlist-controls (66). However, an RCT that compared a multidisciplinary pain intervention to mindfulness-based stress reduction revealed no differences in hostility in either group (67). In total, the evidence from mindfulness-based approaches is inconsistent.

Compassion and forgiveness

A pilot-RCT on Loving-Kindness Meditation in chronic back pain led to significant changes in hostility and state anger compared to waitlist controls (68). Moreover, the degrees of LKM practiced predicted anger levels on the next day, with more meditation leading to less anger. Another pilot-study on Compassion Cultivation Training showed significant reductions in anger levels compared to the within-subject waiting phase (69). Additionally, anger scores correlated significantly with quality-of-life ratings by significant others. Lee and colleagues (70) conducted a pilot-study where women with fibromyalgia and who had experienced child abuse underwent either a forgiveness intervention or a fibromyalgia health intervention. They detected significant reductions in anger levels only in the forgiveness condition. Furthermore, positive psychology interventions, a character strength and a gratitude intervention, were

compared to a positive writing task and waitlist-control condition (71). A cross-over, multiple-baseline design was applied. Their results showed significant differences in anger levels between groups favoring the character strength and gratitude conditions. In conclusion, compassion and forgiveness-focused interventions all led to significant changes in anger levels. However, pilot-studies delivered those findings.

Couples Therapy

Results from studies on couples therapy with individuals suffering from chronic low back pain have shown a significant decrease in hostility levels in ICPs (72). This was compared to individuals in a control-intervention and was stable at their 5-year follow-up. Another study did not address anger in the individual with chronic pain, but rather spouses' punishing responses (73). Compared with individual therapy, couples' therapy led to a significant change in spousal anger, although there was no data provided on the handling of baseline differences between groups. In total, couples therapy may lower anger in individuals in chronic pain as well as their spouses' punishing responses.

Directed at health care professionals (HCP)

One study that involved HCPs varied communication styles of HCPs during a semi-structured interview concerning pain-related aspects of women with recurrent back pain. Conditions varied between validation and invalidation communication styles (74). Individuals in the validation-group reported significantly less anger at posttest than those in the invalidation-group. Moreover, an intervention via phone-calls based on motivational interviewing techniques after rehabilitation led to a significant reduction in ICPs hostility levels compared to a control phone-intervention (75). In sum, interventions targeting improved interaction between health care professionals and individuals in chronic pain led to greater self-efficacy in HCPs and reduced anger in ICPs.

Discussion:

Summary of results

The impact of anger in the context of chronic pain has been discussed many times in research. However, there is little solid evidence on the treatment of anger in pain. This article therefore aimed to provide an overview of existing treatment studies.

In sum, we included N = 19 studies on treatment approaches concerning anger in chronic pain. Two of them specifically addressed anger in chronic pain, and the rest used anger as a secondary outcome. The studies varied in design, sample size, in the specific anger-related construct they assessed, and in treatment approach and quality.

Emotional expression trainings, classical CBT, ACT, mindfulness- and compassion-based treatments are all designed to improve emotion regulation processes. However, RCTs on anger or emotional expression demonstrated no unique influence on anger in individuals with chronic pain. Evidence on the effect of classical CBT or multimodal pain treatment regarding anger is very limited. Treatments including techniques from acceptance- and commitment therapy have shown promising results. Mindfulness approaches have delivered contradictory findings. In contrast, compassion and forgiveness interventions resulted in significant changes in anger, although pilot studies revealed those results. Couples therapy may increase social support via reducing negative spousal interactions. Studies on couples therapy pointed in this direction by leading to reduced anger in the ICP and less punishing responses by spouses. Interventions encouraging better interaction between HCPs and ICPs might enhance treatment processes and effectiveness. Studies showed that interventions led to higher self-efficacy in HCPs and reduced anger in ICPs. In conclusion, the evidence on treating anger in chronic pain has shown promising approaches, but it is limited.

ACT or compassion-based approaches may be promising. Chronic pain as a constant stressor, eliciting threat-based emotions such as anger and leading to exacerbated emotional states, makes it difficult to engage in adaptive emotion-regulation (8). In these highly-intense emotional states, compassion may be easier to demonstrate and thus make further strategies possible (76,77). Particularly ACT- and compassion-based treatments try to identify one's personal needs and values (78,79). They also make use of the motivational and functional aspect of anger, to reveal personal boundaries and needs. Therefore, it should be addressed in treatment (80).

Another potential approach might be to include partners or family. However, there is little solid evidence from couple-oriented approaches in chronic pain or anger treatment. Cano and colleagues (81) used a mindfulness- and acceptance-based couples approach in their case study. Gaining flexibility lead to reductions in stress and improved coping with chronic pain (81). Another study demonstrated increased marital satisfaction, but no additional benefit on chronic pain outcomes from including the partner in multidisciplinary pain treatment (82). However, the existing literature is only partly applicable to the current research question, the reduction of anger.

The training of HCPs is another potentially helpful approach. Many HCPs feel frustrated working with ICPs, i.e., due to hostile interactions and distrust (23). Moreover, HCPs sometimes try to avoid negative emotions, especially anger, during treatment processes (80). Empathy on behalf of the HCP might reduce conflicts and encourage an effective therapeutic relationship (23). A pilot-study involving a training program directed at HCPs treating oncology patients led to a significant increase in self-efficacy in response to patient anger (83). A recent systematic review of training sessions on communication skills for clinicians revealed small overall effects on patients' satisfaction with care, pain, and disability (84).

Apart from the aforementioned studies, therapeutic approaches on anger in general may offer further advice on potentially effective treatments of pain-related anger. Lee and DiGiuseppe (85) conducted a review of meta-analyses concerning anger treatments. The treatments (mostly CBT) were effective in diverse adult samples (offenders, adults with intellectual disabilities, health care patients, mental health clients and college students). Moreover, a review of ACT approaches to treat anger, hostility, and aggression delivered encouraging results (86). However, the numbers of studies are few, and their quality varies. Fernandez (87) also suggests applying cognitive-behavioral affective therapy (CBAT) to treat anger in pain. However, there is no empirical evidence yet for CBAT in chronic pain populations.

Limitations

The main limitation of this article concerns its liberal inclusion criteria. We included every study measuring anger and related concepts in some way in the context of pain treatment. Therefore, the studies are very heterogeneous, which is why we refrained from conducting a meta-analysis. This concerns various aspects such as treatment approaches, dosage, and settings, as well as pain conditions, and durations, samples sizes, study design, control groups, and measuring anger and study quality. Hence, comparing the studies we included is compromised.

To provide a clearer focus of the review it solely referred to anger outcomes, neglecting possible changes in pain-related outcomes. Therefore, no conclusion can be made about the impact or association of changes in anger outcomes on pain-related results.

Moreover, the diversity in instruments assessing anger is potentially problematic. Only the subscale of FESV and the IEQ specifically address pain-related anger. The FESV is only available in German. The IEQ only assesses perceived injustice. Some of the other measurements measure hostility, others measure state anger and/or trait anger. It remains

unclear whether the same underlying construct is assessed by these differentiating instruments. Moreover, we can make no statement on the most relevant aspect of anger to assess in the context of chronic pain treatment.

One could also argue that it is unnecessary to differentiate between negative emotions. Linton (88) tends to recommend a transdiagnostic approach concerning emotion and pain. Furthermore, the existing models of emotion and emotion regulation (33) might suffice. There might be no need for any additional model addressing anger in pain. However, there has been demand for a theoretical framework concerning anger in pain, to foster future research on relevant anger-related variables and to identify treatment processes (30). Moreover, to define whether it is necessary to address general negative affect or anger specifically, studies are needed which assess both in the context of treatment.

Implications for future research

Initially, consistent instruments for measuring anger in pain need to be developed and evaluated, distinguishing various aspects of anger (experience, anger-related behavior, expression, regulation). These instruments then can be used to identify the most relevant aspects of the anger regulation process in pain. Especially process-based measures are needed. Such measures will facilitate the examination of the relationship between anger-related aspects and pain outcomes during the course of therapy. Studies should also consider assessing anger and general negative affect as outcomes. It is still unknown whether it is necessary to target anger-related aspects independently.

Existing evidence-based treatments for chronic pain such as CBT, exposure-based treatments, and ACT should be reassessed regarding their impact on anger outcomes. Moreover, specific anger management therapies effective in other conditions should be evaluated in chronic pain. Moreover, compassion- and forgiveness-based interventions as well as couples therapy and

training for health care professionals should be evaluated in randomized, controlled trials or single-case designs. New treatments or treatment components specifically targeting anger in chronic pain need to be developed and empirically tested. Research on mechanisms of change will help us identify which components are effective and whether anger treatments in pain should be additive or exclusive approaches. These studies might discuss the Process Model of Anger Regulation in Chronic Pain to identify which treatment approach draws on which aspect of the anger regulation process and which aspect is the most relevant for specific individuals. Six possible treatment targets are suggested in the heuristic Process Model of Anger Regulation: (1) state anger: a) commonly occurring situations (e.g., working with interpersonal conflicts via couples therapy or training of HCPs), b) perception and c) appraisal (e.g. ACT, CBT), (2) emotion identification (e.g., mindfulness-based approaches), (3) selection of strategies (e.g., increasing repertoire of strategies to gain flexibility: ACT, compassion-based approaches, CBT), (4) implementation of strategies, (5) feedback (e.g., mindfulness-based approaches) and (6) monitoring processes. However, the model and its different stages need to be empirically tested.

Implications for clinical practice

Anger in chronic pain leads to limited treatment outcomes. Therefore, it is necessary to address anger in individuals with chronic pain to ensure or optimize treatment. There are several potential treatment approaches. Cognitive restructuring or defusion techniques could be applied to address perceived injustice, blame, and goal frustration. Different emotion-regulation strategies could be applied to enhance flexibility. Empathy-training, couple interventions, or conflict resolution and communication interventions may target interpersonal difficulties. However, these recommendations should be “handled with care” due to limited empirical evidence.

Conclusion

Empirical research on the treatment of anger in chronic pain remains sparse. Existing studies are difficult to compare due to various discrepancies in treatment approaches, design and quality. Results are promising in reducing anger levels in individuals with chronic pain. Still, further research is needed. The “Process Model of Anger Regulation in Chronic Pain” may offer a heuristic conceptualization of anger-related aspects in chronic pain. More studies applying randomized, controlled formats or single-case approaches should be designed. New treatments or treatment components, specifically targeting anger in chronic pain, should be developed and empirically tested and existing treatments reassessed regarding anger outcomes.

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References:

1. Nicholas M, Vlaeyen JWS, Rief W, Barke A, Aziz Q, Benoliel R, et al. The IASP classification of chronic pain for ICD-11: Chronic primary pain. Pain. 2019;160(1):28–37.

2. Breivik H, Eisenberg E, O'Brien T. The individual and societal burden of chronic pain in Europe: the case for strategic prioritisation and action to improve knowledge and availability of appropriate care. BMC Public Health. 2013;13:1229.

3. Williams ACDC, Eccleston C, Morley S. Psychological therapies for the management of chronic pain (excluding headache) in adults (Review). Cochrane Database Syst Rev. 2012;(11).

4. Veehof MM, Trompetter HR, Bohlmeijer ET, Schreurs KMG. Acceptance- and mindfulness-based interventions for the treatment of chronic pain : a meta-analytic review. Cogn Behav Ther [Internet]. 2016;45:5–31. Available from: http://dx.doi.org/10.1080/16506073.2015.1098724

5. Glombiewski JA, Holzapfel S, Riecke J, Vlaeyen JWS, de Jong J, Lemmer G, et al. Exposure and CBT for Chronic Back Pain: An RCT on Differential Efficacy and Optimal Length of Treatment. J Consult Clin Psychol. 2018;86(6):533–45.

6. Hasenbring MI, Verbunt JA. Fear-avoidance and Endurance-related Responses to Pain: New Models of Behavior and Their Consequences for Clinical Practice. Clin J Pain. 2010;26(9):747–53.

7. Greenwood KA, Thurston R, Rumble M, Waters SJ, Keefe FJ. Anger and persistent pain : current status and future directions. 2003;103:1–5.

8. Koechlin H, Coakley R, Schechter N, Werner C, Kossowsky J. The role of emotion regulation in chronic pain: A systematic literature review. J Psychosom Res [Internet]. 2018;107:38–45. Available from: https://doi.org/10.1016/j.jpsychores.2018.02.002

9. Dworkin RH, Turk DC, Wyrwich KW, Beaton D, Cleeland CS, Farrar JT, et al. Interpreting the Clinical Importance of Treatment Outcomes in Chronic Pain Clinical Trials: IMMPACT Recommendations. J Pain. 2008;9(2):105–21.

10. Burns JW, Johnson BJ, Devine J, Mahoney N, Pawl R. Anger management style and the prediction of treatment outcome among male and female chronic pain patients. Behav Res Ther [Internet]. 1998;36(11):1051–62. Available from: http://www.ncbi.nlm.nih.gov/pubmed/9737057

11. Okifuji A, Turk DC, Curran SL. Anger in chronic pain: Investigations of anger targets and intensity. J Psychosom Res. 1999;47(1):1–12.

12. Gilbert P. The compassionate mind: a new approach to life's challenges. London: Constable-Robinson; 2009.

13. Fernandez E. The Relationship Between Anger and Pain. Curr Pain Headache Rep. 2005;9:101–5.

14. Schwenkmezger P, Hodapp V, Spielberger CD. Das State-Trait-Ärgerausdrucks-Inventar STAXI. Bern: Hans Huber; 1992.

15. Spielberger CD. Manual for the State-Trait-Anger Expression Inventory. Resources PA, editor. Odessa, FL; 1988.

16. Quartana PJ, Bounds S, Yoon KL, Goodin BR, Burns JW. Anger Suppression Predicts Pain, Emotional, and Cardiovascular Responses to the Cold Pressor. Ann Behav Med. 2010;39:211–21.

17. Burns JW, Holly A, Quartana P, Wolff B, Gray E, Bruehl S. Trait Anger Management Style Moderates Effects of Actual ("State") Anger Regulation on Symptom -Specific Reactivity and Recovery Among Chronic Low Back Pain Patients. Psychosom Med. 2008;70(8):898–905.

18. Burns JW, Gerhart JI, Bruehl S, Peterson KM, Smith DA, Porter LS, et al. Anger Arousal and Behavior Anger Regulation in Everyday Life among Patients with Chronic Low

Back Pain: Relationships to Patient Pain and Function. Heal Psychol. 2015;34(5):547–55.

19. Cedraschi C, Girard E, Luthy C, Kossovsky M, Desmeules J, Allaz A. Primary attributions in women suffering fibromyalgia emphasize the perception of a disruptive onset for a long-lasting pain problem. J Psychosom Res [Internet]. 2013;74(3):265–9. Available from: http://dx.doi.org/10.1016/j.jpsychores.2012.12.014

20. Rudich Z, Lerman SF, Gurevich B, Weksler N, Shahar G. Patients' Self-Criticism Is a Stronger Predictor of Physician's Evaluation of Prognosis Than Pain Diagnosis or Severity in Chronic Pain Patients. J Pain. 2008;9(3):210–6.

21. Schwartz L, Slater M, Birchler G, Atkinson J. Depression in spouses of chronic pain patients: the role of patient pain and anger, and marital satisfaction. Pain. 1991;44(1):61–7.

22. Burns JW, Higdon LJ, Mullen JT, Lansky D, Wei JM. Relationships among patient hostility, anger expression, depression, and the working alliance in a work hardening program. Ann Behav Med. 1999;21(1):77–82.

23. Matthias MS, Parpart AL, Nyland KA, Huffman MA, Stubbs DL, Bair MJ. The Patient – Provider Relationship in Chronic Pain Care: Providers' Perspectives. Pain Med. 2010;11:1688–97.

24. Trost Z, Vangronsveld K, Linton SJ, Quartana PJ, Sullivan MJL. Cognitive dimensions of anger in chronic pain. Pain [Internet]. 2012;153(3):515–7. Available from: http://dx.doi.org/10.1016/j.pain.2011.10.023

25. Eccleston C, Williams ACDC, Rogers WS. Patients' and Professionals' understandings of the causes of chronic pain: blame, responsibility and identity protection. Soc Sci Med. 1997;45(5):699–709.

26. Sullivan MJL, Scott W, Trost Z. Perceived Injustice. 2012;28(6):484–8.

27. Scott W, Trost Z, Bernier E, Sullivan MJL. Anger differentially mediates the relationship between perceived injustice and chronic pain outcomes. Pain [Internet]. 2013;154(9):1691–8. Available from: http://dx.doi.org/10.1016/j.pain.2013.05.015

28. Fernandez E, Turk DC. The scope and significance of anger in the experience of chronic pain. Pain. 1995;61:165–75.

29. Darnall BD. "Compassion Cultivation in Chronic Pain May Reduce Anger, Pain and Increase Acceptance: Study Review and Brief Commentary." Heal Care Curr Rev. 2015;3(2).

30. McCracken LM. Anger, injustice, and the continuing search for psychological mechanisms of pain, suffering, and disability. Pain. 2013;154(9):1495–6.

31. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol. 2018;18(143):1–7.

32. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. Ann Intern Med. 2018;169(7):467–73.

33. Gross JJ. Emotion Regulation: Current Status and Future Prospects. Psychol Inq. 2015;26:1–26.

34. Ford BQ, Gross JJ, Gruber J. Broadening Our Field of View: The Role of Emotion Polyregulation. Emot Rev [Internet]. 2019;11(3):197–208. Available from: https://doi.org/10.1177/1754073919850314

35. Berkowitz L, Harmon-Jones E. Toward an understanding of the determinants of anger.

Vol. 4, Emotion. 2004. p. 107–30.

36. Eisenberger NI, Lieberman MD. Why rejection hurts: a common neural alarm system for physical and social pain. Trends Cogn Sci. 2004;8(7):294–300.

37. Schweinhardt P, Kalk N, Wartolowska K, Chessell I, Wordsworth P, Tracey I. Investigation into the neural correlates of emotional augmentation of clinical pain. Neuroimage. 2008;40:759–66.

38. Eccleston C, Crombez G. Pain demands attention: A cognitive-affective model of the interruptive function of pain. Psychol Bull. 1999;125(3):356–66.

39. Mollet GA, Harrison DW. Emotion and Pain: A Functional Cerebral Systems Integration. Neuropsychol Rev. 2006;16:99–121.

40. Rhudy JL, Williams AE, McCabe KM, Rambo PL, Russell JL. Emotional modulation of spinal nociception and pain: The impact of predictable noxious stimulation. Pain. 2006;126:221–33.

41. Janssen SA, Spinhoven P, Brosschot JF. Experimentally induced anger, cardiovascular reactivity, and pain sensitivity. J Psychosom Res. 2001;51:479–85.

42. Finucane AM, Dima A, Ferreira N, Halvorsen M. Basic Emotion Profiles in Healthy, Chronic Pain, Depressed and PTSD Individuals. Clin Psychol Psychother. 2012;19:14–24.

43. Sturgeon JA, Dixon EA, Darnall BD, Mackey SC. Contributions of physical function and satisfaction with social roles to emotional distress in chronic pain: A Collaborative Health Outcomes Information Registry (CHOIR) study. Pain. 2015;156(12):2627–33.

44. Di Tella M, Castelli L. Alexithymia in Chronic Pain Disorders. Curr Rheumatol Rep. 2016;18(41):1–9.

45. Aldao A, Sheppes G, Gross JJ. Emotion Regulation Flexibility. Cognit Ther Res [Internet]. 2015;39:263–78. Available from: http://dx.doi.org/10.1007/s10608-014-9662-4

46. Kerns RD, Rosenberg R, Jacob M. Anger expression and chronic pain. J Behav Med. 1994;17(1):57–67.

47. Burns JW, Bruehl S, Quartana PJ. Anger Management Style and Hostility Among Patients With Chronic Pain: Effects on Symptom-Specific Physiological Reactivity During Anger- and Sadness-Recall Interviews. Psychosom Med. 2006;68:786–93.

48. Berryman C, Stanton TR, Bowering KJ, Tabor A, McFarlane A, Moseley GL. Do people with chronic pain have impaired executive function? A meta-analytical review. Clin Psychol Rev [Internet]. 2014;34:563–79. Available from: http://dx.doi.org/10.1016/j.cpr.2014.08.003

49. Spielberger CD. State-Trait Anger Expression Inventory professional manual. Odessa, FL: Psychological Assessment Resources; 1999.

50. Derogatis LR, Melisaratos N. The Brief Symptom Inventory : an introductory report. Psychol Med. 1983;13:595–605.

51. Haythornthwaite JA. Profile of Mood States. In: Proceedings of the Fourth Meeting of the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT-IV). Washington, D.C.; 2004.

52. Geissner E. Fragebogen zur Erfassung der Schmerzverarbeitung (FESV). Göttingen: Hogrefe; 2001.

53. Paul A. Pilkonis, Seung W. Choi, Steven P. Reise, Angela M. Stover, William T. Riley and DC. Item Banks for Measuring Emotional Distress From the Patient- Reported

Outcomes Measurement Information System (PROMIS®): Depression, Anxiety, and Anger. NIH Public Access. 2011;18(3):263–83.

54. Sullivan MJL. User Manual for the Injustice Experience Questionnaire IEQ Copyright 2008. 2008;1–14.

55. Davidson K, MacGregor MW, Stuhr J, Dixon K, MacLean D. Constructive anger verbal behavior predicts blood pressure in a population-based sample. Heal Psychol. 2000;19(1):55–64.

56. Kerns D, Turk DC. The West Haven-Yale Multidimensional Inventory (WHYMPI). Pain. 1985;23:345–56.

57. Slavin-Spenny O, Lumley MA, Thakur ER, Nevedal DC, Hijazi AM. Effects of Anger Awareness and Expression Training versus Relaxation Training on Headaches: A Randomized Trial. Ann Behav Med. 2013;

58. Graham JE, Lobel M, Glass P, Lokshina I. Effects of written anger expression in chronic pain patients: making meaning from pain. J Behav Med. 2008;31:201–12.

59. Thakur E, Holmes H, Lockhart N, Carty J, Ziadni M, Doherty H, et al. Emotional awareness and expression training improves irritable bowel syndrome: A randomized controlled trial. Neurogastroenterol Motil. 2017;29:1–9.

60. Evans S, Fishman B, Spielman L, Haley A. Randomized Trial of Cognitive Behavior Therapy Versus Supportive Psychotherapy for HIV-Related Peripheral Neuropathic Pain. Psychosomatics. 2003;44(1):44–50.

61. Boyle GJ, Ciccone VM. Relaxation alone and in combination with rational emotive therapy: Effects on mood and pain. Pain Clin. 1994;7(4):253–65.

62. Mattenklodt P, Ingenhorst A, Wille C, Flatau B, Hafner C, Geiss C, et al. Multimodale

Gruppentherapie bei Senioren mit chronischen Schmerzen. Schmerz. 2008;22:551–61.

63. Cano-garcía FJ, González-Ortega M del C, Sanduvete-Chaves S, Chacón-Moscoso S, Moreno-Borrego R. Evaluation of a Psychological Intervention for Patients with Chronic Pain in Primary Care. Front Psychol. 2017;8(435):1–8.

64. Scott W, Yu L, Patel S, Mccracken LM. Measuring stigma in chronic pain: Preliminary investigation of instrument psychometrics, correlates, and magnitude of change in a prospective cohort attending interdisciplinary treatment. J Pain [Internet]. 2019; Available from: https://doi.org/10.1016/j.jpain.2019.03.011

65. Igna R, Stefan S, Onac I, Onac I, Ungur R-A, Szentagotai Tatar A. Mindfulness-based cognitive-behavior therapy (MCBT) versus virtual reality (VR) enhanced CBT, versus treatment as usual for chronic back pain. A clinical trial. J Evidance-Based Psychother. 2014;14(2):229–47.

66. Amutio A, Franco C, Pérez-Fuentes M de C, Gázquez JJ, Mercader I. Mindfulness training for reducing anger, anxiety, and depression in fibromyalgia patients. Front Psychol. 2015;5:1–8.

67. Wong SY, Chan FW-K, Wong RL, Chu M-C, Lam Y-YK, Mercer SW, et al. Comparing the Effectiveness of Mindfulness-based Stress Reduction and Multidisciplinary Intervention Programs for Chronic Pain - A Randomized Comparative Trial. Clin J Pain. 2011;27(8):724–34.

68. Carson JW, Keefe FJ, Lynch TR, Carson KM, Goli V, Fras AM, et al. Loving-Kindness Meditation for Chronic Low Back Pain - Results From a Pilot Trial. J Holist Nurs. 2005;23(3):287–304.

69. Chapin HL, Darnall BD, Seppala EM, Doty JR, Hah JM, Mackey SC. Pilot study of a compassion meditation intervention in chronic pain. J Compassionate Heal Care.

2014;1(4):1–12.

70. Lee Y, Enright RD. A Forgiveness Intervention for Women With Fibromyalgia Who Were Abused in Childhood : A Pilot Study. Spiritual Clin Pract. 2014;1(3):203–17.

71. Baxter HJ, Johnson MH, Bean D. Efficacy of a Character Strengths and Gratitude Intervention for People with Chronic Back Pain. Aust J Rehabil Couns. 2012;18(2):135–47.

72. Saarijärvi S, Alanen E, Rytökoski U, Hyyppä M. Couple Therapy improves mental well-being in chronic low back pain patients. A controlled, five year follow-up study. J Psychosom Res. 1992;36(7):651–6.

73. Martire LM, Schulz R, Keefe FJ, Rudy TE, Starz TW. Couple-Oriented Education and Support Intervention for Osteoarthritis: Effects on Spouses' Support and Responses to Patient Pain. Fam Syst Heal. 2009;26(2):185–95.

74. Vangronsveld KL, Linton SJ. The effect of validating and invalidating communication on satisfaction, pain and affect in nurses suffering from low back pain during a semi-structured interview. Eur J Pain. 2012;16:239–46.

75. Rau J, Ehlebracht-König I, Petermann F. Einfluss einer Motivationsintervention auf die Bewältigung chronischer Schmerzen - Ergebnisse einer kontrollierten Wirksamkeitsstudie. Schmerz. 2008;22:575–85.

76. Diedrich A, Grant M, Hofmann SG, Hiller W, Berking M. Self-compassion as an emotion regulation strategy in major depressive disorder. Behav Res Ther [Internet]. 2014;58:43–51. Available from: http://dx.doi.org/10.1016/j.brat.2014.05.006

77. Hein G, Singer T. I feel how you feel but not always: the empathic brain and its modulation. Curr Opin Neurobiol. 2008;18:153–8.

78. Neff K. Self-Compassion: An Alternative Conceptualization of a Healthy Attitude Toward Oneself. Self Identity. 2003;2:85–101.

79. Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J. Acceptance and Commitment Therapy: Model, processes and outcomes. Behav Res Ther. 2006;44:1–25.

80. Lumley MA, Schubiner H. Psychological Therapy for Centralized Pain: An Integrative Assessment and Treatment Model. Psychosom Med. 2019;81:114–24.

81. Cano A, Corley AM, Clark SM, Martinez SC. A Couple-Based Psychological Treatment for Chronic Pain and Relationship Distress. Cogn Behav Pract [Internet]. 2017; Available from: http://dx.doi.org/10.1016/j.cbpra.2017.02.003

82. Ramke S, Sharpe L, Newton-John T. Adjunctive cognitive behavioural treatment for chronic pain couples improves marital satisfaction but not pain management outcomes. Eur J Pain. 2016;1–11.

83. Gerhart JI, Varela VS, Burns JW. Brief Training on Patient Anger Increases Oncology Providers' Self-Efficacy in Communicating With Angry Patients. J Pain Symptom Manage [Internet]. 2017;54(3):355–60. Available from: http://dx.doi.org/10.1016/j.jpainsymman.2017.07.039

84. Oliveira VC, Ferreira ML, Pinto RZ, Filho RF, Refshauge K, Ferreira PH. Effectiveness of Training Clinicians' Communication Skills on Patients' Clinical Outcomes: A Systematic Review. J Manipulative Physiol Ther [Internet]. 2015; Available from: http://dx.doi.org/10.1016/j.jmpt.2015.08.002

85. Lee AH, Digiuseppe R. Anger and aggression treatments: a review of meta-analyses. Curr Opin Psychol [Internet]. 2018;19:65–74. Available from: http://dx.doi.org/10.1016/j.copsyc.2017.04.004

86. Berkout O V, Tinsley D, Flynn MK. A review of anger, hostility, and aggression from an ACT perspective. J Context Behav Sci [Internet]. 2019;11:34–43. Available from: https://doi.org/10.1016/j.jcbs.2018.12.001

87. Fernandez E. New prospects for alleviation of anger in the context of chronic cain. In: Bajwa Z, Warfield C, Wootton J, editors. Principles and Practice of Pain Medicine. 3rd ed. New-York: McGraw-Hill; 2016. p. 210–5.

88. Linton SJ. A Transdiagnostic Approach to Pain and Emotion. J Appl Biobehav Res. 2013;18(2):82–103.

Anhang

Tables:

Table 1

General search Terms

Database	Search terms	Identified studies (N)
Web of Science	ALL FIELDS: (anger or hostility NOT danger) AND TITLE: (pain OR migraine OR fibromyalgia OR rheum* OR headache OR arthritis) AND TITLE: (treatment OR therapy OR intervention) Timespan: All years.	34
PubMed	ALL FIELDS:(anger or hostility NOT danger) AND TITLE: (pain OR migraine OR fibromyalgia OR rheum* OR headache OR arthritis) AND TITLE: (treatment OR therapy OR intervention)	34
PsychINFO	ALL FIELDS:(anger or hostility NOT danger) AND TITLE: (pain OR migraine OR fibromyalgia OR rheum* OR headache OR arthritis) AND TITLE: (treatment OR therapy OR intervention)	45

Table 2

Search Terms on Anger Instruments

Database	Search terms	Identified studies (N)
PsychINFO	TM (promis) AND AB (chronic pain or persistent pain or long term pain or pain or headache or fibromyalgia) AND AB (treatment or intervention or therapy)	36
PsychINFO	TM profile of mood states AND TI (treatment or intervention or therapy) AND TI (pain or migraine or headache or fibromyalgia or rheum* or arthritis)	18
PsychINFO	TM ((state trait OR state-trait) anger expression inventory) AND AB (chronic pain or persistent pain or long term pain or pain or headache or fibromyalgia) AND AB (treatment or intervention or therapy)	14
PsychINFO	TM injustice experience questionnaire AND AB (treatment or intervention or therapy) AND AB (pain or migraine or headache or fibromyalgia or rheum* or arthritis)	13
PsychINFO	TM (novaco anger scale and provocation inventory) AND AB (treatment or intervention or therapy) AND AB (pain or migraine or headache or fibromyalgia or rheum* or arthritis)	0
PsychINFO	TM anger disorders scale AND AB (treatment or intervention or therapy) AND AB (pain or migraine or headache or fibromyalgia or rheum* or arthritis)	0

PsychINFO	TX (targets and reasons for anger in pain sufferers) AND AB (treatment or intervention or therapy) AND AB (pain or migraine or headache or fibromyalgia or rheum* or arthritis)	0
PsychINFO	TM multidimensional anger inventory AND AB (treatment or intervention or therapy) AND AB (pain or migraine or headache or fibromyalgia or rheum* or arthritis)	0

Note. TM = Tests & Measures; AB = Abstract; TI = Title; TX = Text

Table 3

Overview of Interventional Studies Measuring Anger in Pain

No.	First Author, Publication Year	Sample size (N)	Age, M (SD)	% Female	Target population	Pain duration M (SD), in years	Design	Type of treatment	Treatment dosage	Anger measure	Outcome on Anger
1	Amutio (2015)	39	51.82 (10.18)	100	Fibromyalgia	N/A	Quasi-experimental design with waiting-list control	Mindfulness based training programm	7 sessions; 2h per week	STAXI-II (state anger, trait anger, anger expression [in/out], anger control [in/out]	Sign. differences between conditions at posttest and follow-up: state anger, anger expression-in, anger control-in
2	Baxter (2012)	8	54.63 (8.25)	50	Chronic back pain	8 (8.27)	Cross-over multi-baseline	Character Strength & Gratitude Intervention vs. positive writing comparison condition vs. Waitlist control	No personal contact? – two weeks per condition approx. 10-15 min. per day	Differential Emotions Scale Probe (Single Item – daily measurement)(94)	Sign. difference between conditions – lower anger levels in character strengths & gratitude condition
3	Boyle (1994)	34	61.06 (12.9)	76.47	Chronic pain (mixed)	3.6 (6.61)	Quasi-experimental design	Relaxation vs. relaxation with rational emotive therapy	5 group sessions, 90 min per week	POMS: hostility subscale	No sign. differences in hostility levels in both groups
4	Cano-García (2017)	40	47.9 (8.68)	55	Chronic pain (mixed)	16.75 (9.14)	Quasi-experimental one-group pre-test post-test follow-up design	Cognitive-behavioral techniques mixed with ACT-components	10 group sessions, 1 per week (groups of 13-14)	POMS: hostility subscale	Substantial change in POMS-Hostility (non-sign.) -> high drop-out at follow-up (n = 18)

5	Carson (2005)	43	51.1 (N/A)	61	Chronic back pain	12.37 (9.68)	RCT (Pilot trial)	Loving-Kindness Meditation (LKM) vs. waitlist control	8 group sessions; 90 min. per week (4-8 patients per group)	BSI (hostility subscale); STAXI-II (state anger, trait anger, anger expression [in/out], anger control [in/out]; daily anger – single item	Sign. within-group changes from pre to follow-up: hostility and state anger; sign. Improvements in daily anger; the amount of LKM predicts daily anger of next day
6	Chapin (2014)	12	48.33 (10.80)	83.3	Chronic pain (mixed)	13.29 (N/A)	Within-subjects waitlist control	Compassion Cultivation Training (not tailored for chronic pain)	9 group-session; 2h per week + additional homework/meditation practice	PROMIS – Anger Scale- (short form)	Sign. reduction in anger; sign. correlation of anger scores sign. Others' rating of quality of life
7	Evans (2003)	61	46.5 (7.9)	21.3	HIV-related Peripheral neuropathic pain	N/A	RCT	CBT vs. supportive therapy	6 individual session; 1h per week	BSI: hostility subscale	Sign. reduction in hostility only in CBT-condition
8	Graham (2008)	148	46.3 (7.5)	57.3	Chronic pain	3.3 (2.8)	Randomized controlled design	Writing tasks: anger expression vs. non-emotionally goal "reflection"	2 two writing tasks in each condition, approx. 2.5 weeks apart	STAXI; Constructive Anger-Behavior-Verbal Scale	No sign. differences in state anger between or within groups; Expressed anger predicted greater pain-control
9	Igna (2014)	85	47 (N/A)	52.94	Chronic back pain	N/A	3 armed control-group design (no randomization)	Mindfulness-based cognitive-behavior therapy (MBCT) vs. virtual reality (VR) enhanced CBT vs. treatment as usual	MBCT + VR-CBT: 6 individual sessions; 2x 1h per week TAU: 10 physiotherapy sessions, 5 per week	Profil of Mood States – Short Version (POMS-SV) (anger-hostility subscale)	No sign. differences in anger self-report between groups or within groups
10	Lee (2014)	11	43.55 (17.03)	100	Fibromyalgia (& childhood abuse)	8.91 (7.19)	Pilot Study	Forgiveness Intervention vs. Fibromyalgia health intervention	24 individual sessions; 1h per week	STAXI-II (State anger, Trait anger)	Sign. less state anger from (pre-FU) in forgiveness condition

No.	First Author, Publication Year	Sample size (N)	Age, M (SD)	% Female	Target population	Pain duration M (SD), in years	Design	Type of treatment	Treatment dosage	Anger measure	Outcome on Anger
11	Martire (2008)	252 (126 couples)	PES: 68.7 (8.4) CES: 69.0 (7.2)	PES: 68 CES: 75	Osteoarthritis	PES: 14.5 (12.2) CES: 14.1 (8.9)	Randomly assigned condition	Patient Education and Support vs. Couple-oriented intervention and Support	6 group sessions; 2h per week (in CES with spouses)	Spouses angry reactions: West Haven-Yale Multidimensional Pain Inventory (Punishing Responses subscale)	Sign. group x time interaction effects, with less punishing responses by spouses in CES condition – baseline differences not considered
12	Mattenklodt (2008)	24	76.2 (4.79)	75	Chronic pain (mixed)	12.4 (10.9)	Prospective design; no randomization	Multidisciplinary pain treatment vs. waitlist control	10 week treatment; partly in groups, partly individuals sessions	FESV: anger subscale	No sign. differences in anger levels in treatment group.
13	Rau (2008)	147	CG: 50.67 (6.88) EG: 47.49 (8.92)	CG: 63.83 EG: 68.18	Chronic pain (mixed)	CG: 9.86 (10.65) EG: 9.95 (7.13)	Controlled prospective design; quasi-randomization	Motivational intervention vs. control (question about attainment of goals from rehabilitation)	3 phone-calls; 1 every two months	FESV: anger subscale	Sign. reduction in anger levels in intervention group – baseline differences not considered
14	Saarijäri (1992)	126 (63 couples)	EG: 50.6 (9.6) CG: 50.4 (8.2)	EG: 50 CG: 53.57	Chronic low back pain	N/A	RCT	Couples therapy vs. control group (not defined)	5 couples sessions; 1-2h per month; by two therapists	BSI: hostility subscale	Sign differences between groups at 5-year follow-up; hostility constantly decreased in EG and increased in CG

15	Scott (2019)	300	45.22 (12.55)	68.3	Chronic pain (mixed)	13.37 (10.29)	Observational study	Interdisciplinary version of ACT	Residential pain management treatment programme; 3-4 weeks; in groups	IEQ	Sign. reduction in perceived injustice after treatment (pre-post)
16	Slavin-Spenny (2013)	147	22.1 (6.0)	87.8	Headaches (mixed clinical/ subclinical – M = 10.35 days of headache per month)	N/A	RCT	Anger Awareness and Expression Training (AAET) vs. relaxation (RT) vs. waitlist control	3 group-sessions (M = 3.9 AAET; M = 4.0 RT patients per group); 1h per week	N/A	None, but: AAET sign. more reduction in alexithymia and more emotional processing; nearly every other outcome or process measure no difference to relaxation, but better than control
17	Thakur (2016)	106	36.14 (16.42)	80.2	Irritable Bowel Syndrome	22.90 (12.84)	RCT	Emotional Awareness and Expression Training (EAET) vs. relaxation vs. Waitlist control	3 individual session; 50 min. per week	BSI (hostility subscale)	No sign. differences between groups
18	Vangronsveld (2012)	28	48 (10.9)	100	Back pain	N/A	Experimental design	Validating vs. Invalidating communication	1 semi-structured interview	Single item	Sign. interaction effect: participants in validation group reported less anger at posttest
19	Wong (2011)	99	47.9 (7.84)	N/A	Chronic pain	½ > 5 years 1/3 > 10 years	RCT	MBSR vs. MPI	8 group session; 2,5h per week + one time 7 h "retreat"	POMS: anger subscale	No sign. changes in hostility; trends in MBSR decreased – in MPI varying; no sign. Differences between groups

Note. PES = patient-oriented education and support; CES = couples-oriented education and support; CG = Control Group; EG = Experimental Group; RCT = Randomized Controlled Trial; ACT = Acceptance- and Commitment Therapy; LKM = Loving Kindness Meditation; CBT = Cognitive Behavioral Therapy; MBCT = Mindfulness-Based Cognitive Therapy; VR = Virtual Reality; AAET = Anger Awareness and Expression Training; RT = Relaxation; EAET = Emotional Awareness and Expression Training; MBSR = Mindfulness-Based Stress Reduction; MPI = Multidisciplinary Pain Intervention; TAU = Treatment as Usual; STAXI = State-Trait Anger Expression Inventory; POMS = Profile of Mood States; PROMIS = Patient-Reported Outcomes Measurement Information System (Anger Subscale); BSI = Brief Symptom Inventory; FESV = Fragebogen zur Erfassung der Schmerzverarbeitung; IEQ = Injustice Experience Questionnaire

Table 4

Critical appraisal of Included Studies

No.	First Author	Description of interventions	Definition of outcome measures	Drop-Out	Baseline Characteristics	Adequacy of inclusion and exclusion criteria	Manualized + standardized intervention	Blind assessment of outcome
1	Amutio	detailed	Detailed, good	EG: 20 -> 14 CG: 19 -> 18	Yes, table 1	Prior (95,96)	probably	N/A
2	Baxter	detailed	adequate	8->7	Yes, table 1	N/A	N/A – no personal contact? Only standardized tasks	N/A
3	Boyle	detailed	Detailed, good	None, 100% completer	Yes, tables 1 +2	Yes (subjects)	Yes	N/A
4	Cano-García	Prior: (97)	adequate	40 ->29	Yes, table 1	Yes, p.3	yes	N/A
5	Carson	Yes, detailed	Detailed, good	EG: 18 -> 16 CG: 25 -> 21	Yes, table 1	yes	yes	Yes, p. 290
6	Chapin	Yes, detailed	Good	None, 100% completer	Yes, table 3	Yes, fig. 2	yes	Online questionnaire?
7	Evans	No	Adequate	EG:28 ->12 CG: 33 ->21	Yes, table 3	Only inclusion	Yes, Training, study protocol + supervision	Yes
8	Graham	Yes, detailed	Sparse, no details	148 ->102 EG:80 ->51 CG: 68 -> 51	Not explicitly mentioned	Yes, p.203	Yes	Yes, p. 204
9	Igna	Detailed	Good	85 -> 68 VR-CBT: 35 -> 25 MBCT: 25 ->18 TAU: 25 -> 25	Yes, table 1	Yes, p.234	yes	N/A

10	Lee	Detailed	Good	None, 100 % completer	Online suppl.	Only inclusion	Yes	Yes, p. 206
11	Martire	Detailed	Detailed, good	(couples) 126 (baseline) -> 103 (post) -> 87 (FU) EG: 64 -> 52 -> 41 CG: 62 -> 51 -> 46	Yes, table 1	Yes, p. 3	yes	Yes
12	Mattenklodt	No	Adequate	N/A	N/A	N/A	N/A	N/A
13	Rau	Very short, naming of concept	Few details	147 -> 91 (38% Drop-Out)	Yes, table 7	Yes, p. 578	N/A (not mentioned)	N/A
14	Saarijäri	Prior (98)	Sparse, no details	EG: 33 -> 28 (couples) CG: 30 -> 28 (couples)	Yes, table 2	Prior (98)	Prior (98)	Yes
15	Scott	detailed	good	300 -> 247	Yes, table 5	Yes p.7	Not directly stated	N/A
16	Slavin-Spenny	Yes, detailed	N/A – no anger	147 -> 127 AAET: 50 -> 40 Relax: 48 -> 43 CG: 49 -> 44	Yes, table 1 (no anger)	N/A	yes	Only baseline
17	Thakur	Yes, detailed	Sparse, no details	106 -> 94 EAET: 36 -> 32 Relax: 48 -> 43 CG: 34 -> 28	Yes, table 2	Yes, p.2	Yes, + supervision	No
18	Vangronsveld	Yes, detailed	Adequate	N/A	Yes, table 1	Only inclusion	yes	N/A
19	Wong	detailed	adequate	MBSR: 51 -> 38 MPI: 49 -> 42	Yes, table 3	Yes, p. 725	yes	Probably, not directly expressed

Figures:

Fig. 1

Process Model of Anger Regulation in Chronic Pain (adapted from extended process model of emotion regulation model by Gross (2015) and Ford, Gruber & Gross (2019)

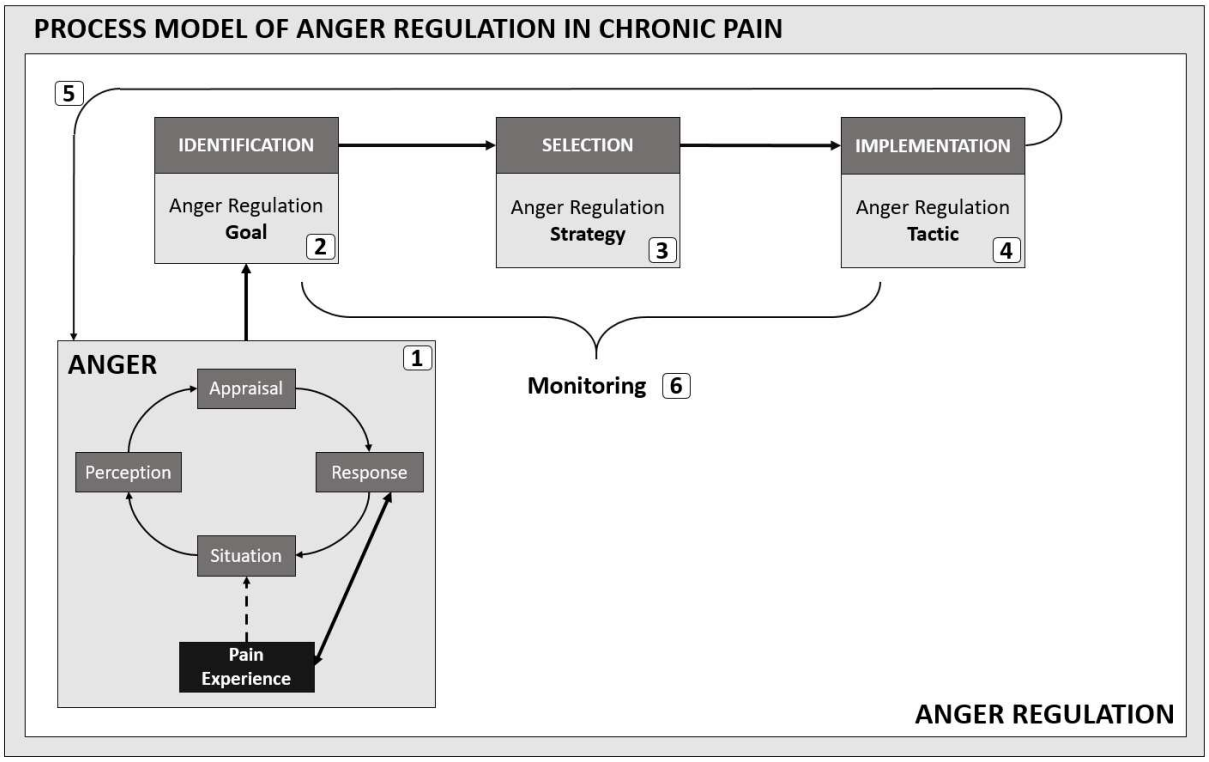
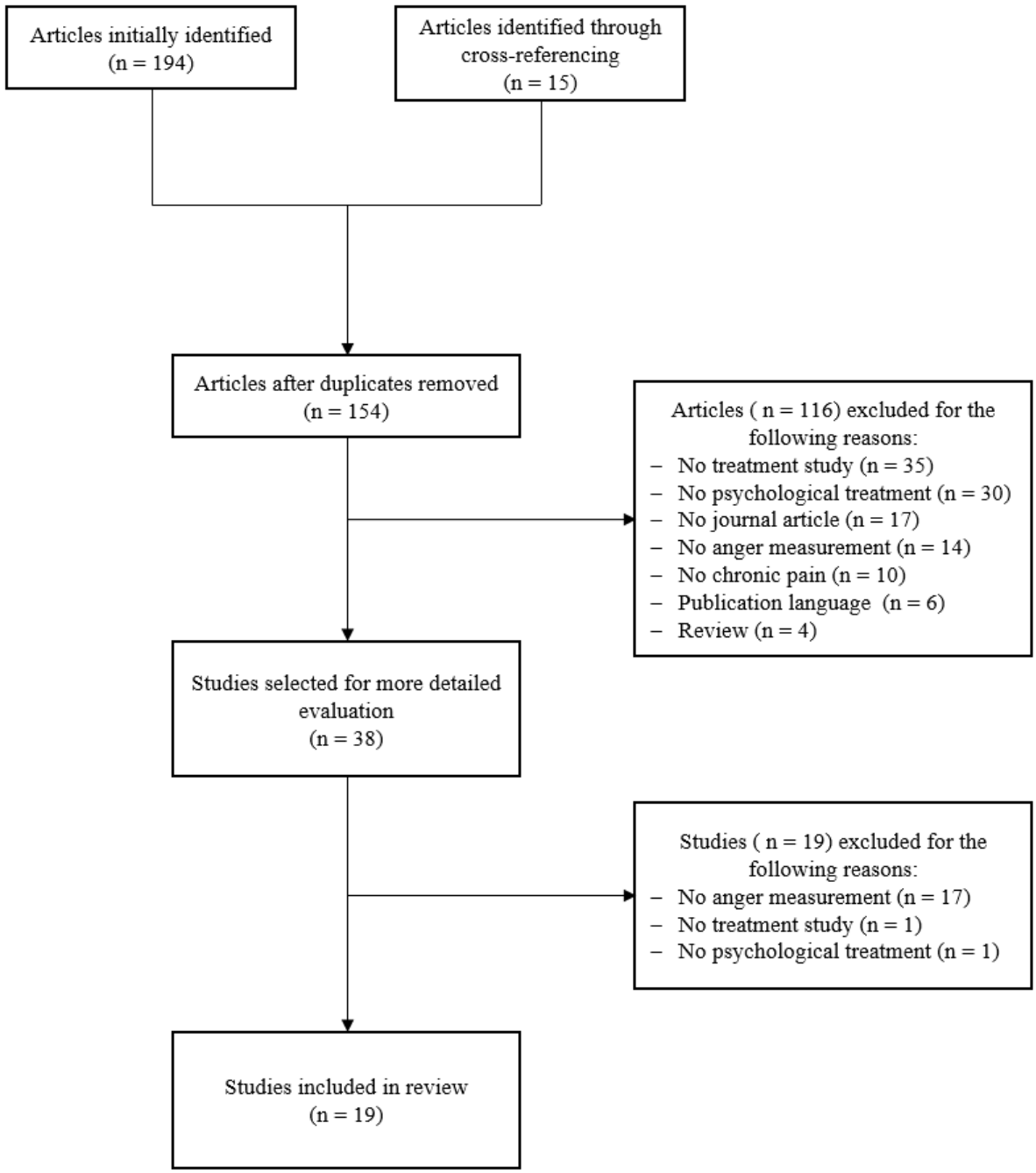


Fig. 2

Selection Procedure – PRISMA flow diagram



Anhang B: Studie 2

A rose by any other name? Self-compassion, psychological inflexibility, and self-esteem in chronic pain.

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Journal of Contextual Behavioral Science (submitted)

Emmerich, A.C., Friehs, T. & Glombiewski, J.A. (submitted) A rose by any other name? Self-compassion, psychological inflexibility, and self-esteem in chronic pain. *Journal of Contextual Behavioral Science.*

A rose by any other name? Self-compassion, psychological inflexibility, and self-esteem in chronic pain

Running Head: Self-Compassion and Related Concepts in Chronic Pain

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Conflict of interests: The authors have no conflicts of interests to declare.

Highlights:

- Best fit for two-factor solution of the Self-Compassion Scale in chronic pain
- Both factors were distinct from psychological inflexibility in pain
- Self-esteem and reduced uncompassionate self-responding may be the same construct

Abstract:

Objectives: Growing research supports the relevance of self-compassion in pain. However, self-compassion has not yet been differentiated from related concepts such as psychological inflexibility or self-esteem. Therefore, the additional value of self-compassion in pain remains unclear. It was this study's aim to close this research gap.

Methods: In our longitudinal survey, several pain-related constructs as well as self-compassion (Self-Compassion Scale - SCS), psychological inflexibility (Psychological Inflexibility in Pain Scale - PIPS), and self-esteem (Rosenberg Self-Esteem Scale - RSES), were assessed twice with eight weeks between assessments. Participants were people suffering from chronic pain ($N = 872$) and healthy controls ($N = 356$).

Results: The postulated six-factor-structure of the SCS could not be replicated. Hence, we conducted further analyses based on an adjusted two-factor solution which showed the best fit in the current data (RMSEA = .047, CFI = .951, SRMR = .045). These two factors, *compassionate self-responding (CS)* and *reduced uncompassionate self-responding (RUS),* were modeled in a confirmatory factor-analysis with the global-factor of RSES and the two factors *avoidance* and *cognitive fusion* of the PIPS. Five independent CFAs with varying samples (total, chronic pain, controls) were computed. Overall, model-fits were acceptable.

Conclusions: Our findings suggest that in pain, the SCS depicts two factors. CS is distinct from psychological inflexibility and self-esteem, whereas high intercorrelations suggest that RUS and self-esteem represent the same construct. Further research should address the impact of these concepts on pain-related and emotional outcomes in chronic pain.

Keywords: chronic pain, self-compassion, psychological flexibility, self-esteem

Introduction:

A growing number of studies have supported the relevance of self-compassion in pain (Carson et al., 2005; Chapin et al., 2014; Edwards et al., 2019; Emmerich, Friehs, Crombez, & Glombiewski, 2020; Parry & Malpus, 2017; Wren et al., 2012). Self-compassion predicts functioning, affect, pain-catastrophizing and disability (Edwards et al., 2019; Emmerich et al., 2020; Wren et al., 2012). Moreover, it is associated with higher pain acceptance, lower pain-related anxiety, disability, and depression (Edwards et al., 2019). Pilot-studies on compassion-based interventions revealed positive effects on pain and emotional outcomes (Carson et al., 2005; Chapin et al., 2014; Parry & Malpus, 2017). However, those studies focused solely on self-compassion.

Related concepts e.g. psychological flexibility or self-esteem have not been considered. Research on veterans with posttraumatic stress disorder (PTSD) suggested a conceptual overlap of self-compassion, mindfulness- and psychological flexibility (Meyer et al., 2018). This makes us wonder whether self-compassion is a genuinely new construct in pain research and treatment.

According to Neff (Neff, 2003) self-compassion comprises three components and their counterparts: self-kindness vs. self-criticism, common humanity vs. isolation, and mindfulness vs. over-identification. *Self-kindness* describes the tendency to react to oneself in a supportive way, especially when confronted with personal failures, or painful life situations. The aspect of *common humanity* helps to understand that failures, and suffering are part of human life, and

that there is therefore no need to feel isolated. *Mindfulness*, being aware of the present moment, enables us to acknowledge personal suffering without being avoidant or over-identified (Neff & Tirch, 2013).

Research offers various definitions of self-esteem. Here, it is defined as an evaluation of the self, regarding one's own qualities and abilities (McCrae & Costa, 1992). In contrast to self-esteem, a self-compassionate mind refers to relating positively to ourselves, not for being above-average, but due to the fact that we are human. According to present research, self-compassion is more stable and less dependent on social comparison and public self-consciousness than self-esteem (Leary, Tate, Adams, Allen, & Hancock, 2007; Neff & Vonk, 2009). Thus, when suffering from high self-criticism or shame, raising self-compassion seems more realistic than changing self-evaluations (Neff & Tirch, 2013).

Psychological flexibility, defined as "being consciously present and changing or persisting in valued behavior" (Hayes, Luoma, Bond, Masuda, & Lillis, 2006), is a highly relevant construct in chronic pain. According to Acceptance- and Commitment-Therapy (ACT), psychological flexibility encompasses six dimensions, namely defusion, acceptance, present-moment awareness, self-as-context, committed action, and values. In chronic pain, two aspects of psychological flexibility have become especially important: avoidance and defusion, as measured by the Psychological Inflexibility in Pain Scale. A recent meta-analysis revealed small to moderate effects of ACT-treatments in pain (Veehof, Trompetter, Bohlmeijer, & Schreurs, 2016). Neff and Tirch (2013) suggest a conceptual overlap between self-compassion and psychological flexibility with self-compassion components being involved in the six ACT processes.

Research exploring the relationship among these concepts in other groups and disorders is sparse and contradictory. On the one hand, self-compassion and psychological flexibility were significantly correlated in university students, with self-compassion explaining unique variance

regarding emotional wellbeing (Marshall & Brockman, 2016). On the other hand, in PTSD, mindfulness, self-compassion and psychological flexibility depicted a single latent factor (Meyer et al., 2018). However, an RCT on ACT in undergraduates revealed that changes in self-compassion were significantly mediated by psychological flexibility (Yadavaia, Hayes, & Vilardaga, 2014).

In conclusion, self-compassion is potentially relevant in pain. However, self-compassion has not yet been defined and differentiated from related constructs, in pain. To close this gap, this study aimed to differentiate self-compassion, psychological inflexibility, and self-esteem in chronic pain, by relying on a large sample and longitudinal, control-group design.

Methods:

Participants

The participants (t1: N_{T1} = 1228; t2: N_{T2} = 376) in this longitudinal study were individuals suffering from chronic pain (t1: N_{CP1} = 872; t2 N_{CP2} = 316) and healthy controls (t1: N_{NP1} = 356; t2: N_{NP2} = 60) recruited from January 2018 to December 2018. Participants were recruited in German-speaking countries through announcements via psychosomatic clinics, general practitioners, physiotherapists and via the internet (e.g., social media, websites of chronic pain support groups). All participants had to be at least 18 years of age to be included. The participants had to have self-reported the presence of chronic pain, and they had to have been suffering from nonmalignant persistent pain for more than the previous 3 months. Participants provided informed consent prior to participation and were able to withdraw from the study at any time. The study involved completing multiple self-report assessments, either online or paper-pencil. Participants were invited to repeat the assessment after seven to eight weeks. They received no reimbursement. All procedures were approved by the local Ethics Committees of

the Departments of Psychology, Philipps-University Marburg (reference number: 2017-52k) and University Koblenz-Landau (reference number: 127_2018).

Measures

The current study is part of a larger research project addressing further research questions (DOI: 10.17605/OSF.IO/82WS7). The relevant instruments used to address the current research question are depicted below.

Demographics. Sociodemographic information included self-reported age, sex, income, education, partner status, highest level of education and work status; prior experience with yoga, mindfulness, and meditation were also assessed.

Pain. Presence, duration, location, and current pain treatment were assessed. Pain intensity and pain discomfort were measured via the Numeric Rating Scale (NRS), one of the most commonly used scales to assess pain (Chapman et al., 2011). The scales ranged from 0 ("no pain/bearable") – 10 ("worst possible pain/unbearable"). Participants were asked to rate their average sensory-discriminative (pain intensity) and their affective-cognitive (pain unpleasantness) dimension of pain for the last four weeks.

Pain-related disability. This was assessed based on measurements in the German version of the Pain Disability Index (PDI) (Pollard, 1984). The degree of disability is measured within seven life domains (family/home responsibilities, occupation, social activity, recreation, sexual behavior, self-care, life-support activity). Each of the seven items was rated on a 11-point Likert-scale from 0 ("no disability") to 10 ("total disability"). The total level of disability is calculated by adding up all seven items, with a higher score indicating a higher level of disability. Previous studies have exhibited good psychometric properties in chronic pain populations (Soer et al., 2013). Within our present sample (total sample at t1), PDI showed good internal consistency (Cronbach's α = .85-.96).

Psychological Flexibility. Psychological flexibility was measured using the German version of the Psychological Inflexibility in Pain Scale (PIPS) (Barke, Riecke, Rief, & Glombiewski, 2015; Wicksell, Lekander, Sorjonen, & Olsson, 2010). This questionnaire comprises 12 items rated on a 7-point Likert-scale (1 = never true, 7 = always true), with higher scores indicating greater psychological inflexibility. The items contribute to two subscales, *Avoidance* (A - 8 items) and *Cognitive Fusion* (F - 4 items), depicting two of the six dimensions of psychological flexibility. The subscale "Avoidance" assesses the tendency to avoid certain behaviors (e.g. "I cancel planned activities when I am in pain"). The subscale "Cognitive Fusion" measures the possibility of specific thoughts that exacerbate avoidance behaviors (e.g., "It is important to understand what causes my pain."). In this sample, the PIPS revealed adequate internal consistency for both subscales (avoidance: Cronbach's α = .88-.94; cognitive fusion: Cronbach's α = .64-.76). According to Barke and colleagues (Barke et al., 2015), the German version of PIPS is a reliable and valid measure, especially the scale measuring pain-related avoidance behavior.

Self-compassion. The German version of the Self-Compassion Scale (SCS-D)(Hupfeld & Ruffieux, 2011; Neff, 2003) was used to assess self-compassion. The SCS-D consists of 26 items rated on a 5-point Likert-scale (1 = almost never; 5 = almost always). The items contribute to six subscales (self-kindness vs. self-judgment; common humanity vs. isolation; mindfulness vs. over-identification) and a higher-order "self-compassion"-factor. Three subscales indicate the positive aspects of self-compassion (e.g., "I try to be loving towards myself when I'm feeling emotional pain." or "I try to see my failings as part of the human condition.") and three the lack of self-compassion ("When times are really difficult, I tend to be tough on myself." or "When I'm feeling down I tend to obsess and fixate on everything that's wrong."). Neff claims (Neff, 2003), that the higher-order self-compassion-factor explains the intercorrelations among the six facets with higher total scores indicating higher amounts of self-compassion. Research

on pain populations confirms that the SCS has good predictive, convergent and discriminant validity as well as good internal consistency (Cronbach's α = 0.91-0.95; (Purdie & Morley, 2015; Wren et al., 2012)).

However, in recent research there has been a critical debate about the SCS' factor-structure (Muris, Broek, Otgaar, Oudenhoven, & Lennartz, 2018; Muris, Otgaar, & Petrocchi, 2016; Muris, Otgaar, & Pfattheicher, 2019; Muris & Otgaar, 2020; K. D. Neff, 2016, 2019; K. D. Neff, Tóth-Király, & Colosimo, 2018; K. D. Neff, Whittaker, & Karl, 2017; Pfattheicher, Geiger, Hartung, Weiss, & Schindler, 2017). We therefore ran confirmatory factor-analyses (CFA) prior to further analysis. The six-factor-structure with a higher-order factor could not be replicated within our sample. Hence, an adjusted scale based on the current data was used. A two-factor solution with intercorrelated factors showed the best fit. The two scales *compassionate self-responding* (CS) and the *reduced uncompassionate self-responding* (RUS) exhibit good internal consistencies in the present sample (Cronbach's alpha CS= .89-.92; RUS = .90-.92).

Self-esteem. Self-esteem was measured via the revised German version of the Rosenberg Self-Esteem scale (RSES) (von Collani & Herzberg, 2003). It comprises 10 items concerning feelings of self-worth, self-acceptance, and global self-esteem (e.g. "On the whole, I am satisfied with myself." or "I feel I do not have much to be proud of."). The amount of agreement is rated on a 4-point Likert-scale (1 = "strongly agree"; 4 = "strongly disagree") with higher scores indicating higher self-esteem. Within this sample the RSES showed good internal consistency with Cronbach's α = .89-.94.

Statistical analysis

Confirmatory factor analyses were computed to separate these constructs. We used Robust Maximum Likelihood Estimation for its advantages in missing value estimation and robustness

against non-normality. The fit of a model is presented in a X^2-value. As sample size has a large impact on the X^2-values, we report them, but did not use them to interpret the model fit in this study. Instead, we used the Comparative Fit Index (CFI; excellent: > .98, good: > .95, acceptable: > .9), Root Mean Score Error of Approximation (RMSEA; excellent: < .05, good: < .08, acceptable: < .1), and Standardized Root Mean Square Residual (SRMR; excellent: < .05, good: < .08, acceptable: <.1) (Brown, 2015).

First, each instrument's structure was established on the basis of already published factor structures. If multiple factor structures for a construct were known, all were tested and the best-fitting model was used henceforth. In cases of insufficient model fits, a methodological factor for reversed coded items and correlated error variances were allowed for items with inherent similarities. If model fits remained non-acceptable, a new factor solution was developed by reducing the item pool beginning with the items with the lowest factor loadings. Furthermore, we scanned modification indices for statistical meaningful and theoretically possible structure improvements. We used the full sample t1 in this step (Brown, 2015).

Second, the final solutions for each construct were used in a merged confirmatory factor analysis with intercorrelated latent factors to establish each construct's individuality: first in the total samples, and then in the pain and control sub-samples on T1 and T2. Total model fits, as well as intercorrelations (independent constructs if standardized intercorrelations $r < .8$) were interpreted to determine whether constructs were independent or essentially the same (Brown, 2015).

Results:

A total of $N_{T1} = 1228$ participants completed the online survey at t1 and $N_{T2} = 376$ also at t2. Demographics are shown separately for participants with and without chronic pain in *table 1*. Both subsamples were predominantly female with the chronic pain sample revealing an even

higher percentage of women. On average, people suffering from chronic pain were slightly older and less educated than those without pain. Marital status was similar between the two samples.

Pain-related aspects such as mean pain duration, pain-related disability, pain diagnosis as well as average pain intensity and unpleasantness during the last four weeks are shown in *table 2*. These aspects indicate that this sample is comparable to other studies on chronic pain (e.g. Glombiewski et al., 2018). Most of our participants suffered from various kinds of pain, with back pain and joint pain the most prominent.

Preliminary Analysis:

Descriptive statistics concerning SCS, RSES and PIPS are depicted in *table 3*. Prior to a mutually modeled confirmatory factor-analysis (CFA) including the all different subscales of SCS, RSES and PIPS, CFAs were computed separately for SCS, PIPS and RSES using to the total sample (N_{T1} = 1228) at t1.

SCS. As presented before, the six-factor model with a higher-order factor for self-compassion was not replicable in the present sample. Other published factor structures were not replicable either (see *table S1* – supplements). Instead, an adjusted two-factor model with the two factors CS and RUS was developed using the procedure described before (*table S2* - supplements). That factor structure yielded the best model-fit with good to excellent fit indices: RMSEA (.05), CFI (.95), SRMR (.05).

PIPS. The two-factor structure of PIPS (avoidance and cognitive fusion) was replicable by conceding correlated error variances. Model-fits indices were good to excellent: RMSEA (.07), CFI (.95), SRMR (.04). The intercorrelation between the two factors was r = .75.

RSES. Concerning the RSES, the one-factor structure was replicable by conceding a methodological factor for inverted items. Model-fits indices were good to excellent for RMSEA (.08), CFI (.96) and SRMR (.04).

Differentiation of constructs:

The five factors (CS, RUS, RSES, F, A) were modeled in a single CFA with intercorrelated factors for the total sample at t1 (N_{T1}). It was replicated for the total sample at t2 (N_{T2}), people suffering from chronic pain at t1 (N_{CP1}) and t2 (N_{CP2}) and the control group at t1 (N_{NP1}). Our control sample at t2 (N_{NP2}) was too small to calculate a CFA. Results are shown in *table 4*.

RMSEA-values were ≤ .05 for every tested model that can be regarded as excellent model fit. CFI-values ranged between .90 and .93, which can be interpreted as an acceptable model fit. SRMR-values varied between .05 and .07, indicating a good model fit. Intercorrelations between factors are shown in *table 5*.

Intercorrelations between RUS and RSES tended to exceed r = -.8. We can therefore assume that they depict a single underlying concept. Correlations between F and A, as well as CS and RSES were high, yet below r = .8, indicating related but distinct constructs.

Modification indices revealed no relevant improvements when CS items were loaded on other factors or other items were loaded on CS, strengthening the assumption of factor CS's independence. Modification indices suggested substantial improvement in the model-fit if there was a correlation between the methodological factor of the RSES and RUS. This is statistically impossible, although it makes content-wise sense. The methodological factor controls for the variance caused by recoded RSES items. Therefore, this supports the assumption that RUS and RSES depicted one underlying factor.

Discussion:

Prior studies on self-compassion in pain support its relevance regarding pain-related functioning, disability, or emotional aspects such as depression or anger (e.g. Carson et al., 2005; Chapin et al., 2014; Edwards et al., 2019; Parry & Malpus, 2017; Wren et al., 2012). However, they addressed self-compassion alone, without considering related concepts. The additional value of self-compassion in pain research and treatment is therefore questionable. The present study is the first to differentiate self-compassion from related concepts such as psychological inflexibility and self-esteem in the context of chronic pain.

Our results could not replicate the six-factor structure of the Self-Compassion Scale (SCS). We therefore suggested a data-based, adjusted, two-factor solution applying the factors compassionate self-responding and reduced uncompassionate self-responding. These two factors were modeled in a confirmatory factor analysis together with global self-esteem (RSES) and the two factors in the Psychological Inflexibility in Pain Scale (PIPS), namely avoidance and cognitive fusion, in our entire sample at t1. CFAs were then repeated for the total sample at t2, the chronic pain sample at t1 and t2, and due to sample size, the control sample at t1. Our findings reveal acceptable to good model fits. CS could be established as an independent construct with acceptable intercorrelations with the other constructs. RUS demonstrated a very strong intercorrelation with self-esteem, suggesting a single underlying construct.

The factor-structure of SCS and its consequences for psychological research were recently discussed by several research groups (Muris et al., 2018, 2016, 2019; Muris & Otgaar, 2020; K. D. Neff, 2016, 2019; K. D. Neff, Tóth-Király, et al., 2018; K. D. Neff et al., 2017; Pfattheicher et al., 2017). Current findings are in line with research by Muris and colleagues who questioned the original hierarchical 6-factor-structure or a general self-compassion factor and recommended the use of two factors (Muris & Otgaar, 2020; Muris et al., 2016). Several investigations have supported a bi-factor model or six-factor-structure without a higher order

factor (Brenner, Heath, Vogel, & Credé, 2017; Coroiu et al., 2018; Williams, Dalgleish, Karl, & Kuyken, 2014). In contrast, the latest research by Neff and colleagues supported the original factor-structure in several different populations (Neff, Long, et al., 2018; Neff, Tóth-Király, et al., 2018). However, their results also revealed some support for other factor-solutions, e.g., a bi-factor-model (Neff, Tóth-Király, et al., 2018). Neff (2019) also questioned the evidence recommending a bi-factor-model, because of the use of uncorrelated factors, which contradicts the theoretical assumption of self-compassion. In the present study, we applied a two-factor-model with intercorrelated factors that complies with the theory. In sum, our results contribute to the ongoing debate about the appropriate use of the SCS, by recommending the use of the two factors CS and RUS in the context of pain.

We discuss below our findings on the differentiation of constructs. Several researchers promote a conceptual overlap between self-compassion and the underlying concept of ACT, namely psychological flexibility (Neff & Tirch, 2013; Yadavaia et al., 2014). This raises the question whether we need research on additional concepts. Our study findings suggest correlated yet distinct constructs. However, the existing empirical evidence is contradictory. Only one study - on PTSD in war veterans - has addressed the close relation between mindfulness, self-compassion, and psychological flexibility. There is evidence that they comprise one single factor “mindful awareness”. When tested against the individual concepts, this mindful awareness-factor was the best predictor for PTSD recovery at one-year follow-up (Meyer et al., 2018). A cross-sectional study on university students explicitly targeted the relationship between psychological flexibility and self-compassion (Marshall & Brockman, 2016), showing significant associations between those two concepts. Self-compassion significantly predicted greater unique variance of emotional well-being, than psychological flexibility. In contrast, results from another study on undergraduate students indicated that psychological inflexibility predicted higher variance than self-compassion in psychological-health terms (Woodruff et al.,

2014). Another study examined oncology nurses prior to and after undergoing a mindfulness-based intervention (Duarte & Pinto-Gouveia, 2017). Changes in mindfulness, self-compassion and psychological inflexibility all mediated several treatment outcomes. However, the specific relevance of each concept was not addressed. A randomized controlled trial on ACT in undergraduates showed larger increases in self-compassion in the treatment group than in waitlist-control participants (Yadavaia et al., 2014). Effects were mediated by changes in psychological flexibility. The authors suggested that self-compassion can be improved by ACT. In the context of chronic pain, the relevance of mindfulness versus self-compassion regarding depressive symptoms was assessed in women suffering from musculoskeletal pain (Carvalho, Gouveia, Gillanders, & Castilho, 2018). The relationship between self-compassion and depressive symptoms was mediated by activity engagement, a part of pain acceptance. Engaging in valued actions can also be considered an aspect of psychological flexibility. In sum, all the previous studies suggest a certain degree of theoretical overlap between psychological flexibility and self-compassion – a claim that stands in contrast to our results. However, in the present study we assessed psychological flexibility via the PIPS, which is pain-specific, although it only addresses two of the six facets of psychological flexibility, avoidance, and cognitive fusion. Hence, the explicit relationship between self-compassion and psychological flexibility and how they influence each other remains unclear.

To our knowledge, this is the first study comparing self-compassion and self-esteem in the context of pain. The present results demonstrate a very strong overlap between RUS and self-esteem, indicating a single underlying construct. CS, can be considered a distinct construct. This might explain previous research on other populations. Several studies showed moderate to high associations between global self-compassion and self-esteem (Hwang, Kim, Yang, & Yang, 2016; Leary et al., 2007; Neff, 2003; Neff & Vonk, 2009). Thus, when relying on a global self-compassion factor, the concepts can be differentiated (Barnard & Curry, 2011; Neff &

Vonk, 2009). The research evidence also suggests that global self-compassion is more stable and less dependent on social comparison than self-esteem (Leary et al., 2007; Neff & Vonk, 2009). Moreover, both constructs varied in their associations with other variables: for example, only self-esteem correlated with narcissism, whereas only self-compassion was associated with catastrophizing and anger (Barnard & Curry, 2011).

Our results might enable the conclusion that RUS could account for the very strong associations with self-esteem, due to measuring the same underlying concept. Moreover, CS might explain the differences from self-esteem in prior research.

Limitations:

Several limitations should be considered when interpreting our results. First, our inclusion criteria were very liberal. Participants only had to be at least 18 years old. That led to a heterogeneous sample in terms of age and the pain diagnosis. However, it can also be thought of as a strength thanks to our findings' broad generalizability across pain diagnoses. However, our sample was very homogeneous in gender terms. Our chronic pain subsample was predominantly female, which fails to fully reflect reality in the chronic-pain context. Our interpretations might not be transferable to chronic pain in men. Also, we did not consider cultural factors. Another limitation is that physiological or psychological comorbidities were not addressed. Therefore, we may have overlooked some relevant aspects influencing outcome measures. Additionally, our study included only self-report measures, including the evaluation of experiencing chronic pain. We were unable to rely on accurate clinical diagnoses for study-design reasons. Furthermore, other relevant third-wave concepts were not considered – including mindfulness or acceptance. To keep our survey economical, we decided on psychological flexibility measured by PIPS, as it is a construct and the questionnaire currently most relevant in chronic pain research and treatment. Also, acceptance in the context of pain may be considered the counterpart of avoidance, which was assessed via the PIPS, which,

however, only addresses two of the aspects we considered explaining psychological flexibility, avoidance, and cognitive fusion. When items in the avoidance-subscale are scrutinized, we note that they tend to address avoidance behavior that is known to be especially relevant in chronic pain (fear-avoidance-model).

Future directions:

Future research should compare the predictive value of compassionate self-responding, reduced uncompassionate self-responding, and psychological inflexibility on pain-related outcomes. In particular, the relative impact of CS compared RUS warrants investigation. The relevance of self-compassion compared to other emotion-regulation strategies was addressed via experimental designs on acute and chronic pain. To evaluate the therapeutic value, self-compassion interventions could be applied in chronic pain treatment. Especially the use of single-case experimental research designs could help us identify whether such interventions might alleviate pain or improve emotional outcomes in general or only for specific subgroups. Additionally, future studies should consider gender effects and cultural differences regarding self-compassion in pain.

Conclusion:

In this longitudinal survey, self-compassion was differentiated from related concepts and their differential impact in the context of pain. We found that the Self-Compassion Scale's original six-factor-structure was not replicable. In the context of chronic pain, we suggest an adjusted two-factor structure entailing the factors compassionate self-responding and reduced uncompassionate self-responding. Both were distinct from psychological inflexibility, which was also represented by two factors, namely avoidance and cognitive fusion. Uncompassionate self-responding demonstrated a very strong association with self-esteem, indicating a single underlying construct.

References

Barke, A., Riecke, J., Rief, W., & Glombiewski, J. A. (2015). The Psychological Inflexibility in Pain Scale (PIPS) – validation , factor structure and comparison to the Chronic Pain Acceptance Questionnaire (CPAQ) and other validated measures in German chronic back pain patients. *BMC Musculoskeletal Disorders*, *16*(171), 1–10. https://doi.org/10.1186/s12891-015-0641-z

Barnard, L. K., & Curry, J. F. (2011). Self-Compassion: Conceptualizations, Review of General Psychology. *Review of General Psychology*, *Advance on*. https://doi.org/10.1037/a0025754

Brenner, R. E., Heath, P. J., Vogel, D. L., & Credé, M. (2017). Two is more valid than one: Examining the factor structure of the self-compassion scale (SCS). *Journal of Counseling Psychology*, *64*(6), 696–707. https://doi.org/10.1037/cou0000211

Brown, T. A. (2015). *Confirmatory Factor Analysis for Applied Research* (2nd Editio). New York: Guilford Publications.

Carson, J. W., Keefe, F. J., Lynch, T. R., Carson, K. M., Goli, V., Fras, A. M., & Thorp, S. (2005). Loving-Kindness Meditation for Chronic Low Back Pain - Results From a Pilot Trial. *Journal of Holistic Nursing*, *23*(3), 287–304. https://doi.org/10.1177/0898010105277651

Carvalho, S. A., Gouveia, J. P., Gillanders, D., & Castilho, P. (2018). Mindfulness , selfcompassion , and depressive symptoms in chronic pain : The role of pain acceptance, (January), 1–13. https://doi.org/10.1002/jclp.22689

Chapin, H. L., Darnall, B. D., Seppala, E. M., Doty, J. R., Hah, J. M., & Mackey, S. C. (2014). Pilot study of a compassion meditation intervention in chronic pain. *Journal of Compassionate Health Care*, *1*(4), 1–12.

Chapman, J. R., Norvell, D. C., Hermsmeyer, J. T., Bransford, R. J., Devine, J., McGirt, M. J., & Lee, M. J. (2011, October 1). Evaluating common outcomes for measuring treatment success for chronic low back pain. *Spine*. https://doi.org/10.1097/BRS.0b013e31822ef74d

Coroiu, A., Kwakkenbos, L., Moran, C., Thombs, B., Albani, C., Bourkas, S., … Körner, A. (2018). Structural validation of the Self-Compassion Scale with a German general population sample. *PLoS ONE*, *13*(2), 1–17. https://doi.org/10.1371/journal.pone.0190771

Duarte, J., & Pinto-Gouveia, J. (2017). Mindfulness, self-compassion and psychological inflexibility mediate the effects of a mindfulness-based intervention in a sample of oncology nurses. *Journal of Contextual Behavioral Science*, *6*(2), 125–133. https://doi.org/10.1016/j.jcbs.2017.03.002

Edwards, K. A., Pielech, M., Hickman, J., Ashworth, J., Sowden, G., & Vowles, K. E. (2019). The relation of self - compassion to functioning among adults with chronic pain. *European Journal of Pain*, *23*, 1538–1547. https://doi.org/10.1002/ejp.1429

Emmerich, A. C., Friehs, T., Crombez, G., & Glombiewski, J. A. (2020). Self-compassion predicting pain, depression and anger in people suffering from chronic pain: A prospective study. *European Journal of Pain*, *24*(10), 1902–1914. https://doi.org/10.1002/ejp.1638

Glombiewski, J. A., Holzapfel, S., Riecke, J., Vlaeyen, J. W. S., de Jong, J., Lemmer, G., & Rief, W. (2018). Exposure and CBT for Chronic Back Pain: An RCT on Differential Efficacy and Optimal Length of Treatment. *Journal of Consulting and Clinical Psychology*, *86*(6), 533–545.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes. *Behavior Research and Therapy*, *44*, 1–25. https://doi.org/10.1016/j.brat.2005.06.006

Hupfeld, J., & Ruffieux, N. (2011). Validierung einer deutschen Version der Self-Compassion

Scale (SCS-D). *Zeitschrift Für Klinische Psychologie Und Psychotherapie*, *40*(2), 115–123. https://doi.org/10.1026/1616-3443/a000088

Hwang, S., Kim, G., Yang, J. W., & Yang, E. (2016). The Moderating Effects of Age on the Relationships of Self-Compassion, Self-Esteem, And Mental Health. *Japanese Psychological Research*, *58*(2), 194–205. https://doi.org/10.1111/jpr.12109

Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-Compassion and Reactions to Unpleasant Self-Relevant Events: The Implications of Treating Oneself Kindly. *Journal of Personality and Social Psychology*, *92*(5), 887–904. https://doi.org/10.1037/0022-3514.92.5.887

Marshall, E. J., & Brockman, R. N. (2016). The Relationships Between Psychological Flexibility , Self-Compassion , and Emotional Well-Being. *Journal of Cognitive Psychotherapy*, *30*(1), 60–72. https://doi.org/10.1891/0889-8391.30.1.60

McCrae, R. R., & Costa, P. T. (1992). Age and the Spontaneous Self-concept. *Journal of Gerontology: Social Scienes*, *43*(6), S177-185. https://doi.org/10.1111/j.1559-1816.1992.tb00979.x

Meyer, E. C., Frankfurt, S. B., Kimbrel, N. A., Debeer, B. B., Gulliver, S. B., & Morrisette, S. B. (2018). The influence of mindfulness, self-compassion, psychological flexibility, and posttraumatic stress disorder on disability and quality of life over time in war veterans. *Journal of Clinical Nursing*, *74*, 1272–1280. https://doi.org/10.1002/jclp.22596

Muris, P., Broek, M. Van Den, Otgaar, H., Oudenhoven, I., & Lennartz, J. (2018). Good and Bad Sides of Self-Compassion: A Face Validity Check of the Self-Compassion Scale and an Investigation of its Relations to Coping and Emotional Symptoms in Non-Clinical Adolescents. *Journal of Child and Family Studies*, *27*, 2411–2421. https://doi.org/10.1007/s10826-018-1099-z

Muris, P., & Otgaar, H. (2020). The Process of Science: A Critical Evaluation of more than 15 Years of Research on Self-Compassion with the Self-Compassion Scale. *Mindfulness*, *11*, 1469–1482. https://doi.org/10.1007/s12671-020-01363-0

Muris, P., Otgaar, H., & Petrocchi, N. (2016). Protection as the Mirror Image of Psychopathology: Further Critical Notes on the Self-Compassion Scale. *Mindfulness*, *7*, 787–790. https://doi.org/10.1007/s12671-016-0509-9

Muris, P., Otgaar, H., & Pfattheicher, S. (2019). Stripping the Forest from the Rotten Trees: Compassionate Self-Responding Is a Way of Coping, but Reduced Uncompassionate Self-Responding Mainly Reflects Psychopathology. *Mindfulness*, *10*, 196–199.

Neff, K. (2003). Self-Compassion: An Alternative Conceptualization of a Healthy Attitude Toward Oneself. *Self and Identity*, *2*, 85–101. https://doi.org/10.1080/15298860390129863

Neff, K. D. (2003). The Development and Validation of a Scale to Measure Self-Compassion. *Self and Identity*, 223–250. https://doi.org/10.1080/15298860390209035

Neff, K. D. (2016). The Self-Compassion Scale is a Valid and Theoretically Coherent Measure of Self-Compassion. *Mindfulness*, *7*(1), 264–274. https://doi.org/10.1007/s12671-015-0479-3

Neff, K. D. (2019). Setting the Record Straight About the Self-Compassion Scale. *Mindfulness*, *10*(1), 200–202. https://doi.org/10.1007/s12671-018-1061-6

Neff, K. D., Long, P., Knox, M. C., Davidson, O., Kuchar, A., Costigan, A., … Breines, J. G. (2018). The forest and the trees: Examining the association of self-compassion and its positive and negative components with psychological functioning. *Self and Identity*, *17*(6), 627–645. https://doi.org/10.1080/15298868.2018.1436587

Neff, K. D., Tóth-Király, I., & Colosimo, K. (2018). Self-compassion Is Best Measured as a Global Construct and Is Overlapping with but Distinct from Neuroticism: A Response to Pfattheicher, Geiger, Hartung, Weiss, and Schindler (2017). *European Journal of Personality*, *32*(4), 371–392. https://doi.org/10.1002/per.2148

Neff, K. D., & Vonk, R. (2009). Self-Compassion Versus Global Self-Esteem : Two Different Ways of Relating to Oneself. *Journal of Personality*, *77*(1), 23–50. https://doi.org/10.1111/j.1467-6494.2008.00537.x

Neff, K. D., Whittaker, T. A., & Karl, A. (2017). Examining the Factor Structure of the Self-Compassion Scale in Four Distinct Populations: Is the Use of a Total Scale Score Justified? *Journal of Personality Assessment*.

Neff, K., & Tirch, D. (2013). Self-- Compassion and ACT. In T. B. Kashdan & J. V Ciarrochi (Eds.), *Mindfulness & Acceptance for Positive Psychology*. Oakland: New Harbinger.

Parry, S., & Malpus, Z. (2017). Reconnecting the Mind and Body: A Pilot Study of Developing Compassion for Persistant Pain. *Patient Experience Journal*, *4*.

Pfattheicher, S., Geiger, M., Hartung, J., Weiss, S., & Schindler, S. (2017). Old Wine in New Bottles? The Case of Self-compassion and Neuroticism. *European Journal of Personality*, *31*, 160–169. https://doi.org/10.1002/per.2097

Pollard, C. A. (1984). Preliminary validity study of the pain disability index. *Perceptual and Motor Skills*, *59*, 974.

Purdie, F., & Morley, S. (2015). Self-Compassion, pain, and breaking a social contract. *PAIN*, *156*, 2354–2363.

Soer, R., Köke, A. J. A., Vroomen, P. C. A. J., Stegeman, P., Smeets, R. J. E. M., Coppes, M. H., & Reneman, M. F. (2013). Extensive validation of the pain disability index in 3 groups

of patients with musculoskeletal pain. *Spine*, *38*(9), E562–E568. https://doi.org/10.1097/BRS.0b013e31828af21f

Veehof, M. M., Trompetter, H. R., Bohlmeijer, E. T., & Schreurs, K. M. G. (2016). Acceptance- and mindfulness-based interventions for the treatment of chronic pain : a meta-analytic review. *Cognitive Behaviour Therapy*, *45*, 5–31. https://doi.org/10.1080/16506073.2015.1098724

von Collani, G., & Herzberg, P. Y. (2003). Eine revidierte Fassung der deutschsprachigen Skala zum Selbstwertgefühl von Rosenberg. *Zeitschrift Für Differentielle Und Diagnostische Psychologie*, *24*(1), 3–7.

Wicksell, R. K., Lekander, M., Sorjonen, K., & Olsson, G. L. (2010). The Psychological Inflexibility in Pain Scale (PIPS) – Statistical properties and model fit of an instrument to assess change processes in pain related disability. *European Journal of Pain*, *14*, 771.e1-771.e14. https://doi.org/10.1016/j.ejpain.2009.11.015

Williams, M. J., Dalgleish, T., Karl, A., & Kuyken, W. (2014). Examining the factor structures of the Five Facet Mindfulness Questionnaire and the Self-Compassion Scale. *Psychological AssessmentPsychological Assessment*, *26*(2), 407–418. https://doi.org/10.3390/w9120928

Woodruff, S. C., Glass, C. R., Arnkoff, D. B., Crowley, K. J., Hindman, R. K., & Hirschhorn, E. W. (2014). Comparing Self-Compassion, Mindfulness, and Psychological Inflexibility as Predictors of Psychological Health. *Mindfulness*, *5*, 410–421. https://doi.org/10.1007/s12671-013-0195-9

Wren, A. A., Somers, T. J., Wright, M. A., Goetz, M. C., Leary, M. R., Fras, A. M., … Keefe, F. J. (2012). Self-Compassion in Patients With Persistent Musculoskeletal Pain: Relationship of Self-Compassion to Adjustment to Persistent Pain. *Journal of Pain and*

Symptom Management, *43*(4), 759–770. https://doi.org/10.1016/j.jpainsymman.2011.04.014

Yadavaia, J. E., Hayes, S. C., & Vilardaga, R. (2014). Using acceptance and commitment therapy to increase self-compassion: A randomized controlled trial. *Journal of Contextual Behavioral Science*, *3*, 248–257. https://doi.org/10.1016/j.jcbs.2014.09.002

Tables

Table 1

Demographics

Variable	Chronic pain (t1)	No chronic pain (t1)
Sex	90.5 % female	73.9 % female
Age	45.83 ± 14.87	39.69 ± 17.54
Marital status		
Single	16.1 %	27.8 %
Partnership	69.4 %	62.1 %
Divorced	11.6 %	8.1 %
Widowed	2.3 %	.8%
Highest school grade completed		
Grades 9 and below	16.3 %	7.6 %
Grades 10	46.2 %	28.4 %
Grades 13	37.5 %	64.0 %

Note. Values are presented as means (± standard deviation) or percentages; t1 = first measurement

Table 2

Pain Characteristics (N_{CP1})

Variable	M (SD)/ %
Pain duration	11.84 (10.40)
PDI	35.57 (15.37)
Pain intensity	5.83 (1.92)
Pain unpleasantness	5.65 (2.42)
Pain diagnosis	
Back pain	61.5 %
Head pain	30.2 %
Fibromyalgia	39.7 %
Rheumatic pain	41.2 %
Joint pain	59.1 %
Other pain	31.1 %

Note. N_{CP1} = chronic pain sample at first measurement; PDI = Pain Disability Index

Table 3

Descriptive Statistics

	Chronic pain		Control		Baseline-differences (t1)	
	CP1 M (SD)	CP2 M (SD)	NP1 M (SD)	NP2 M (SD)	F (df)	p-value
CS	2.85 (.78)	2.93 (.78)	2.98 (.80)	3.06 (.88)	6.42 (1218)	.011
RUS	3.02 (.89)	2.98 (.88)	2.56 (.82)	2.52 (.78)	71.33 (1218)	< .001
RSES	18.97 (6.87)	19.05 (7.08)	22.84 (5.28)	22.87 (5.59)	88.65 (1195)	< .001
F	19.82 (4.49)	19.47 (4.58)	15.46 (5.89)	14.60 (5.69)	193.99 (1213)	< .001
A	30.57 (10.78)	30.84 (10.94)	19.60 (8.33)	20.77 (9.59)	290.63 (1210)	<. 001

Note. CP1 = chronic pain sample at t1; CP2 = chronic pain sample at t2; NP1 = no pain sample at t1; NP2 = no pain sample at t2; CS = Compassionate Self-Responding; RUS = Reduced Uncompassionate Self-Responding; RSES = Rosenberg Self-Esteem Scale; F = Cognitive Fusion; A = Avoidance

Table 4

Model Fits for Confirmatory Factor Analysis (Differentiation)

sample	RMSEA	CFI	SRMR	X^2 (df)
T1	.04	.93	.05	2782.33 (841)
T2	.05	.93	.06	1573.73 (841)
CP1	.04	.93	.05	2164.07 (841)
CP2	.05	.92	.06	1513.24 (841)
NP1	.05	.90	.07	1518.14 (841)

Note. RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Square Residual; T1 = total sample at t1; T2 = total sample at t2; CP1 = chronic pain sample at t1; CP2 = chronic pain sample at t2; NP1 = no pain sample at t1

Table 5

Intercorrelations Between Factors

		T1 r (S.E.)	T2 r (S.E.)	CP1 r (S.E.)	CP2 r (S.E.)	NP1 r (S.E.)
F						
	A	.75 (.02)***	.69 (.04)***	.69 (.03)***	.60 (.06)***	.74 (.04)***
CS						
	A	-.15(.04)***	-.26 (.06)***	-.18 (.04)***	-.28 (.07)***	.02 (.07)
	F	-.03 (.04)	-.15 (.07)*	- .07 (.05)	-.10 (.07)	.13 (.07)
RUS						
	A	.50 (.03)***	.57 (.04)***	.45 (.03)***	.54 (.05)***	.46 (.06)***
	F	.47 (.03)***	.55 (.05)***	.43 (.04)***	.51 (.06)***	.42 (.05)***
	CS	-.52 (.03)***	-.63 (.05)***	-.61 (.04)***	-.69 (.04)***	-.27 (.07)***
RSES						
	A	-.47 (.03)***	-.48 (.04)***	-.40 (.04)***	-.46 (.05)***	-.39 (.07)***
	F	-.33 (.03)***	-.37 (.05)***	-.26 (.04)***	-.30 (.06)***	-.19 (.07)**
	CS	.64 (.03)***	.71 (.04)***	.68 (.03)***	.75 (.04)***	.55 (.06)***
	RUS	-.81 (.02)***	-.84 (.02)***	-.82 (.02)***	-.84 (.02)***	-.73 (.06)***

Note. T1 = total sample at t1; T2 = total sample at t2; CP1 = chronic pain sample at t1; CP2 = chronic pain sample at t2; NP1 = no pain sample at t1; NP2 = no pain at t2; F = Cognitive Fusion; A = Avoidance; CS = Compassionate Self-Responding; RUS = Reduced Uncompassionate Self-Responding; RSES = Rosenberg Self-Esteem Scale; * $p < .05$; ** $p < .01$; *** $p < .001$

Supplements

Supplementary Tables

Table S1

Model Fits for Confirmatory Factor Analysis of Self-Compassion Scale in T1

Factor solution	RMSEA	CFI	SRMR	X^2 (df)
6 subscales	.06	.91	.06	1466.39 (284)
6 subscales & 1 higher order factor	No convergence, 100.000 iterations exceeded			
6 subscales & 2 higher order factors	.06	.89	.07	1644.61 (292)
2 subscales	.07	.87	.07	1977.40 (298)
3 subscales	.11	.66	.11	4630.41 (296)
1 factor	.11	.65	.12	4777.41 (299)
6 subscales & 1 bifactor	No convergence, 100.000 iterations exceeded			
6 subscales & 2 bifactors	No convergence, 100.000 iterations exceeded			
6 subscales & 1 higher order factor & 1 method-factor	No convergence, 100.000 iterations exceeded			
6 subscales & 2 higher order factors & 1 method-factor	No convergence, 100.000 iterations exceeded			
2 subscales & method-factor	.07	.87	.06	1970.42 (297)
1 factor & 1 method-factor	.07	.86	.07	2120.25 (298)

Note. T1 = total sample at t1; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Square Residual

Table S2

Adjusted Two-Factor Solution for SCS and Excluded Items.

	Standardized Estimate	S.E.	Item	Original subscale
CS				
	.68	.02	14. When something painful happens, I try to take a balanced view of the situation.	MI
	.70	.02	17. When I fail at something important to me, I try to keep things in perspective.	MI
	.68	.02	22. When I'm feeling down I try to approach my feelings with curiosity and openness.	MI
	.52	.03	10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.	CH
	.70	.02	15. I try to see my failings as part of the human condition	CH
	.65	.02	5. I try to be loving towards myself when I'm feeling emotional pain.	SK
	.63	.02	12. When I'm going through a very hard time, I give myself the caring and tenderness I need.	SK
	.73	.02	19. I'm kind to myself when I'm experiencing suffering	SK
	.75	.02	26. I try to be understanding and patient towards those aspects of my personality I don't like.	SK
RUS				
	.70	.02	1. I'm disapproving and judgmental about my own flaws and inadequacies.	SJ
	.56	.02	8. When times are really difficult, I tend to be tough on myself.	SJ
	.72	.02	11. I'm intolerant and impatient towards those aspects of my personality I don't like.	SJ
	.78	.02	16. When I see aspects of myself that I don't like, I get down on myself.	SJ

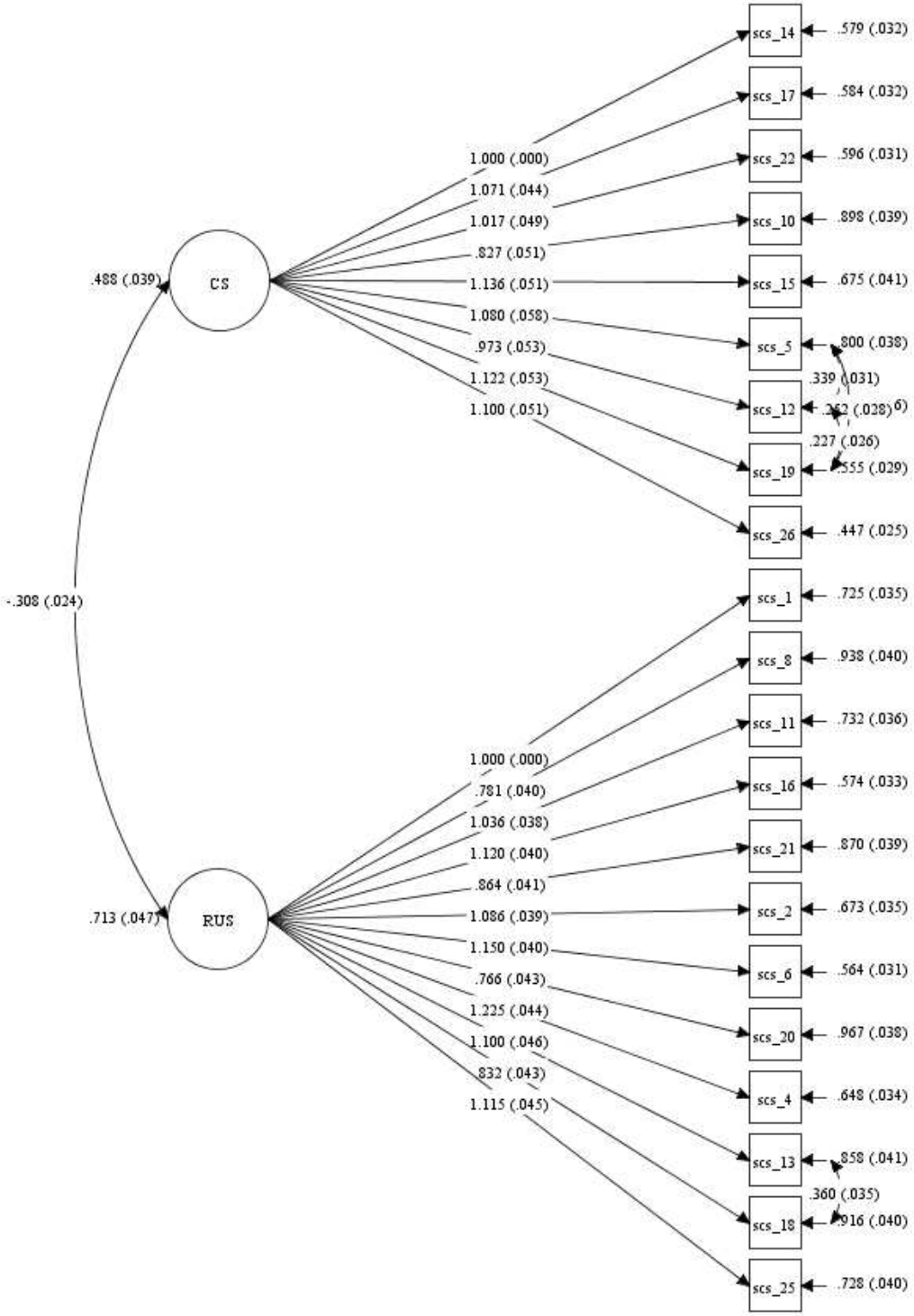
.62	.02	21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.	SJ
.75	.02	2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.	OI
.79	.01	6. When I fail at something important to me I become consumed by feelings of inadequacy	OI
.55	.02	20. When something upsets me I get carried away with my feelings.	OI
.79	.01	4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.	IS
.71	.02	13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.	IS
.59	.02	18. When I'm really struggling, I tend to feel like other people must be having an easier time of it.	IS
.74	.02	25. When I fail at something that's important to me, I tend to feel alone in my failure.	IS
Excluded items			
		3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.	CH
		7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.	CH
		9. When something upsets me I try to keep my emotions in balance.	MI
		23. I'm tolerant of my own flaws and inadequacies.	SK
		24. When something painful happens I tend to blow the incident out of proportion.	OI

Note. CS = Compassionate Self-Responding; RUS = Reduced Uncompassionate Self-Responding; MI = Mindfulness; CH = Common Humanity; SK = Self-Kindness; SJ = Self-Judgement; OI = Over-identification; IS = Isolation

Supplementary Figures

Figure S1

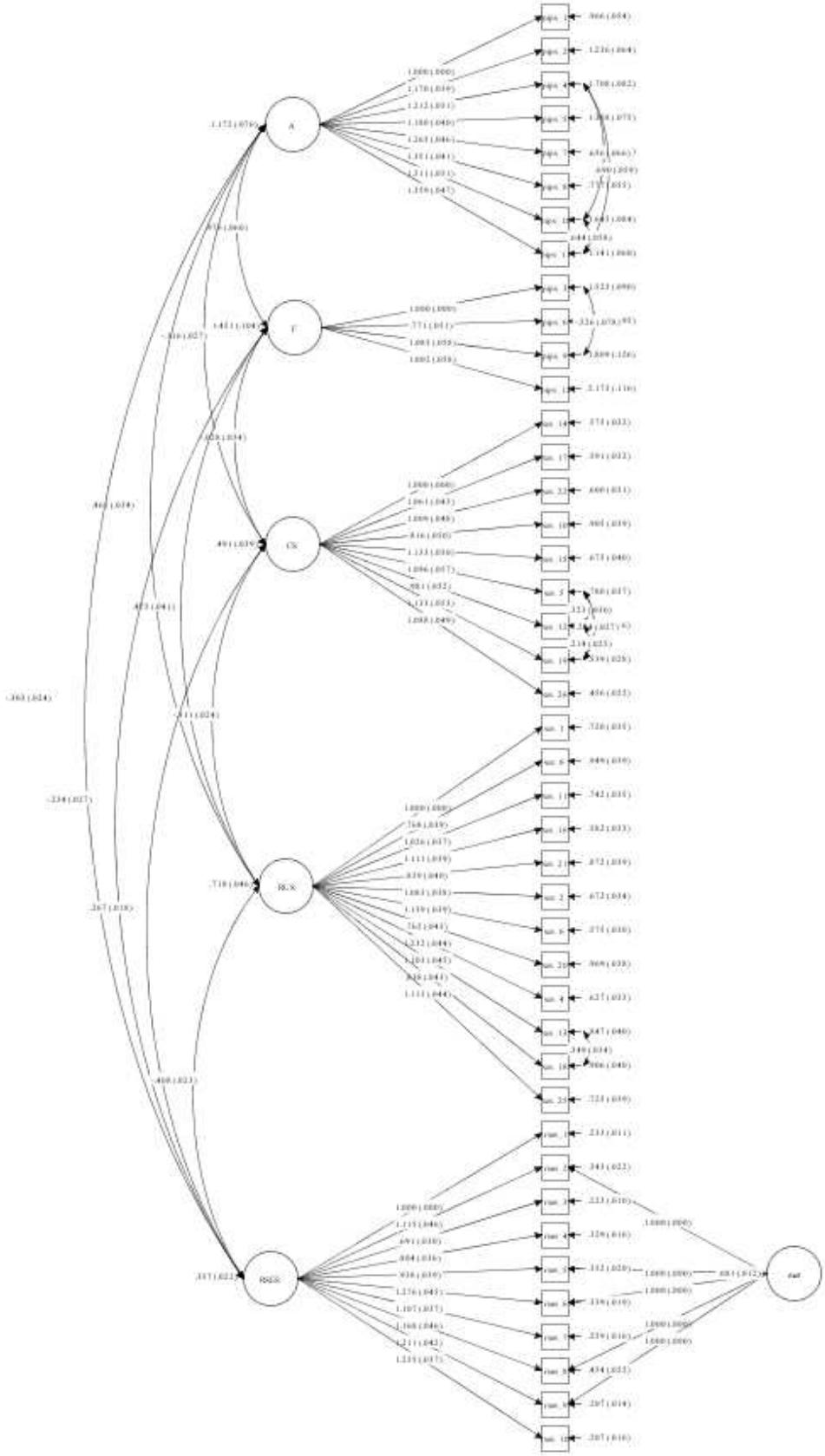
Two-factor solution of SCS



Note. CS = Compassionate Self-Responding; RUS = Reduced Uncompassionate Self-Responding; scs_ = items of the Self-Compassion Scale.

Figure S2

Confirmatory Factor Analysis



Note. A = Avoidance; F = Cognitive Fusion; CS = Compassionate Self-Responding; RUS = Reduced Uncompassionate Self-Responding; RSES = Rosenberg Self-Esteem Scale; pips_ = items of the Psychological Inflexibility in Pain Scale; scs_ = items of the Self-Compassion Scale; rses_ = items of the Rosenberg Self-Esteem Scale.

Anhang C: Studie 3

The role of self-compassion in predicting pain, depression and anger in patients with chronic pain: a prospective study.

Emmerich, A.C.

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ORIGINAL ARTICLE

Self-compassion predicting pain, depression and anger in people suffering from chronic pain: A prospective study

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Abstract

Self-compassion is associated with disability, pain-related anxiety as well as depression and anger in patients with chronic pain. However, the unique value of self-compassion versus other concepts such as psychological flexibility and self-esteem is unknown. The present study therefore aimed to clarify these relationships. Individuals with chronic pain ($N_{CP} = 872$) and without chronic pain ($N_{NP} = 356$) took part in a longitudinal study. Participants completed self-report instruments: Pain Disability Index (PDI), Pain Catastrophizing Scale (PCS), Pain Anxiety Symptom Scale (PASS-20), Patient Health Questionnaire (PHQ-9), State Trait Anger Expression Inventory (STAXI), Self-Compassion Scale (SCS), Psychological Inflexibility in Pain Scale (PIPS) and Rosenberg Self-Esteem Scale (RSES). Assessments were repeated after 8 weeks. We found differences in baseline levels of all relevant variables except for anger-out and anger-control between people with and without chronic pain. Subsequently, we computed a path model analysis regarding individuals suffering from chronic pain (N_{CP}), addressing the predictive value of reduced uncompassionate self-responding (RUS), compassionate self-responding (CS), avoidance (PIPS), cognitive fusion (PIPS) and self-esteem (RSES) regarding pain-related (PDI, PCS, PASS) and emotional variables (PHQ-9, STAXI). Avoidance predicted disability, catastrophizing, anxiety and depression. RUS predicted catastrophizing and pain-related anxiety. Self-esteem predicted depression. CS and cognitive fusion had no unique predictive value. The model explained 65.4%-72.1% of the variance in pain-related variables, 68.7% of the variance in depression and 38.7%-60.7% in the variance of anger-related variables. In conclusion, psychological flexibility, in terms of avoidance, seems to be more relevant for chronic pain than self-compassion. Future research should focus on subgroups and tailored-treatment approaches.

Significance: Applying a longitudinal design, this study examined the predictive value of self-compassion regarding pain, depression and anger. The relevance of self-compassion was compared to psychological flexibility and self-esteem. We can conclude that psychological flexibility, in terms of avoidance behaviour, is the most relevant predictor concerning pain.

1 | INTRODUCTION

According to Neff (2003a) self-compassion incorporates three components and their opposites: *self-kindness* (being kind and supportive towards ourselves when confronted with personal failures and inadequacies) versus *self-criticism*; *common humanity* (understand our failures as part of human life) versus *isolation*; and *mindfulness* (being aware of the present moment, without avoiding it) versus *over-identification*.

A compassionate attitude towards oneself might be helpful in the context of chronic pain to target and regulate emotional experiences (Purdie & Morley, 2016). Depression, shame and anger, as well as their regulation are highly relevant in chronic pain (Koechlin, Coakley, Schechter, Werner, & Kossowsky, 2018; Linton, 2013). In terms of tailored treatment, research should identify new approaches to target these emotional states in pain.

A growing number of studies have supported the relevance of self-compassion in chronic pain. In cross-sectional studies on chronic pain, self-compassion was associated with the following pain-related outcomes: worse functioning and higher pain catastrophizing as well as higher pain acceptance and lower pain-related anxiety (Edwards et al., 2019; Wren et al., 2012). Concerning negative emotions and emotion regulation, self-compassion was associated with positive and negative affect, depression, anxiety and distress (Costa & Pinto-Gouveia, 2011; Edwards et al., 2019; Wren et al., 2012). One recent longitudinal study showed that self-compassion predicted future depressive symptoms in individuals with chronic pain, whereas mindful awareness did not (Carvalho, Trindade, Gillanders, Pinto-Gouveia, & Castilho, 2019).

Interventional studies targeting self-compassion revealed improved pain outcomes such as pain severity, functional status, pain-related distress and pain acceptance (Carson et al., 2005; Chapin et al., 2014; Montero-Marín et al., 2018; Parry & Malpus, 2017; Penlington, 2018). They also led to reduced anger (Carson et al., 2005; Chapin et al., 2014). Moreover, self-compassion was a significant mediator of change in Acceptance and Commitment Therapy (ACT) and Attachment-Based Compassion Therapy (ABCT) for chronic pain regarding disability, depression and (pain-related) anxiety (Montero-Marin et al., 2020; Vowles, Witkiewitz, Sowden, & Ashworth, 2014).

However, research considering self-compassion in comparison to other related concepts, for example psychological flexibility or self-esteem is still sparse. This makes us wonder whether self-compassion is a genuinely new construct in pain research and treatment. Self-compassion is strongly associated with self-esteem (Leary, Tate, Adams, Allen, & Hancock, 2007; Neff & Vonk, 2009) and suffering from chronic pain is associated with low self-esteem (Burke, Mathias, & Denson, 2015). Though, compared to self-esteem self-compassion is considered to be more stable and less dependent on social comparison (Leary et al., 2007; Neff & Vonk, 2009). Psychological flexibility, as the underlying concept of ACT, is a highly relevant construct in chronic pain. However, Neff and Tirch (2013) suggest a conceptual overlap between self-compassion and psychological flexibility.

In conclusion, self-compassion may be relevant for chronic pain treatment, although the additional value of self-compassion compared to other important concepts should be clarified. Therefore, the aim of the present study was to explore the unique contribution of self-compassion compared to psychological flexibility and self-esteem concerning central pain-related and emotional outcomes. Our hypothetical model is depicted in Figure 1.

2 | METHODS

2.1 | Participants

Individuals with chronic pain (T1: $N_{CP1} = 872$; T2 $N_{CP2} = 316$) and without pain (T1: $N_{NP1} = 356$; T2: $N_{NP2} = 60$) took part in this longitudinal survey resulting in a total sample of $N_{T1} = 1{,}228$ at T1 and $N_{T2} = 376$ at T2. Table 1 provides an overview regarding the resulting samples. We included individuals without pain to examine whether our results might also be applicable to the general population. Participants were recruited in German-speaking countries from January 2018 to December 2018. All participants (with and without chronic pain) were recruited through announcements via psychosomatic clinics, general practitioners, physiotherapists and via the internet (social media websites e.g. Facebook-page of 'Pain and Psychotherapy Research Lab', chronic pain self-help groups and associations). The participants had to be at least 18 years old. There were no other exclusion criteria. To be categorized in the sample of individuals suffering from chronic pain, the participants had to report chronic pain. They had to indicate whether the persistent pain had been present for more than 3 months and was benign. All participants provided informed consent. They had the opportunity to withdraw from the study at any time. Participation involved completing multiple self-report assessments at baseline (T1) and again after 7 to 8 weeks (T2), either online or via paper–pencil. The local ethics committees of the Departments of Psychology of Philipps-University Marburg (reference number: 2017-52k) and University Koblenz-Landau (reference number: 127_2018) approved all the procedures.

2.2 | Measures

The presented study is part of a larger research project addressing further research questions (https://doi.org/10.17605/OSF.IO/82WS7). The relevant instruments used to address the current research question are depicted below and in Figure 1.

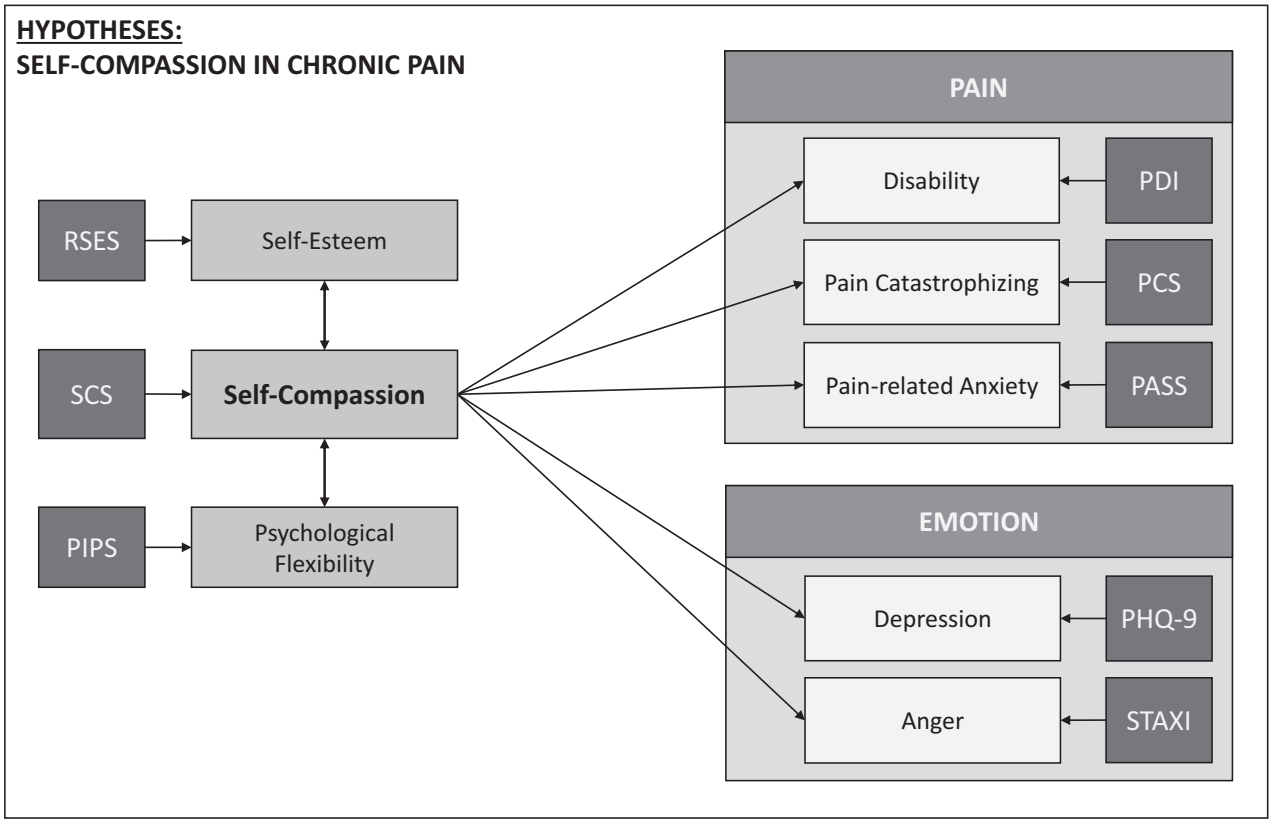

FIGURE 1 Hypothesized Model of Self-Compassion in Chronic Pain. PASS, pain anxiety symptom scale; PCS, pain catastrophizing scale; PDI, pain disability index; PHQ-9, depression subscale of the Patient Health Questionnaire; PIPS, psychological inflexibility in pain scale; RSES, Rosenberg self-esteem scale; SCS, self-compassion scale; STAXI, state trait anger expression inventory

TABLE 1 Study samples

Sample	*N* (T1)	*N* (T2)
Individuals with chronic pain (N_{CP})	N_{CP1} (872)	N_{CP2} (316)
Healthy controls (N_{NP})	N_{NP1} (356)	N_{NP2} (60)
Total sample (N_T)	N_{T1} (1,228)	N_{T2} (376)
Subsample - STAXI	N_{AN1} (397)	N_{AN2} (273)

Abbreviation: STAXI, state trait anger expression inventory.

2.2.1 | Demographics

Self-reported age, sex, partner status, education and highest level of education were assessed. Participants indicated also their prior experience with yoga, mindfulness and meditation.

2.2.2 | Pain

Participants provided information regarding pain location or diagnosis, pain duration and current treatment. Average pain intensity and discomfort during the previous 4 weeks were assessed via the Numeric Rating Scale (NRS), with scores ranging from 0 ('no pain/bearable') to 10 ('worst possible pain/unbearable').

2.2.3 | Self-compassion

Self-compassion was measured via the German version of the Self-Compassion Scale (SCS-D; Hupfeld & Ruffieux, 2011; Neff, 2003b). The items were rated on a 5-point Likert scale ranging from 1 ('almost never') to 5 ('almost always'). The factor structure of SCS and its consequences for psychological research were recently discussed by several research groups (Muris, Broek, Otgaar, Oudenhoven, & Lennartz, 2018; Muris & Otgaar, 2020; Muris, Otgaar, & Petrocchi, 2016; Muris, Otgaar, & Pfattheicher, 2019; Neff, 2016; Neff, Tóth-Király, & Colosimo, 2018; Neff et al., 2019; Neff, Whittaker, & Karl, 2017; Pfattheicher, Geiger, Hartung, Weiss, & Schindler, 2017). We therefore conducted confirmatory factor analyses which could not replicate the original six-factor structure with a higher order factor. Here we used a data-based adjusted two-factor solution with intercorrelated factors that yielded the best model fit. The two factors were *compassionate self-responding* (CS:

nine items e.g. 'I'm kind to myself when I'm experiencing suffering'.) and *reduced uncompassionate self-responding* (RUS: 12 items e.g. 'I'm intolerant and impatient towards those aspects of my personality I don't like'.). Internal consistencies of the two scales *compassionate self-responding* and *reduced uncompassionate self-responding* in the current samples showed good results (Cronbach's alpha CS = 0.89-0.92; RUS = 0.90-0.92).

2.2.4 | Pain-related disability

Disability was measured using the German version of the Pain Disability Index (PDI; Pollard, 1984). Seven items rated on a 11-point scale from 0 ('no disability') to 10 ('total disability') assess disability in seven life domains. These comprise family/home responsibilities, occupation, social activity, recreation, sexual behaviour, self-care and life-support activity. A total score indicates the global level of disability. The PDI has demonstrated good psychometric properties regarding individuals with and without chronic pain (Mewes et al., 2009; Soer et al., 2013). In the current samples, internal consistency of the PDI can be rated as good (Cronbach's alpha = 0.85-0.96). However, the original factor structure could not be replicated.

2.2.5 | Pain catastrophizing

The level of pain catastrophizing was measured using the German version of the Pain Catastrophizing Scale (PCS; Cronbach`s a = 0.92; Meyer, Sprott, & Mannion, 2008; Sullivan, Bishop, & Pivik, 1995). The PCS comprises of 13 items and three subscales (rumination, magnification and helplessness). The degree to which specific cognitions and emotions are related to pain is estimated on a 5-point Likert scale (0 = not at all, 4 = all the time). A higher score indicates higher levels of pain catastrophizing. The PCS is validated for the use in individuals with and without chronic pain (Sullivan et al., 1995; Van Damme, Crombez, Bijttebier, Goubert, & Houdenhove, 2002). In these samples, the PCS demonstrates excellent internal consistency (Cronbach's a = 0.93-0.95).

2.2.6 | Pain-related anxiety

Fear and anxiety responses specific to pain were assessed via the German short-form version of the Pain Anxiety Symptoms Scale (PASS-20; Cronbach's α = 0.91; McCracken & Dhingra, 2002). The 20 items are rated on a 6-point Likert scale (0 = never, 5 = always) with higher scores indicating greater pain-related anxiety. The PASS-D-20 comprises of a second-order factor and four subscales (Cognitive, Escape/Avoidance, Fear and Physiological anxiety) represented by five items each. The PASS-20 showed good psychometric properties for people with and without chronic pain (Abrams, Carleton, & Asmundson, 2007; Kreddig, Rusu, Burkhardt, & Hasenbring, 2015; McCracken & Dhingra, 2002). In the current samples, internal consistency was excellent (Cronbach's a = 0.92-0.95).

2.2.7 | Depressive Symptoms

The depression subscale of the Patient Health Questionnaire (PHQ-9) (Spitzer, Kroenke, Williams, & Group, 1999) was used to assess depressive symptoms. It includes nine items rated on a 4-point Likert scale (0 = 'not at all'; 3 = 'nearly every day'). Higher scores indicate more severe depressive symptoms. The PHQ-9 exhibits adequate psychometric characteristics in other chronic pain samples (e.g. Dear et al., 2013; Yu, Norton, Almarzooqi, & McCracken, 2017). In the present study, PHQ-9 demonstrates good internal consistency (Cronbach's α = 0.87-0.91).

2.2.8 | Anger

Due to technical problems, anger was assessed in a subsample (T1: N_{AN} = 397, T2: N_{AN2} = 273). Different aspects of anger were measured using the German version of the State Trait Anger Expression Inventory (STAXI; Schwenkmezger, Hodapp, & Spielberger, 1992; Spielberger, 1988). It consists of five subscales: state anger (10 items), trait anger (10 items) as well as the anger-related traits anger-in (8 items), anger-out (8 items) and anger-control (8 items). Items of all five subscales were rated on a 4-point Likert scale. Higher scores indicate a stronger expression of the underlying concept. In the context of chronic pain, the STAXI is the most widely used instrument to assess anger (Sommer, Lukic, Rössler, & Ettlin, 2019). In the present samples, all subscales demonstrate adequate to excellent internal consistency (state anger: Cronbach's α = 0.90–96; trait anger: Cronbach's α = 0.71–87; anger-in: Cronbach's α = 0.78-0.88; anger-out: Cronbach's α = 0.83-0.84; anger-control: Cronbach's α = 0.83-0.92).

2.2.9 | Self-esteem

The revised German version of the Rosenberg Self-Esteem Scale (RSES) was used to assess self-esteem (von Collani & Herzberg, 2003; Rosenberg, 1979). The 10 items (e.g. 'On the whole, I am satisfied with myself'. or 'I feel I do not have

much to be proud of'.) are rated on a 4-point Likert scale from 1 ('strongly agree') to 4 ('strongly disagree'). A higher total score indicates greater global self-esteem. Internal consistency within the present samples was good (Cronbach's $\alpha = 0.89\text{-}0.94$).

2.2.10 | Psychological Flexibility

Psychological Flexibility was assessed via the German version of the Psychological Inflexibility in Pain Scale (PIPS; Barke, Riecke, Rief, & Glombiewski, 2015; Wicksell, Lekander, Sorjonen, & Olsson, 2010). The 12 items are divided into the two subscale *Avoidance* (eight items, e.g. 'I cancel planned activities when I am in pain') and *Cognitive Fusion* (four items, e.g. 'It is important to understand what causes my pain'.). All items are rated on a 7-point scale ranging from 1 ('never true') to 7 ('always true'), higher scores suggesting lower psychological flexibility. The PIPS is a valid and reliable instrument to assess pain-related avoidance behaviour (Barke et al., 2015). It is frequently applied in studies on chronic pain treatment (e.g. Glombiewski et al., 2018; Wicksell et al., 2013). Both subscales in the PIPS showed adequate internal consistency with the present data (*Avoidance:* Cronbach's $\alpha = 0.88\text{-}0.94$; *Cognitive Fusion:* Cronbach's $a = 0.64\text{-}0.76$).

2.3 | Statistical analysis

To assess the unique value of self-compassion over and above self-esteem and psychological flexibility, we conducted a longitudinal path model analysis with Mplus version 8. First, we modelled this path model analysis only for the individuals suffering from chronic pain (N_{CP}). We repeated the path model analysis for the total sample (N_T) to examine whether the path model might also be valid concerning the general population. Path model was fit using Robust Maximum Likelihood Method to allow inclusion of all included data for participants with incomplete data sets. Following our research question, we hypothesized an autoregressive path model in which every pain- and emotion-related construct at T2 was predicted by all other constructs at T1. The self-compassion, self-esteem and psychological flexibility scales at T1 were used to predict pain- and emotion-related constructs at T2, but revealed only autoregressive paths otherwise. All variables measured at the same time point were allowed to correlate freely. Path modelling allows both the proposed model's adequacy to be assessed by analysing the model fit and the interpretation of standardized parameter estimates, which represent each construct's unique predictive value.

TABLE 2 Demographics and pain characteristics

Variable	Chronic pain (T1)	No chronic pain (T1)
Sex	90.5% female	73.9% female
Age	45.83 ± 14.87	39.69 ± 17.54
Marital status		
Single	16.10%	27.80%
Partnership	69.40%	62.10%
Divorced	11.60%	8.10%
Widowed	2.30%	0.80%
Highest school grade completed		
Grades 9 and below	16.30%	7.60%
Grades 10	46.20%	28.40%
Grades 13	37.50%	64.00%
Pain duration	11.84 (10.40)	—
Pain intensity	5.83 (1.92)	—
Pain unpleasantness	5.65 (2.42)	—
Pain diagnosis		
Back pain	61.50%	—
Head pain	30.20%	—
Fibromyalgia	39.70%	—
Rheumatic pain	41.20%	—
Joint pain	59.10%	—
Other pain	31.10%	—

Note: Values are presented as means (±standard deviation) or percentages; T1 = first measurement.

3 | RESULTS

A total of $N_{T1} = 1{,}228$ participants completed the online survey at T1, and $N_{T2} = 376$ also at T2. Our STAXI data were assessed with a subsample of $N_{AN1} = 397$ (T1) and $N_{AN2} = 273$ (T2). Individuals with chronic pain (ICP) were mostly female (90.5%) and had an average age of 45.86 years ($SD = 14.87$). Our control sample also comprised women predominantly (73.9%) aged an average 39.69 years ($SD = 17.54$). Further demographic information and pain-related aspects such as pain duration, intensity and diagnosis are displayed in Table 2. Baseline differences between the samples were computed via univariate analysis of variance (ANOVA) and are shown in Table 3. There were differences in baseline levels of all relevant variables except for anger-out and anger-control. In addition, regarding differences in data collection (online vs. paper–pencil), there were no significant differences years of education and pain duration; however, participants who used paper–pencil questionnaires were significantly older.

TABLE 3 Descriptive statistics and baseline differences

	Chronic pain		No chronic pain		Differences at baseline
	CP1 *M* (*SD*)	CP2 *M* (*SD*)	NP1 *M* (*SD*)	NP2 *M* (*SD*)	*p*-value
CS	2.85 (0.78)	2.93 (0.78)	2.98 (0.80)	3.06 (0.88)	.011
RUS	3.02 (0.89)	2.98 (0.88)	2.56 (0.82)	2.52 (0.78)	<.001
RSES	18.97 (6.87)	19.05 (7.08)	22.84 (5.28)	22.87 (5.59)	<.001
F	19.82 (4.49)	19.47 (4.58)	15.46 (5.89)	14.60 (5.69)	<.001
A	30.57 (10.78)	30.84 (10.94)	19.60 (8.33)	20.77 (9.59)	<.001
PDI	35.57 (15.37)	35.29 (14.61)	9.84 (13.94)	11.10 (16.11)	<.001
PCS	23.98 (10.72)	22.07 (11.47)	10.51 (10.29)	12.37 (10.02)	<.001
PASS	38.51 (18.92)	37.14 (19.18)	23.85 (17.70)	20.32 (14.16)	<.001
PHQ-9	11.67 (7.18)	12.08 (5.74)	4.62 (4.53)	5.00 (4.49)	<.001
SA	15.96 (6.66)	15.64 (5.72)	11.42 (2.92)	13.50 (5.76)	<.001
TA	20.56 (5.60)	20.02 (5.29)	17.21 (3.46)	18.39 (4.58)	.001
AI	19.55 (5.26)	18.85 (5.29)	14.64 (3.78)	16.18 (4.35)	<.001
AO	12.97 (3.90)	12.61 (3.60)	11.68 (3.18)	12.64 (3.41)	.062
AC	22.41 (4.71)	21.99 (4.55)	23.47 (4.40)	22.75 (5.78)	.208

Abbreviations: A, Avoidance; AC, Anger-control subscale (STAXI); AI, Anger-In subscale (STAXI); AO, Anger-Out subscale (STAXI); CP1, chronic pain sample at T1; CP2, chronic pain sample at T2; CS, Compassionate Self-Responding; F, Cognitive Fusion; NP1, no pain sample at T1; NP2, no pain sample at T2; PASS, Pain Anxiety Symptom Scale; PCS, Pain Catastrophizing Scale; PDI, Pain Disability Index; PHQ-9, depression subscale of the Patient Health Questionnaire; RSES, Rosenberg Self-Esteem Scale; RUS, Reduced Uncompassionate Self-Responding; SA, State Anger subscale (STAXI, State Trait Anger Expression Inventory); TA, Trait Anger subscale (STAXI).

3.1 | Path model analysis

Path model analysis was first conducted only for individuals with chronic pain (N_{CP}). It examined the predictive values of compassionate self-responding (CS) and reduced uncompassionate self-responding (RUS) on pain-related variables (PDI, PCS, PASS), as well as depression (PHQ-9) and anger (STAXI), in relation to avoidance (PIPS-A), cognitive fusion (PIPS-F) and self-esteem (RSES). Exogenous/Independent variables were all included variables at T1 and endogenous/dependent variables were all included variables at T2. To simplify the model, we included only auto-regressions for the predictors of most interest (compassionate self-responding, reduced uncompassionate self-responding, avoidance, cognitive fusion, self-esteem). Descriptive statistics concerning means, standard deviations and ranges of all included variables are depicted in Table 3. Bivariate correlations were examined and are shown in Table 4. Path analysis was repeated for the total sample (N_T).

3.1.1 | Model fit

Model fit was estimated according to fit indices and the percentage of variance accounted for in the model. Figure 2 depicts the final path analysis for individuals with chronic pain (N_{CP}). All standardized and unstandardized parameter estimates are provided in Table 5. Considering the fit indices, we noted that the comparative fit index (CFI = 0.98) and root mean square error of approximation (RMSEA = 0.04, 90% CI = 0.03 to 0.05) revealed a good model fit. The standardized root mean square residual (SRMR = 0.052) was within the acceptable range. The Chi-square test was significant, indicating an insufficient fit (X^2 (65) = 149.68, $p < .001$). However, our large sample size means this can be disregarded. Model fits of the repeated path analysis (N_T) showed acceptable fit (RMSEA = 0.04, 90% CI = 0.03 to 0.04; CFI = 0.98; TLI = 0.91; SRMR = 0.05; X^2 (65) = 171.92, $p < .001$), supporting the quality of our pain-specific model.

Further specifications are only depicted regarding the path model that included individuals with chronic pain (N_{CP}).

3.1.2 | Direct effects

Regarding pain-related aspects, PDI at T2 was significantly predicted by PDI at T1 ($\beta = 0.72$, $p < .001$), anger-out ($\beta = 0.21$, $p = .006$), trait anger ($\beta = -0.19$, $p = .008$) and avoidance ($\beta = 0.13$, $p = .024$). PCS at T2 was significantly predicted by

TABLE 4 Bivariate correlations

	CS_ CP2	RUS_ CP2	A_ CP2	F_ CP2	RSES_ CP2	PDI_ CP2	PCS_ CP2	PASS_ CP2	PHQ-9_ CP2	SA_ CP2	TA_ CP2	AI_ CP2	AO_ CP2	AC_ CP2
CS_CP1	0.75**	−0.59**	−0.32**	−0.10	0.59**	−0.15**	−0.39**	−0.35**	−0.38**	−0.25**	−0.33**	−0.44**	−0.18**	0.15*
RUS_CP1	−0.54**	0.82**	0.46**	0.30**	−0.70	0.24**	0.55**	0.55**	0.54**	0.33*	0.41*	0.48**	0.24**	−0.11
A_CP1	−0.25**	0.42**	0.82**	0.37**	−0.40**	0.51**	0.61**	0.66**	0.58**	0.29**	0.17**	0.29**	0.10	0.02
F_CP1	−0.11	0.31**	0.45**	0.68**	−0.22**	0.25**	0.39**	0.41**	0.35**	0.16*	0.07	0.19**	0.00	0.00
RSES_CP1	0.61**	−0.74**	−0.48**	−0.23**	0.88**	−0.29**	−0.53**	−0.53**	−0.59**	−0.36**	−0.38**	−0.49**	−0.21**	0.11
PDI_CP1	−0.13*	0.23**	0.54**	0.24**	−0.26**	0.82**	0.47**	0.46**	0.56**	0.27**	0.13*	0.26**	0.06	0.10
PCS_CP1	−0.38**	0.53**	0.63**	0.37**	−0.50**	0.475**	0.82**	0.69**	0.60**	0.32**	0.26**	0.31**	0.16*	−0.09
PASS_CP1	−0.30**	0.51**	0.68**	0.41**	−0.46**	0.44**	0.70**	0.82**	0.54**	0.32**	0.29**	0.30**	0.18**	−0.11
PHQ-9_CP1	−0.36**	0.56**	0.63**	0.36**	−0.58**	0.56**	0.64**	0.63**	0.79**	0.40**	0.40**	0.40**	0.23**	−0.03
SA_CP1	−0.16*	0.34**	0.37**	0.34**	−0.40**	0.21**	0.35**	0.43**	0.42**	0.55**	0.38**	0.36**	0.28**	−0.12
TA_CP1	−0.22**	0.35**	0.35**	0.17*	−0.33**	0.18*	0.28**	0.40**	0.27**	0.35**	0.68**	0.34**	0.50**	−0.33**
AI_CP1	−0.39**	0.43**	0.45**	0.30**	−0.50**	0.33**	0.37**	0.40**	0.46**	0.26**	0.20*	0.69**	0.02	0.24**
AO_CP1	−0.06	0.18*	0.21**	0.16*	−0.15	0.14	0.13	0.26**	0.18*	0.32**	0.60**	0.10	0.71**	−0.42**
AC_CP1	0.16	−0.12	−0.06	0.03	0.07	0.05	−0.05	−0.11	−0.02	−0.18*	−0.34**	0.13	−0.39**	0.58**

Abbreviations: A, avoidance; AC, anger-control subscale (STAXI); AI, anger-in subscale (STAXI); AO, anger-out subscale (STAXI); CP1, chronic pain sample at T1; CP2, chronic pain sample at T2; F, cognitive fusion; PASS, pain anxiety symptom scale; PCS, pain catastrophizing scale; PDI, pain disability index; PHQ-9, depression subscale of the Patient Health Questionnaire; RSES, rosenberg self-esteem scale; RUS, reduced uncompassionate self-responding; SA, state anger subscale (STAXI, State Trait Anger Expression Inventory); SC, compassionate self-responding; TA, trait anger subscale (STAXI).

**$p < .01$;

*$p < .05$.

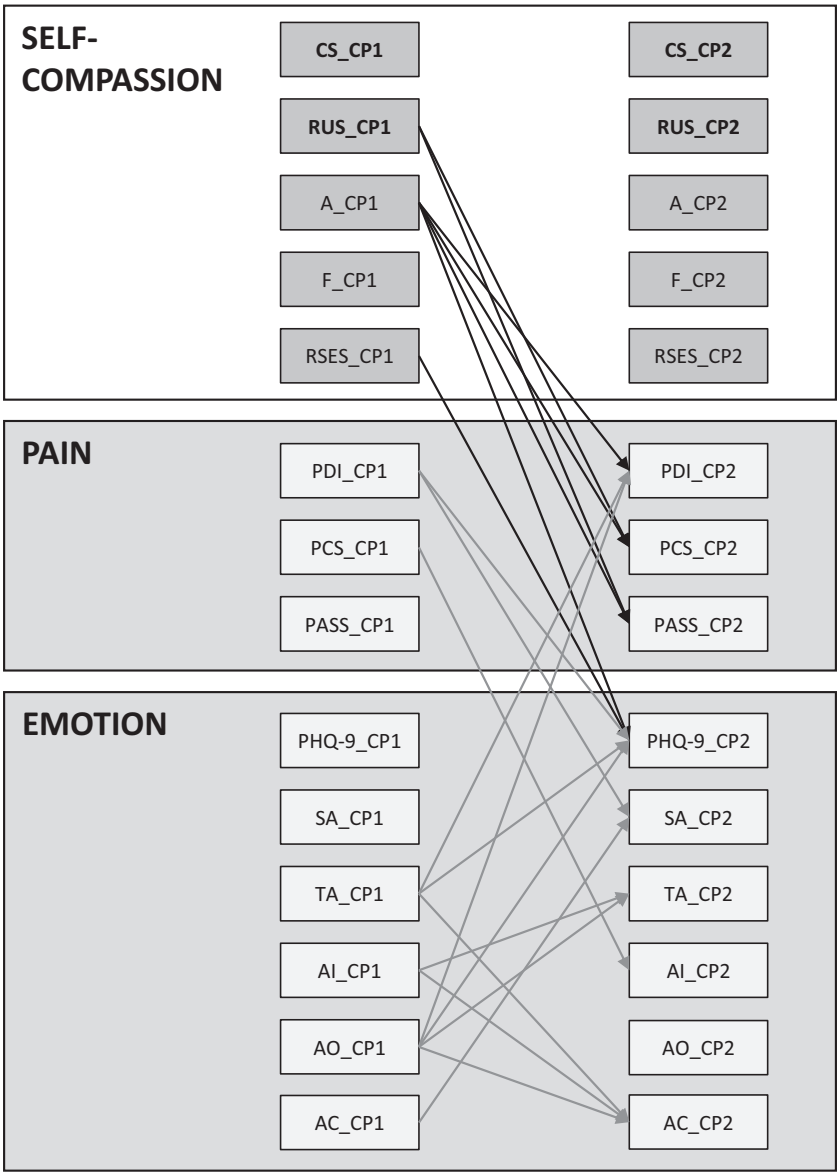

FIGURE 2 Path model. In terms of comprehensibility, co-variances and autocorrelations were excluded in the figure; autocorrelations were all significant; A, avoidance; AC, ANGER-control subscale (STAXI); AI, anger-in subscale (STAXI); AO, anger-out subscale (STAXI); CP1, chronic pain sample at T1; CP2, chronic pain sample at T2; CS, compassionate self-responding; F, cognitive fusion; PASS, pain anxiety symptom scale; PCS, pain catastrophizing scale; PDI, pain disability index; PHQ-9, depression subscale of the patient health questionnaire; RSES, Rosenberg self-esteem scale; RUS, reduced uncompassionate self-responding; SA, state anger subscale (STAXI, State Trait Anger Expression Inventory); TA, trait anger subscale (STAXI)

PCS at T1 ($\beta = 0.63$, $p < .001$), as well as by SCo ($\beta = 0.13$, $p = .020$) and avoidance ($\beta = 0.11$, $p = .040$). PASS at T2 was significantly predicted by PASS at T1 ($\beta = 0.57$, $p < .001$) and also by avoidance ($\beta = 0.18$, $p < .001$) and SCo ($\beta = 0.11$, $p = .018$).

PHQ-9 scores at T2 were significantly predicted by PHQ-9 at T1 ($\beta = 0.60$, $p < .001$), as well as by avoidance ($\beta = 0.18$, $p = .001$), trait-anger ($\beta = -0.18$, $p = .008$), anger-out ($\beta = 0.15$, $p = .035$), RSES ($\beta = -0.15$, $p = .018$) and PDI ($\beta = 0.12$, $p = .007$).

Concerning anger-related variables, state-anger at T2 was significantly predicted by state anger at T1 ($\beta = 0.51$, $p < .001$), PASS ($\beta = -0.20$, $p = .048$), anger-control ($\beta = -0.19$, $p = .015$) and PDI ($\beta = 0.17$, $p = .013$). Trait anger at T2 was significantly predicted by trait anger at T1 ($\beta = 0.50$, $p < .001$), anger-out ($\beta = 0.27$, $p < .001$) and anger-in ($\beta = -0.15$, $p = .037$). Moreover, anger-control at T2 was significantly predicted by anger-control at T1 ($\beta = 0.41$, $p < .001$), anger-in ($\beta = 0.23$, $p = .009$), trait anger ($\beta = -0.22$, $p = .034$) and anger-out ($\beta = -0.17$, $p = .046$). Anger-in at T2 was significantly predicted by anger-in at T1 ($\beta = 0.55$, $p < .001$) as well as PCS ($\beta = -0.16$, $p = .033$). Anger-out at T2 was only significantly predicted by anger-out at T1 ($\beta = 0.68$, $p < .001$).

3.1.3 | Indirect effects

We carried out no mediator or moderator analyses.

3.1.4 | Explanation of variance

In terms of pain-related aspects, the present model explained 72.1% of the PDI variance ($R^2 = 0.72$), 65.4% of the

TABLE 5 Standardized beta-coefficients (Only Significant Paths)

DV	IV	β	*p*-value
PDI_CP2	PDI_CP1	0.72	<.001
	TA_CP1	−0.19	.008
	AO_CP1	0.21	.006
	A_CP1	0.13	.024
PCS_CP2	PCS_CP1	0.63	<.001
	A_CP1	0.11	.04
	RUS_CP1	0.13	.02
PASS_CP2	PASS_CP1	0.57	<.001
	A_CP1	0.18	<.001
	RUS_CP1	0.11	.018
PHQ-9_CP2	PDI_CP1	0.12	.007
	TA_CP1	−0.18	.008
	AO_CP1	0.15	.035
	PHQ−9_CP1	0.6	<.001
	A_CP1	0.18	.001
	RSES_CP1	−0.15	.018
SA_CP2	PDI_CP1	0.17	.013
	PASS_CP1	−0.2	.048
	SA_CP1	0.51	<.001
	AC_CP1	−0.19	.015
TA_CP2	TA_CP1	0.5	<.001
	AI_ CP1	−0.15	.037
	AO_ CP1	0.27	<.001
AC_CP2	TA_ CP1	−0.22	.034
	AC_ CP1	0.41	<.001
	AI_ CP1	0.23	.009
	AO_ CP1	−0.17	.046
AI_CP2	PCS_ CP1	−0.16	.033
	AI_ CP1	0.55	<.001
AO_CP2	AO_ CP1	0.68	<.001

Abbreviations: A, avoidance; AC, anger-control subscale (STAXI); AI, anger-in subscale (STAXI); AO, anger-out subscale (STAXI); CP1, chronic pain sample at t1; CP2, chronic pain sample at t2; DV, dependent variable; IV, independent variable; PASS, pain anxiety symptom scale; PCS, pain catastrophizing scale; PDI, pain disability index; PHQ-9, depression subscale of the Patient Health Questionnaire; RSES, Rosenberg self-esteem scale; RUS, reduced uncompassionate self-responding; SA, state anger subscale (STAXI, State Trait Anger Expression Inventory); TA, trait anger subscale (STAXI).

variance in PCS scores ($R^2 = 0.65$) and 67.5% of the variance in PASS ($R^2 = 0.68$). 68.7% of the variance of PHQ-9 ($R^2 = 0.69$) was explained. Regarding anger, our model explained 38.7% of the variance in state anger ($R^2 = 0.39$), 60.7% of the variance in trait anger ($R^2 = 0.61$), 55.1% of the variance in anger-control ($R^2 = 0.55$), 51.3% of the variance in anger-in ($R^2 = 0.51$) and 60.7% of the variance in anger-out ($R^2 = 0.61$).

4 | DISCUSSION

We addressed the specific impact of self-compassion on pain-related and emotional aspects such as anger and depression, in contrast to psychological flexibility and self-esteem in a longitudinal study. A path analysis including individuals with chronic pain (N_{CP}) examined the unique predictive values of self-compassion (CS, RUS), self-esteem and psychological flexibility (avoidance and cognitive fusion) on pain-related disability, catastrophizing and pain-related anxiety, as well as depression and anger. In sum, our results suggest that only RUS reveals any relevance in the context of pain. It predicted pain catastrophizing and pain-related anxiety. CS demonstrated no predictive value concerning pain-related or emotional variables. We replicated our results in a second path analysis including the total sample (N_T).

Our findings partially replicate prior research. In line with evidence from cross-sectional studies, self-compassion predicted catastrophizing (Wren et al., 2012) and pain-related anxiety (Edwards et al., 2019). However, those and other studies also demonstrated associations of self-compassion with disability, depression, anxiety, distress, positive affect or pain acceptance (Costa & Pinto-Gouveia, 2011; Edwards et al., 2019; Wren et al., 2012). We did not find any unique predictive value of self-compassion regarding these aspects. These differences might be explained due to the use of the two factors, CS and RUS, instead of a general self-compassion factor. Moreover, prior research did not compare self-compassion with psychological flexibility or self-esteem; although, in one cross-sectional study the association between self-compassion and depression was mediated by activity engagement (Carvalho, Gouveia, Gillanders, & Castilho, 2018). Moreover, another study did compare CS with mindful awareness as predictors of depressive symptoms in chronic pain. In contrast to our findings, results identified CS as a relevant predictor after 6 and 12 months (Carvalho et al., 2019).

Moreover, interventional studies on compassion-based approaches led to reduced pain intensity, pain-related distress and anxiety, depression as well as greater self-efficacy, pain willingness and activity engagement following the intervention (Montero-Marín et al., 2018; Parry & Malpus, 2017; Penlington, 2018). There were also reductions in anger (Carson et al., 2005; Chapin et al., 2014). Relying on these results, we hypothesized that self-compassion will predict anger. Although self-compassion and anger were associated, self-compassion did not uniquely predict anger-related concepts. However, as we did not investigate any therapeutic intervention, we cannot draw any conclusions about the therapeutic value of compassion-based interventions regarding anger in pain.

Our results add to recent debate regarding the factor structure of the self-compassion scale (Muris et al.., 2018; Muris

& Otgaar, 2020; Muris et al., 2016, 2019; Neff, 2016; Neff et al., 2017, 2018, 2019; Pfattheicher et al., 2017). The latest research by Neff and colleagues supported the original factor structure in several different populations (Neff et al., 2018, 2019). However, their results also revealed some support for other factor solutions, for example, a bi-factor model (Neff et al., 2018). The current findings are in line with research by Muris and colleagues who questioned the original factor structure and explicitly recommend the use of the two factor structure (Muris & Otgaar, 2020; Muris et al., 2016). There is evidence that RUS might be more relevant than CS to predict various psychopathological symptoms for example depression, anxiety or stress (López, Sanderman, & Schroevers, 2018; Muris & Petrocchi, 2016). Our results support the findings of Muris and Petrocchi (2016). The association between RUS and psychopathology might be explained by the content overlap between the RUS subscale and psychopathology scales. Some researchers even suggest that RUS only depicts neuroticism (Pfattheicher et al., 2017). The discrepancy might occur due to different context in which the scale is used: in the context of psychological disorders RUS might be more relevant, but in the context of resilience and prevention CS might be more relevant. In sum, our results contribute to the ongoing debate about the appropriate use of the SCS. In line with the recommendations of Muris and Otgaar (2020) we suggest using the two factors (CS and RUS) in the context of pain.

Avoidance significantly predicted pain disability, catastrophizing, pain-related anxiety, as well as depression. Hence, in general, it was the most important predictor in the current study. Evidence on psychological flexibility or avoidance behaviour supports the present findings. Avoidance exerts a major impact in the chronic pain context. According to the 'fear-avoidance model' (Vlaeyen, Crombez, & Linton, 2016), it is one of the most important development and maintenance factors of chronic pain (Vlaeyen & Linton, 2000). It depicts the theoretical foundation of exposure therapy, which has been proven effective (e.g. den Glombiewski et al., 2018; Hollander et al., 2016; Woods & Asmundson, 2008). Moreover, avoidance can be regarded as the counterpart of acceptance. This might explain the effectiveness of ACT in chronic pain (Veehof, Trompetter, Bohlmeijer, & Schreurs, 2016). In both ACT and exposure therapy, reducing avoidance behaviour is considered a key mechanism of change (Hedman-Lagerlöf et al., 2019; Wicksell et al., 2013). Although, there is also evidence that self-compassion was a mediator of change in ACT (Vowles et al., 2014), changing the behaviour to become more active might be a more fundamental treatment goal in pain treatment. Relating to yourself in a positive or less negative way might rather be a secondary treatment goal.

Self-esteem significantly predicted depression, but demonstrated no predictive value concerning pain-related aspects. Prior research indicated that suffering from chronic pain is associated with low self-esteem (Burke et al., 2015). Prior research partly contradicts the present findings: self-esteem predicted positive and negative affect, stress and symptom severity as well as psychological well-being in patients with asthma and rheumatoid arthritis (Juth, Smyth, & Santuzzi, 2008; Nagyova, Stewart, Macejova, Van Dijk, & Van Den Heuvel, 2005) However, the present findings are in line with results from a longitudinal study on individuals suffering from fibromyalgia (Morea, Friend, & Bennett, 2008); their findings indicated that compared to illness self-concept, neither self-esteem nor optimism explained unique variances regarding health-related outcomes. Furthermore, the relationship between disability and self-esteem in fibromyalgia was mediated by body-self unity and illness cognitions, especially helplessness and acceptance (Bode, Van Der Heij, Taal, & Van De Laar, 2010).

4.1 | Limitations

Some study limitations should be noted. First, our sample reveals various age ranges and pain diagnoses, but was predominantly female. In our impression, women are better networked through self-help groups, would rather support research or are more often affected by certain disorders. Second, we included only self-report instruments. Hence, there might be a self-reflection or social desirability bias. Third, the very high attrition rate (69.38%). It might be explained by the absence of compensation and the noninterventional character of the study and is comparable to another study (Carvalho et al., 2019). Fourth, due to our study's design, we carried out no valid clinical diagnoses regarding pain. The evidence of being in chronic pain relied solely on our participants' own ratings. We considered no other physiological or psychological impairments in our participants. Fifth, other concepts related to self-compassion (e.g. mindfulness, optimism) were not considered, meaning we had to disregard other relevant influences of outcome variables. Sixth, the psychometric properties of the measurements we took were somewhat compromised, largely due to the PDI and SCS. Although recommended by Muris and Otgaar (2020), it is still unclear what the two factors (RUS and CS) of the SCS actually measure. Due to these restrictions, we refrained from calculating a structural equation model. Furthermore, we considered neither mediators nor moderators. One could also find fault with the STAXI, as it did not address pain-specific anger. Nevertheless, the STAXI is the most commonly used instrument in pain research (Sommer et al., 2019).

4.2 | Future directions

Future research should focus on developing and evaluating pain-specific compassion-based interventions. First,

self-compassion should be compared to other emotion-regulation strategies in experimental designs. Second, compassion interventions should be investigated in treatment studies by either evaluating general improvements in pain and emotional functioning or addressing specific subgroups in terms of tailored treatment approaches via process-based studies for example single-case designs. One potential target of treatment is pain-related anger. By addressing anger in chronic pain, it might be possible to enhance other validated treatment approaches in pain, such as ACT or exposure. Moreover, how current psychological pain treatments influence CS and RUS should also be evaluated. This might help to further clarify the critique regarding the overlap between RUS and psychopathology. The potential role of RUS and CS as mediators of change in existing therapies could be explored. Finally, in terms of research on resilience, especially CS should be evaluated in noninterfering pain.

5 | CONCLUSION

Concerning self-compassion, we found that only RUS revealed unique predictive value regarding pain-related outcomes, pain catastrophizing and pain-related anxiety. Neither CS nor RUS predicted emotional outcomes such as depression and anger. Self-esteem, however, did predict depressive symptoms. Avoidance, as an element in psychological flexibility in pain, predicted pain-related disability, catastrophizing, pain-related anxiety and depressive symptoms. Hence, we can conclude that avoidance seems to be more relevant in the chronic pain context than self-compassion. Nevertheless, future research should focus on the role of self-compassion in alleviating the burden of anger in pain. Interventional studies, especially those of single-case design rather than questionnaire studies, should help us fulfil the need for personalized treatment approaches in chronic pain.

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CONFLICT OF INTERESTS

The authors have no conflict of interests to declare.

AUTHORS' CONTRIBUTION

All the authors read and approved the manuscript. The authors made the following contributions: Anja Carina Emmerich was involved in conceiving the study design, in data acquisition, interpreting the data, and in preparing the initial version of the manuscript and in its revision. Thilo Friehs was involved in data analysis and interpretation, as well as in revising this article. Geert Crombez was involved in interpreting and revising the manuscript. Julia Anna Glombiewski was involved in conceiving the study design, data interpretation and in revising this article.

REFERENCES

Abrams, M. P., Carleton, R. N., & Asmundson, G. J. G. (2007). An exploration of the psychometric properties of the PASS-20 with a nonclinical sample. *Journal of Pain*, *8*(11), 879–886. https://doi.org/10.1016/j.jpain.2007.06.004

Barke, A., Riecke, J., Rief, W., & Glombiewski, J. A. (2015). The Psychological Inflexibility in Pain Scale (PIPS) – validation, factor structure and comparison to the Chronic Pain Acceptance Questionnaire (CPAQ) and other validated measures in German chronic back pain patients. *BMC Musculoskeletal Disorders*, *16*(171), 1–10. https://doi.org/10.1186/s12891-015-0641-z

Bode, C., Van Der Heij, A., Taal, E., & Van De Laar, M. A. F. J. (2010). Body-self unity and self-esteem in patients with rheumatic diseases. *Psychology, Health and Medicine*, *15*(6), 672–684. https://doi.org/10.1080/13548506.2010.507774

Burke, A. L. J., Mathias, J. L., & Denson, L. A. (2015). Psychological functioning of people living with chronic pain: A meta-analytic review. *British Journal of Clinical Psychology*, *54*, 345–360. https://doi.org/10.1111/bjc.12078

Carson, J. W., Keefe, F. J., Lynch, T. R., Carson, K. M., Goli, V., Fras, A. M., & Thorp, S. (2005). Loving-kindness meditation for chronic low back pain - Results from a pilot trial. *Journal of Holistic Nursing*, *23*(3), 287–304. https://doi.org/10.1177/0898010105277651

Carvalho, S. A., Gouveia, J. P., Gillanders, D., & Castilho, P. (2018). Mindfulness, selfcompassion, and depressive symptoms in chronic pain: The role of pain acceptance. *Journal of Clinical Psychology*, *74*(12):2094–2106. https://doi.org/10.1002/jclp.22689

Carvalho, S. A., Trindade, I. A., Gillanders, D., Pinto-Gouveia, J., & Castilho, P. (2019). Self-compassion and depressive symptoms in chronic pain (CP): A 1-year longitudinal study. *Mindfulness*, *11*(3), 709–719. https://doi.org/10.1007/s12671-019-01292-7

Chapin, H. L., Darnall, B. D., Seppala, E. M., Doty, J. R., Hah, J. M., & Mackey, S. C. (2014). Pilot study of a compassion meditation intervention in chronic pain. *Journal of Compassionate Health Care*, *1*(4), 1–12. https://doi.org/10.1186/s40639-014-0004-x

Costa, J., & Pinto-Gouveia, J. (2011). Acceptance of pain, self-compassion and psychopathology: Using the chronic pain acceptance questionnaire to identify patients' subgroups. *Clinical Psychology and Psychotherapy*, *18*, 292–302. https://doi.org/10.1002/cpp.718

Dear, B. F., Titov, N., Nicholson Perry, K., Johnston, L., Wootton, B. M., Terides, M. D., … Hudson, J. L. (2013). The pain course: A randomised controlled trial of a clinician-guided Internet-delivered cognitive behaviour therapy program for managing chronic pain and emotional well-being. *Pain*, *154*, 942–950. https://doi.org/10.1016/j.pain.2013.03.005

den Hollander, M., Goossens, M., De Jong, J., Ruijgrok, J., Oosterhof, J., Onghena, P., … Vlaeyen, J. W. S. (2016). Expose or protect? A randomized controlled trial of exposure in vivo vs pain-contingent treatment as usual in patients with complex regional pain syndrome type 1. *Pain*, *157*, 2318–2329. https://doi.org/10.1097/j.pain.0000000000000651

Edwards, K. A., Pielech, M., Hickman, J., Ashworth, J., Sowden, G., & Vowles, K. E. (2019). The relation of self - compassion to functioning among adults with chronic pain. *European Journal of Pain*, *23*, 1538–1547. https://doi.org/10.1002/ejp.1429

Glombiewski, J. A., Holzapfel, S., Riecke, J., Vlaeyen, J. W. S., de Jong, J., Lemmer, G., & Rief, W. (2018). Exposure and CBT for chronic back pain: An RCT on differential efficacy and optimal length of treatment. *Journal of Consulting and Clinical Psychology*, *86*(6), 533–545. https://doi.org/10.1037/ccp0000298

Hedman-Lagerlöf, M., Andersson, E., Hedman-Lagerlöf, E., Wicksell, R. K., Flink, I., & Ljótsson, B. (2019). Approach as a key for success: Reduced avoidance behaviour mediates the effect of exposure therapy for fibromyalgia. *Behaviour Research and Therapy*, *122*, 103478. https://doi.org/10.1016/j.brat.2019.103478

Hupfeld, J., & Ruffieux, N. (2011). Validierung einer deutschen Version der Self-Compassion Scale (SCS-D). *Zeitschrift Für Klinische Psychologie Und Psychotherapie*, *40*(2), 115–123. https://doi.org/10.1026/1616-3443/a000088

Juth, V., Smyth, J. M., & Santuzzi, A. M. (2008). How do you feel? Self-esteem predicts affect, stress, social interaction, and symptom severity during daily life in patients with chronic illness. *Journal of Health Psychology*, *13*(7), 884–894. https://doi.org/10.1177/1359105308095062

Koechlin, H., Coakley, R., Schechter, N., Werner, C., & Kossowsky, J. (2018). The role of emotion regulation in chronic pain: A systematic literature review. *Journal of Psychosomatic Research*, *107*, 38–45. https://doi.org/10.1016/j.jpsychores.2018.02.002

Kreddig, N., Rusu, A. C., Burkhardt, K., & Hasenbring, M. I. (2015). The German PASS-20 in patients with low back pain: New aspects of convergent, divergent, and criterion-related validity. *International Journal of Behavioral Medicine*, *22*(2), 197–205. https://doi.org/10.1007/s12529-014-9426-2

Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself kindly. *Journal of Personality and Social Psychology*, *92*(5), 887–904. https://doi.org/10.1037/0022-3514.92.5.887

Linton, S. J. (2013). A transdiagnostic approach to pain and emotion. *Journal of Applied Biobehavioral Research*, *18*(2), 82–103. https://doi.org/10.1111/jabr.12007

López, A., Sanderman, R., & Schroevers, M. J. (2018). A close examination of the relationship between self-compassion and depressive symptoms. *Mindfulness*, *9*(5), 1470–1478. https://doi.org/10.1007/s12671-018-0891-6

McCracken, L. M., & Dhingra, L. (2002). A short version of the Pain Anxiety Symptoms Scale (PASS-20): Preliminary development and validity. *Pain Research Management*, *7*(1), 45–50. https://doi.org/10.1155/2002/517163

Mewes, R., Rief, W., Stenzel, N., Glaesmer, H., Martin, A., & Brähler, E. (2009). What is "normal" disability? An investigation of disability in the general population. *Pain*, *142*, 36–41. https://doi.org/10.1016/j.pain.2008.11.007

Meyer, K., Sprott, H., & Mannion, A. F. (2008). Cross-cultural adaptation, reliability, and validity of the German version of the Pain Catastrophizing Scale. *Journal of Psychosomatic Research*, *64*, 469–471. https://doi.org/10.1016/j.jpsychores.2007.12.004

Montero-Marín, J., Navarro-Gil, M., Puebla-Guedea, M., Luciano, J. V., Van Gordon, W., Shonin, E., & García-Campayo, J. (2018). Efficacy of "Attachment-Based Compassion Therapy" in the treatment of fibromyalgia: A randomized controlled trial. *Frontiers in Psychistry*, *8*, 1–11. https://doi.org/10.3389/fpsyt.2017.00307

Montero-Marin, J., Van Gordon, W., Shonin, E., Navarro-Gil, M., Gasión, V., López-del-Hoyo, Y., … Garcia-Campayo, J. (2020). Attachment-Based Compassion Therapy for Ameliorating Fibromyalgia: Mediating Role of Mindfulness and Self-Compassion. *Mindfulness*, *11*(3), 816–828. https://doi.org/10.1007/s12671-019-01302-8

Morea, J. M., Friend, R., & Bennett, R. M. (2008). Conceptualizing and measuring illness self-concept: A comparison with self-esteem and optimism in predicting fibromyalgia adjustment. *Research in Nursing and Health*, *31*, 563–575. https://doi.org/10.1002/nur.20294

Muris, P., & Otgaar, H. (2020). The process of science: A critical evaluation of more than 15 years of research on self-compassion with the self-compassion scale. *Mindfulness*, *11*, 1469–1482. https://doi.org/10.1007/s12671-020-01363-0

Muris, P., Otgaar, H., & Petrocchi, N. (2016). Protection as the mirror image of psychopathology: Further critical notes on the self-compassion scale. *Mindfulness*, *7*, 787–790. https://doi.org/10.1007/s12671-016-0509-9

Muris, P., Otgaar, H., & Pfattheicher, S. (2019). Stripping the forest from the rotten trees: Compassionate self-responding is a way of coping, but reduced uncompassionate self-responding mainly reflects psychopathology. *Mindfulness*, *10*, 196–199. https://doi.org/10.1007/s12671-018-1030-0

Muris, P., & Petrocchi, N. (2016). Protection or vulnerability? A meta-analysis of the relations between the positive and negative components of self-compassion and psychopathology. *Clinical Psychology and Psychotherapy*, *24*(2), 373–383. https://doi.org/10.1002/cpp.2005

Muris, P., van den Broek, M., Otgaar, H., Oudenhoven, I., & Lennartz, J. (2018). Good and bad sides of self-compassion: A face validity check of the self-compassion scale and an investigation of its relations to coping and emotional symptoms in non-clinical adolescents. *Journal of Child and Family Studies*, *27*, 2411–2421. https://doi.org/10.1007/s10826-018-1099-z

Nagyova, I., Stewart, R. E., Macejova, Z., Van Dijk, J. P., & Van Den Heuvel, W. J. A. (2005). The impact of pain on psychological well-being in rheumatoid arthritis: The mediating effects of self-esteem and adjustment to disease. *Patient Education and Counseling*, *58*, 55–62. https://doi.org/10.1016/j.pec.2004.06.011

Neff, K. (2003). Self-Compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity*, *2*, 85–101. https://doi.org/10.1080/15298860390129863

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity*, 223–250, https://doi.org/10.1080/15298860390209035

Neff, K. D. (2016). The self-compassion scale is a valid and theoretically coherent measure of self-compassion. *Mindfulness*, *7*(1), 264–274. https://doi.org/10.1007/s12671-015-0479-3

Neff, K., & Tirch, D. (2013). Self- Compassion and ACT. In T. B. Kashdan & J. V. Ciarrochi (Eds.), *Mindfulness & Acceptance for Positive Psychology*. Oakland: New Harbinger.

Neff, K. D., Tóth-Király, I., & Colosimo, K. (2018). Self-compassion is best measured as a global construct and is overlapping with but distinct from neuroticism: A response to Pfattheicher, Geiger, Hartung, Weiss, and Schindler (2017). *European Journal of Personality*, *32*(4), 371–392. https://doi.org/10.1002/per.2148

Neff, K. D., Tóth-Király, I., Yarnell, L. M., Arimitsu, K., Castilho, P., Ghorbani, N., … Mantzios, M. (2019). Examining the factor structure of the Self-Compassion Scale in 20 diverse samples: Support for use of a total score and six subscale scores. *Psychological Assessment*, *31*(1), 27–45. https://doi.org/10.1037/pas0000629

Neff, K. D., & Vonk, R. (2009). Self-compassion versus global self-esteem: Two different ways of relating to oneself. *Journal of Personality*, *77*(1), 23–50. https://doi.org/10.1111/j.1467-6494.2008.00537.x

Neff, K. D., Whittaker, T. A., & Karl, A. (2017). Examining the factor structure of the self-compassion scale in four distinct populations: Is the use of a total scale score justified? *Journal of Personality Assessment*. https://doi.org/10.1080/00223891.2016.1269334

Parry, S., & Malpus, Z. (2017). Reconnecting the mind and body: A pilot study of developing compassion for persistent pain. *Patient Experience Journal*, *4*. https://doi.org/10.35680/2372-0247.1175

Penlington, C. (2018). Exploring a compassion-focused intervention for persistent pain in a group setting. *British Journal of Pain*, *13*(1), 59–66. https://doi.org/10.1177/2049463718772148

Pfattheicher, S., Geiger, M., Hartung, J., Weiss, S., & Schindler, S. (2017). Old wine in new bottles? The case of self-compassion and neuroticism. *European Journal of Personality*, *31*, 160–169. https://doi.org/10.1002/per.2097

Pollard, C. A. (1984). Preliminary validity study of the pain disability index. *Perceptual and Motor Skills*, *59*, 974. https://doi.org/10.2466/pms.1984.59.3.974

Purdie, F., & Morley, S. (2016). Compassion and chronic pain. *Pain*, *157*(12), 2625–2627. https://doi.org/10.1097/j.pain.0000000000000638

Rosenberg, M. (1979). *Conceiving the Self*. New York: Basic Books.

Schwenkmezger, P., Hodapp, V., & Spielberger, C. D. (1992). *Das State-Trait-Ärgerausdrucks-Inventar STAXI*. Bern: Hans Huber.

Soer, R., Köke, A. J. A., Vroomen, P. C. A. J., Stegeman, P., Smeets, R. J. E. M., Coppes, M. H., & Reneman, M. F. (2013). Extensive validation of the pain disability index in 3 groups of patients with musculoskeletal pain. *Spine*, *38*(9), E562–E568. https://doi.org/10.1097/BRS.0b013e31828af21f

Sommer, I., Lukic, N., Rössler, W., & Ettlin, D. A. (2019). Measuring anger in patients experiencing chronic pain - A systematic review. *Journal of Psychosomatic Research*, *125*, 109778. https://doi.org/10.1016/j.jpsychores.2019.109778

Spielberger, C. D. (1988). Manual for the State-Trait Anger Expression Inventory (STAXI) Psychological Assessment Resources: Odessa.

Spitzer, R. L., Kroenke, K., Williams, J. B. W.; Group, P. H. Q. P. C. S (1999). Validation and utility of a self-report version of PRIME-MD. *JAMA*, *282*(18), 1737–1744.

Sullivan, M. J. L., Bishop, S. R., & Pivik, J. (1995). The pain catastrophizing scale: Development and validation. *Psychological Assessment*, *7*(4), 524–532. https://doi.org/10.1037/1040-3590.7.4.524

Van Damme, S., Crombez, G., Bijttebier, P., Goubert, L., & Houdenhove, B. V. (2002). A confirmatory factor analysis of the Pain Catastrophizing Scale: Invariant factor structure across clinical and non-clinical populations. *Pain*, *96*, 319–324.

Veehof, M. M., Trompetter, H. R., Bohlmeijer, E. T., & Schreurs, K. M. G. (2016). Acceptance- and mindfulness-based interventions for the treatment of chronic pain : A meta-analytic review. *Cognitive Behaviour Therapy*, *45*, 5–31. https://doi.org/10.1080/16506073.2015.1098724

Vlaeyen, J. W. S., Crombez, G., & Linton, S. J. (2016). The fear-avoidance model of pain. *Pain*, *157*, 1588–1589. https://doi.org/10.1097/j.pain.0000000000000574

Vlaeyen, J. W. S., & Linton, S. J. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain - a state of the art. *Pain*, *85*, 317–332. https://doi.org/10.1145/2994143

von Collani, G., & Herzberg, P. Y. (2003). Eine revidierte Fassung der deutschsprachigen Skala zum Selbstwertgefühl von Rosenberg. *Zeitschrift Für Differentielle Und Diagnostische Psychologie*, *24*(1), 3–7. https://doi.org/10.1024//0170-1789.24.1.3

Vowles, K. E., Witkiewitz, K., Sowden, G., & Ashworth, J. (2014). Acceptance and commitment therapy for chronic pain: Evidence of mediation and clinically significant change following an abbreviated interdisciplinary program of rehabilitation. *The Journal of Pain*, *15*(1), 101–113. https://doi.org/10.1016/j.jpain.2013.10.002

Wicksell, R. K., Kemani, M., Jensen, K., Kosek, E., Kadetoff, D., Sorjonen, K., … Olsson, G. L. (2013). Acceptance and commitment therapy for fibromyalgia: A randomized controlled trial. *European Journal of Pain*, *17*, 599–611. https://doi.org/10.1002/j.1532-2149.2012.00224.x

Wicksell, R. K., Lekander, M., Sorjonen, K., & Olsson, G. L. (2010). The Psychological Inflexibility in Pain Scale (PIPS) – Statistical properties and model fit of an instrument to assess change processes in pain related disability. *European Journal of Pain*, *14*, 771.e1–771.e14. https://doi.org/10.1016/j.ejpain.2009.11.015

Woods, M. P., & Asmundson, G. J. G. (2008). Evaluating the efficacy of graded in vivo exposure for the treatment of fear in patients with chronic back pain: A randomized controlled clinical trial. *Pain*, *136*, 271–280. https://doi.org/10.1016/j.pain.2007.06.037

Wren, A. A., Somers, T. J., Wright, M. A., Goetz, M. C., Leary, M. R., Fras, A. M., … Keefe, F. J. (2012). Self-compassion in patients with persistent musculoskeletal pain: Relationship of self-compassion to adjustment to persistent pain. *Journal of Pain and Symptom Management*, *43*(4), 759–770. https://doi.org/10.1016/j.jpainsymman.2011.04.014

Yu, L., Norton, S., Almarzooqi, S., & McCracken, L. M. (2017). Preliminary investigation of self-as-context in people with fibromyalgia. *British Journal of Pain*, *11*(3), 134–143. https://doi.org/10.1177/2049463717708962

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Anhang D: Studie 4

Self-compassion and acute pain – an experimental investigation.

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European Journal of Pain (submitted)

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Anhang

Self-Compassion and Acute Pain – a Randomized Controlled Trial of Emotion Regulation Strategies

Running Head: Self-Compassion and Pain – an RCT

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Significance: Applying an experimental design, this study evaluated self-compassion in relation to acceptance and distraction to manage acute pain Self-compassion was as effective as these well-established strategies. The effects are stable over a one-week time period. The adaptive use of emotion regulation strategies should be explored.

Abstract:

Background: Physiological pain is associated with negative affect. Therefore, emotion regulation is highly relevant in pain. Acceptance and distraction strategies show the best empirical evidence. Self-compassion is another potentially helpful strategy. Regarding chronic pain, pilot-studies on compassion-interventions lead to higher pain-acceptance, as well as less depression and anger. The current study aimed to evaluate self-compassion as an emotion regulation strategy in acute pain.

Methods: Our experiment applied a 3 (randomized condition: self-compassion, acceptance, distraction) x 3 (time: pretest, posttest, FU) mixed between-within design. In the first laboratory session participants (N = 120 undergraduates, 70.8% female) received a brief auditory intervention corresponding to the condition, which they practiced daily during the one-week practice-phase. Acute pain was triggered via TSA-II-thermode with three measurement time points in total (1. pre, post; 2. one-week follow-up). Outcomes were pain tolerance, pain intensity and pain unpleasantness. The study was preregistered on ClinicalTrials.org (Identifier: NCT03647683).

Results: Multivariate analysis of variance (MANOVA) showed a significant within-subjects effect (time) ($F(2) = 6.450$; $p < .001$), but no between-subjects effect (condition) or interaction effect (time x condition). All three conditions led to higher pain tolerance, a similar course of pain intensity and reduced pain unpleasantness.

Conclusions: Self-compassion was as helpful as acceptance and distraction in coping with acute pain. Adopting tailored treatment, future research should identify subgroups or context specificity in attempting to increase flexibility in emotion regulation.

1. Introduction

Experiencing pain is linked to negative emotions (1,2). A recent review depicted the importance of emotion regulation (ER) in coping with chronic pain (3).

Two of the ER strategies yielding the most convincing evidence in the context of pain are acceptance and distraction. Acceptance refers to a welcoming attitude towards one's own experiences such as cognitions, emotions and physiological experiences (4). In the context of pain, this may lead to better pain tolerance and thus less avoidance behavior. Acceptance has been proven an effective strategy to regulate pain in experimental settings (5–7). Another established and well proven strategy is distraction (e.g. 6,8,9). As attention is located away from the perceived pain, subjective pain intensity decreases. Studies comparing distraction and acceptance strategies have delivered contradictory results. A meta-analysis found acceptance to be superior to distraction in terms of pain tolerance, but found no differences for pain intensity (10). Other studies, however revealed positive results of distraction when related to pain intensity (6,8). A recent meta-analysis supported the effectiveness of Acceptance-and-Commitment-Therapy (ACT) in association with chronic pain (11), whereas there has been little research on distraction interventions in chronic pain management (12). A meta-analysis on distraction in experimental research in chronic pain implied non-superiority compared to control interventions (13).

Self-compassion is another ER strategy, one proven helpful regarding several affective states (14–17); it might also be relevant for physiological pain. Self-compassion is defined as consisting of the three components *mindfulness*, *common humanity* and *self-kindness* (18). *Mindfulness* describes the awareness of the present moment and personal suffering without avoidance or over-identification. The comprehension of personal failures, challenges and suffering as a common human experience is depicted by *common humanity*. *Self-kindness*

relates to reacting to oneself in a kind and supporting way, particularly in situations of suffering (19).

Research on self-compassion in pain keeps increasing. Cross-sectional studies have revealed associations with functioning, pain-acceptance, pain-related anxiety, pain catastrophizing, as well as depression (20–22). However, a longitudinal study showed that self-compassion was less relevant to pain-related outcomes than psychological inflexibility in predictive-value terms (*Author, A).* In another longitudinal study, self-compassion predicted depressive symptoms in people suffering from chronic pain, whereas mindfulness did not (23). In contrast, self-compassion in healthy students was not related to pain-catastrophizing or pain intensity in experimentally-induced pain via a cold pressor task (24). Research on compassion-based interventions remains limited. In an experimental study, acute pain intensity was lower following a compassionate self-talk protocol compared to a within-subject control condition (25). Though, pilot interventions for chronic pain led to lowered pain, distress, depression and anger-levels as well as increased self-compassion, pain acceptance and activity engagement (26–28). Nevertheless, self-compassion might still prove to be another concept belonging to acceptance- and mindfulness-based strategies. The unique benefit of self-compassion interventions still needs to be evaluated.

Although self-compassion is another potentially relevant ER in the context of pain, there is little evidence on the effectiveness of compassion-interventions. To the best of our knowledge, no experimental study to date has compared the ER strategies self-compassion, acceptance and distraction in relation to thermal heat pain. The aim of the current study was to explore the following outcomes: the primary outcome was individual heat pain tolerance, the secondary outcomes were pain intensity, pain unpleasantness and self-compassion.

2. Methods

2.1.Participants

This study was completed by N = 120 participants (70.8% female). Participants' average age was 24.21 years (SD 4.665). All participants were students at Philipps-University Marburg, 29.2% were undergraduate psychology students, others were studying medicine, pharmacy or teaching. All possessed adequate German language skills. Recruitment lasted from April to November 2018, when the target number of participants was reached. Our exclusion criteria were: (1) acute or chronic pain conditions, (2) current use of analgesic medication or drugs (24h prior), (3) morbus Reynaud, (4) any current cardiovascular disorder or diabetes, (5) current alcohol consumption and (6) studying psychology longer than two years. Participants received either course credit or financial compensation (40€). All procedures were approved by the local ethics committee of the Department of Psychology, Philipps-University Marburg. The study was preregistered on ClinicalTrials.org (Identifier: NCT03647683), a full protocol is available.

2.2.Equipment (Stimulus Material)

2.2.1. Thermal pain stimulator

Thermal heat pain was induced via a 3-x3-cm peltier-based thermode (TSA II: Thermal Sensory Analyser; Medoc Ltd, Ramat Yishai, Israel). Stimuli were applied to the inner side of the dominant forearm (pretest, posttest + FU) and the non-dominant forearm (practice-phase I), approximately 10 cm above the wrist. The thermal stimulus started at 32°C and reached a maximum of 51°C. Pain tolerance was defined as the highest temperature tolerated by the participant (indicated vocally). The temperature returned to baseline (32°C) whenever the pain-tolerance limit or maximum 51°C temperature was reached. Thermal pain is widely used in experimental pain research and has been proven to be safe, valid and reliable (e.g. 6,29,30).

2.3.Measures

Demographics. Participants provided sociodemographic information concerning age, sex, course of studies, level of German language skills and partner status. We also assessed any prior experience with meditation.

Pain. The Numeric Rating Scale (NRS) was used to assess momentary pain intensity (sensory-discriminative dimension) and pain unpleasantness (affective-cognitive dimension) after each painful thermal stimulus during the testing phases. The scales ranged from 0 ("no pain/bearable") – 10 ("worst possible pain/unbearable")., The NRS is one of the most commonly used instruments to measure pain (31).

Depressive Symptoms. Depressive Symptoms were assessed via the depression-subscale Patient Health Questionnaire (PHQ-9) (32). The contributing nine items are rated on a 4-point Likert-scale (0 = "not at all"; 3 = "nearly every day"). Higher scores indicate more severe depressive symptoms. The PHQ-9 is widely used in pain research and shows adequate psychometric properties in chronic pain (e.g. 33,34). In the current study, PHQ-9 has shown acceptable internal consistency (Cronbach's $\alpha = .766$).

Pain Catastrophizing. The German Version of the Pain Catastrophizing Scale (PCS; Cronbach`s $\alpha = .92$) was used to assess the individual level of pain catastrophizing (35,36). The 13 items are rated on a 5-point Likert-scale (0 = "not at all", 4 = "all the time"), contributing to three subscales: rumination, magnification and helplessness. The higher the score is, the higher the level of pain catastrophizing. In this sample, the PCS demonstrated good internal consistency (Cronbach's $\alpha = .878$).

Self-compassion. Self-compassion was assessed via the German version of the Self-Compassion Scale (SCS) (37,38). Items are measured on a 5-point Likert-scale (1 = "almost never" to 5 = "almost always"). The original factor structure included six subscales (self-kindness vs. self-judgement; common humanity vs. isolation; mindfulness vs. over-identification) with a higher-order general self-compassion-factor. However, this factor-structure has been strongly criticized in resent research (39–41). We therefore used an adjusted two-factor solution in the current study, which yielded good internal consistency in a prior study on individuals with chronic pain and healthy individuals (Cronbach's alpha: *compassionate*

self-responding α = .887; *reduced uncompassionate compassionate self-responding* α = .918) (*Author, B*). The two factors we used are *compassionate self-responding* (CS: 9 items e.g. "I'm kind to myself when I'm experiencing suffering.") and *reduced uncompassionate compassionate self-responding* (RUS: 12 items e.g. "I'm intolerant and impatient towards those aspects of my personality I don't like."). Internal consistencies in the present study were good (Online pretest, Cronbach's α: *compassionate self-responding* α = .842; *reduced uncompassionate compassionate self-responding* α = .889).

Habitual Acceptance. To measure habitual acceptance (HA), we employed a questionnaire created by Kohl and colleagues (6), one they had used in their similar experiment. Nine items from several acceptance and emotion regulation questionnaires were used (Chronic Pain Acceptance Questionnaire CPAQ, Acceptance and Action Questionnaire AAQ II, Difficulties in Emotion Regulation Scale DERS). They were adapted for use in healthy subjects. Items such as "I accept when I'm in pain" or "I do a lot of activities when I'm in pain", were rated on a 5-point Likert scale. Internal consistency in the current study was acceptable (α = .704).

Manipulation Check. Participants filled out the Credibility/Expectancy Questionnaire (CEQ) (42) immediately after receiving the experimental instruction. It functioned as a manipulation check. The English version reveals adequate internal consistency for both credibility (α = .81) and expectancy (α = .79) (42). Examples are "How confident would you be in recommending this treatment to a friend?" or "How logical does the instruction seem?". In the current study, internal consistency for credibility-scale (α = .868) and the expectancy-scale were good (α = .845). Further information regarding the manipulation check was assessed by asking the participants to summarize the strategy they were recommended to pursue just after listening to the audio instruction. We also assessed adherence rates. Every participant rated their adherence to the learned strategy after post and FU pain induction.

2.4.*Study design & Procedure*

This study applied a mixed between-within design with two factors. The instruction condition served as the between-group factor (self-compassion, acceptance, distraction), the time point was the within-group factor (pretest, posttest, follow-up). Participants completed an online-pretest and two experimental sessions with a one-week practice-phase in between. The CONSORT flow diagram as well as design and process are shown in *figure 1*.

2.4.1. Online-pretest

The procedure included an online-pretest one week prior to the first experimental session. Participants were screened for exclusion criteria and afterwards provided informed consent. They then answered a set of online-questionnaires (demographics, PHQ-9, PCS, HA, SCS).

2.4.2. Laboratory Session I

Participants were welcomed by the experimenter and again informed about the following processes (oral and written). Experimenters were three well trained master students in clinical psychology. All procedures were standardized and manualized, the allocation sequence of randomization was determined prior to the experiment. The first experimental session began by applying the TSA-II-thermode to the participant's dominant forearm. Then their individual baseline pain-tolerance was measured (pre-test) according to the method-of-limits protocol. Starting at 32°C, the thermode was heated at a rate of 1.0°C per second up to a maximum temperature of 51°C (43). Participants were instructed to say "stop", when they could no longer tolerate the heat stimulus. The examiner would then immediately end the thermal stimulus and the thermode returned automatically to the baseline (32°C). Pain intensity and pain unpleasantness were then measured via the NRS.

After the baseline thermode-trial, participants were randomly assigned (stratified by experimenter) to one of the following strategies: (1) self-compassion (n = 40), (2) acceptance

(n = 39) or (3) distraction (n = 42). Their instructions were auditory (see 5.5. instructional sets). Participants were asked about their pain-coping strategy and given the opportunity to ask questions about its content. Our participants also filled out the CEQ, giving their opinions about the credibility and expectancy regarding the effectiveness of the learned strategy concerning following pain-stimuli. This we considered a manipulation check. The thermode was now applied to the participant's non-dominant forearm. The following three pain-stimuli participants were told to practice their pain-coping strategy. The pain-stimulus increased from the baseline-temperature (32°C) to one degree below baseline pain-tolerance-temperature, was held constant for max. 5 sec. and then returned to baseline-temperature. The baseline-temperature was maintained for 10 sec. between trials. After the practice trials, the thermode was again applied to the same spot on the dominant forearm as before. Heat-pain-tolerance levels were measured a second time (posttest) using the same instructions as in pretest. Again, self-reported pain-intensity and pain tolerance were rated after the stimulus. Then the thermode was removed. At the end of the first experimental session, participants filled out several self-report questionnaires (SCS, PCS, PHQ-9, HA).

2.4.3. Practice-Phase II

During the one-week practice phase, participants received six e-mails containing a link to an online task. Before each task in all conditions, participants were asked to recall a negative or difficult event of the day via imagination. Participants were then presented with one of three audio-instructions corresponding to condition and instructed to apply the strategy that would cope better with the difficult imagined situation. Each exercise closed with questions about utilization and credibility. For the self-compassion condition, exercises from https://self-compassion.org/ had been translated into German (Self-Compassion Break, Affectionate Breathing, Loving-Kindness Meditation). Exercises for the acceptance condition were "No and yes to your inner self (Nein und Ja zu deinem Inneren)", "Give your emotions room (Gefühlen

Raum geben)" and "Destroy the monster (Das Monster auseinandernehmen)" (44). Exercises for the distraction condition were "The Memorial (Das Denkmal)" (45) and "Island Adventure (Inselerlebnis)" as well as "Flying Carpet (Fliegender Teppich)" (46).

2.4.4. Laboratory Session II

The second experimental session took place approximately one week after the first and at the same time of day. Again, the thermode was applied to the participant's dominant forearm. Heat-pain tolerance was measured again (follow-up). Pain-intensity and pain-unpleasantness were self-rated afterwards. Participants again completed the questionnaires on self-compassion (SCS), pain catastrophizing (PCS), habitual acceptance, and depression (PHQ-9).

2.5.Instructional Sets (Practice-Phase I)

Audio instructions served to display the three different strategies. Instructions of acceptance and distraction strategies were in line with those used in several prior studies (6,47). We had drafted the self-compassion instruction to have approximately the same length and format. In every instruction, participants first noted three specific thoughts which caused them to terminate the pretest heat-stimulus. Next, the respective strategy was explained. Participants were then requested to write down an important life goal. Next, a metaphor was used to help them imagine themselves walking through a swamp trying to reach their life goal at the end of the swamp by using that strategy. Participants were then asked to summarize how they would apply the strategy. After that, they could practice the strategy with the heat-pain stimuli applied to the non-dominant forearm (and lower than their pain tolerance at the pretest). All in all, the instruction and practice phase lasted about 15 minutes. Instructional sets are explained in the following, for further details, see the Appendix.

Self-compassion. We explained that painful thoughts, perceptions and feelings are natural phenomena and part of a shared human experience. Moreover, we explained that it is important to be mindfully aware of these experiences, without over-identifying them or trying to avoid

them. This mindful awareness helps create pleasant and compassionate support for one's own pain. It is essential to assess one's own needs when coping with pain, instead of simply avoiding the pain. Within this exercise, participants were asked to be mindfully aware of the painful heat-stimulus, while bringing to mind the normality of suffering and kindly support themselves during this experience.

Acceptance. We explained that thoughts often result in certain behavior, but at the same time we explained that it is possible to detach from these thoughts. This can happen through a conscious and value-free attitude or through the acceptance of the thoughts. If thoughts can be accepted, they no longer control behavior or stand in the way of personal goals. Within the exercise, participants were asked to tolerate the painful stimulus by accepting their thoughts and sensations as well as being willing to experience the pain without trying to change them.

Distraction. We explained that distraction can lessen our perception of thoughts and feelings. We shift the focus of our attention and thereby de-activate unpleasant perception, thoughts and feelings. We can distract ourselves internally or externally. Internal distraction can be imagined or occur through remembering past experiences, while external distraction can mean increased attention to environmental stimuli. Within the exercise, participants were asked to tolerate the painful stimulus and at the same time distract themselves by imagining a pleasant scene.

2.6.Overview of statistical analyses

The Statistical Package for Social Sciences (SPSS, Windows v. 25: SPSS Inc, Chicago, IL) was used for conducting all analyses. Data was screened for univariate and multivariate outliers. Two multivariate outliers were detected by analyzing Mahalanobis distance. Cases were examined for measuring errors, which we ruled out. Hence, due to content reasons, cases were not excluded (48).

Differences in demographics (age, sex), as well as baseline differences in sample characteristics concerning depression (PHQ-9), pain catastrophizing (PCS), self-compassion (SCS) and

habitual acceptance (HA) were computed. Differences in sex were calculated via Kruskal-Wallis-Test, all other variables via univariate analysis of variance (ANOVA).

Credibility and expectancy (CEQ), serving as manipulation checks were analyzed via separate ANOVAs. When significant, post-hoc pairwise comparisons were conducted.

Pain-related Outcomes (pain tolerance, pain intensity, pain unpleasantness) were analyzed via a series of 3 (condition) x 3 (time) multivariate analyses of variance (MANOVAs). In case of significant multivariate effects, separate univariate ANOVAs were conducted for the different pain-related outcomes. The assumption of sphericity was examined via Mauchly's test. In terms of violation, we corrected degrees of freedom (> .75 Huynh-Feldt correction; < .75 Greenhouse-Geisser correction)(49). Significant ANOVAs were followed by post-hoc pairwise comparisons. Bonferroni correction was used in case of multiple comparisons. To minimize the risk of type 1 error, a conservative alpha level of $\alpha = .01$ was used.

Self-compassion levels (CS and RUS) were inspected using repeated measures ANOVA. When significant, post-hoc pairwise comparisons were computed.

3. Results

3.1. Baseline Characteristics

A total of N = 120 participants (70.8% female) aged a mean 24.21 years (SD = 4.67) completed the study. One participant dropped out after the first experimental session without providing a reason. There were no significant differences at baseline in age, sex, PHQ-9, PCS, HA and SCS (CS and RUS) (as *table 1* shows). About half of each group had no prior experience with meditation (self-compassion: 57.5%; acceptance: 53.8%; distraction: 56.1%). We thus assumed our randomization-process was successful.

3.2. Manipulation Check

Concerning the manipulation check, univariate analyses of variance (ANOVA) were conducted for CEQ-expectancy and CEQ-credibility prior to T1_2 (after instructional sets). Both ANOVAs revealed significant differences between groups concerning CEQ-expectancy ($F(2) = 4.555$; $p = .013$) and CEQ-credibility ($F(2) = 5.457$; $p = .005$). Pairwise post-hoc analysis showed significantly higher expectancy for the distraction instruction than for acceptance ($p = .026$) or self-compassion ($p = .036$). Acceptance and self-compassion conditions did not differ significantly. For credibility, pairwise post-hoc analysis also revealed higher scores for distraction than acceptance ($p = .043$) or self-compassion ($p = .007$). Acceptance and self-compassion conditions again did not differ significantly. Calculations were adjusted using Bonferroni correction. Regarding adherence rates, a univariate analysis of variance (ANOVA) revealed significant differences between groups after T1_2 ($F (2) = 6.784$; $p = .002$). Pairwise post-hoc analyses indicated lower adherence rates for using acceptance strategy than distraction ($p = .002$). There were no significant differences between self-compassion and distraction adherence rates or self-compassion and acceptance, nor were any significant differences in adherence rates detected at T2.

3.3. Power-Analysis

Power-Analyses were computed for a total sample size of N = 120, 3 groups, 3 measurements and a correlation among repeated measures of $r = .5$. An actual power of 88.41% was revealed for a MANOVA with repeated measures and within-between interaction effects. Power-analysis for an ANOVA with repeated measures and within-between interaction effects showed an actual power of 99.99%.

3.4. Pain-related Outcomes

Mixed-model MANOVA revealed a significant within-subjects effect (time) ($F (2) = 6.450$; $p < .001$), but no between-subjects effect (condition) or interaction effect (condition x time).

Table 2 depicts means and SD for the relevant variables across these conditions: pain tolerance, pain intensity and pain unpleasantness. We identified no significant differences between conditions at baseline (T1_1) in any of the three outcome variables.

Concerning pain tolerance: the follow-up univariate analysis of variance also demonstrated a significant within-subjects effect (time), F (1.801) = 137.713, p < .001. There was no significant between-subjects effect (condition). Pairwise comparisons revealed significantly higher tolerance levels at T1_2 (M = 49.347, SD = 1.5234) than at T1_1 (M = 48.272, SD = 1.7880) p < .001, as well as significantly higher tolerance levels at T2 (M = 49.626, SD = 1.3596), p = .001 compared to T1_2 and compared to T1_1 (p < .001). Results are shown in *figure 2*.

Considering the frequencies of pain tolerance levels, (within-subjects) revealed a 5.8% percentage at T1_1 reaching a maximum 50.9°C temperature at baseline. At T1_2 29.2% of total participants tolerated the maximum temperature and at T2, 32.5% did. *Table 3* depicts differences according to conditions (between-subjects).

Univariate analysis of variance regarding pain intensity demonstrated a significant within-subjects effect (time), F (1.845) = 13.693, p < .001. There was no significant between-subjects effect (condition). Contrast analysis revealed higher pain intensity at T1_2 (M = 6.81, SD = 1.924), than T1_1 (M = 6.18, SD = 1.685), p < .001 and higher pain intensity at T1_2 than T2 (M = 6.34, SD = 2.214), p < .001 (*figure 2*). We found no significant difference between pain intensity at T1_1 and T2.

The follow-up univariate analysis of pain unpleasantness also confirmed the significant within-subjects effect (time), F (1.726) = 6,019, p = .005 (*figure 2*). There was no significant between-subjects effect (condition). Pairwise comparisons showed significantly lower pain unpleasantness at T2 (M = 6.26, SD = 2.367) than at T1_2 (M = 6.78, SD = 1.985), p = 002. All other comparisons were non-significant.

In sum, all three different instructions prolonged the tolerance of painful heat-stimuli, demonstrated the same pattern of pain intensity, and led to a drop in pain unpleasantness across the three measurements.

3.5. Self-compassion

Repeated measures ANOVA were computed separately for CS and RUS. Regarding CS: repeated measures ANOVA showed a significant within-subjects effect (time), $F(1.814) = 4.246$, $p = .019$. No significant between-subjects effect (condition) was detected. Considering RUS: repeated measures ANOVA also revealed a significant within-subjects effect (time), $F(1.835) = 44.705$, $p < .001$, and no significant between-subjects effect (condition). Means and standard deviations for CS and RUS in all three conditions are shown in *table 4*.

4. Discussion

4.1. Main Outcomes

The current study aimed to assess a brief self-compassion intervention in the context of acute pain. Self-compassion was compared to two well-established emotion regulation strategies, namely acceptance and distraction. Thermal heat pain served as the painful stimulus at three different measurements taken at the pretest, posttest and 1-week-follow up.

Our results indicated similar patterns of response comparing the different strategies over time. In self-compassion, acceptance and distraction, we detected a similar, significant increase in pain tolerance. Moreover, there was a significant increase in pain intensity at the post-measurement, and another decrease at follow-up in all three strategies. We observed a significant decrease in pain unpleasantness over time in all three strategies.

The latest research findings are contradictory concerning different emotion-regulation strategies and their impact on pain. Several studies, as well as the meta-analysis by Kohl and colleagues (10) have demonstrated superior effects of acceptance compared to other strategies

when it comes to pain tolerance (e.g. 6,50). Some studies found distraction to be superior regarding pain intensity (6,8). However, others failed to reveal the superiority of any one strategy on pain intensity (9,10). Moreover, an investigation of individuals with fibromyalgia showed no differences between different emotion regulation strategies (47). In line with this research, evidence from the present study suggests that self-compassion, acceptance and distraction are equally effective emotion-regulation strategies in acute pain.

The importance of emotion regulation in pain was highlighted in a recent review (3). The regulation of intense emotionality or negative mood may lead to an indirect reduction in pain-related aspects. Conversely, the evidence suggests that the inadequate use of emotion regulation is a risk factor in people suffering from chronic pain. An adaptive application of emotion regulation may constitute being flexible enough to choose between several helpful strategies depending on the given context.

Results from experimental research on self-compassion to regulate negative mood might offer hints for the adaptive use of self-compassion in the pain context. One study compared people suffering from depression to individuals who had been depressed and to healthy controls. Using self-compassion to regulate induced depressed mood was more effective than the use of an acceptance strategy across groups. In those not currently depressed, self-compassion was also superior to reappraisal (51). In contrast, another experiment failed to reveal any differences between self-compassion, reappraisal and acceptance strategies regarding the regulation of negative mood (52). Another experiment suggested that self-compassion is a potentially beneficial preparatory strategy to enhance the impact of others such as reappraisal (53). Hence, researchers have suggested that self-compassion may be an adequate strategy for regulating intense negative emotions, facilitating the use of subsequent strategies such as reappraisal and acceptance (52,53).

The research on pilot-interventions in chronic pain demonstrated that increased self-compassion led to reductions in anger-levels as well as pain-related anxiety, depression or overall emotional reactions (26–28). When interpreting the current results, we should consider that experimental pain may not possess much emotional value, especially when applied in a healthy student sample (6). Moreover, as there was no variation in context in the current study and differences in emotional experiences were not assessed, we can make no assumptions regarding the adaptive use of any of the strategies.

We noted an increase in CS and a decrease in RUS after the first instruction in all three emotion regulation strategies. Moreover, the former increased (and the latter decreased) after one week of regularly practicing self-compassion, acceptance or distraction. One could argue that this indicates that our instructions did not foster differential strategies. However, it might also show that several interventions, not just those directly targeting self-compassion, might increase self-compassion. There is evidence that mindfulness-based cognitive therapy, not specifically targeting self-compassion, also elevates self-compassion levels in people suffering from recurrent depression (54). The same applies to an ACT-intervention in undergraduate students, which also led to increased self-compassion (55). The non-significant differences in self-compassion between conditions might also be due to our non-clinical sample.

In conclusion, our results may indicate that we need to identify specific subgroups of people suffering from chronic pain in whom the different strategies might be especially helpful. Self-compassion might help individuals who additionally experience intense emotions and struggle coping with them. Such emotions may be anger, shame, anxiety or depression. Self-compassion may be fostered directly by specifically targeting it or raised indirectly while applying other therapeutic strategies.

4.2.Advantages of this Study

The current study is the first to have evaluated the emotion regulation strategy of self-compassion in an experimental-pain context. Our fundamental design relied on several prior studies. It was randomized and controlled, and the strategies were stratified by the experimenter. Moreover, a follow-up measurement was taken, considering acceptance and self-compassion to be more complex strategies that require specific training to optimize effectiveness (6). Apart from that, practicing a newly-learned strategy enables greater generalizability to an actual therapeutic context than does a one-time intervention. Thermal pain was induced via a well-standardized procedure using a thermode. Our sample size delivered adequate statistical power. Furthermore, we assessed expectancy and credibility, as well as adherence rates of the emotion regulation strategies.

4.3.Limitations

Our study's results should be interpreted considering the following limitations. First, as our healthy cohort only comprised undergraduate university students, generalizability is limited. Implications for cohorts of other ages or people suffering from chronic pain are problematic. Acute pain stimuli might possess a different emotional value for healthy students then would a chronic pain disorder (6). Nevertheless, it provides a basis from which to conduct an investigation involving people suffering from chronic pain.

Second, our choice of emotion regulation strategies in this experimental design is limited to distraction, acceptance and self-compassion while lacking a control condition. However, according to the rationale of randomized controlled trials, novel treatments can also be assessed by comparing them to those already proven effective, which is why we did not include a control condition. Nevertheless, other strategies would have been conceivable, such as relaxation, mindfulness, reappraisal or exposition. We decided on using distraction and acceptance mainly

because they are among the most effective in the context of pain. We chose acceptance also due to its conceptual overlap with self-compassion. Methodological restrictions, specifically a manageable and adequate sample size led us to include only three conditions.

The third limitation is the ceiling effects on pain tolerance. For obvious ethical reasons, we could only apply heat up to 50.9°C, which meant that the maximum heat pain tolerance was occasionally underestimated, which in turn might lead to the underestimation of therapeutic effects and limited interpretability. For future research, an option to reduce ceiling effects in a non-harmful manner would be to apply capsaicin cream before applying the heat stimulus. Another option would be to apply other pain-stimulus modes, such as different pain durations or pain tasks (e.g. electrical) (29).

Our study's fourth limitation results from the homework-tasks during the practice phase. Although most of our participants claimed to have completed the tasks, we cannot say for certain whether that is true. As our exercises were only audio sequences, the adherence rate is only measureable through personal statements. Moreover, one could argue that the exercises we chose for the distraction condition have had a more relaxing content and was therefore perhaps unsuitable for fostering distraction. Still, having homework tasks included in the design offers a more realistic therapeutic context and therefore stronger resemblance to genuine treatment.

4.4.Clinical Implications

The evidence from experimental pain research is not readily generalizable to the therapy of chronic pain. Nevertheless, the current study provides some support for the use of self-compassion as an emotion regulation strategy in people suffering from chronic pain. It might be an alternative to distraction without restrictions in long-term implementation. We suspect

that this emotion regulation strategy might prove especially helpful for a specific subgroup of patients or specific contexts such as high emotions.

Flexibility in regulating emotions should be fostered. Having a range of several effective strategies offers greater flexibility in pain treatments and for individuals suffering from pain. Additionally, the fact that several strategies proved to be equally effective also enables therapists to choose their preferred course of treatment, thereby enhancing potential placebo responses.

4.5.Implications for Future Research

Future research should continue to address adaptive emotion regulation in the context of chronic pain. In line with the call for tailored-treatment approaches, we need to determine which emotion regulation strategies are best applied in certain contexts, and for whom. Further experimental research should identify specific aspects. Moreover, more research on predictors of treatment outcomes is needed, e.g. pain-related aspects, personality traits and comorbid psychological disorders. These should be addressed by applying single-case designs or other process-oriented measures. On this basis, personalized treatment approaches should be developed. In terms of self-compassion, specific interventions targeting strongly negative emotions (such as anger in the context of pain), should be developed and evaluated. We should also investigate whether such self-compassion interventions will optimize other validated treatment approaches in pain such as ACT or exposure.

4.6.Conclusion

Self-compassion is just as effective as acceptance and distraction are for coping with acute thermal pain. All three strategies led to higher pain-tolerance-levels, an increase in pain intensity and a reduction in pain unpleasantness. These effects remain stable over a one-week time period. Now that we have several empirically tested emotion regulation strategies in the

context of pain, their adaptive use should be explored. Hence, it is necessary to identify the circumstances and contexts in which specific strategies are most effective. The latest research indicates that self-compassion might be especially helpful when strong emotions are present.

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Author Contributions:

All authors read and approve the manuscript. Anja Carina Emmerich: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing- original draft preparation. Tanja Könen: Writing- Reviewing and Editing. Julia Anna Glombiewski: Conceptualization, Methodology, Supervision, Writing- Reviewing and Editing.

References

1. Linton SJ. A Transdiagnostic Approach to Pain and Emotion. Journal of Applied Biobehavioral Research. 2013;18:82–103.

2. Lumley MA, Cohen JL, Borszcz GS, Cano A, Radcliffe AM, Porter LS, Schubiner H, Keefe FJ. Pain and Emotion: A Biopsychosocial Review of Recent Research. Journal of Clinical Psychology. 2011;67:942–68.

3. Koechlin H, Coakley R, Schechter N, Werner C, Kossowsky J. The role of emotion regulation in chronic pain: A systematic literature review. Journal of Psychosomatic Research [Internet]. 2018;107:38–45. Available from: https://doi.org/10.1016/j.jpsychores.2018.02.002

4. Hayes SC. Acceptance and Commitment Therapy, Relational Frame Theory, and the Third Wave of Behavioral and Cognitive Therapies. Behavior Therapy. 2004;35:639–

65.

5. Braams BR, Blechert J, Boden MT, Gross JJ. The effects of acceptance and suppression on anticipation and receipt of painful stimulation. Journal of Behavior Therapy and Experimental Psychiatry [Internet]. 2012;43:1014–18. Available from: http://dx.doi.org/10.1016/j.jbtep.2012.04.001

6. Kohl A, Rief W, Glombiewski JA. Acceptance, Cognitive Restructuring, and Distraction as Coping Strategies for Acute Pain. The Journal of Pain [Internet]. 2013;14:305–15. Available from: http://dx.doi.org/10.1016/j.jpain.2012.12.005

7. Masedo AI, Esteve MR. Effects of suppression, acceptance and spontaneous coping on pain tolerance, pain intensity and distress. Behavior Research and Therapy. 2007;45:199–209.

8. Gutiérrez O, Luciano C, Rodríguez M, Fink BC. Comparison Between an Acceptance-Based and a Cognitive-Control-Based Protocol for Coping With Pain. Behavior Therapy. 2004;35:767–83.

9. Georgescu R, Dobrean A, Predescu E. Benefits of Cognitive Restructuring, Acceptance and Distraction for Pain Intensity and Pain Tolerance. Journal of Evidance-Based Psychotherapies. 2018;18:143–59.

10. Kohl A, Rief W, Glombiewski JA. How effective are acceptance strategies? A meta-analytic review of experimental results. Journal of Behavior Therapy and Experimental Psychiatry [Internet]. 2012;43:988–1001. Available from: http://dx.doi.org/10.1016/j.jbtep.2012.03.004

11. Veehof MM, Trompetter HR, Bohlmeijer ET, Schreurs KMG. Acceptance- and mindfulness-based interventions for the treatment of chronic pain : a meta-analytic review. Cognitive Behaviour Therapy [Internet]. 2016;45:5–31. Available from:

http://dx.doi.org/10.1080/16506073.2015.1098724

12. Subnis UB, Starkweather A, Menzies V. A current review of distraction-based interventions for chronic pain management. European Journal of Integrative Medicine [Internet]. 2016;8:715–22. Available from: http://dx.doi.org/10.1016/j.eujim.2016.08.162

13. Van Ryckeghem D, Van Damme S, Eccleston C, Crombez G. The efficacy of attentional distraction and sensory monitoring in chronic pain patients: A meta-analysis. Clinical Psychology Review. 2018;59:16–29.

14. Hofmann SG, Grossman P, Hinton DE. Loving-kindness and compassion meditation: Potential for psychological interventions. Clinical Psychology Review [Internet]. 2011;31:1126–32. Available from: http://dx.doi.org/10.1016/j.cpr.2011.07.003

15. Macbeth A, Gumley A. Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. Clinical Psychology Review [Internet]. 2012;32:545–52. Available from: http://dx.doi.org/10.1016/j.cpr.2012.06.003

16. Kirby JN, Tellegen CL, Steindl SR. A Meta-Analysis of Compassion-Based Interventions: Current State of Knowledge and Future Directions. Behavior Therapy [Internet]. 2017;48:778–92. Available from: https://doi.org/10.1016/j.beth.2017.06.003

17. Graser J, Stangier U. Compassion and Loving-Kindness Meditation: An Overview and Prospects for the Application in Clinical Samples. Harvard review of psychiatry [Internet]. 2018;26:201–15. Available from: http://insights.ovid.com/crossref?an=00023727-201807000-00003%0Ahttp://www.ncbi.nlm.nih.gov/pubmed/29975338

18. Neff K. Self-Compassion: An Alternative Conceptualization of a Healthy Attitude Toward Oneself. Self and Identity. 2003;2:85–101.

19. Neff K, Tirch D. Self-- Compassion and ACT. In: Kashdan TB, Ciarrochi J V, editors. Mindfulness & Acceptance for Positive Psychology. Oakland: New Harbinger; 2013.

20. Edwards KA, Pielech M, Hickman J, Ashworth J, Sowden G, Vowles KE. The relation of self - compassion to functioning among adults with chronic pain. European Journal of Pain. 2019;23:1538–47.

21. Costa J, Pinto-Gouveia J. Acceptance of Pain, Self-Compassion and Psychopathology: Using the Chronic Pain Acceptance Questionnaire to Identify Patients' Subgroups. Clinical Psychology and Psychotherapy. 2011;18:292–302.

22. Wren AA, Somers TJ, Wright MA, Goetz MC, Leary MR, Fras AM, Huh BK, Rogers LL, Keefe FJ. Self-Compassion in Patients With Persistent Musculoskeletal Pain: Relationship of Self-Compassion to Adjustment to Persistent Pain. Journal of Pain and Symptom Management [Internet]. 2012;43:759–70. Available from: http://dx.doi.org/10.1016/j.jpainsymman.2011.04.014

23. Carvalho SA, Trindade IA, Gillanders D, Pinto-Gouveia J, Castilho P. Self-Compassion and Depressive Symptoms in Chronic Pain (CP): A 1-Year Longitudinal Study. Mindfulness. 2019;

24. Talbot F, Basque D, French DJ. Relationship Between Self-Compassion and pain resilience in the context of acute experimental pain. In: Annals of Behavioral Medicine. 2018.

25. Luo X, Liu J, Che X. Investigating the Influence and a Potential Mechanism of Self-compassion on Experimental Pain: Evidence from a Compassionate Self-talk Protocol and Heart Rate Variability. The Journal of Pain [Internet]. 2019; Available from: https://doi.org/10.1016/j.jpain.2019.11.006

26. Parry S, Malpus Z. Reconnecting the Mind and Body: A Pilot Study of Developing

Compassion for Persistant Pain. Patient Experience Journal. 2017;4.

27. Chapin HL, Darnall BD, Seppala EM, Doty JR, Hah JM, Mackey SC. Pilot study of a compassion meditation intervention in chronic pain. Journal of Compassionate Health Care. 2014;1:1–12.

28. Carson JW, Keefe FJ, Lynch TR, Carson KM, Goli V, Fras AM, Thorp S. Loving-Kindness Meditation for Chronic Low Back Pain - Results From a Pilot Trial. Journal of Holistic Nursing. 2005;23:287–304.

29. Hampton AJD, Hadjistavropoulos T, Gagnon MM, Williams J, Clark D. The effects of emotion regulation strategies on the pain experience: a structured laboratory investigation. PAIN. 2015;156:868–79.

30. Thibodeau MA, Welch PG, Katz J, Asmundson GJG. Pain-related anxiety influences pain perception differently in men and women: A quantitative sensory test across thermal pain modalities. Pain [Internet]. 2013;154:419–26. Available from: http://dx.doi.org/10.1016/j.pain.2012.12.001

31. Chapman JR, Norvell DC, Hermsmeyer JT, Bransford RJ, Devine J, McGirt MJ, Lee MJ. Evaluating common outcomes for measuring treatment success for chronic low back pain. Vol. 36, Spine. 2011.

32. Spitzer RL, Kroenke K, Williams JBW, Group PHQPCS. Validation and Utility of a Self-report Version of PRIME-MD. JAMA. 1999;282:1737–44.

33. Yu L, Norton S, Almarzooqi S, McCracken LM. Preliminary investigation of self-as-context in people with fibromyalgia. British Journal of Pain. 2017;11:134–43.

34. Dear BF, Titov N, Nicholson Perry K, Johnston L, Wootton BM, Terides MD, Rapee RM, Hudson JL. The Pain Course: A randomised controlled trial of a clinician-guided

Internet-delivered cognitive behaviour therapy program for managing chronic pain and emotional well-being. Pain [Internet]. 2013;154:942–50. Available from: http://dx.doi.org/10.1016/j.pain.2013.03.005

35. Sullivan MJL, Bishop SR, Pivik J. The Pain Catastrophizing Scale : Development and Validation. Psychological Assessment. 1995;7:524–32.

36. Meyer K, Sprott H, Mannion AF. Cross-cultural adaptation, reliability, and validity of the German version of the Pain Catastrophizing Scale. Journal of Psychosomatic Research. 2008;64:469–71.

37. Neff KD. The Development and Validation of a Scale to Measure Self-Compassion. Self and Identity. 2003;223–50.

38. Hupfeld J, Ruffieux N. Validierung einer deutschen Version der Self-Compassion Scale (SCS-D). Zeitschrift für Klinische Psychologie und Psychotherapie. 2011;40:115–23.

39. Muris P, Otgaar H, Petrocchi N. Protection as the Mirror Image of Psychopathology: Further Critical Notes on the Self-Compassion Scale. Mindfulness [Internet]. 2016;7:787–90. Available from: http://dx.doi.org/10.1007/s12671-016-0509-9

40. Muris P, Otgaar H, Pfattheicher S. Stripping the Forest from the Rotten Trees: Compassionate Self-Responding Is a Way of Coping, but Reduced Uncompassionate Self-Responding Mainly Reflects Psychopathology. Mindfulness. 2019;10:196–99.

41. Pfattheicher S, Geiger M, Hartung J, Weiss S, Schindler S. Old Wine in New Bottles? The Case of Self-compassion and Neuroticism. European Journal of Personality. 2017;31:160–69.

42. Devilly GJ, Borkovec TD. Psychometric properties of the credibility / expectancy questionnaire ☪. Journal of Behavior Therapy and Experimental Psychiatry.

2000;31:73–86.

43. Rolke R, Baron R, Maier C, Tölle TR, Treede R-D, Beyer A, Binder A, Birbaumer N, Birklein F, Bötefür IC, Braune S, Flor H, Huge V, Klug R, Landwehrmeyer GB, Magerl W, Maihöfner C, Rolko C, Schaub C, Scherens A, Sprenger T, Valet M, Wasserka B. Quantitative sensory testing in the German Research Network on Neuropathic Pain (DFNS): Standardized protocol and reference values. PAIN. 2006;123:231–43.

44. Wengenroth M. Therapie-Tools Akzeptanz- und Commitmenttherapie (ACT). Weinheim: Beltz; 2017.

45. Wehrle M. Handbuch für Fantasiereisen: Für Training, Coaching, Beratung, Jugendarbeit und Therapie. Weinheim: Beltz; 2011.

46. Müller E. Du spürst unter deinen Füßen das Gras: Autogenes Training in Phantasie- und Märchenreisen. Frankfurt am Main: FISCHER Taschenbuch; 1983.

47. Kohl A, Rief W, Glombiewski JA. Do fibromyalgia patients benefit from cognitive restructuring and acceptance? An experimental study. Journal of Behavior Therapy and Experimental Psychiatry [Internet]. 2014;45:467–74. Available from: http://dx.doi.org/10.1016/j.jbtep.2014.06.006

48. Tabachnick BG, Fidell LS. Using multivariate statistics. 6th ed. Upper Saddle River: Pearson Education; 2013. 76–77 p.

49. Field A. Discovering statistics using SPSS. 3rd ed. London: SAGE Publications Ltd; 2009.

50. Wang Y, Qi Z, Hofmann SG, Si M, Liu X, Xu W. Effect of Acceptance Versus Attention on Pain Tolerance: Dissecting Two Components of Mindfulness. Mindfulness. 2019;10:1352–59.

51. Ehret AM, Joormann J, Berking M. Self-compassion is more effective than acceptance and reappraisal in decreasing depressed mood in currently and formerly depressed individuals. Journal of Affective Disorders [Internet]. 2018;226:220–26. Available from: http://dx.doi.org/10.1016/j.jad.2017.10.006

52. Diedrich A, Grant M, Hofmann SG, Hiller W, Berking M. Self-compassion as an emotion regulation strategy in major depressive disorder. Behaviour Research and Therapy [Internet]. 2014;58:43–51. Available from: http://dx.doi.org/10.1016/j.brat.2014.05.006

53. Diedrich A, Hofmann SG, Cuijpers P, Berking M. Self-compassion enhances the efficacy of explicit cognitive reappraisal as an emotion regulation strategy in individuals with major depressive disorder. Behaviour Research and Therapy [Internet]. 2016;82:1–10. Available from: http://dx.doi.org/10.1016/j.brat.2016.04.003

54. Kuyken W, Watkins E, Holden E, White K, Taylor RS, Byford S, Evans A, Radford S, Teasdale JD, Dalgleish T. How does mindfulness-based cognitive therapy work? Behaviour Research and Therapy [Internet]. 2010;48:1105–12. Available from: http://dx.doi.org/10.1016/j.brat.2010.08.003

55. Yadavaia JE, Hayes SC, Vilardaga R. Using acceptance and commitment therapy to increase self-compassion: A randomized controlled trial. Journal of Contextual Behavioral Science [Internet]. 2014;3:248–57. Available from: http://dx.doi.org/10.1016/j.jcbs.2014.09.002

Tables

Table 1

Sample Characteristics at Baseline

	Self-compassion (N = 40)	Acceptance (N = 39)	Distraction (N = 41)		
	N (%)/M (SD)	N (%)/M (SD)	N (%)/M (SD)	X^2/F (df)	p-value
Sex				.787 (2)	.68
Female	28 (70%)	26 (66.7%)	31 (75.6%)		
Male	12 (30%)	13 (33.3%)	10 (24.4%)		
Age	24.43 (4.97)	24.38 (5.31)	23.83 (3.71)	.20	.82
PHQ-9	5.30 (4.12)	5.77 (3.00)	5.44 (3.13)	.19	.83
PCS	2.28 (.63)	2.24 (.67)	2.23 (.67)	.06	.95
HA	3.54 (.56)	3.54 (.36)	3.46 (.50)	.43	.65
CS	3.19 (.65)	2.91 (.55)	3.14 (.66)	1.11	.34
RUS	2.83 (.69)	2.91 (.71)	2.78 (.75)	1.33	.15

Note. M = Mean; SD = Standard Deviation; PHQ-9 = Patient Health Questionnaire, Depression Subscale; PCS = Pain Catastrophizing Scale; HA = Habitual Acceptance; CS = Compassionate Self-Responding subscale of the Self-Compassion Scale; RUS = Reduced Uncompassionate Self-Responding subscale of the Self-Compassion Scale

Table 2

Pain-related outcomes: Descriptives and Baseline Differences.

Outcome	Time point	Self-compassion	Acceptance	Distraction	Differences at baseline
		M (SD)	M (SD)	M (SD)	p-value
Pain tolerance	Pre	48.70 (1.51)	48.32 (1.91)	47.82 (1.85)	.083
	Post	49.77 (1.30)	49.40 (1.65)	48.89 (1.51)	
	Follow-up	49.94 (1.05)	49.79 (1.27)	49.15 (1.60)	
Pain intensity	Pre	6.05 (1.66)	6.15 (1.74)	6.34 (1.68)	.735
	Post	6.58 (1.84)	6.82 (1.95)	7.02 (2.01)	
	Follow-up	6.30 (2.29)	6.36 (2.17)	6.35 (2.25)	
Pain	Pre	6.75 (2.06)	6.69 (1.95)	6.73 (1.80)	.991
unpleasantness	Post	6.53 (2.05)	6.87 (2.11)	6.93 (1.82)	
	Follow-up	6.12 (2.47)	6.15 (2.46)	6.50 (2.21)	

Note. M = Mean; SD = Standard Deviation

Table 3

Frequencies – Percentage Maximum Temperature

	Total	Self-compassion	Acceptance	Distraction
Pre	5.8 %	10.0 %	5.1 %	2.4 %
Post	29.2 %	37.5 %	30.7 %	19.5 %
Follow Up	32.5 %	37.5 %	35.8 %	24.4 %

Table 4

Self-Compassion: Descriptives

Outcome	Time point	Self-compassion	Acceptance	Distraction
		M (SD)	M (SD)	M (SD)
CS	Pre	3.19 (.65)	2.91 (.55)	3.14 (.66)
	Post	3.34 (.63)	3.06 (.59)	3.18 (.73)
	Follow-up	3.28 (.63)	3.04 (.66)	3.03 (.80)
RUS	Pre	2.83 (.69)	2.91 (.71)	2.78 (.75)
	Post	2.65 (.67)	2.84 (.70)	2.61 (.77)
	Follow-up	2.47 (.62)	2.71 (.73)	2.46 (.79)

Note. M = Mean; SD = Standard Deviation; CS = Compassionate Self-Responding; RUS = Reduced Uncompassionate Self-Responding

Figures

Figure 1

CONSORT Flow Diagram - Experimental Procedure

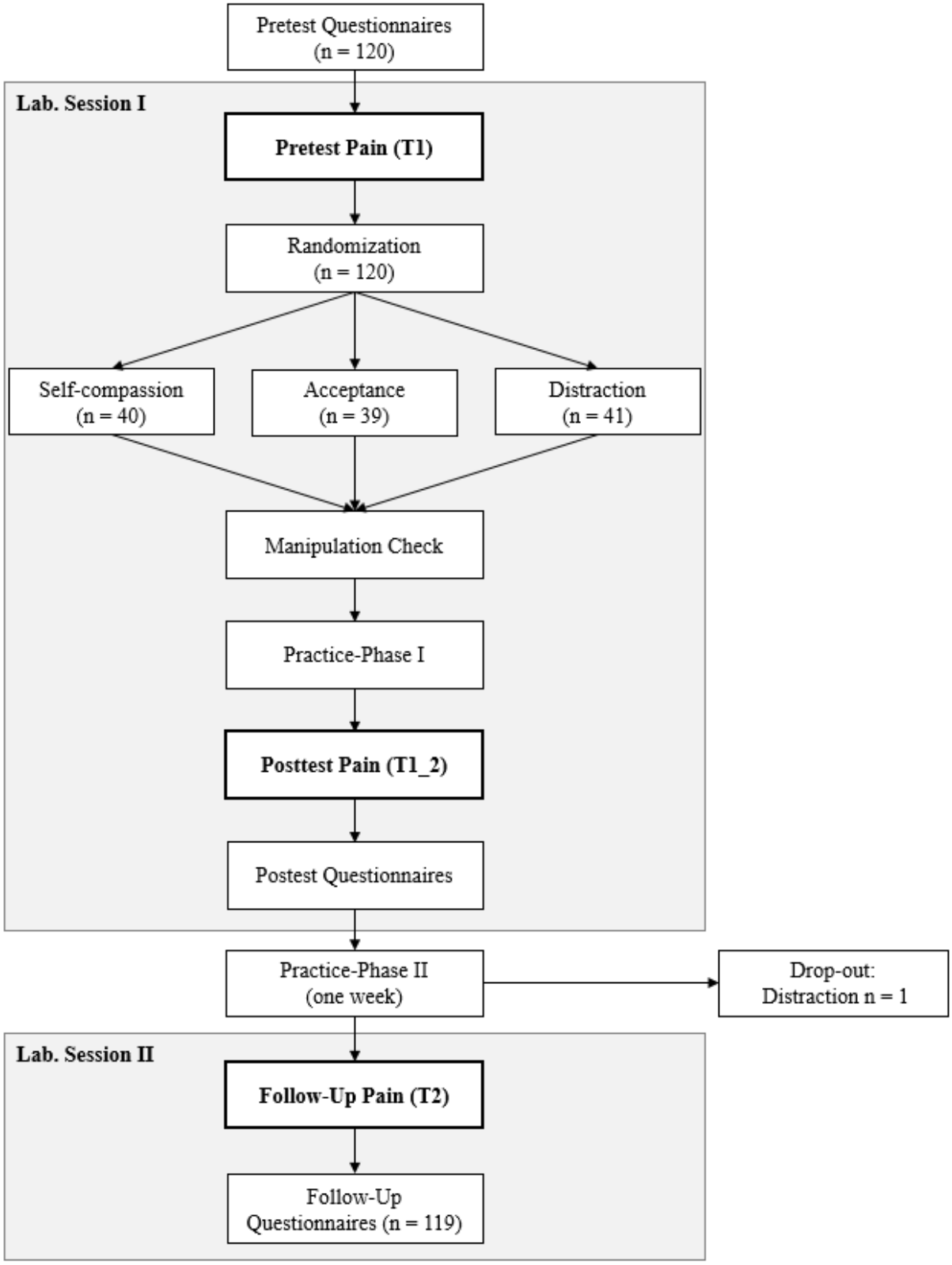
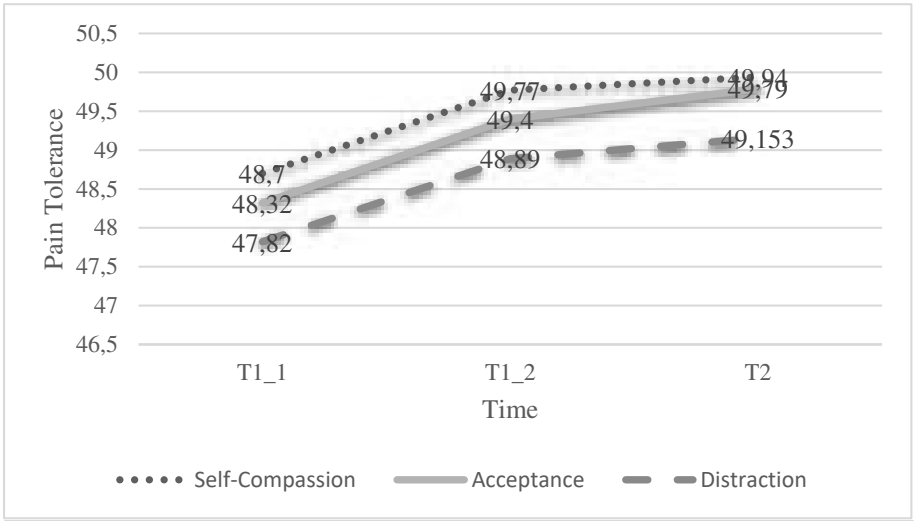
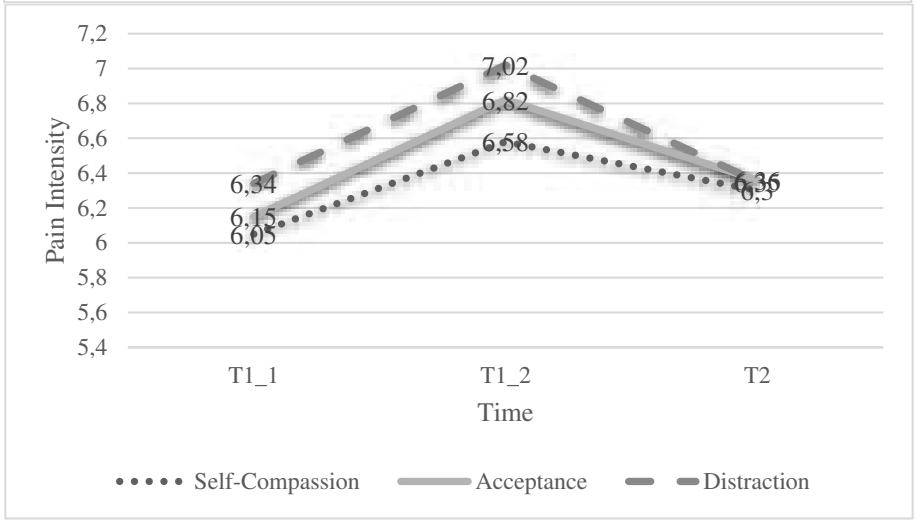
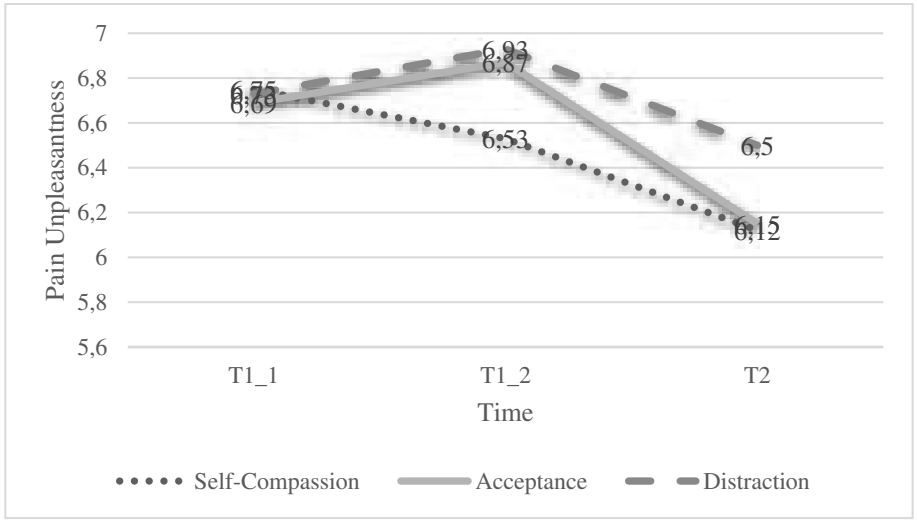


Figure 2

Mean Pain Tolerance, Pain Intensity and Pain Unpleasantness Dependent on Time and Condition







Note. Pain Tolerance was measured in max. tolerable temperature (°C); Pain Intensity and Pain Unpleasantness were measured via Numeric Rating Scale ranging from 0 to 10.

Abbreviations

ACT = Acceptance- and Commitment-Therapy

CEQ = Credibility and Expectancy Questionnaire

CS = Compassionate Self-Responding Subscale of Self-Compassion Scale

ER = emotion regulation

HA = Habitual Acceptance

NRS = Numeric Rating Scale

PCS = Pain Catastrophizing Scale

PHQ-9 = Depression Subscale of Patient Health Questionnaire

RUS = Reduced Uncompassionate Self-Responding Subscale of Self-Compassion Scale

SCS = Self-Compassion Scale

SPSS = Statistical Package for Social Sciences

T1_1 = Pretest at Laboratory Session 1

T1_2 = Posttest at Laboratory Session 1

T2 = Follow-Up at Laboratory Session 2

TSA = Thermal Sensory Analyzer

Appendix

Complete Instructions

Self-compassion

Exercise: Please write down three different thoughts that led you to stop the heat stimulus. (Investigator gives participant a piece of white paper). Be aware of how you were feeling at the moment you stopped the pain stimulation. Be also aware that pain is something normal and part of being human. Please stand up and take a few steps. What would make you feel good right now? Maybe it's a compassionate thought like "I'll muster up the self-compassion I need" or "I must be strong" or "I must take care of myself", or kind gestures like a hand on a shoulder or a hug.

This exercise will make it clear to you that pain as well as unpleasant thoughts and feelings are natural phenomena. It helps to become aware of such experiences without getting lost in them and without wanting to avoid them. That is the only way to acknowledge the pain and develop kind and sympathetic support for yourself. That is why it is not generally helpful to simply want the pain to stop; rather, it is much more important to ask yourself what you need at that moment to master this painful, difficult situation. To reach your own goal it is therefore important to be fully aware of difficult thoughts and feelings and of how normal they are, and thus accompany yourself on the journey to attaining your goal.

Example: Can you remember a situation when you had difficult thoughts or feelings and supported yourself in a kind manner to experience or cope with them – a situation in which it was OK to have such thoughts while you were being kind to yourself? Please write down this situation and your thoughts and behavior in that situation. This personal example should help make you aware that compassionate treatment of yourself can help you tolerate a painful situation.

Metaphor: Please write down a personal life goal that is important to you. Then imagine that you're standing on the edge of a muddy swamp. The other side of the swamp symbolizes one of your important life goals. To achieve that goal, you must get across the swamp. You might have thoughts like "it stinks" or "This is too much for me" or "it might be dangerous". Here too, the best strategy is to be conscious of those difficult thoughts and feelings, remembering that they are natural, normal phenomena, while you accompany yourself in a kind, supportive and sympathetic manner on the way to reaching that goal. It is thus OK to have such thoughts and feelings because you are helping yourself in such a conducive way to get across the swamp.

Concrete Instruction: Now, try to lengthen the time you tolerate the painful heat stimulus by being fully aware of the present moment and of how normal pain is. Support yourself in a kind manner while you experience this difficult situation without wanting to avoid it.

Acceptance

Please write down three different thoughts that led you to stop the heat or cold stimulus. (The investigator gives the participant a piece of paper with the sentence: "I can't walk". The participant is then asked to stand up and walk around while saying that thought outloud). This exercise makes it clear that thoughts and feelings need not necessarily be connected to types of behavior. It can even be very important to disregard our thoughts when we are trying to achieve important goals. There is ample evidence that the deliberate suppression of thoughts and feelings tends to make them occur more often. That is why it is a good strategy to simply be aware of them without judging or changing them. The willingness to experience unpleasant thoughts and feelings is part of this strategy. Accepting such thoughts and feelings can lead us to react differently than our thoughts and feelings would normally require. This is how we keep our thoughts from controlling our lives, because they cannot be considered the cause of or justification for such behavior.

Example: Can you remember a situation in which you had thoughts that told you to do something but you reacted differently? Or have you ever had thoughts that told you not to do something but you did it anyway? Please write down such a situation, what your thoughts were, and your behavior. It would appear that we can choose how we behave, even when our thoughts are pointing us in a certain direction.

Metaphor: Write down one of your important life goals. Now imagine that you're standing on the edge of a muddy swamp. The other side of the swamp symbolizes one of your important life goals. To achieve that goal, you must get across the swamp. You might have thoughts like "it stinks" or "It's too hard for me" or "it might be dangerous". Here too, the best strategy is to be aware of your thoughts without following or acting upon them. For if you were to act out your thoughts, you would not reach your goal. Do not try to suppress your thoughts and feelings – just be aware of them and take them with you while you are crossing the swamp to reach your goal.

Concrete instruction: Now, try to lengthen the time you tolerate the heat or cold stimulus by accepting and absorbing all your thoughts and sensations. That also means being willing to experience pain 100% without trying to change it.

Distraction

Exercise: Please write down three different thoughts that made you stop the heat or cold stimulus. (The investigator gives the participant a piece of paper). Think of a pleasant scene and write it down in lively detail. Please stand up and walk around while you state those thoughts outloud. Then, please try to distract yourself from the aforementioned thoughts by concentrating on thinking of the imagined scene, thereby suppressing those thoughts. This exercise makes it obvious that distraction can help us suppress unpleasant thoughts and sensations. It is a good idea to distract ourselves when we want to attain a difficult goal. When

we are imagining something pleasant, it keeps our brain busy, and it is then harder for it to perceive unpleasant things. We can shift the focus of our attention and thereby de-activate unpleasant thoughts and feelings. If we concentrate hard on negative thoughts and feelings, our attention is only being drawn toward one small detail in our perception. For one, we can distract ourselves internally, for example by recalling a pleasant scene. And secondly, we can, for instance, distract ourselves outwardly by concentrating on our physical surroundings.

Example: Can you remember a situation in which you were pursuing an important goal, but getting there was very unpleasant? Might you have had to grit your teeth and distract yourself in order not to notice the unpleasant thoughts and feelings so keenly? Please write down such a situation. This personal example also helps make clear what a good strategy distraction is for suppressing unpleasant thoughts and feelings.

Metaphor: Write down one of your important life goals. Now imagine that you're standing on the edge of a muddy swamp. The other side of the swamp symbolizes one of your important life goals. To achieve that goal, you must get across the swamp. You might have thoughts like "it stinks" or "It's too much for me" or "it might be dangerous". Here too, the best strategy is to suppress your thoughts and feelings by distracting yourself -try to imagine that you are somewhere else. You could also imagine yourself in the situation you described in the exercise above in order to distract yourself from unpleasant thoughts and feelings so that you can cross the swamp and achieve your goal.

Concrete instruction: Now, try to lengthen the time you tolerate the heat or cold stimulus by distracting yourself from all your thoughts and sensations. That also means you will be trying to weaken your perception of pain-related thoughts and the pain itself as far as possible.

Anhang E: Curriculum Vitae und Publikationen

Tabellarischer Lebenslauf

PERSÖNLICHE DATEN

Name	Anja Carina Emmerich (geb. Schmitt)
Staatsangehörigkeit	Deutsch
Geburtsdaten	22.04.1991 in Worms
Familienstand	verheiratet – getrennt lebend

AUS- UND WEITERBILDUNG

Seit 04/2018	**Weiterbildungsstudiengang in Psychologischer Psychotherapie (WiPP), Landau** Wechsel der Postgradualen Weiterbildung in Kognitiver-Verhaltenstherapie
Seit 04/2018	**Universität Koblenz-Landau** Doktorandin, Klinische Psychologie und Psychotherapie des Erwachsenenalters Arbeitstitel: „Selbstmitgefühl im Kontext akuter und chronischer Schmerzen, die besondere Relevanz von Ärger" Anleiterin: Prof. Dr. Julia A. Glombiewski
01/2017 – 03/2018	**Philipps-Universität Marburg** Doktorandin, Klinische Psychologie und Psychotherapie Arbeitstitel: „Selbstmitgefühl im Kontext akuter und chronischer Schmerzen" Anleiterin: Prof. Dr. Julia A. Glombiewski
11/2016 – 03/2018	**Institut für Psychotherapie-Ausbildung Marburg (IPAM)** Postgraduale Weiterbildung in Kognitiver-Verhaltenstherapie
10/2010 – 07/2016	**Philipps-Universität Marburg** Diplom in Psychologie („sehr gut" – 1,3) Diplomarbeit: "Einflussfaktoren der Nocebo-Reaktion im kardiovaskulären System" Anleiterinnen: Dr. Bettina K. Doering, Prof. Dr. Julia A. Glombiewski
08/2001 – 03/2010	**Gauß-Gymnasium Worms, Deutschland** Abitur („sehr gut" – 1,4)

BERUFLICHE ERFAHRUNGEN

Seit 04/2020	**Celenus Parkklinik Bad Bergzabern** Psychologische Psychotherapeutin in Ausbildung
01/2019 – 03/2021	**Universität Koblenz-Landau** Klinische Psychologie und Psychotherapie des Erwachsenenalters **-** Wissenschaftliche Mitarbeiterin
10/2018 – 05/2019	**Universität Koblenz-Landau** Mentorin im ment²-Mentoring-Programm für Nachwuchswissenschaftlerinnen
04/2018 – 12/2018	**Universität Koblenz-Landau** Klinische Psychologie und Psychotherapie des Erwachsenenalters **-** Promotionsstipendiatin (WiPP)
01/2017 – 01/2019	**Psychotherapie-Ambulanz Marburg (PAM)** Ambulante Therapeutin in Weiterbildung
01/2017 – 03/2018	**Philipps-Universität Marburg** Klinische Psychologie und Psychotherapie - Promotionsstipendiatin („Marburger Modell“ – IPAM)
01/2016 – 02/2016	**Schön Klinik Bad Arolsen** Psychosomatische Akutklinik (Station mit Fokus Depression, Burnout, ADHS im Erwachsenenalter) - Praktikantin
10/2014 – 03/2016	**Philipps-Universität Marburg** Klinische Psychologie und Psychotherapie – studentische Hilfskraft (Prof. Dr. Julia A. Glombiewski)
05/2014 – 11/2014	**Philipps-Universität Marburg** Methodenlehre – studentische Hilfskraft (Prof. Dr. Mario Gollwitzer)
08/2013 – 09/2013	**Vitos Klinik Haina** Psychiatrische Klinik (geschützte Akutstation) - Praktikantin
11/2012 – 09/2015	**Philipps-Universität Marburg** Begabungsdiagnostische Beratungsstelle *BRAIN* – studentische Hilfskraft (Prof. Dr. Detlef H. Rost)

LEHRE

Bachelor:	Einführung Klinische Psychologie; Psychologische Basiskompetenzen “Gesprächsführung” & „Gruppenleitung“; Zwangsstörungen; Propädeutikum; Kolloquium
Master:	Interventions-Praktikum-II: vertiefende kognitive Techniken; Evaluation klinisch-psychologischer Interventionen
Abschlussarbeiten:	Miriam Lehmann (M.Sc.), Clarissa Salger (M.Sc.), Moritz Pelz (M.Sc.), Mona Deucker (M.Sc.), Agata Bieguszewski (M.Sc.), Alena Michl (M.Sc.), Kristin Hüwelmeier (M.Sc.), Vivianne von Coelln

(M.Sc.), Lukas Wirtz (B.Sc.), Larissa Busch (B.Sc.), Paula Zimmer (B.Sc.), Sylvia Kraus (B.Sc.), Corinna Markert (B.Sc.), Lorna Tapal (B.Sc.), Dilek Akkus (B.Sc.), Leonie von Mässenhausen (B.Sc.), Anna Vogel (B.Sc.), Janina Hecht (cand.-B.Sc.)

AUSZEICHNUNGEN

2020 **Preis für hervorragende Lehre** des Fachbereichs 8 – Psychologie der Universität Koblenz-Landau für die Lehrveranstaltung „Psychologische Basiskompetenzen, Gesprächsführung“ Sommersemester 2019.

2020 **Förderung im Rahmen des Programms ERASMUS+** zur Unterstützung einer Mobilitätsmaßnahme zur Fort- und Weiterbildung an der Universitet Örebro, Örebro, Schweden (28.02.-11.03.)

2019 **Auszeichung für die “Innovativste Forschungsidee”** Pain Research Meeting (PRM) 2019 des International Scientific Research Network on PAIN (Pain, Action and Interference), FWO-Flandern, Groot Bijgaarden, Belgium

2019 **Förderung zur Tagungsteilnahme der Universität Koblenz-Landau** zur Teilnahme am Pain Research Meeting (PRM) 2019 of the International Scientific Research Network on PAIN (Pain, Action and Interference), FWO-Flandern, Groot Bijgaarden, Belgium

2019 **Förderung zur Tagungsteilnahme der Universität Koblenz-Landau** (Projekt NAWI – Förderung von Nachwuchs-wissenschaftlerinnen) zur Teilnahme an der 9. World Conference of Behavioral and Cognitive Therapies (WCBCT) in Berlin (17.-20.07.)

2018 **DAAD Stipendium für Kogressreisen** zur Teilnahme am 17. World Congress on Pain (IASP) in Boston (12.-16.09.)

2018 **Universität Koblenz-Landau (Weiterbildungsstudiengang in Psychologischer Psychotherapie – WiPP)**

2-jähriges Promotionsstipedium

2017 **Philipps-Universität Marburg**

3-jähriges Promotionsstipendium

AD HOC REVIEWER

European Journal of Pain, Verhaltenstherapie

Publikationen

ZEITSCHRIFTENARTIKEL

Emmerich, A.C., Lischetzke, T. & Glombiewski, J.A. (submitted) Anger and its treatment in chronic pain – a scoping review and conceptual model. *Scandinavian Journal of Pain.*

Emmerich, A.C., Friehs, T. & Glombiewski, J.A. (submitted) A rose by any other name? Self-compassion, psychological inflexibility, and self-esteem in chronic pain. *Journal of Contextual Behavioral Science.*

Emmerich, A.C., Friehs, T., Crombez, G. & Glombiewski, J.A. (2020). The role of self-compassion in predicting pain, depression and anger in patients with chronic pain: a prospective study. *European Journal of Pain,* Vol 24 (10), 1902-1914.

Emmerich, A.C., Könen, T. & Glombiewski, J.A. (submitted). Self-compassion and acute pain – an experimental investigation. *European Journal of Pain.*

Glombiewski, J.A., **Emmerich, A.C.** & Rief, W. (2020). Fallseminare in der Klinischen Psychologie und Psychotherapie an den Universitäten Marburg und Koblenz-Landau. *Verhaltenstherapie,* 30, pp. 156-168.

KONFERENZBEITRÄGE

Emmerich, A.C. & Glombiewski, J.A. (2019). "Extreme body modification – new insides in noninterfering pain". Lecture presented at the Pain Research Meeting 2019 of the International Scientific Research Network on PAIN (Pain, Action and Interference), FWO-Flandern, Groot-Bijgaarden, Belgium.

Schmitt, A.C. & Glombiewski, J.A. (2019). "Anger in chronic pain – the role of Self-Compassion". Poster presented at the 9th World Congress of Behavioral and Cognitive Therapies, Berlin, Germany.

Schmitt, A.C. & Glombiewski, J.A. (2019). "Self-Compassion and acute Pain – an experimental evaluation". Lecture presented at the 37th congress of the German Psychological Association (Clinical Psychology and Psychotherapy Section), Erlangen, Germany.

Schmitt, A.C. & Glombiewski, J.A. (2018). "Self-Compassion, Psychological Flexibility and Self-Esteem in chronic pain". Poster presented at the 17th World Congress on Pain of the International Association for the Study of Pain, Boston, USA.

Schmitt, A.C. & Glombiewski, J.A. (2018). "Group-therapy on self-compassion in chronic pain – tailored treatment on anger". Lecture presented at the Pain Research Meeting 2018 of the International Scientific Research Network on PAIN (Pain, Action and Interference), FWO-Flandern, Lanaken, Belgium.

Schmitt, A.C. & Glombiewski, J.A. (2017). "Self-Compassion in the context of acute and chronic pain – planning a PhD-Project." Poster presented at the Pain Research Meeting 2017 of the International Scientific Research Network on PAIN (Pain, Action and Interference), FWO-Flandern, Antwerp, Belgium.

Anhang F: Eidesstattliche Erklärung

Hiermit versichere ich, Anja Carina Emmerich (geb. Schmitt) geb. 22.04.1991 in Worms, meine Dissertation „Selbstmitgefühl bei akutem und chronischem Schmerz – die spezifische Rolle von Ärger“ eigenständig und ohne fremde Hilfe verfasst zu haben. Es wurden keine anderen als die angegebenen Quellen und Hilfsmittel verwendet. Alle vollständig oder sinngemäß übernommenen Zitate sind als solche gekennzeichnet. Die vorliegende Dissertation wurde weder in dieser noch einer ähnlichen Form bei einer anderen in- oder ausländischen Hochschule anlässlich eines Promotionsgesuchs oder zu anderen Prüfungszwecken eingereicht.

Landau, Mai 2021

_____

Anja Carina Emmerich

Anhang G: Prozentverteilung der Publikationen

Studie 1: Anger and its Treatment in Chronic Pain – a Scoping Review and Conceptual Model

Emmerich, Anja Carina	60%
Lischetzke, Tanja	20%
Glombiewski, Julia Anna	20%

Studie 2: A rose by any other name? Self-compassion, psychological inflexibility, and self-esteem in chronic pain

Emmerich, Anja Carina	60%
Friehs, Thilo	20%
Glombiewski, Julia Anna	20%

Studie 3: The role of self-compassion in predicting pain, depression and anger in patients with chronic pain: a prospective study

Emmerich, Anja Carina	50%
Friehs, Thilo	20%
Crombez, Geert	10%
Glombiewski, Julia Anna	20%

Studie 4: Self-Compassion and Acute Pain - an Experimental Investigation

Emmerich, Anja Carina	65%
Könen, Tanja	10%
Glombiewski, Julia Anna	25%

Landau, Mai 2021

_____ _____

Prof. Dr. Julia Anna Glombiewski Anja Carina Emmerich