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Prävention psychischer Störungen am Arbeitsplatz: Evaluation eines achtsamkeitsbasierten Führungskräfteprogramms zur Stärkung der psychischen Gesundheit

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„The nature of work is changing rapidly. Factors such as the globalization of markets, urbanization and migration, and advances in information technology have an impact on the nature of work and on the health – including mental health – of employees. The development and implementation of a workplace mental health policy and program will benefit the health of employees, increase productivity for the company and will contribute to the well-being of the community at large."

World Health Organization

INHALTSVERZEICHNIS

ABKÜRZUNGSVERZEICHNIS

ArbSchG	Arbeitsschutzgesetz
ACT	Acceptance Commitment Therapy
DALY	disability adjusted life years
DBT	Dialektisch Behaviorale Therapie
DIW	days of incapacity to work
DRKS	Deutsches Register Klinischer Studien
EUR	Euro
HADS	Hospital Anxiety and Depression Scale
HoL	Health-oriented Leadership
ICC	Intraclass correlation
ICD	International Statistical Classification of Diseases and Related Health Problems
ITT	Intention-to-treat analysis
JD-R	Job Demands Resources Model of Burnout
MBCT	Mindfulness Based Cognitive Therapy
MBP	Mindfulness Based Programs
MBSR	Mindfulness Based Stress Reduction
MC	Medical costs
MT	Mindfulness Training
OC	Observed cases analysis
OECD	Organisation for Economic Co-operation and Development
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCT	Randomized Controlled Trial
UK	United Kingdom
US	United States of America
USD	US Dollar
WHO	World Health Organization

1 THEORETISCHER HINTERGRUND

Die Welt, in der wir leben, unterliegt einem ständigen Wandel. Im Zuge der Globalisierung, Digitalisierung und des gesellschaftlichen Wandels hat sich auch die Arbeitswelt in den letzten Jahren stark und nachhaltig verändert. Arbeitsprozesse werden fortlaufend schneller, komplexer und dynamischer und fordern eine erhöhte Flexibilität und Mobilität der Arbeitnehmer (Mack et al., 2015). Moderne Kommunikationstechnologien führen zu ortsunabhängigen, zeitlich flexiblen Arbeitsprozessen und damit zu einer zunehmenden Entgrenzung von Arbeit. So verzeichnet das Statistische Bundesamt einen Anstieg der Arbeitsproduktivität je Erwerbstätigenstunde seit 1991 um 45,4% (Statistisches Bundesamt, 2016).

Somit ist anzunehmen, dass die Transformation in die moderne Arbeitswelt deutlich erhöhte Anforderungen an die psychische Belastbarkeit von Beschäftigten mit sich bringt. Obwohl repräsentative Längsschnittstudien fehlen, die einen Anstieg psychischer Belastungen durch die Arbeit empirisch absichern, gibt es einige Befunde, die diese Annahme stützen. So zeigen Daten aus Deutschland, dass die Arbeitsunfähigkeitstage aufgrund von psychischen Störungen in den letzten Jahrzehnten kontinuierlich zugenommen haben, während die Arbeitsunfähigkeitstage aufgrund von anderen Erkrankungen (z.B. Muskelskelett-erkrankungen oder Atemwegserkrankungen) auf einem stabilen Level geblieben sind. So lässt sich ein Anstieg der Arbeitsunfähigkeitstage aufgrund psychischer Erkrankungen seit 2005 um 79,3% verzeichnen und 41,7% der Frühberentungen gingen 2019 auf eine psychisch bedingte Erwerbsminderung zurück (DRV Bund, 2020; Meyer et al., 2017). Neben hohem individuellen Leiden für Betroffene verursacht dieser Anstieg auch erhebliche Kosten für Arbeitgeber und hohe sozioökonomische Kosten für die gesamte Gesellschaft (Goetzel et al., 2004; James et al., 2018).

Doch nicht nur die steigenden Produktivitätsausfälle aufgrund offensichtlicher psychischer Störungen stellen Unternehmen vor erhebliche Herausforderungen. Die erhöhte Beanspruchung der Mitarbeitenden drückt sich oft zunächst im sogenannten *Präsentismus* aus. Dieser Begriff beschreibt die limitierte Leistungsfähigkeit von psychisch belasteten Mitarbeitenden, die auf Krankschreibungen verzichten und am Arbeitsplatz erscheinen (Johns, 2010). Untersuchungen weisen darauf hin, dass Präsentismus langfristig zu einer starken Zunahme von emotionaler Erschöpfung führt (Demerouti et al., 2009). Die durch psychische Belastungen verursachten sozioökonomischen Folgen von Präsentismus sind laut

einer Studie um das Drei- bis Vierfache erhöht im Vergleich zu den ökonomischen Folgen von psychisch bedingtem Absentismus (Goetzel et al., 2004).

Die Frage, wie Arbeitsbedingungen gesund gestaltet werden können, gewinnt daher sowohl ökonomisch als auch gesellschaftlich zunehmend an Bedeutung. Neben der Notwendigkeit eines strategisch geführten und ganzheitlich ausgerichteten betrieblichen Gesundheitsmanagements in Unternehmen (Uhle & Treier, 2015), ist die Entwicklung und Evaluation von konkreten Interventionsmaßnahmen eine zentrale Aufgabe der Wissenschaft (Schaufeli, 2004). Die entwickelten Präventionsmaßnahmen sollten auf unterschiedlichen Ebenen im Unternehmen etabliert werden. Eine gesundheitsförderliche Unternehmenskultur ist ebenso wichtig wie die konkrete Verhaltensprävention auf Mitarbeiterebene. Eine besondere Verantwortung bei der Prävention tragen die Führungskräfte eines Unternehmens, da diese die Arbeitsprozesse und die Arbeitsumgebung maßgeblich planen und gestalten (siehe z.B. Rudolph et al., 2020).

Eine wichtige Voraussetzung für eine erfolgreiche Gesundheitsförderung in Unternehmen ist die Berücksichtigung ökonomischer Rahmenbedingungen. Während die Auswirkung psychischer Störungen auf die sozioökonomischen Kosten gut untersucht ist (z.B. Goetzel et al., 2004; Luppa et al., 2007), ist die Datengrundlage bezüglich der Auswirkung subklinischer psychischer Belastungen im Hinblick auf die sozioökonomischen Kosten deutlich eingeschränkt. Gerade im Hinblick auf die Implementierung von Maßnahmen zur Prävention und Gesundheitsförderung in Unternehmen ist es jedoch von zentraler Bedeutung, belastbare Erkenntnisse zu den sozioökonomischen Auswirkungen psychischer Belastung aufzuzeigen, etwa durch das Ausmaß des Produktivitätsverlusts aufgrund von gesundheitsbedingten Fehltagen der Belegschaft.

1.1 Die Auswirkung von Arbeitsbelastungen auf die psychische Gesundheit

1.1.1 Das Job-Demands-Resources Model

Das wohl bekannteste und in den letzten Jahren intensiv empirisch untersuchte Modell zur Beschreibung der Effekte von Arbeitsfaktoren auf die psychische Gesundheit ist das sogenannte *Job-Demands-Resources Model of Burnout* (Bakker & Demerouti, 2017; Demerouti et al., 2001). Es wurde entwickelt, um den Zusammenhang zwischen Arbeitsmerkmalen und Burnoutsymptomen sowie mögliche Auswirkungen auf arbeitsplatzbezogene Variablen (z.B. Arbeitsleistung) zu beschreiben. Das Modell trifft dazu

mehrere spezifische Annahmen, die in den letzten Jahren die Grundlage für intensive empirische Forschung darstellten (siehe Abbildung 1).

1. Arbeitsmerkmale lassen sich in zwei Kategorien einteilen, nämlich in Arbeitsanforderungen und in Arbeitsressourcen. Arbeitsanforderungen werden definiert als diejenigen physischen, psychischen, sozialen oder organisatorischen Aspekte der Arbeit, die eine anhaltende physische und/oder psychische Anstrengung erfordern und daher mit bestimmten physiologischen und/oder psychologischen Kosten verbunden sind (z.B. Arbeitsdruck, emotionale Anforderungen durch Kunden). Arbeitsressourcen beziehen sich auf die physischen, psychologischen, sozialen oder organisatorischen Aspekte der Arbeit, die zur Erreichung der Arbeitsziele beitragen, die Arbeitsanforderungen und die damit verbundenen physiologischen und psychologischen Kosten reduzieren oder das persönliche Wachstum, das Lernen und die Entwicklung fördern (z.B. Autonomie, soziale Unterstützung, Feedback).
2. Arbeitsanforderungen weisen einen gesundheitsbeeinträchtigenden Effekt auf, während Ressourcen die Arbeitsmotivation stärken und die psychische Gesundheit positiv beeinflussen.
3. Arbeitsressourcen können den negativen Effekt von Arbeitsanforderungen auf die psychische Gesundheit abmildern (*Buffering-Effect*).
4. Der motivationsfördernde Effekt von Ressourcen ist besonders hoch, wenn die Arbeitsanforderungen hoch sind (sogenannte *aktive Berufe*).
5. Auch persönliche Ressourcen, wie Kontrollerleben, Optimismus oder Selbstwirksamkeit können eine ähnliche Funktion wie Arbeitsressourcen einnehmen.
6. Die Auswirkungen von Arbeitsanforderungen und Arbeitsressourcen wirken sich auch auf das berufliche Funktionsniveau und die Arbeitsleistung aus.
7. Abwärtsspirale: Arbeitsanforderungen führen zu einer erhöhten psychischen Belastung, die wiederum zu einer erhöhten Wahrnehmung von Arbeitsanforderungen führt.
8. Aufwärtsspirale: Arbeitsressourcen führen dazu, dass Mitarbeitende motivierter und engagierter bei der Arbeit sind und dadurch Verhaltensweisen zur aktiven Arbeitsplatzgestaltung anwenden, die wiederum zu einem höheren Niveau an beruflichen und persönlichen Ressourcen führt (sogenanntes *Job-Crafting*).

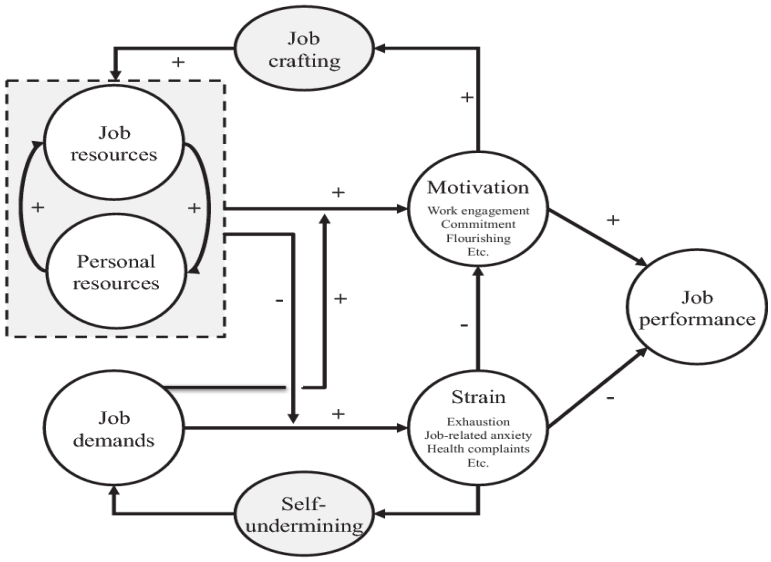

Abbildung 1. Job Demands Resources Model of Burnout (JD-R), entnommen aus Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: taking stock and looking forward. *Journal of Occupational Health Psychology*, 22(3), 273-285.

Die empirische Evidenz für die ersten sechs Annahmen wurde in hunderten von empirischen Studien und Meta-Analysen untersucht (vgl. Bakker & Demerouti, 2014; Bakker et al., 2014). Dabei zeigte sich, dass Arbeitsanforderungen und Ressourcen eine Vielzahl an unterschiedlichen Ausprägungen annehmen können, wie z.B. die physische Arbeitsmenge, die Arbeitsumgebung, Zeitdruck, Kundenkontakt und Schichtarbeit als Anforderungen oder aber Feedback, Belohnung, Handlungsspielraum, Partizipation, Arbeitsplatzsicherheit und Unterstützung durch die Führungskraft als Ressourcen, wobei die subjektive Bewertung (*appraisal*) eine entscheidende Rolle dabei spielt, welche Anforderungen und Ressourcen als belastend bzw. motivierend wahrgenommen werden (Demerouti et al., 2001). In mehreren Studien konnte auch der sogenannte *Buffering-Effekt* nachgewiesen werden. So zeigte sich, dass der negative Zusammenhang zwischen Arbeitsmenge, physischen und emotionalen Anforderungen sowie Konflikten zwischen Arbeit- und Privatleben mit Burnoutsymptomen durch den Grad der Autonomie und sozialen Unterstützung sowie der Qualität der Beziehung zur Führungskraft und der Qualität des Feedbacks abgemildert werden konnte (Bakker et al., 2005). Auch die Wertschätzung von Vorgesetzten und Kollegen spielt dabei eine entscheidende Rolle, dass demnach durch Wertschätzung negative Effekte von langen Arbeitszeiten auf die Arbeitszufriedenheit, illegitimen Aufgaben auf Kündigungsabsichten sowie Unterbrechungen bei der Arbeit auf das Wohlbefinden abgemildert werden konnten (Apostel et al., 2018; Stocker et al., 2010; Stocker et al., 2019).

Um die langfristigen Folgen von Arbeitsanforderungen und Arbeitsressourcen zu beschreiben wurden zwei weitere Annahmen formuliert, die dynamische reziproke Effekte zwischen Gesundheit und Arbeitsmerkmalen beschreiben (Annahme 7 und 8). In diesem Kontext werden sogenannte Abwärtsspiralen durch die Arbeitsanforderungen, aber auch Aufwärtsspiralen durch die Arbeitsressourcen postuliert. Empirische Arbeiten stützen diese Annahmen. So zeigten sich in einer aktuellen Meta-Analyse über 48 Längsschnittstudien hinweg reziproke Effekte zwischen Arbeitsstressoren und Burnout: Demnach waren die Stressoren bei der Arbeit nicht nur mit späteren Burnoutzuständen assoziiert, sondern die Burnoutzustände hatten wiederum zur Folge, dass die wahrgenommenen Arbeitsbelastungen zunahmen (Guthier et al., 2020). In einer weiteren Meta-Analyse unter Einsatz von Strukturgleichungsmodellen über 74 Längsschnittstudien hinweg konnte gezeigt werden, dass das reziproke Modell mit den Annahmen sieben und acht signifikant besser zu den Daten passte als die Modelle, die nur eine Richtung der Effekte annahmen (Lesener et al., 2019). Die Autoren schlussfolgern, dass das JD-R Modell einen exzellenten theoretischen Rahmen bildet, um den Zusammenhang zwischen Arbeitsmerkmalen und Gesundheit bzw. Wohlbefinden zu beschreiben.

1.1.2 Arbeitsplatzbezogene Belastungen und psychische Störungen

Das JD-R Modell bildet auch eine empirische Grundlage dafür, dass erhöhte und andauernde Arbeitsanforderungen bei gleichzeitigem Mangel an Ressourcen Burnoutzustände hervorrufen, die sich auf lange Sicht wiederum zu stressbedingten manifesten psychischen Störungen entwickeln können. So zeigte sich, dass ein anhaltendes Missverhältnis zwischen Arbeitsanforderungen und Ressourcen zukünftige depressive Störungen vorhersagten (Hakanen et al., 2008). Außerdem besteht ein Zusammenhang zwischen arbeitsbezogener Überlastung und gesundheitsschädlichen Verhaltensweisen wie Rauchen, Alkoholkonsum, ungesundem Essverhalten und körperlicher Inaktivität (Magnusson-Hanson et al., 2016). Auch Angststörungen wie phobische Ängste können durch anhaltende arbeitsbedingte Überlastung verstärkt werden (Vignoli et al., 2017). Die Weltgesundheitsorganisation (WHO) verweist daher in einem Arbeitspapier auf eine Reihe von möglichen schwerwiegenden psychischen Beschwerden, bis hin zu depressiven Störungen, Substanzmissbrauch und -abhängigkeit, Angststörungen und psychotischen Störungen, die durch Arbeitsbelastungen und Stress verstärkt werden können, und betont in diesem Zusammenhang die zentrale Rolle der Prävention im Arbeitskontext (World Health Organization, 2005a).

1.1.3 Die Rolle von Prävention am Arbeitsplatz

Es wird angenommen, dass eine effektive Prävention von psychischen Störungen am Arbeitsplatz Vorteile für Beschäftigte, für Unternehmen und für die gesamte Gesellschaft gleichermaßen darstellen. So postuliert die WHO, dass durch effektive Präventionsprogramme am Arbeitsplatz das individuelle Leiden der Betroffenen gemindert, sozioökonomische Belastungen für die Gesellschaft reduziert und die Arbeitsleistung und Produktivität von Unternehmen gesteigert werden könne (World Health Organization, 2005a). Außerdem können so präventive Angebote im Alltag der Menschen implementiert und ein niedrigschwelliger Zugang geschaffen werden (Bloch et al., 2014; Dryden et al., 2012). Die arbeitsplatzbezogene Prävention spielt daher eine zentrale Rolle bei der Prävention psychischer Störungen (Saxena et al., 2006). Dabei sollten arbeitsbezogene Belastungsfaktoren am Arbeitsplatz abgebaut und arbeitsbezogene sowie persönliche Ressourcen gestärkt werden.

1.2 Achtsamkeitsbasierte Ansätze zur Prävention psychischer Störungen

In der Präventionsforschung hat sich in den letzten Jahren das Konzept der Achtsamkeit als wichtiger Bestandteil herausgestellt. Achtsamkeit, die ihre Wurzeln in der buddhistischen Meditationspraxis hat, wird als eine bestimmte Form der Aufmerksamkeitslenkung beschrieben, die absichtsvoll und nicht wertend auf die Erfahrungen des gegenwärtigen Augenblicks gerichtet ist (Kabat-Zinn, 1990). Dabei spielen nach der Definition von Bishop et al. (2004) vor allem zwei Prozesse eine entscheidende Rolle: die selbstregulierte Aufmerksamkeit auf innere und äußere Prozesse (z.B. Gefühle und Gedanken oder die äußere Umgebung) sowie eine bestimmte Orientierung gegenüber Erfahrungen, die durch Neugier, Offenheit und Akzeptanz gekennzeichnet ist. In zahlreichen Studien zeigte sich Achtsamkeit mit psychischer Gesundheit assoziiert (Carpenter et al., 2019; Keng et al., 2011). Dabei wurde deutlich, dass Achtsamkeit sowohl als situativer Zustand als auch als Persönlichkeitsmerkmal vorliegt und durch gezielte Interventionsprogramme erlernt, gestärkt und kultiviert werden kann (Jamieson & Tuckey, 2017). Das wohl bekannteste manualisierte Interventionsprogramm zur Stärkung der Achtsamkeit ist das von Jon Kabat-Zinn entwickelte *Mindfulness-Based Stress Reduction* Programm (MBSR; Kabat-Zinn, 1990). Das achtwöchige Achtsamkeitsprogramm besteht aus wöchentlichen Sitzungen à 2,5 Stunden und täglichen Übungen für Zuhause (ca. 45 Minuten), in denen die Achtsamkeit durch verschiedene formelle Meditationsübungen (z.B. Atemmeditation, Body-Scan und Yoga, Sitz- und Gehmeditation) eingeübt und mit informellen Achtsamkeitsübungen in den Alltag integriert

wird (z.B. achtsames Ausführen von Alltagstätigkeiten). Große Meta-Analysen weisen auf positive Effekte von Achtsamkeitsinterventionen in verschiedenen klinischen Stichproben hin (z.B. Grossman et al., 2004). Die Achtsamkeit bildet daher eine wichtige Grundlage für die Entwicklung neuer Interventionsformen in der modernen Psychotherapie (Michalak et al., 2006), wie zum Beispiel der *Acceptance-Commitment-Therapie* (ACT; Hayes et al., 1999), der *Mindfulness-based Cognitive Therapy* (MBCT; Segal et al., 2002) oder der *Dialektisch Behavioralen Therapie* (DBT; Linehan, 1993a, 1993b). Aufgrund zahlreicher Studien, die auch positive Effekte der Achtsamkeit in gesunden Stichproben nachweisen konnten (z.B. Gu et al., 2015; Khoury et al., 2015), kommt der Achtsamkeit auch in der Präventionsforschung eine wichtige Bedeutung zu: So zeigte sich, dass achtsamkeitsbasierte Maßnahmen bei gesunden Stichproben Stress, Ängstlichkeit, Depressivität und Burnoutsymptome reduzieren und das Wohlbefinden und die Lebensqualität steigern (Gu et al., 2015; Khoury et al., 2015). Auf Basis der empirischen Grundlage scheint es daher sinnvoll zu sein, neue Präventionsprogramme auf den Grundprinzipien der Achtsamkeit aufzubauen (z.B. Lyssenko et al., 2015).

1.2.1 Achtsamkeit am Arbeitsplatz

Durch die empirischen Befunde zu den positiven Effekten von Achtsamkeit bei gesunden Stichproben hat das Konzept der Achtsamkeit auch in der Arbeitswelt Einzug gehalten. Zahlreiche Übersichtsarbeiten diskutieren die möglichen positiven Effekte von Achtsamkeit am Arbeitsplatz (z.B. Good et al., 2016; Hyland et al., 2015). Konzeptionelle Studien zeigen, dass die Achtsamkeit im Rahmen des JD-R Modells als persönliche Ressource eingeordnet werden kann (Grover et al., 2017). Dabei gehen die diskutierten Effekte von Achtsamkeit deutlich über das persönliche Wohlbefinden von Beschäftigten hinaus und bilden auch zentrale Aspekte der Arbeitsleistung ab (z.B. Hülsheger et al., 2013). So zeigte sich Trait-Achtsamkeit in einer Meta-Analyse nicht nur mit gesundheitsbezogenen Variablen assoziiert, sondern darüber hinaus mit Arbeitszufriedenheit, Arbeitsleistung, sozialen Beziehungen bei der Arbeit und weniger Arbeitsausfällen (Mesmer-Magnus et al., 2017). Dabei wurden beide Komponenten der Definition von Bishop et al. (2004) mit der Arbeitsleistung in Verbindung gebracht. Die Selbstregulierung der Aufmerksamkeit auf den gegenwärtigen Moment soll den Einzelnen in die Lage versetzen, sich besser auf die aktuellen Aufgaben zu konzentrieren, weniger ablenkbar für fremde Reize zu sein und Fehler zu vermeiden (z.B. Glomb et al., 2011; Good et al., 2016). Die Orientierung auf eigene Erfahrungen mit Neugier, Offenheit und Akzeptanz wird im Hinblick darauf diskutiert, Kreativität zu wecken, neue Perspektiven

zu eröffnen, die Problemlösung zu verbessern und den Umgang mit Unsicherheit zu erleichtern (Baas et al., 2014; Jacobs & Blustein, 2008; Lebuda et al., 2016; Ostafin & Kassman, 2012). Diese innerpersönlichen Qualitäten könnten die zwischenmenschlichen Funktionen (Moll et al., 2015) und das Führungsverhalten positiv beeinflussen (Nübold et al., 2020; Reb et al., 2019; Schuh et al., 2019). So wird erwartet, dass Achtsamkeit am Arbeitsplatz nicht nur das Wohlbefinden und die Leistungsfähigkeit des Einzelnen verbessert, sondern darüber hinaus auch die Produktivität, Agilität und Innovationskraft von Organisationen insgesamt (Greiser & Martini, 2018).

1.2.2 Achtsamkeitsbasierte Interventionen am Arbeitsplatz

Aufgrund der ermutigenden Effekte von achtsamkeitsbasierten Interventionen nahmen viele große Unternehmen, wie Google oder General Mills eine Vorreiterrolle bei der Implementierung von Achtsamkeitsprogrammen am Arbeitsplatz ein (Gelles, 2015; Schaufenbuel, 2015). Interessanterweise geschah diese groß angelegte Umsetzung ohne fundierte empirische Belege für die positiven Effekte von Achtsamkeit auf arbeitsbezogene Prozesse (Jamieson & Tuckey, 2017). Obwohl ein klares Rational für die Wirksamkeit von achtsamkeitsbasierten Interventionen am Arbeitsplatz entwickelt wurde, in dem Effekte der Achtsamkeit aus anderen Kontexten auf den Arbeitsplatz übertragen wurden (z.B. Good et al., 2016; Hyland et al., 2015), wurde immer wieder kritisch reflektiert, ob die diskutierten positiven Effekte von achtsamkeitsbasierten Programmen tatsächlich auf den Arbeitsplatz übertragen werden können (Jamieson & Tuckey, 2017). Besondere kontextbezogene Merkmale der Arbeit wie die Zielgerichtetheit von Arbeit oder das leistungsorientierte Umfeld scheinen den Grundsätzen der ursprünglichen Achtsamkeitspraxis zu widersprechen. Zusätzliche Merkmale der Organisationskultur oder bestimmte soziale Normen unterschiedlicher Berufsgruppen könnten die Effektivität zusätzlich beeinflussen (z.B. Krick & Felfe, 2020). Außerdem wurden die klassischen achtsamkeitsbasierten Programme wie MBSR und MBCT häufig adaptiert, um die Interessen der spezifischen Zielgruppen zu adressieren (z.B. Inhalt oder Dosis; Jamieson & Tuckey, 2017). Gleichzeitig ist die Anzahl der Studien zu achtsamkeitsbasierten Programmen am Arbeitsplatz in den letzten Jahren rasant angestiegen. Bisherige Übersichtsarbeiten zu achtsamkeitsbasierten Interventionen beschränken sich allerdings auf qualitative Reviews (z.B. Eby et al., 2019; Janssen et al., 2018) oder meta-analytische Betrachtungen in spezifischen Berufsgruppen (z.B. Gesundheitsberufe; Iancu et al., 2018) oder bezogen auf spezifische Outcomevariablen (z.B. psychischer Belastung; Slemp et al., 2019). Eine umfassende Übersichtsarbeit zur

Wirksamkeit von achtsamkeitsbasierten Programmen am Arbeitsplatz über verschiedene Berufsgruppen und Outcomevariablen hinweg lag zu Beginn des Dissertationsprojekts noch nicht vor.

1.3 Die Bedeutung der Führungskraft bei der Prävention psychischer Störungen am Arbeitsplatz

Eine zentrale Bedeutung bei der Prävention psychischer Störungen am Arbeitsplatz kommt den Führungskräften zu, denn diese beeinflussen und steuern maßgeblich die Anforderungen und Ressourcen der Arbeit (z.B. Rudolph et al., 2020). Im Rahmen des JD-R Modells kann Führung demnach sowohl als Ressource als auch als Anforderung fungieren. Zahlreiche Studien weisen darauf hin, dass schädliches Führungsverhalten wie z.B. Führungsmissbrauch (supervisor abuse; z.B. Liao et al., 2018) oder die Übertragung illegitimer Aufgaben (z.B. Semmer et al., 2015) pathogen wirken und so schließlich zu deutlichen Beeinträchtigungen der psychischen Gesundheit führen können, was sich bei Mitarbeitenden u.a. durch Schlafstörungen, vermehrtem Alkoholkonsum oder Burnout-symptome zeigen kann (Lyons & Schneider, 2009; Montano et al., 2017). Ressourcen-orientiertes Führungsverhalten hingegen, wie z.B. soziale Unterstützung (z.B. Halbesleben, 2006; Viswesvaran et al., 1999) oder Wertschätzung (z.B. Stocker et al., 2014) kann sich positiv auf die psychische Gesundheit auswirken und zu einer Stärkung der Arbeitszufriedenheit, des Arbeitsengagements und der wahrgenommenen Sinnhaftigkeit der Arbeit auf Mitarbeiterebene beitragen (Dulebohn et al., 2012; Han & Oh, 2020; Kuoppala et al., 2008). In der bisherigen Forschung wurden vor allem gesundheitsunspezifische Führungsstile untersucht, die mit positiven Effekten für die Mitarbeitergesundheit assoziiert waren, wie z.B. *transformational leadership* (Arnold, 2017), *authentic leadership* (Macik-Frey et al., 2009) oder *empowering leadership* (Park et al., 2017). Aufgrund der bereits dargestellten Anforderungen der modernen Arbeitswelt für die psychische Gesundheit wurden in den letzten Jahren jedoch zusätzliche theoretische Konzepte zu *gesunder Führung* eingeführt, die das *explizite* und *direkte* Engagement von Führungskräften für die Gesundheit am Arbeitsplatz beschreiben (Gurt et al., 2011). Diese Konzepte zu gesunder Führung haben in den letzten Jahren deutlich an Bedeutung gewonnen (Rudolph et al., 2020; Yao et al., 2021). Im *Health-oriented Leadership* Konzept (HoL) von Franke et al. (2014) werden zwei zentrale Wirkfaktoren der gesunden Führung beschrieben: die gesunde Selbstführung und die gesunde Mitarbeiterführung. Diese beiden Wirkmechanismen lassen sich weiterhin in die Dimensionen Bewusstsein (*Awareness*), Stellenwert (*Value*) und Verhalten (*Behavior*)

unterteilen. Das Bewusstsein beschreibt die Fähigkeit von Führungskräften, die eigenen Belastungen und Grenzen sowie die Belastungen und Grenzen der Mitarbeitenden zu erkennen. Die Dimension Stellenwert beschreibt die Wichtigkeit, die Führungskräfte der eigenen und der Gesundheit der Mitarbeitenden zuschreiben. Die Verhaltensdimension beschreibt konkrete Verhaltensweisen, die Führungskräfte ausführen um die eigene und die Mitarbeitergesundheit zu erhalten und zu fördern. Dabei werden sowohl die Gestaltung der Rahmenbedingungen der Arbeit als auch der gesundheitsförderliche Umgang mit einzelnen Mitarbeitenden hervorgehoben.

In bisherigen Studien konnte nachgewiesen werden, dass Konzepte zu gesunder Führung mit einer Vielzahl von positiven Variablen der Gesundheit und des Wohlbefindens auf Führungs- und Mitarbeiterebene assoziiert sind (Rudolph et al., 2020). Viele dieser Studien untersuchten diesen Zusammenhang jedoch nur aus einer Perspektive, meistens aus der Perspektive der Mitarbeitenden. Ob und auf welchen Dimensionen die Selbsteinschätzung der Führungskräfte mit der Einschätzung der Mitarbeitenden korrespondiert und wie diese Einschätzungen mit der Gesundheit der Mitarbeitenden assoziiert sind, wurde im Rahmen des HoL Ansatzes noch nicht untersucht.

1.3.1 Gesunde Selbstführung

Eine gesunde Selbstführung stellt aus mehreren Gründen das Fundament für einen gesunden Führungsstil dar. Zunächst wird davon ausgegangen, dass Führungskräfte eine wichtige Vorbildfunktion für die Mitarbeitenden aufweisen. So konnte gezeigt werden, dass Führungskräfte, die Arbeit und Privatleben stärker trennten, eher als Vorbilder zur Vereinbarkeit von Arbeit und Privatleben wahrgenommen wurden. Mitarbeitende mit solchen Vorbildern konnten wiederum stärker selbst zwischen Arbeit und Privatleben trennen und zeigten geringere arbeitsbezogene Erschöpfung (Koch & Binnewies, 2015). Weiterhin zeigte sich, dass der Zusammenhang zwischen gesundem Führungsstil und Gesundheit der Mitarbeitenden stärker ausgeprägt war, wenn Führungskräfte stärker auf die eigene Gesundheit achteten (Kranabetter & Niessen, 2017). Des Weiteren beeinflusst die gesunde Selbstführung maßgeblich die Gesundheit der Führungskraft selbst. Die Gesundheit der Führungskraft wiederum beeinflusst ihr Führungsverhalten, mit Folgen für die Gesundheit der Mitarbeitenden. So zeigte sich beispielsweise, dass Mitarbeitende das Führungsverhalten ihrer Führungskraft eher als missbräuchlich bewerteten, wenn diese unter erhöhter depressiver und ängstlicher Symptomatik litt (Byrne et al., 2014). Eine weitere Studie zeigte eine erhöhte Burnoutsymptomatik bei Mitarbeitenden, wenn deren Führungskraft durch Familienkonflikte

selbst psychisch belastet war (Ten Brummelhuis et al., 2014). Schutzfaktoren für die individuelle Gesundheit am Arbeitsplatz, die im Rahmen der gesunden Selbstführung eingeordnet werden können, beinhalten unter anderem die Auswahl flexibler, situationsangepasster Bewältigungsstrategien (Bonanno & Burton, 2013), die Fähigkeit, sich effektiv zu erholen (Sonnentag & Fritz, 2015), sowie effektive Emotionsregulationsstrategien und Achtsamkeitsfertigkeiten (Hülsheger et al., 2013).

1.3.2 Gesunde Mitarbeiterführung

Bei einer gesunden Mitarbeiterführung wird zwischen personaler und organisationaler Führung unterschieden (Yaffe & Kark, 2011). Die organisationale Führung beschreibt die gesundheitsförderliche Gestaltung der Arbeitsumgebung und des Teamklimas durch die Führungskraft. Die personale Führung beschreibt den gesundheitsförderlichen Kontakt zu einzelnen Mitarbeitenden. In bisherigen Studien zeigte sich besonders ein mitarbeiterorientierter und transformationaler Führungsstil als gesundheitsförderlich (z.B. Gregersen et al., 2011), wobei ein mitarbeiterorientierter Führungsstil die Bedürfnisse und Fähigkeiten jeder einzelnen Person berücksichtigt. Die Führungskräfte zeigen empathisches Interesse, Anerkennung und Wertschätzung gegenüber ihren Mitarbeitenden. Sie unterstützen die individuelle Weiterentwicklung und stärken ihren Mitarbeitenden bei Schwierigkeiten den Rücken. Überlastung, aber auch Unterforderung werden soweit als möglich vermieden (z.B. Judge & Piccolo, 2004). Beim transformationalen Führungsstil bringt sich die Führungskraft darüber hinaus als authentische Person in den Arbeitsalltag ein. Durch die Orientierung an eigenen Werten und Zielen motiviert die Führungskraft, vermittelt Sinn und Bedeutung der Arbeit und ermutigt ihr Team, neue kreative Problemlösungen zu finden (Avolio & Yammarino, 2013). Bei einem transformationalen Führungsstil schließlich spielt die Achtsamkeit von Führungskräften eine wichtige Rolle (Pinck & Sonnentag, 2018). Dementsprechend hilft Achtsamkeit den Führungskräften, die Stresssignale ihrer Mitarbeitenden wahrzunehmen, deren persönliche Bedürfnisse zu erkennen und sie bei der Bewältigung herausfordernder Situationen zu unterstützen (Pinck & Sonnentag, 2018). In der Tat hat die bisherige Forschung gezeigt, dass Achtsamkeitstraining die Führungsqualität effektiv verbessern kann (Donaldson-Feilder et al., 2019; Kersemaekers et al., 2020).

1.3.3 Der Umgang mit psychisch belasteten Mitarbeitenden

Im Rahmen gesunder Führung spielt nicht nur gesundheitsförderliches Führungsverhalten, sondern auch das explizite Engagement der Führungskraft bei der Gesundheit der Mitarbeitenden eine wichtige Rolle (Gurt et al., 2011). Dabei sollten Führungskräfte geschult

sein, psychische Belastungen am Arbeitsplatz zu erkennen und geeignete Maßnahmen zur Prävention und Linderung zu ergreifen. Die Führungskraft ist demnach verantwortlich, der Fürsorgepflicht des Arbeitgebers nach §3[1] ArbSchG im täglichen Arbeitsalltag nachzukommen. Wenn die psychische Belastung auf arbeitsplatzbezogene Belastungen zurückzuführen ist, ist eine Klärung der Ursachen und eine Ergreifung von geeigneten Maßnahmen zur Reduktion der Belastung eine zentrale Aufgabe des Arbeitgebers. Gleichzeitig, zeigen Umfragen in Deutschland, dass viele Führungskräfte Unsicherheiten oder Ängste in Bezug auf das Thema psychische Störungen aufweisen (Kramer et al., 2015). Führungskräfte sollten daher geschult werden, psychische Belastungen frühzeitig zu erkennen, um dann geeignete Maßnahmen zu ergreifen.

1.4 Bisherige Führungskräfteprogramme zur Stärkung der psychischen Gesundheit

Die Entwicklung von Führungskräfteinterventionen nimmt eine zentrale Rolle in der betrieblichen Gesundheitsförderung ein (z.B. Bliese et al., 2017; Kelloway & Barling, 2010; Schaufeli, 2004). Die konzeptionellen Arbeiten zu gesunder Führung in den letzten Jahren haben zudem einen enormen Beitrag geleistet um einen theoretischen Rahmen zu schaffen, wie das explizite Engagement von Führungskräften für die Gesundheit am Arbeitsplatz beschrieben werden kann. Auf Basis dieser Erkenntnisse wurden vermehrt Forderungen postuliert, Interventionen zu entwickeln und empirisch zu untersuchen, um die gesunde Führung von Führungskräften zu fördern (Rudolph et al., 2020). In den theoretischen Konzepten bleibt jedoch weitgehend unklar welche Fähigkeiten Führungskräfte erlernen sollten, um ihre gesunde Führung zu verbessern. Zudem weist eine aktuelle Übersichtsarbeit darauf hin, dass bisher kaum evaluierte Interventionsstudien vorliegen und bisherige Arbeiten deutliche methodische und konzeptionelle Einschränkungen aufweisen, wodurch die Interpretierbarkeit der Ergebnisse deutlich limitiert ist (Kuehnl et al., 2019; Stuber et al., 2020). Eine besondere methodische Herausforderung stellt dabei die Evaluation dieser Interventionen im Hinblick auf die Wirksamkeit auf Mitarbeiterebene dar (Kuehnl et al., 2019; Kulik, 2011).

1.5 Entwicklung eines achtsamkeitsbasierten Führungskräfteprogramms zur Stärkung der psychischen Gesundheit

Wie bereits beschrieben, könnte die Achtsamkeit der Führungskräfte eine wichtige Grundlage für deren gesunde Führung bilden. Ein aktuelles Review zu achtsamkeitsbasierten Interventionen für Führungskräfte zeigte kleine bis mittlere Effektstärken auf das Wohlbefinden der Führungskräfte und die Führungsqualität (Donaldson-Feilder et al., 2019).

Daher erscheint es vielversprechend, Interventionen zur gesunden Führung auf bisherige Erkenntnisse der Achtsamkeitsforschung zu stützen.

Das in dieser Dissertation untersuchte achtsamkeitsbasierte Führungskräfteprogramm *Führung in Balance* wurde von Wissenschaftlern des Zentralinstituts für Seelische Gesundheit in Zusammenarbeit mit einer großen deutschen Krankenkasse entwickelt. Es basiert konzeptionell auf dem achtsamkeitsbasierten Präventionsprogramm *Lebe Balance*, das zur Prävention psychischer Störungen in der Allgemeinbevölkerung entwickelt wurde und dessen Wirksamkeit bereits empirisch nachgewiesen wurde (Bohus et al., 2013; Lyssenko et al., 2015, 2016, 2019). Auf Basis des HoL Ansatzes (Franke et al., 2014) wurde das Interventionskonzept von *Lebe Balance* so adaptiert, dass sowohl die gesunde Selbst- als auch Mitarbeiterführung der Führungskräfte geschult und die Dimensionen *Bewusstsein*, *Stellenwert* und *Verhalten* der Führungskräfte adressiert werden.

Führung in Balance gliedert sich in insgesamt drei Seminarbausteine, die jeweils in Tagesseminaren à 8 Stunden durchgeführt werden, sowie zwei Nachhaltigkeitstermine à 3 Stunden, die den Transfer des Erlernten in den Arbeitsalltag fördern sollen. Die Tagesseminare gliedern sich in die Module 1.) Gesunde Selbstführung 2.) Gesunde Mitarbeiterführung und 3.) Umgang mit belasteten Mitarbeitenden. Um den *Stellenwert* der Gesundheit zu fördern, beinhalten alle Seminarbausteine Informationsvermittlung in klar strukturierten Wissenseinheiten, sowie die Vermittlung von wissenschaftlichen Hintergründen. Um das *Bewusstsein* der Führungskräfte für die Gesundheit zu erhöhen, basieren alle Seminarbausteine auf dem Konzept der Achtsamkeit. Das Achtsamkeitstraining wurde auf Basis des skill-basierten Achtsamkeitskonzepts der DBT (Linehan, 2014) aufgebaut und vermittelt. Um das *Verhalten* der Führungskräfte zu adressieren, gründen alle diese Seminarbausteine auf Prinzipien der Verhaltensänderung und beinhalten die Vermittlung alltagspraktischer Fertigkeiten (Skills) sowie praktische Übungen und interaktive Einheiten. Nach jedem Modul wählen die Führungskräfte die für sie nützlichsten Skills aus und erstellen einen persönlichen Plan zur Verhaltensänderung. Zur Förderung der Nachhaltigkeit werden zwei jeweils dreistündige Nachhaltigkeitstermine angeboten, die jeweils im Abstand von einem Monat stattfinden. Die gesamte Trainingszeit beträgt damit insgesamt 30 Stunden über einen Zeitraum von fünf Monaten. Eine ausführliche Darstellung der Konzeption und Inhalte der Intervention ist in Abbildung 2 dargestellt.

1.5.1 Modul 1: Gesunde Selbstführung

Im Seminarbaustein 1 „Gesunde Selbstführung“ werden zentrale Schutzfaktoren für die individuelle psychische Gesundheit am Arbeitsplatz vermittelt, d.h. eine adaptive Selbstreflexion über eigene Belastungen und Stressoren (Falon et al., 2021), die Fähigkeit flexible und situationsspezifische Bewältigungsstrategien zu nutzen (Bonanno & Burton, 2013) sowie die Fähigkeit zur effektiven Regeneration (Sonnentag & Fritz, 2015). Zunächst werden die Teilnehmenden durch die Vermittlung von wissenschaftlichen Zusammenhängen motiviert, ihrer eigenen Gesundheit und Stressbelastung mehr Beachtung zu schenken. Die individuelle Situation wird in Bezug auf mögliche Stressoren und Belastungen mit Hilfe des expressiven Schreibens reflektiert (Pennebaker & Chung, 2007). Anschließend wird als zentrale Resilienzfertigkeit die Unterscheidung zwischen veränderbaren und unveränderbaren Stressoren eingeführt, da dies eine wichtige Voraussetzung für die Auswahl von geeigneten Bewältigungsstrategien darstellt (Bonanno & Burton, 2013). Die Teilnehmenden erlernen in erfahrungsbasierten Übungen, wie sie die mentale Technik der Achtsamkeit nutzen können, um ihre Aufmerksamkeit zu fokussieren, eigene Belastungsgrenzen zu erkennen und effektiv zu regenerieren (Reb et al., 2014; Sonnentag & Fritz, 2015). Zum Umgang mit unveränderbaren Stressoren üben die Teilnehmenden akzeptanzbasierte Techniken. Der Umgang mit veränderbaren Stressoren wird anhand von Problemlösetechniken eingeführt.

1.5.2 Modul 2: Gesunde Mitarbeiterführung

Im Seminarbaustein „Gesunde Mitarbeiterführung“ werden die Führungskräfte zunächst für diese Thematik sensibilisiert. Dabei werden die eigenen Vorteile eines gesunden, leistungsfähigen Teams betont. Im weiteren Verlauf liegt der Schwerpunkt auf der Vermittlung alltagspraktischer Fertigkeiten zur gesundheitsorientierten Führung auf zwei Ebenen: organisationale und personale Führung. Im Rahmen der organisationalen Führung werden Möglichkeiten zur Stärkung gesunder Rahmenbedingungen, wie Regenerationspausen, sowie Maßnahmen zur Förderung einer kooperativ-unterstützenden Teamdynamik thematisiert. Bei der personalen Führung erarbeiten die Teilnehmer konkrete Handlungsansätze, um individuell auf die Bedürfnisse und Kompetenzen ihrer Mitarbeitenden einzugehen, z.B. bei der Formulierung von Leistungszielen. Das Thema Wertschätzung wird als zentrales Führungselement mit zahlreichen Kommunikationsübungen trainiert.

1.5.3 Modul 3: Umgang mit psychisch belasteten Mitarbeitenden

Im Seminarbaustein „Umgang mit belasteten Mitarbeitenden“ werden gemeinsam mit den Teilnehmenden zunächst die Möglichkeiten und Grenzen im Führungshandeln besprochen. Um Unsicherheiten abzubauen, erhalten die Teilnehmenden eine Einführung in die Entstehung und Symptomatik stressbedingter psychischer Erkrankungen. Die beobachtbaren Veränderungen im Leistungsverhalten und Denken, Erscheinungsbild, Gefühlsreaktionen und Sozialverhalten werden anhand von Fallbeispielen besprochen. Im Hauptteil des Seminars wird anhand eines Gesprächsleitfadens exemplarisch ein Gespräch geführt, das die Führungskraft als Reaktion auf beobachtete Veränderungen initiativ führen kann. Dazu gehören folgende Gesprächsphasen: Gesprächseröffnung mit der Vermittlung von Wertschätzung und einer vertrauensvollen Atmosphäre, die Situationsklärung in Bezug auf mögliche Stressoren am Arbeitsplatz sowie das Treffen von konkreten Vereinbarungen zum Umgang mit den Belastungen. Weitere Gesprächssettings wie regelmäßige Mitarbeiter-gespräche, Begleitung einer Erkrankung, Rückkehr-/Willkommensgespräche sowie die betriebliche Wiedereingliederung werden vorgestellt.

1.5.4 Modul 4: Nachhaltigkeitstermine

In jedem Trainingsbaustein setzen sich die Teilnehmenden konkrete Ziele, welche der vermittelten Inhalte sie in ihrem Alltag umsetzen wollen. Zwischen den Trainingsbausteinen 1 bis 3 erhalten die Teilnehmenden jeweils eine Erinnerungs-Email und zu Beginn jedes Trainingstages wird die Umsetzung der Ziele reflektiert. Die beiden Nachhaltigkeitstermine à 3 Stunden gliedern sich in drei Teile: Reflexion der Umsetzung der Ziele, Analyse der nicht umgesetzten Ziele mit Fokus auf intrapsychischen Barrieren, und Planung der nächsten Schritte.

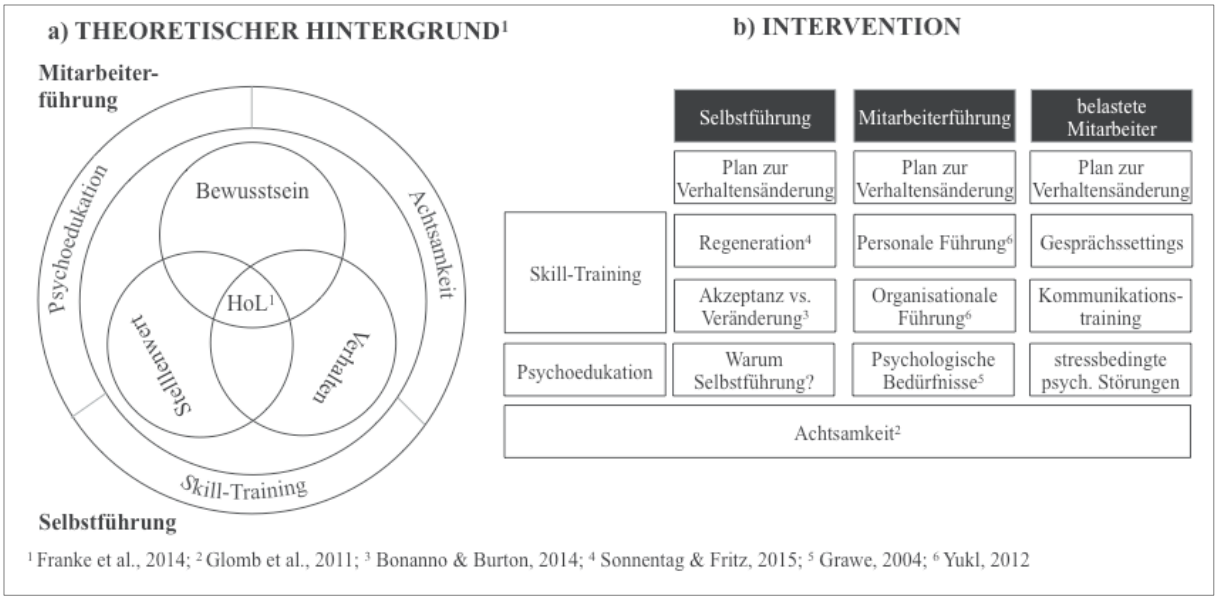

Abbildung 2. Theoretischer Hintergrund Health Oriented Leadership (HoL) und Interventionskonzept „Führung in Balance“

1.6 Zusammenfassung und Fragestellungen

Vor dem Hintergrund zunehmender Belastungen in der modernen Arbeitswelt kommt der Prävention psychischer Störungen am Arbeitsplatz eine wichtige Bedeutung zu. Führungskräfte nehmen dabei eine zentrale Rolle ein, denn das Führungsverhalten hat einen signifikanten Einfluss auf die Gesundheit der Mitarbeitenden und eine gesunde Arbeitsumgebung. Die zahlreichen positiven Effekte achtsamkeitsbasierter Programme bei gesunden Stichproben legen nahe, dass diese auch für die Prävention am Arbeitsplatz und für die Förderung der gesunden Führung eine wichtige Grundlage darstellen könnten. Übergreifendes Ziel dieser Dissertation ist es daher, die Wirksamkeit achtsamkeitsbasierter Programme in der Arbeitswelt, insbesondere im Kontext der gesunden Führung empirisch zu prüfen und potentielle Wirkmechanismen besser zu verstehen.

Die vorliegende Dissertation gliedert sich daher in mehrere Fragestellungen und Abschnitte. Zunächst wird im ersten Teil dieser Arbeit der Zusammenhang zwischen psychischen Belastungen und Krankheitskosten bzw. Arbeitsunfähigkeitstagen in einem längsschnittlichen Studiendesign analysiert, um die Bedeutung von psychischen Belastungen und möglichen Präventionsangeboten aus sozioökonomischer Sicht zu beurteilen. In zweiten Teil der Arbeit wird in Form einer Übersichtsarbeit der aktuelle Forschungsstand zu achtsamkeitsbasierten Programmen in der Arbeitswelt skizziert und deren Wirksamkeit und potentielle Wirkmechanismen metaanalytisch geprüft. Im dritten Teil der Arbeit wird der Zusammenhang zwischen gesunder Führung und psychischer Gesundheit von Mitarbeitenden

aus der Perspektive von Führungskräften und deren Mitarbeitenden in einem querschnittlichen Studiendesign untersucht, um den multifaktoriellen Zusammenhang zwischen Führung und Gesundheit besser zu verstehen. Im vierten Teil der Arbeit soll schließlich ein konzeptioneller Beitrag zur gesunden Führung geleistet werden, indem ein Vorschlag unterbreitet wird, wie gesunde Führung konkret trainiert werden kann und welche Rolle das Konzept der Achtsamkeit bei der Ausgestaltung gesunder Führung spielt. Außerdem sollen die methodischen Einschränkungen bisheriger Studien überwunden werden und sowohl die Wirksamkeit als auch potentielle Wirkmechanismen dieser Intervention auf Führungs- und Mitarbeiterebene untersucht werden. Die spezifischen Hypothesen und angewendeten Methoden werden in den jeweiligen Abschnitten der Arbeit ausgeführt.

2 SCHRIFT 1: SOCIO-ECONOMIC CONSEQUENCES OF MENTAL DISTRESS: QUANTIFYING THE IMPACT OF SELF-REPORTED MENTAL DISTRESS ON THE DAYS OF INCAPACITY TO WORK AND MEDICAL COSTS IN A TWO-YEAR PERIOD: A LONGITUDINAL STUDY IN GERMANY

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2.1 Abstract

Background: Mental disorders are related to high individual suffering and significant socio-economic burdens. However, it remains unclear to what extent self-reported mental distress is related to individuals’ days of incapacity to work and their medical costs. This study aims to investigate the impact of self-reported mental distress for specific and non-specific days of incapacity to work and specific and non-specific medical costs over a two-year span.

Method: Within a longitudinal research design, 2,287 study participants' mental distress was assessed using the Hospital Anxiety and Depression Scale (HADS). HADS scores were included as predictors in generalized linear models with a Tweedie distribution with log link function to predict participants’ days of incapacity to work and medical costs retrieved from their health insurance routine data during the following two-year period.

Results: Current mental distress was found to be significantly related to the number of specific days absent from work and medical costs. Compared to participants classified as no cases by the HADS (2.6 days), severe case participants showed 27.3 times as many specific days of incapacity to work in the first year (72 days) and 10.3 times as many days in the second year (44 days), and resulted in 11.4 times more medical costs in the first year (2272 EUR) and 6.2 times more in the second year (1319 EUR). The relationship of mental distress to non-specific days of incapacity to work and non-specific medical costs was also significant, but mainly driven from specific absent days and specific medical costs. Our results also indicate that the prevalence of presenteeism is considerably high: 42% of individuals continued to go to work despite severe mental distress.

Conclusions: Our results show that self-reported mental distress, assessed by the HADS, is highly related to the days of incapacity to work and medical costs in the two-year period. Reducing mental distress by improving preventive structures for at-risk populations and increasing access to evidence-based treatments for individuals with mental disorders might, therefore, pay for itself and could help to reduce public costs.

Keywords: mental distress, incapacity to work, longitudinal study, prevention and health promotion, presenteeism

2.2 Introduction

Mental disorders are related to high individual suffering and a significantly reduced quality of life for those affected (Alonso et al., 2004; Spitzer et al., 1995). In addition, they are related to significant socio-economic burdens worldwide (Statistisches Bundesamt, 2020; Patel et al., 2018; Vos et al., 2015; World Health Organization, 2005b). Depression and anxiety disorders are ranked third and eighth among all diseases regarding the most years lived with disability (DALY) worldwide (James et al., 2018; Vos et al., 2015). About one in five people across industrialized countries and the world is suffering from a current mental disorder (18% Germany, 17.3% the EU, 18.9% the US, and 17.6% worldwide; OECD, 2018b; Steel et al., 2014). According to current forecasts, the economic burden of mental disorders will continue to increase in the coming years (Bloom et al., 2011); accordingly, it has been assumed that direct and indirect medical costs due to mental illness will more than double between 2010 and 2030 (factor 2.4) and that the global loss of economic output (loss of working days) will amount to $16.3 USD trillion during this period (2011–2030; Bloom et al., 2011; Eaton et al., 2018). This global loss of economic output due to mental disorders is not only caused by increased absence days, but also by an increased prevalence of presenteeism. Presenteeism, which refers to attending work while ill (Johns, 2010) has been estimated to produce 4 times as many costs compared to being absent from work (Goetzel et al., 2004).

Therefore, recognizing and reducing mental distress is of central importance to society to reduce individual suffering and socio-economic burdens (Campion et al., 2012). For doing so, individuals with mild or moderate mental distress should be given access to prevention services. In addition, individuals with severe mental distress or even mental illness should be given rapid access to specialized treatments and professional help. However, to date, mental distress or even mental illness are often detected and treated too late or not at all; only about one in five mentally ill people seek medical treatment (18.9% as 12-month prevalence; Mack et al., 2014). The treatment gap for mental disorders is universally large across countries

(Kohn et al., 2004). For example, in a representative survey of the French population, 46.5% of participants with any type of mental disorder reported no lifetime use of mental health treatment (ranging from 35.6% for mood disorders to 56.7% for substance use disorders; Font et al., 2018). Over time, mild mental distress can turn into severe mental distress – with its consequences for the duration of incapacity to work and sickness costs (Bijl et al., 2003; Ekman et al., 2013; Guthier et al., 2020; Hakanen et al., 2008). Indeed, previous studies have shown that subclinical symptoms in the general population are predictive of later mental disorders. Subclinical psychotic symptoms, for example, were studied early in the general population (Strauss, 1969; Van Os et al., 2000; Verdoux & Van Os, 2002), with significant associations with progression to psychotic disorders (Hanssen et al., 2005; Poulton et al., 2000) but also with non-psychotic disorders (Bourgin et al., 2020; Pignon et al., 2018). Further studies on other subclinical symptoms suggest that 'sadness' as a subclinical symptom is predictive of later major depressive disorder (Tebeka et al., 2021; Tebeka et al., 2018).

Creating a low-threshold and rapid access to professional help requires financial investment. At the same time, when considering the reduction of days of incapacity to work and productivity losses, it could save money. Results from the English Improving Access to Psychological Therapies service (IAPT; e.g., Clark, 2018) in the UK have shown that increasing access to psychological therapies would largely pay for itself by reducing other depression and anxiety-related public costs (e.g., medical costs and productivity loss) and increasing revenues (e.g., paying taxes; Laynard et al., 2007). It has been suggested that mental health services from other countries might benefit from adopting this approach (Clark, 2018). However, to the best of our knowledge, a detailed analysis of the socio-economic consequences of mental distress from other European countries in the general population is still lacking. This analysis is important in estimating the potential amount of money that could be saved by effective treatments and invested in improving services. Health insurers, politicians, employers, and other health care decision-makers should, therefore, be informed about the financial consequences of increased mental distress when thinking about implementing and improving preventive and curative structures to maintain and restore mental health (Chirico et al., 2019).

2.2.1 Aim of the Study

This study aims to examine the impact of different degrees of self-reported mental distress as expressed in terms of subclinical anxiety and depression levels on the number of specific (due to mental disorder and burnout) and non-specific (due to any diagnosis) days of

incapacity to work (DIW) as well as specific and non-specific medical costs in a two-year period in Germany.

2.3 Methods

Data from a passive control cohort of a large health promotion intervention study were used, which was conducted in 2013 and 2014 in 43 locations in Southern Germany (Lyssenko et al., 2015, 2016; Müller et al., 2019). The study has been registered in the German Register of Clinical Trials (DRKS) and was approved by the Ethics Review Committee at the University of Heidelberg, Germany (Study Registration: DRKS00006216). For this study, data collected in a longitudinal section were analyzed. At the beginning of the study (t0), the mental distress and the sample's socio-demographic data were collected. The DIW data were analyzed with a latency of one and two years, respectively, starting after t0.

2.3.1 Participants

A total of 34,207 policyholders of a large German health insurance company were contacted, 5,549 of whom declared their willingness to participate in the study. This corresponds to a response rate of 16%. The data could not be analyzed for 861 participants because (i) the questionnaire data was incomplete or DIW data was not available because of being insured with another health insurance company (n = 808), (ii) consent to participate in the study was withdrawn (n = 20), or (iii) the questionnaire was sent out twice (n = 23). The education variable “still in school” (n = 10) was excluded because the incomplete educational status could not be included in the ranking of the education factor. Of the remaining 4,688 insured persons, 1,329 insured persons were not included because they were not entitled to sickness benefits (e.g., pensioners, family insured persons, rehabilitates, voluntarily insured persons not entitled to sickness benefit), and 1,072 because they belonged to the experimental group in the initial study. Finally, a total sample of 2,287 study participants were included in the analyses. For details, see Lyssenko et al. (2015).

2.3.2 Assessments

Mental Distress

Cross-sectional mental distress was assessed with the Hospital Anxiety and Depression Scale (HADS; Herrmann-Lingen et al., 2011). The HADS is a self-report questionnaire measuring anxiety and depressive symptoms with good psychometric properties (Bjelland et al., 2002). The questionnaire consists of seven items for each of the two subscales, assessing

the frequency of occurrence of respective symptoms on a four-point Likert-Scale, ranging from 0 = 'not at all' to 3 = 'very often'. Total scores can be calculated for each subscale, ranging from 0 to 21 or an overall score for both subscales ranging from 0 to 42, which can be interpreted as a global screener of mental distress (Spinhoven et al., 1997). Higher values in the subscales indicate more severe anxiety or depressive symptoms. Based on the values in one of the two subscales, the degree of mental distress can be differentiated as no distress (0–7), mild distress (8–10), moderate distress (11–15), and severe mental distress (≥ 16) (Zigmond & Snaith, 1983). In addition, cut-off values are provided to distinguish between inconspicuous values and values requiring therapy. For the HADS, cut-off values apply to one of the two subscales of ≥ 8 (values ≥ 11 are considered conspicuous; Geue et al., 2016; Hinz & Brähler, 2011). Therefore, a need for therapy should be clarified by further procedures, even at a low level of mental distress. A meta-analytic consideration showed an averaged sensitivity of 0.82 and specificity of 0.74 when applying a cut-off point of 8 and an averaged sensitivity of 0.56 and specificity of 0.92 when applying a cut-off point of 11 across different clinical samples (Brennan et al., 2010). In our sample, the HADS showed good reliability, with a Cronbach's α of 0.91.

Days of Incapacity to Work

The number of specific and non-specific DIW was selected from all study participants' routine health insurance data. As specific DIW, the days of incapacity to work due to mental illness were selected classified according to the following ICD-10 domains (International Statistical Classification of Diseases and Related Health Problems), F00-F99, "mental and behavioral disorders", and ICD-10, Z73, "problems with regard to difficulties in coping with life", including burnout. As non-specific DIW, all days of incapacity to work due to any ICD-10 diagnosis were selected. Both specific and non-specific DIW were retrieved cumulatively during the first and second year, starting on the day after the HADS assessment.

Medical Costs

Direct specific and non-specific medical costs were retrieved from routine health insurance data for all study participants. The direct specific health care costs of the diagnostic main group "mental and behavioral disorders" (ICD-10, F00-F99) and "problems related to difficulties in coping with life" including burnout (Z73) were determined for the cost fields of outpatient treatment, hospital (main diagnosis), and rehabilitation (admission diagnosis). The drug costs were composed of the costs for antidepressants (N06A), psycholeptics, and psychoanaleptics in combination (N06C), anxiolytics (N05B), and hypnotics and sedatives

(N05C). The averaged direct specific and non-specific medical costs are available in Euro and were retrieved cumulatively during the first and second year, starting on the day after the HADS assessment.

Socio-demographic Data

The socio-demographic characteristics of the sample age, gender, and employment status were retrieved from the routine health insurance data. The questionnaires also assessed education and marital status.

2.3.3 Statistical Analyses

Many individuals do not generate any medical costs and do not cause a single DIW. Therefore, health insurance costs and DIW data are usually not normally distributed, but represent a probability distribution, with a positive mass at zero (discrete distribution) and a continuous distribution above zero. This so-called compound Poisson-gamma distribution belongs to the family of Tweedy distributions and can be modeled in generalized linear models (Bonat et al., 2018; Hasan & Dunn, 2011; König et al., 2019; Kurz, 2017; McCullagh & Nelder, 1989; Nelder & Wedderburn, 1972; Zavras, 2020). Accordingly, instead of using analyses of covariance, which would be appropriate in the case of normally distributed outcome variables, a generalized linear model with a Tweedie distribution with log link function was calculated with mental distress (HADS) as an independent variable and the specific and non-specific DIW and medical costs in the first and second year after the HADS assessment as dependent variables. Since prior studies have shown an effect of socio-demographic variables on DIW (DAK, 2019; Rennert et al., 2020; Schneider et al., 2017), we included the sample's socio-demographic variables as control variables in the model (age, gender, education, and relationship and employment status). By retrieving DIW and medical costs from the routine health insurance data, these data were complete for all participants over the two-year period, so there were no dropouts. The analyses were performed with SPSS 26.

2.4 Results

The sample of 2,287 participants consisted of 89% women and averaged 46.1 years of age (*SD* = 10.4). Most (72.4%) of the study participants were married. The percentage of participants holding an A-Level degree was 25.7%, whereas 2.5% had no school-leaving certificate. A small group of participants (0.5%) became unemployed by losing their job during the study period. Regarding mental distress, 47.6% of study participants were classified as no cases, 24.1% were classified as mild cases, 23.5% were classified as moderate

cases, and 4.7% were classified as severe cases, by applying the proposed cut-off values to their HADS scores. Socio-demographics of the sample are depicted in Table 1.

Table 1

Socio-demographic characteristics of the sample (N = 2,287)

		N	*%*
Gender	female	2,029	88.7%
	male	258	11.3%
Age	18-33 years	366	16.0%
	34-49 years	906	39.6%
	50-65 years	1,015	44.4%
Marital status	married	1,655	72.4%
	not married	632	27.6%
Years of school education	no school-leaving certificate	57	2.5%
	9 years	592	25.9%
	10 years	1,051	46.0%
	13 years (A-Level)	587	25.7%
Employment status	employed	2,276	99.5%
	unemployed	11	0.5%
Mental distress category (HADS)	no case	1,089	47.6%
	mild case	552	24.1%
	moderate case	538	23.5%
	severe case	108	4.7%

With 78% of all specific DIW due to mental illnesses and burnout, the diagnostic groups affective disorders (41%; e.g., depression) and neurotic, stress, and somatoform disorders (37%; e.g., anxiety disorders) dominate in the sample. None of the other diagnostic groups from the "mental and behavioral disorders" or burnout showed a proportion above 9% (i.e., 8% substance-related disorders, 7% personality disorders, 3% schizophrenia spectrum disorders, 2% problems related to difficulties in coping with life including burnout, 2% behavioral syndromes associated with physiological disturbances and physical factors [e.g., eating disorders], 1% mental disorders due to known physiological conditions [e.g., dementia]).

However, 79.6% of our sample had no specific DIW in the two years that followed the HADS testing. Based on the sample's HADS scores, the percentage of participants who did not have any specific DIW was 89% for no cases, 82% for mild cases, 66% for moderate

cases, and 42% for severe cases. Regarding non-specific DIW, 21% of our sample had no non-specific DIW in the following two years. Based on the sample's HADS scores, the percentage of participants who did not have any non-specific DIW was 27% for no cases, 20% for mild cases, 13% for moderate cases, and still 8% for severe cases.

Regarding specific (non-specific) medical costs, the proportion without any costs depending on the HADS scores was 51.1% (1.0%) for no cases, 38.9% (0.4%) for mild cases, 19.9% (0.0%) for moderate cases, and 8.3% (0.9%) for severe cases.

2.4.1 Impact of Socio-demographic Variables

Gender

Gender revealed no significant differences in non-specific and specific DIW in the first and second years (Tables 2 and 3). Accordingly, no differences in non-specific medical costs were obtained between male and female participants (Table 4). However, specific medical costs were significantly increased for female participants in the second year (Table 5). Compared to men, female participants showed 1.2 times as many specific medical costs ($\chi^2[1] = 2.60$, $p = .107$) in the first year and 1.4 times as many specific medical costs ($\chi^2[1] = 8.51$, $p = .004$) in the second year.

Age

Compared to 18–33 year-old participants, older participants showed significantly increased non-specific DIW in the first year ($\chi^2[2] = 22.54$, $p < .001$, factor 1.2 to 1.5) and the second year ($\chi^2[2] = 31.86$, $p < .001$, 1.1 to 1.5). This increase of non-specific DIW was not driven by higher specific DIW (first year: $\chi^2[2] = 2.31$, $p = .315$; second year: $\chi^2[2] = 2.23$, $p = .328$). Accordingly, older participants showed significantly higher non-specific medical costs in the first year ($\chi^2[2] = 11.68$, $p = .003$) and second year ($\chi^2[2] = 26.83$, $p < .001$), but no significant differences in specific medical costs.

Marital Status

Marital status revealed no significant differences in non-specific and specific DIW in the first or second years. Accordingly, no differences in non-specific medical costs were obtained between married and unmarried participants. The specific medical costs, however, were significantly increased in unmarried participants both in the first year ($\chi^2[1] = 30.56$, $p < .001$, factor 1.5) and the second year ($\chi^2[1]=12.51$, $p < .001$, factor 1.3).

Education

Lower educated participants showed a significant increase in non-specific DIW. Compared to participants holding an A-Level degree, lower educated participants showed 1.2 to 2.2 as many non-specific DIW in the first ($\chi^2[3] = 33.59$, $p < .001$) and in the second year ($\chi^2[3] = 54.60$, $p < .001$). The number of specific DIW was also increased for lower educated participants, however, this only yielding significance in the second year. Lower educated participants showed in the first year 1.2 to 2.0 as many specific DIW ($\chi^2[3] = 3.46$, $p = .326$) and in the second year 1.4 to 3.3 as many specific DIW ($\chi^2[3] = 11.22$, $p = .011$). Regarding the medical costs, no differences were obtained on non-specific costs in the first year, but an increase was shown in non-specific medical costs for lower educated participants in the second year ($\chi^2[3] = 43.12$, $p < .001$). An opposite pattern was found concerning specific costs. Here, lower educated participants showed increased costs in the first year ($\chi^2[3] = 14.56$, $p = .002$) but not in the second year.

Employment Status

Employment status revealed no significant differences in non-specific and specific DIW in the first and second years. However, the non-specific costs of unemployed participants were significantly increased. Compared to employed participants, unemployed participants showed 2.0 times as many non-specific medical costs ($\chi^2[1] = 8.99$, $p < .003$) in the first year and 1.7 times as many non-specific medical costs ($\chi^2[1] = 4.07$, $p = .044$) in the second year. Specific medical costs of unemployed participants were descriptively increased (1.3 to 1.5), but this was not significant.

2.4.2 Impact of Self-reported Mental Distress

The impact of HADS severity scores on specific and non-specific DIW and medical costs in the first and second years after HADS assessment is depicted in Figure 3.

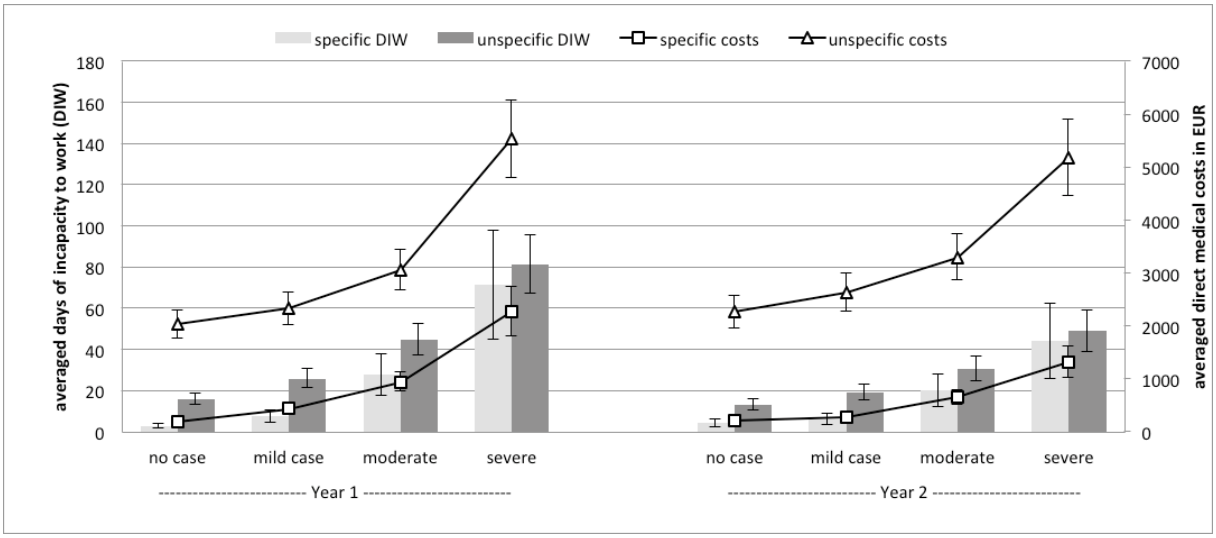

Figure 3. Mean scores of specific and non-specific days of incapacity to work (DIW) on the left y-axis and specific and non-specific medical costs (MC) on the right y-axis in the first and second year after HADS assessment, depending on the HADS severity score. Specific = DIW or MC due to mental illness. Non-specific = DIW or MC due to all diagnoses. Results are controlled for age, gender, marital status, education, and employment status. Error bars represent standard errors.

Days of Incapacity to Work

Mental distress, as measured with the HADS at t0, showed a significant effect on the number of non-specific DIW in the first year ($\chi^2[3] = 320.78$, $p < .001$; see Table 2) and the second year ($\chi^2[3] = 195.17$, $p < .001$). The number of non-specific DIW increased continuously with the degree of mental distress. While participants classified as no cases averaged 15.8 non-specific DIW in the first year (13.1 in the second year), mild case participants averaged 1.6 (1.5) times as many non-specific DIW (M = 25.8 days in the first year and M = 19.1 days in the second year), moderate case participants averaged 2.8 (2.3) times as many non-specific DIW (M = 44.7 days in the first year and M = 30.6 days in the second year), and severe case participants averaged 5.1 (3.7) times as many non-specific DIW (M = 81.4 days in the first year and M = 48.9 days in the second year).

This increase of non-specific DIW was mainly driven by an increase of specific DIW in the first year ($\chi^2[3] = 196.98$, $p < .001$) and the second year ($\chi^2[3] = 106.21$, $p < .001$; see Table 3). While participants, classified as no cases averaged 2.6 specific DIW in the first year (4.3 in the second year), mild case participants averaged 2.8 (1.5) times as many specific DIW (M = 7.4 days in the first and M = 6.2 days in the second year), moderate case participants averaged 10.5 (4.7) times as many specific DIW (M = 27.5 days in the first and M = 20.1 days in the second year), and severe case participants averaged 27.3 (10.3) times as many specific DIW (M = 71.5 days in the first and M = 43.9 days in the second year).

The increases of DIW in the first and second years were obtained on both the anxiety and depression subscales (all *p* values < .001).

Medical Costs

The increase of DIW depending on mental distress was also reflected in higher non-specific medical costs in the first year (χ^2[3] = 164.41, p < .001; see Table 4) and the second year (χ^2[3] = 110.45, p < .001). Again, the number of non-specific medical costs increased continuously according to the degree of mental distress: While participants classified as no cases averaged 2,031 EUR non-specific medical costs in the first year (2,260 EUR in the second year), mild case participants had 1.2 (1.2) times as many non-specific medical costs (*M* = 2330 EUR in the first year and *M* = 2,635 EUR in the second year); moderate case participants had 1.5 (1.5) times as many non-specific medical costs (*M* = 3,048 EUR in the first and *M* = 3,292 EUR in the second year); and severe case participants had 2.7 (1.9) times as many non-specific medical costs (*M* = 5,544 EUR in the first and *M* = 5,181 EUR in the second year).

The increase of non-specific medical costs was again mainly driven by an increase of specific medical costs in the first year (χ^2[3] = 496.56, p < 0.001; see Table 5) and the second year (χ^2[3] = 309.45, p < .001). While participants classified as no cases averaged 199 EUR specific medical costs in the first year (213 EUR in the second year), mild case participants had 2.2 (1.3) times as many specific medical costs (*M* = 434 EUR in the first and *M* = 272 EUR in the second year); moderate case participants had 4.7 (3.1) times as many specific medical costs (*M* = 941 EUR in the first and *M* = 661 EUR in the second year); and severe case participants had 11.4 (6.2) times as many specific medical costs (*M* = 2,272 EUR in the first and 1,319 EUR in the second year).

The increases in medical costs in the first and second years were obtained on both the anxiety and depression subscales (all *p* values < .001).

Table 2

Results from the generalized linear model to predict the non-specific days of incapacity to work (due to any diagnosis) by self-reported mental distress, controlled for socio-demographic characteristics

		Non-specific DIW in the first year					Non-specific DIW in the second year				
		M	*95% CI*	*Exp(B)*	*95% CI*	*p-value*	*M*	*95% CI*	*Exp(B)*	*95% CI*	*p-value*
Constant				6.44	[4.95; 8.38]	< .001			6.39	[4.85; 8.41]	< .001
Gender	male[a]	32.2	[22.9; 45.4]	1.00			22.5	[15.2; 33.2]	1.00		
	female	37.8	[27.8; 51.6]	1.17	[0.97; 1.42]	.093	27.2	[19.0; 39.1]	1.21	[1.00; 1.47]	.052
Age groups	18-33 years[a]	28.4	[20.1; 40.2]	1.00			21.0	[14.2; 31.2]	1.00		
	34-49 years	35.0	[25.4; 48.2]	1.23	[1.03; 1.48]	.026	22.8	[15.7; 33.0]	1.08	[0.89; 1.31]	.412
	50-65 years	42.8	[31.4; 58.5]	1.51	[1.26; 1.81]	< .001	31.6	[22.0; 45.4]	1.51	[1.25; 1.82]	< .001
Marital status	married[a]	33.0	[24.1; 45.1]	1.00			23.2	[16.2; 33.4]	1.00		
	not married	37.0	[26.8; 51.1]	1.12	[0.99; 1.27]	.072	26.3	[18.1; 38.2]	1.13	[0.99; 1.29]	.065
Years of school education	13 years (A-Level)[a]	25.1	[18.1; 34.9]	1.00			16.5	[11.3; 24.2]	1.00		
	10 years	30.3	[22.1; 41.5]	1.21	[1.04; 1.40]	.016	20.7	[14.3; 30.1]	1.23	[1.07; 1.47]	.005
	9 years	37.9	[27.5; 52.2]	1.51	[1.23; 1.79]	< .001	29.6	[20.3; 43.0]	1.79	[1.50; 2.13]	< .001
	no school-leaving certificate	51.7	[34.2; 78.1]	2.06	[1.50; 2.83]	< .001	36.9	[23.6; 57.7]	2.23	[1.59; 3.13]	< .001
Employment status	employed[a]	27.9	[24.6; 31.5]	1.00			24.9	[21.9; 28.3]	1.00		
	unemployed	43.8	[24.0; 79.9]	1.57	[0.86; 2.87]	.143	24.6	[12.1; 49.8]	0.99	[0.48; 2.02]	.973
Mental distress category (HADS)	no case[a]	15.8	[11.4; 22.1]	1.00			13.1	[9.0; 19.1]	1.00		
	mild case	25.8	[18.4; 36.2]	1.63	[1.40; 1.90]	< .001	19.1	[13.0; 28.0]	1.46	[1.25; 1.70]	< .001
	moderate case	44.7	[32.2; 61.9]	2.82	[2.45; 3.25]	< .001	30.6	[21.1; 44.3]	2.34	[2.02; 2.71]	< .001
	severe case	81.4	[58.0; 114.3]	5.14	[4.11; 6.41]	< .001	48.9	[32.7; 73.0]	3.73	[2.95; 4.72]	< .001

Note. N = 2,287. t0 = assessment of predictor variables. *M* = Mean days of incapacity to work. *CI* = 95% confidence interval. HADS = Hospital Anxiety and Depression Scale. a = reference category. Method = log-link function, Tweedie-distribution of residuals.

Table 3

Results from the generalized linear model to predict the specific days of incapacity to work (due to mental illness) by self-reported mental distress, controlled for socio-demographic characteristics

		Specific DIW in the first year					Specific DIW in the second year				
		M	*95% CI*	*Exp(B)*	*95% CI*	*p-value*	*M*	*95% CI*	*Exp(B)*	*95% CI*	*p-value*
Constant				0.78	[0.36; 1.69]	.533			1.25	[0.58; 2.69]	.567
Gender	male[a]	11.2	[5.1; 24.5]	1.00			10.2	[4.4; 23.3]	1.00		
	female	17.5	[9.1; 33.9]	1.57	[0.91; 2.69]	.373	15.1	[7.4; 30.9]	1.48	[0.87; 2.52]	.147
Age groups	18-33 years[a]	11.1	[5.0; 24.5]	1.00			11.3	[4.9; 26.1]	1.00		
	34-49 years	16.3	[8.1; 32.5]	1.47	[0.89; 2.41]	.129	11.5	[5.4; 24.5]	1.01	[0.62; 1.65]	.964
	50-65 years	15.2	[7.7; 29.7]	1.37	[0.83; 2.26]	.221	14.6	[7.1; 30.0]	1.29	[0.79; 2.09]	.309
Marital status	married[a]	14.2	[7.2; 28.1]	1.00			11.2	[5.4; 23.4]	1.00		
	not married	13.7	[6.8; 27.9]	0.96	[0.68; 1.36]	.835	13.6	[6.4; 29.2]	1.22	[0.87; 1.70]	.258
Years of school education	13 years (A-Level)[a]	10.8	[5.2; 22.6]	1.00			7.3	[3.3; 16.1]	1.00		
	10 years	13.1	[6.7; 25.8]	1.21	[0.80; 1.83]	.360	10.2	[4.8; 21.7]	1.41	[0.92; 2.15]	.114
	9 years	12.1	[6.0; 24.6]	1.12	[0.70; 1.79]	.636	13.1	[6.0; 28.4]	1.80	[1.13; 2.85]	.013
	no school-leaving certificate	22.1	[8.7; 56.5]	2.04	[0.93; 4.48]	.074	24.2	[9.5; 61.6]	3.32	[1.51; 7.28]	.003
Employment status	employed[a]	8.4	[6.0; 11.7]	1.00			9.0	[6.5; 12.5]	1.00		
	unemployed	23.4	[6.6; 82.5]	2.80	[0.80; 9.86]	.108	17.0	[4.2; 68.0]	1.88	[0.46; 7.59]	.377
Mental distress category (HADS)	no case[a]	2.6	[1.2; 5.6]	1.00			4.3	[2.0; 9.3]	1.00		
	mild case	7.4	[3.5; 15.8]	2.83	[1.78; 4.49]	< .001	6.2	[2.8; 14.0]	1.46	[0.94; 2.28]	.095
	moderate case	27.5	[13.6; 55.9]	10.50	[7.04; 15.67]	< .001	20.1	[9.5; 42.4]	4.71	[3.21; 6.90]	< .001
	severe case	71.5	[34.7; 147.1]	27.26	[15.79; 47.07]	< .001	43.9	[19.5; 99.0]	10.29	[5.97; 17.72]	< .001

Note. N = 2,287. t0 = assessment of predictor variables. *M* = Mean days of incapacity to work. *CI* = 95% confidence interval. HADS = Hospital Anxiety and Depression Scale. a = reference category. Method = log-link function, Tweedie-distribution of residuals.

Table 4

Results from the generalized linear model to predict the direct non-specific medical costs by self-reported mental distress, controlled for socio-demographic characteristics

		Non-specific costs in the first year					Non-specific costs in the second year				
		M	*95% CI*	*Exp(B)*	*95% CI*	*p-value*	*M*	*95% CI*	*Exp(B)*	*95% CI*	*p-value*
Constant				1217.15	[1016.57; 1457.31]	< .001			1302.23	[1082.57; 1566.46]	< .001
Gender	male[a]	2799.9	[2174.8; 3604.7]	1.00			3142.1	[2415.0; 4088.0]	1.00		
	female	3191.1	[2527.0; 4029.9]	1.14	[1.00; 1.30]	.053	3207.3	[2507.0; 4103.3]	1.02	[0.89; 1.17]	.761
Age groups	18-33 years[a]	2682.3	[2078.7; 3461.0]	1.00			2760.1	[2111.1; 3608.7]	1.00		
	34-49 years	3008.9	[2370.6; 3819.0]	1.12	[0.99; 1.27]	.072	3099.7	[2413.6; 3980.9]	1.12	[0.98; 1.28]	.083
	50-65 years	3309.2	[2613.7; 4189.8]	1.23	[1.09; 1.40]	.001	3739.3	[2917.0; 4793.3]	1.35	[1.19; 1.54]	< .001
Marital status	married[a]	2947.5	[2330.6; 3727.7]	1.00			3055.6	[2387.9; 3909.9]	1.00		
	not married	3031.3	[2380.1; 3860.7]	1.03	[0.94; 1.13]	.545	3298.1	[2557.3; 4253.5]	1.08	[0.98; 1.19]	.108
Years of school education	13 years (A-Level)[a]	3059.7	[2401.1; 3899.0]	1.00			2833.3	[2193.2; 3660.3]	1.00		
	10 years	2870.0	[2267.9; 3632.0]	0.94	[0.85; 1.04]	.221	2609.4	[2033.0; 3349.1]	0.92	[0.83; 1.03]	.131
	9 years	3123.5	[2466.3; 3955.8]	1.02	[0.91; 1.15]	.731	3620.8	[2822.6; 4644.8]	1.28	[1.13; 1.44]	< .001
	no school-leaving certificate	2910.6	[2099.8; 4034.4]	0.95	[0.73; 1.23]	.707	3793.8	[2732.5; 5267.5]	1.34	[1.04; 1.73]	.024
Employment Status	employed[a]	2111.4	[1923.4; 2317.9]	1.00			2474.8	[2253.9; 2717.2]	1.00		
	unemployed	4231.7	[2693.3; 6648.7]	2.00	[1.27; 3.16]	.003	4072.2	[2522.1; 6574.8]	1.65	[1.01; 2.67]	.044
Mental distress category (HADS)	no case[a]	2031.0	[1588.2; 2597.4]	1.00			2259.5	[1744.5; 2926.6]	1.00		
	mild case	2329.7	[1810.8; 2997.2]	1.15	[1.03; 1.27]	.010	2635.1	[2024.0; 3430.7]	1.17	[1.05; 1.30]	.005
	moderate case	3048.4	[2389.3; 3889.4]	1.50	[1.36; 1.66]	< .001	3292.0	[2546.0; 4256.6]	1.46	[1.31; 1.62]	< .001
	severe case	5543.7	[4273.8; 7167.5]	2.73	[2.30; 3.23]	< .001	5181.3	[3952.3; 6792.3]	2.29	[1.92; 2.74]	< .001

Note. N = 2,287. t0 = assessment of predictor variables. *M* = Mean non-specific direct costs in Euro per person and year. *CI* = 95% confidence interval. HADS = Hospital Anxiety and Depression Scale. a = reference category. Method = log-link function, Tweedie-distribution of residuals.

Table 5

Results from the generalized linear model to predict the direct specific medical costs by self-reported mental distress, controlled for socio-demographic characteristics

		Specific costs in the first year					Specific costs in the second year				
		M	*95% CI*	*Exp(B)*	*95% CI*	*p-value*	*M*	*95% CI*	*Exp(B)*	*95% CI*	*p-value*
Constant				93.72	[67.94; 129.28]	< .001			132.74	[96.86; 181.92]	
Gender	male[a]	595.4	[395.2; 897.1]	1.00			397.7	[259.9; 608.6]	1.00		
	female	721.4	[395.2; 897.1]	1.21	[0.96; 1.53]	.107	564.9	[384.7; 608.6]	1.42	[1.12; 1.80]	.004
Age groups	18-33 years[a]	687.6	[458.6; 1030.8]	1.00			464.9	[304.7; 709.4]	1.00		
	34-49 years	641.7	[439.5; 937.0]	0.93	[0.76; 1.15]	.515	444.9	[298.7; 662.6]	0.96	[0.78; 1.17]	.673
	50-65 years	638.0	[443.2; 918.6]	0.93	[0.75; 1.14]	.484	514.8	[349.6; 758.1]	1.11	[0.90; 1.36]	.330
Marital status	married[a]	531.9	[367.8; 769.2]	1.00			414.7	[280.7; 612.7]	1.00		
	not married	807.5	[552.8; 1179.6]	1.52	[1.31; 1.76]	< .001	541.7	[363.4; 807.5]	1.31	[1.13; 1.52]	< .001
Years of school education	13 years (A-Level)[a]	492.3	[334.1; 725.4]	1.00			474.3	[315.0; 714.1]	1.00		
	10 years	648.7	[449.0; 937.3]	1.89	[1.04; 1.40]	.001	487.7	[328.0; 725.1]	1.03	[0.87; 1.22]	.753
	9 years	619.4	[423.4; 906.2]	1.26	[1.23; 1.79]	.029	541.4	[360.9; 812.2]	1.14	[0.94; 1.39]	.187
	no school-leaving certificate	932.6	[573.7; 1516.1]	1.32	[1.10; 1.58]	.003	403.0	[238.8; 680.2]	0.85	[0.55; 1.31]	.464
Employment Status	employed[a]	531.1	[458.9; 614.7]	1.00			409.7	[350.6; 478.7]	1.00		
	unemployed	808.7	[402.3; 1625.8]	1.52	[0.76; 3.05]	.234	548.4	[259.3; 1159.7]	1.34	[0.63; 2.85]	.448
Mental distress category (HADS)	no case[a]	199.0	[134.8; 293.9]	1.00			213.1	[142.2; 319.5]	1.00		
	mild case	433.6	[291.8; 644.3]	2.18	[1.80; 2.64]	< .001	271.6	[179.0; 412.2]	1.27	[1.06; 1.53]	.010
	moderate case	940.9	[647.1; 1368.0]	4.73	[3.97; 5.63]	< .001	661.1	[445.5; 980.9]	3.10	[2.63; 3.66]	< .001
	severe case	2272.3	[1521.0; 3394.6]	11.42	[8.90; 14.66]	< .001	1318.9	[858.7; 2026.0]	6.19	[4.79; 7.99]	< .001

Note. N = 2,287. t0 = assessment of predictor variables. *M* = Mean specific direct costs in Euro per person and year. *CI* = 95% confidence interval. HADS = Hospital Anxiety and Depression Scale. a = reference category. Method = log-link function, Tweedie-distribution of residuals.

2.5 Discussion

This study aimed to examine the impact of self-reported mental distress, assessed by the HADS, on the number of specific and non-specific DIW and medical costs in the two years following the assessment. To address this aim, we conducted a longitudinal study, in which the HADS scores of 2,287 participants were used to predict their specific and non-specific DIW and medical costs in the first and second years after HADS assessment.

Our results revealed that self-reported mental distress (HADS scores) was significantly related to the number of non-specific DIW in the first and second years. Accordingly, the number of non-specific DIW increased continuously based on the level of mental distress. Compared to the reference group classified as no cases, severe cases had 5.1 times as many non-specific DIW in the first year and 3.7 times as many non-specific DIW in the second year. Not surprisingly, the increase of non-specific DIW was mainly driven by a significant increase of specific DIW. Compared to the no cases, severe cases showed 27.3 times as many specific DIW in the first year and 10.3 times as many specific DIW in the second year.

These results demonstrate that mental distress impacts a person's life for several years by predicting their sickness absence rates even two years later. This increased sickness absence rate might be, in turn, related to generally reduced social and occupational functioning levels and reduced well-being of individuals (Hannula et al., 2006). Furthermore, mental distress appears to be a central challenge for employers in terms of productivity loss. The financial consequences of specific DIW due to production loss can be calculated by multiplying the specific DIW by average income. Regarding average costs due to production loss in 2014 of 105 EUR per DIW (BAuA, 2014), the averaged additional costs for an employee under severe mental distress due to absenteeism alone amount to 7,230 EUR in the first years and 4,163 EUR in the second year, compared to an employee without mental distress. According to prior empirical findings, the additional costs due to presenteeism can be estimated to be four times higher (Rennert et al., 2020). Our results revealed that 66% of participants classified as moderate cases and 42% of participants classified as severe cases did not have any specific DIW in the two-year period that was analyzed. These results indicate that the percentage of people who go to work despite severe mental distress might be considerably high and illustrate the importance and spread of presenteeism. Given this high prevalence of presenteeism and the assumed adverse mental health outcomes, future studies should characterize this subsample's environmental context (e.g., country, cultural norms), work related variables (e.g., job insecurity, strict attendance policies), psychological and personal

factors (e.g., consciousness, perfectionism) as well as socio-demographic characteristics (e.g., gender, educational level) to better understand the risk factors of presenteeism (Johns, 2010; Kwon, 2020; Lohaus & Habermann, 2019; Robertson et al., 2012). By doing so, a distinction should be made between whether work characteristics are perceived as resources and thus contribute to the stabilization of mental health, or as stressors that lead to the maintenance of high mental distress (Lohaus et al., 2020).

Both the anxiety and depression subscales of the HADS were predictive for specific and non-specific DIW. This is not surprising since 78% of all specific DIW due to mental illness and burnout in our sample were caused by the diagnostic groups affective disorders (41%; e.g., depression) and neurotic, stress and somatoform disorders (37%; e.g., anxiety disorders). This roughly corresponds to results from other studies in Germany, in which 88.6% of all specific DIW resulted from affective (41.4%) or neurotic, stress, and somatoform disorders (47.2%; DAK, 2019). Accordingly, it seems plausible that both the anxiety and depression subscale of the HADS predicted the number of specific DIW in our analyses. However, the impact of both HADS subscales for non-specific DIW is in contrast to the results of Schneider et al. (Schneider et al., 2017), in which only the anxiety symptoms, but not the depressive symptoms, were found to be a significant predictor of the duration of absences due to non-specific DIW.

Beyond non-specific and specific DIW, our results demonstrated that mental distress is also significantly related to individuals' specific and non-specific medical costs in the first and second year. Specific costs in the first year were 11.4 times higher for severe cases, compared to no cases. Even in the second year, severe cases showed 6.2 times as many specific costs as no cases. This amounts to an additional average specific cost of 2,073 EUR per person and year for severe cases in the first year and 1,106 EUR per person and year in the second year for the public health care system. The predictive effect of non-specific costs was considerably smaller, but also significant. Compared to no cases, severe cases averaged 2.7 times the costs in the first and 1.9 times the costs in the second year. This amounts to additional average non-specific costs of 3,513 EUR per person and year for severe cases in the first year and 2,922 EUR per person and year in the second year for the public health care system. The significant relationship between mental distress and non-specific medical costs was mainly driven by specific medical costs. However, these results also imply that subclinical psychiatric symptoms are associated with non-psychiatric medical outcomes. This finding is consistent with other research indicating, for example, an association between psychotic symptoms and diabetes (Nuevo et al., 2011), loneliness and venous

thromboembolic events (Enga et al., 2012), or depressive symptoms and blood pressure levels (Vallée et al., 2021).

These results underline the socio-economic burden of mental distress for public health care systems. However, they also show that this burden can be predicted by self-reported mental distress at an early stage. This result is consistent with previous studies, which have identified subclinical symptoms in the general population as predictive for later mental disorders (Strauss et al., 1969; Van Os et al., 2000; Verdoux & Van Os, 2002; Poulton et al., 2000; Hanssen et al., 2005; Pignon et al., 2018; Bourgin et al., 2020; Tebeka et al., 2021; Tebeka et al., 2018). There is rising evidence for the importance of subclinical symptoms to recognize possible mental burden at an early stage and opening the possibility of prevention.

Although our data represent costs from a German population, these results can be seen as an indicator for other industrialized countries, since both the prevalence of mental disorders (Germany 18%, EU 17.3%) and the percentage of direct and indirect medical costs due to mental illness in Germany (Germany 4.8%, EU 4.0%) are comparable to other EU countries (OECD, 2018b).

Most demographic characteristics of our sample showed no consistent effects across the different dependent variables. However, these have been included mainly as control variables to control possible confounding variables. Future studies should specifically focus on these variables to draw reliable conclusions about socio-demographic variables' influence on absence days and medical costs. Only the participants' age showed a consistent pattern with increased non-specific DIW and non-specific medical costs for both years, but no differences in specific DIW and specific medical costs. Lower education in our sample was significantly related to non-specific DIW. However, on specific DIW, the increase by lower education yielded significance only in the second year. These results are in line with prior studies showing that mental distress (anxiety symptoms), higher age, and lower education emerged as significant predictors of non-specific DIW (Schneider et al., 2017). Given these findings, it seems likely that lower educational status and higher age can be considered a risk factor for non-specific DIW. However, their effect on specific DIW or medical costs remains uncertain. Future studies should include large and representative samples to investigate the differential effects of age and education on specific and non-specific DIW and specific and non-specific medical costs.

Contrary to prior studies, in which female gender was found to be a significant predictor of specific DIW (DAK, 2019; Rennert et al., 2020), our analyses showed no differences of

specific DIW between male and female participants. However, a closer look at the descriptive factors shows that the factors from our study (1.57) are comparable to those from previous studies (1.6; DAK, 2019; Rennert et al., 2020). Therefore, the non-significant differences in DIW depending on the sample characteristics in our study could result from a too small sample size in the different subgroups, thus limiting the power for individual comparisons. With 89%, the proportion of female participants was considerably high. Interestingly, female participants showed higher specific medical costs in both years. This finding is in line with prior research, indicating a higher prevalence of anxiety and affective mental disorders in female populations (OECD, 2018b; Seedat et al., 2009).

2.5.1 Strengths, Limitations, and Recommendations for Future Research

Our study's major strengths relate to its longitudinal research design and the analysis of real DIW and medical cost data from a health insurance company in conjunction with psychometrically assessed mental distress from individuals. By including DIW and medical costs in the first and second year, we were able to show that self-reported mental distress was predictive for DIW and medical costs regardless of the DIW and medical costs occurring immediately after the HADS assessment, and this enabled us to show the long-term consequences of severe mental distress. By including specific and non-specific DIW and specific and non-specific costs as dependent variables, we were able to show the importance of mental health for general, occupational functioning and point to the consequences of mental distress for companies and the public health care systems. Furthermore, the available cut-off scores of the HADS to distinguish between no, mild, moderate, and severe cases allowed us to demonstrate clear, practical implications for the consequences of severe mental distress in applied settings. However, this study has some limitations, which should be considered when interpreting the results.

Firstly, we only investigated the main effects of the sample characteristics and mental distress. However, more complex interaction effects between the independent variables are conceivable and should be investigated in future studies using larger sample sizes. Secondly, although our total sample was reasonably large, it is not a representative sample of the German population. Accordingly, we have included sociodemographic variables including gender, age groups, employment status, education and marital status in the models. However, some socio-demographic subgroups might be too small, resulting in limited power to retrieve reliable conclusions about the effect of different sample characteristics on DIW and medical costs, respectively (e.g., n = 11 participants in the unemployment group). Third, in addition to

the sample characteristics analyzed in this study, other variables might impact the relationship between mental distress and DIW, such as the quality of health management in organizations (Cullen et al., 2018), subjectively perceived workplace characteristics (e.g., social support or leadership quality; Aas et al., 2008; Lysaght & Larmour-Trode, 2008) or interindividual differences in psychological conditions, such as self-efficacy or work attitude (Brouwer et al., 2010). In addition, variables influencing the relationship between mental distress and medical costs should be investigated, such as access to psychotherapy or stigmatization. Finally, we analyzed DIW and medical costs independently of each other. Given possible confounding factors between those dependent variables, a multivariate analysis would have been appropriate to control for these dependencies. However, due to the Tweedie distributions of both the cost and DIW data, which represents a serious deviation from the normal distribution, the prerequisite for a multivariate analysis was not given. The use of general linear models allowed us to model Tweedie distributions. Future studies should investigate how medical costs and DIW are related to each other over time (e.g., whether increased specific medical costs help to reduce DIW). Future studies should also systematically investigate how prevention programs for distressed individuals and evidence-based treatments for individuals with mental disorders contribute to saving money by restoring occupational and social functioning.

2.5.2 Implications for Practice

This study shows the extent to which self-reported mental distress is related to the subsequent inability to work and to medical costs. On an individual level, our results indicate that mental distress affects a person's life after a span of two years by reducing occupational and social functioning. On a societal level, our results demonstrate the high socio-economic costs of mental distress through productivity losses due to reduced individual functional levels. The results, therefore, suggest that joint efforts should be made to effectively reduce mental distress (Saxena et al., 2006). Individuals with mild and moderate mental distress who do not yet suffer from a manifested mental illness should be given access to preventive services (World Health Organization, 2002). Preventive structures should be established within peoples' everyday lives (e.g., at the workplace) to enable low-threshold access (Kohn et al., 2004; Mack et al., 2014). Workplace health promotion programs play a special role here because occupational risk factors, such as emotional load or work-related stress, can contribute critically to increased mental distress, which often manifests itself in anxiety and depression symptoms as well as burnout conditions (Chirico, 2017a, 2017b). This also refers

to the importance of occupational health surveillance for the monitoring and early prevention of mental distress, since not recognizing mental distress, ignoring it, or not taking effective countermeasures might exacerbate the problem and result in significant negative financial impact (Chirico et al., 2019; Guthier et al., 2020; Hakanen et al., 2008; Magnavita, 2018). A preventive commitment from employers to the workforce's mental health should ultimately lead to a better working atmosphere, a better quality of life for employees, and an increase in productivity (Eaton et al., 2018).

Individuals with severe mental distress or those with manifested mental disorders should be given rapid access to specialized help in the form of evidence-based psychotherapeutic or psychiatric treatments (Laynard et al., 2007). Prior studies from the UK have shown that increasing access to psychological therapies would largely pay for itself by reducing other depression and anxiety-related public costs (e.g., medical costs and productivity loss) and increasing revenues (e.g., paying taxes; Laynard et al., 2007). Rapid access to mental health services should be enabled, since the time spent waiting to start psychological treatments was negatively associated with treatment outcome (Clark, 2018).

2.5.3 Conclusion

In summary, our study demonstrates the extent to which mental distress is associated with reduced occupational and social functioning. Accordingly, mental distress significantly impacts the number of DIW and medical costs for a span of two years following the initial HADS assessment. These results indicate that improving preventive structures for at-risk populations and increasing access to specialized treatments for individuals with mental disorders might reduce individual suffering as well as public costs.

3 SCHRIFT 2: MINDFULNESS-BASED PROGRAMS IN THE WORKPLACE: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

An adapted version of this chapter has been published as '**Vonderlin, R.**, Biermann, M., Bohus, M., & Lyssenko, L. (2020). Mindfulness-based programs in the workplace: a meta-analysis of randomized controlled trials. *Mindfulness*, *11*(7), 1579-1598.'

3.1 Abstract

Objectives: Given the complex demands of many workplaces, there is growing interest in the potential beneficial effects of mindfulness-based programs (MBPs) for employees. This meta-analysis systematically synthesizes the results of randomized-controlled studies conducted in various workplace settings.

Methods: Eligible studies were identified by a systematic literature search in four electronic databases and complementary manual search strategies through 11/2018. Random-effects models were used to synthesize data across 56 studies including n = 2,689 participants and n = 2,472 controls. The validity of synthesized effect size estimates was analyzed for heterogeneity and influential cases (outliers). Risk of bias was assessed following Cochrane recommendations.

Results: Analyses of between-group effects indicated that MBPs effectively reduce stress, burnout, mental distress and somatic complaints, while improving mindfulness, well-being, compassion, and job satisfaction – all with small to large effect sizes ranging from Hedge's g = 0.32 to 0.77. Results were maintained in follow-up assessments ≤ 12 weeks. Heterogeneity among primary studies was not explained consistently by program or participant characteristics in the exploratory moderator analyses. Results on work engagement and productivity were limited by low numbers of primary studies with outliers among their effect sizes.

Conclusions: Our meta-analysis provides evidence that MBPs effectively promote the health and well-being of employees in various occupational settings. Further research is needed to investigate potential benefits on work-related outcomes and effects for longer-term follow-ups.

Keywords: Meta-analysis; Mindfulness-based programs; Workplace randomized controlled trials

3.2 Introduction

Globalization, digitization and societal transformations have changed the world of work dramatically in the last decades: work processes have become more complex, more intense, and require more flexibility and mobility from employees (Mack et al., 2015). Productivity per hour worked has increased by approximately 20% since the year 2000 across OECD countries (OECD, 2018a). Adverse effects of the increased psychosocial demands include prolonged work-related stress, exhaustion, burnout and subsequent health impairments (Quick & Henderson, 2016). Absenteeism and presenteeism account for major productivity losses and high societal costs in industrialized countries (Schmidt et al., 2019; Strömberg et al., 2017). Consequently, health promotion has become an important objective in occupational settings.

Mindfulness-based programs (MBPs) have attained an outstanding position among occupational health promotion programs. The proposed benefits go beyond personal well-being to cover key aspects of workplace functioning (e.g., Hülsheger et al., 2013). Both components of mindfulness, as defined by Bishop et al. (2004), have been discussed with regard to their potential for work performance (Good et al., 2016; Hyland et al., 2015). The self-regulation of attention to the present moment is thought to enable individuals to better focus on the tasks at hand, be less distractible to extraneous stimuli and avoid mistakes (e.g., Glomb et al., 2011; Good et al., 2016). Relating to one's experiences with curiosity, openness and acceptance has been proposed to spark creativity, open new perspectives, enhance problem solving and facilitate coping with uncertainty (Baas et al., 2014; Jacobs & Blustein, 2008; Lebuda et al., 2016; Ostafin & Kassman, 2012). These intrapersonal qualities might positively affect interpersonal functioning (Moll et al., 2015) and leadership behavior (Nübold et al., 2020; Reb et al., 2019; Schuh et al., 2019). Thus, workplace mindfulness is expected to improve not only individual well-being and performance, but also the productivity, agility and innovative strength of organizations on the whole (Greiser & Martini, 2018).

Building on enthusiastic reports from pioneering companies since the late 1980s, an exponential growth in popularity sparked in the 2000s, when a number of large companies launched mindfulness programs for their workforces – the most influential Google, General Mills, Intel and Target (Gelles, 2015; Schaufenbuel, 2015). Meanwhile, the provision of services related to mindfulness and/or meditation has become a billion-dollar industry (Wolever et al., 2018). In a survey conducted by the National Business Group on Health (US) in 2018, about 60% mid- to large-sized US-companies reported offering mindfulness, yoga or

meditation courses to their employees (National Business Group on Health, 2019). Prominent examples cover a wide range of industries, such as hard- and software development (e.g., Microsoft, Apple, Cisco, SAP), social media (e.g., Facebook, LinkedIn, Twitter), long-established industrial companies (e.g., Beiersdorf, Bosch), clothing and furniture (e.g., Nike, IKEA), global service providers in finance/insurance (e.g., Aetna, Goldman Sachs), as well as political institutions (e.g., UK Parliament, US House of Representatives) and numerous programs in health care and educational settings (Burton et al., 2017; Klingbeil & Renshaw, 2018).

Interestingly, this large-scale implementation has progressed without sound empirical evidence for the anticipated effects on work-related outcomes (Jamieson & Tuckey, 2017). Several scientists have provided a logically stringent theoretical rationale on how empirical findings from other contexts might apply to work performance and productivity (e.g., Good et al., 2016; Hyland et al., 2015). However, the proposed correlates of mindfulness were predominantly investigated in cross-sectional studies (Mesmer-Magnus et al., 2017), thus not allowing inferences, whether similar effects can be achieved through training.

Intervention studies in other settings have shown that mindfulness training provides a variety of benefits by inducing positive changes in attention, cognition, emotions, behavior, and physiology (Hendriks et al., 2017; Jayawardene et al., 2017; Khoury et al., 2015; Spijkerman et al., 2016). However, it has been questioned whether these results can be transferred to occupational settings (Jamieson & Tuckey, 2017). Several contextual characteristics may influence the acceptability and potential benefits of MBPs, including working conditions, organizational culture, social norms and work patterns in specific industries or professions (Glomb et al., 2011; Sutcliffe et al., 2016).

The strong interest in MBPs in workplace settings is reflected by a growing number of systematic reviews. Qualitative reviews have provided an overview of empirical studies across occupational groups (Eby et al., 2019; Jamieson & Tuckey, 2017; Janssen et al., 2018; Lomas et al., 2017a) and in specific settings, such as teaching/education (Hwang et al., 2017; Lomas et al. 2017b), health care (Boellinghaus et al., 2014; Escuriex & Labbé, 2011; Irving et al., 2009; Lomas et al., 2019b; Luken & Sammons, 2016; Morgan et al., 2015; Rudaz et al., 2017; Smith, 2014), social workers (Trowbridge & Mische-Lawson, 2016) and managers (Donaldson-Feilder et al., 2019). Although most authors draw encouraging conclusions, the inclusion of uncontrolled studies with a varying methodological quality impede the evaluation to which extent effects can be achieved.

Most previous meta-analyses either refer to a specific occupational group, such as teachers (Iancu et al., 2018; Klingbeil & Renshaw, 2018) and mental health professionals (Barns, 2017; Burton et al., 2017; Lomas et al., 2019b), or to specific outcome variables, e.g., psychological distress (Slemp et al., 2019; Virgili, 2015) or burnout (Iancu et al., 2018; Slemp et al., 2019). Two recently published meta-analyses allow a more comprehensive assessment of empirical effectiveness by reporting synthesized effect sizes based on randomized controlled trials (RCTs) published before January 2016 (k = 35; Lomas et al., 2019a) and May 2016, respectively (k = 23; Bartlett et al., 2019). However, the exponential increase in popularity also seems to apply to intervention research, as the number of published RCTs has almost doubled between 2016 and 2019. The primary objective of this meta-analysis is therefore to update the aforementioned meta-analyses and to extend their work by synthesizing effect sizes on work-related outcomes and long-term effects of MBPs in the occupational setting. The secondary objective is to explore characteristics that may influence the magnitude of effects on different outcome domains.

Several authors have emphasized the large variability across MBPs and the associated difficulties to evaluate their efficacy (e.g., Van Dam et al., 2018). Most empirical research in healthy populations has been conducted on the 'classical' manualized form of Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990; Khoury et al., 2015), but a variety of other multi-component programs have been designed, combining basic meditation practices with yoga exercises, informal mindfulness techniques and elements of compassion. In workplace settings, the variability of MBPs seems to be even larger (Jamieson & Tuckey, 2017). To consider the needs of employees and organizations, a variety of modifications have been made to manualized MBPs, such as shortened versions of MBSR (e.g., Huang et al., 2015; Klatt et al., 2009; Manotas et al., 2014) and several idiosyncratic curricula have been developed, which couple mindfulness elements with other training, such as emotion regulation, compassion or physical exercise to produce beneficial synergistic effects (e.g., Jennings et al., 2013).

These modified MBPs differ largely in time scope and mode of delivery – all of which might impact their effects on outcomes (Jamieson & Tuckey, 2017). Across contexts, brief mindfulness training programs and digital interventions have become increasingly popular due to their advantages in accessibility and availability (Mrazek et al., 2019; Schumer et al., 2018). In the occupational settings, some programs keep to the in-class group format, some use blended curricula combining classroom learning with online practices or e-coaching (Allexandre et al., 2016; Van Berkel et al., 2014), while others are delivered exclusively

through the internet (Aikens et al., 2014; Wolever et al., 2012). The location of delivery might intensify or diminish contextual influences, e.g., due to implicit associations of office buildings with occupational stress experiences. To account for this variability, we examined possible moderating effects of delivery mode and location, type of program, time-scope/duration and recommended practice at home.

Most empirical studies in occupational settings focus on specific professions, and thus include samples with distributions of participant characteristics different from those in general health promotion. Previous meta-analyses in healthy populations have noted to a preponderance of young female participants in MBP studies (Khoury et al., 2015; Spijkerman et al., 2016), which aligns with general research on the utilization of preventive healthcare (Dryden et al., 2012; Koopmans et al., 2012). Occupational settings might be an opportunity to reach more diverse populations, possibly including more males and/or older participants (e.g., Martin et al., 2009). Thereby, specific occupational demands and characteristics of professional groups have to be considered (Good et al., 2016). Healthcare professionals for instance, seem to be a logical target group for MBPs due to their exposure to high interpersonal demands and physical stress (Burton et al., 2017). At the same time, this group of professionals might be particularly inclined to cultivating mindfulness skills (Irving et al., 2009). A less favorable climate might prevail in the context of 'tough, male'-oriented occupations, such as police officers or firefighters, including social norms, attitudes and expectations that possibly lower the acceptance and effects of MBPs (see e.g., Krick & Felfe, 2020). Other implicit features of samples can include the level of education required to practice a profession or work experience aligned with certain hierarchical positions. To investigate possible influences of these characteristics, we conducted moderator analyses on age, gender, professional group, level of education and work experience.

3.3 Methods

This meta-analysis was conducted according to the PRISMA-guidelines (Moher et al., 2009; see PRISMA-checklist in Appendix E in the supplemental materials) and the Cochrane recommendations for the reduction of subjectivity biases and data extraction errors (Higgins et al., 2011). Accordingly, all process steps involving decision-making (e.g., abstract and full-text screening), manual transfer of data (e.g., extraction of data from original studies) or evaluation (e.g., risk-of-bias assessment, clustering primary outcomes to review outcomes) were performed by two reviewers independently, based on standardized coding schemes.

Conflicts were discussed and resolved in the reviewer team. A protocol for this meta-analysis was pre-registered and is available in PROSPERO (CRD42015019282).

3.3.1 Literature Search

We conducted a systematic literature search up to November 2018 in the databases PsychInfo, PubMed, Web of Science, and Academic Search Premier based on the following search strategy: (((DE "Intervention") OR (DE "Prevention") OR (DE "Clinical Trials" OR DE "Treatment Effectiveness Evaluation"))) AND ((DE "Mindfulness") OR mindful* OR (DE "Meditation") OR meditat*) AND (work* OR (DE "Occupational Health") OR (DE "Occupational Stress") OR job). Reference lists of the included studies were screened for relevant literature, and authors were contacted for unpublished and/or incomplete data.

3.3.2 Study Selection

First, abstracts of all results were screened for eligibility criteria: (a) the reporting of empirical data, (b) mindfulness-based program, and (c) not explicitly conducted in a setting other than the workplace. Second, full texts of eligible studies were assessed for the inclusion criteria: (1) sample of healthy adults (age 18–65 years) with close to full-time employment (> 30 h/week), (2) any type of mindfulness/meditation-based intervention with at least 2 h of training and with mindfulness elements constituting at least 50% of the program, (3) programs offered at the workplace or initiated by the employer, (4) randomized control trial design, (5) report of mean (*M*), standard deviation (*SD*), and sample size (*N*) for all relevant outcome measures, or (6) sufficient information to calculate those values. Studies were excluded if they could neither be obtained via electronic access, interlibrary loan, or contact with the authors (Figure 4).

3.3.3 Coding of Study Characteristics

The following characteristics were coded for each included study:

Setting: Country and organization/corporation in which the study was conducted.

Population: Age, gender (% of female participants), education in years, and work experience. The occupational profession was assigned to the categories of health care, public administration, law enforcement, industry, science, teaching, finance, marketing, phone service (call center) or mixed profession.

Program: Hours of attendance, time span in weeks, delivery method (i.e., in class, online, blended, audio) and location of delivery (at work, after work, centralized [employees from

several organizations meet in a location outside from work], or not specified), and practice time at home. The type of treatment was assigned to the following categories: (a) mindfulness training (MT) with yoga, (b) MT with relaxation, (c) MT with psychoeducation and personal reflection, (d) MBSR (original and adapted scripts), (e) meditation practice, (f) MT with elements of ACT and/or MBCT, and (g) others.

Methodological Design: Binary codes were assigned on the handling of missing data via intention-to-treat (ITT) methods, the type of control group (wait-list, active, passive), and the length of the follow-up period (≤ 12 weeks or > 12 weeks after post-assessment).

Outcome Assessment: Primary outcome data were clustered by assigning originally reported constructs to review outcomes within the domains of (a) mindfulness, (b) stress and health impairments (perceived stress, subsyndromal symptoms, burnout, somatization & physical illness), (c) well-being (well-being/life satisfaction, compassion), (d) work-related outcomes (work engagement, productivity, job satisfaction), and (e) resilience (Table 6). Constructs that were assessed in less than four distinct intervention samples were excluded from analyses; i.e. aggression, job control, job security, self-esteem, and empathy. If a study reported more than one measure per review outcome, we controlled for dependencies by computing the weighted mean and pooled standard deviation (according to Cohen, 1988), presented in (1) and (2).

(1) $M_{pooled} = \frac{M_1 * n_1 + M_2 * n_2}{n_1 + n_2}$

(2) $SD_{pooled} = \sqrt{\frac{(n_1 - 1) * SD_1^2 + (n_2 - 1) * SD_2^2}{n_1 + n_2 - 2}}$

Table 6

Development of review outcomes and theoretical domains in this meta-analysis deducted from original reported constructs in the primary studies

Domain	Review Outcome	Original reported constructs
Mindfulness	Mindfulness	Mindfulness
Mental well-being	Well-being & life satisfaction	(Psychological) Well-being Life satisfaction Quality of life Orientation to life Relaxation disposition Vigor Positive affect
	Compassion	Self-compassion Occupational self-compassion Compassion for others
Stress and health impairment	Stress	(Job) stress (Job) stressors (Job) demands Traumatic stress Need for recovery (Job) strain Work family conflict Work home interaction Work life conflict
	Subsyndromal symptoms	Anxiety Psychological distress Depression Sleep quality / impairment (Job) rumination (Job) fatique Negative affect Worry Alcohol abuse Suicidal ideation
	Burnout	Emotional exhaustion Depersonalization Personal accomplishment Distancing from work Personal burnout Work-related burnout Client related burnout Global burnout
	Somatization & physical illness	Physical symptoms Somatization Somatic health

3.3.4 Computation of Effect Sizes

As a dependent variable, we computed the standardized mean difference scores between the intervention and control groups (Hedges' $g = [m_{Mindfulness\ Group} - m_{Control\ Group}]/sd_{pooled}$). For each review outcome and each time point of assessment (post-intervention, follow-up), a *g*-score was built, with higher values indicating higher scores in the intervention groups (conventions for interpretation: $g = 0.2$ small effect, $g = 0.5$ medium effect, $g = 0.8$ large effect; Hedges & Olkin, 1985). To account for the high heterogeneity of endpoints within each outcome, we used random-effects models to synthesize *g*-scores (Raudenbush, 1994). The variability in effect-size estimates was estimated using the restricted maximum likelihood estimator (REML; Viechtbauer, 2005). For sensitivity analyses, influential case diagnostics were computed using Cook's distances (Viechtbauer & Cheung, 2010). If applicable, additional analyses without the outliers were performed for comparison.

Heterogeneity was assessed using the index I^2 (Higgins & Thompson, 2002) and tested with Cochran's *Q* statistic (Cochran, 1954), as recommended by the Cochrane Collaboration (Higgins & Green, 2008). The I^2 is a descriptive measure that displays the proportion of total variability, which can be attributed to heterogeneity among the true effects (Viechtbauer, 2010). The conventions for interpretation are $I^2 = 25\%$ small, $I^2 = 50\%$ medium, and $I^2 = 75\%$ high heterogeneity (Higgins et al., 2003). Exploratory moderator analyses were conducted on review outcomes indicating a moderate to high degree of heterogeneity if ≥ 10 primary effect sizes were available (as recommended by Pincus et al., 2011). Categorical moderators were investigated using subgroup analyses (e.g., profession), and continuous moderators via meta-regression (e.g., age). All statistical analyses were performed with R version 3.2.4 (R Core Team, 2020) using the metafor package (Viechtbauer, 2010).

3.3.5 Risk of Bias

Funnel plots were graphed for the visual inspection of publication bias. Statistical analysis of funnel plot asymmetry was conducted with Egger's regression test (Egger et al., 1997; Sterne et al., 2005). Primary studies were rated with the Cochrane Collaboration's tool for assessing the risk of bias in randomized trials (Higgins et al., 2011) on the following domains: sequence generation, allocation concealment, incomplete outcome data, and selective outcome reporting. The domain 'blinding of participants, personnel, and outcome assessors' was excluded, as blinding is not applicable in studies evaluating psychosocial interventions.

3.4 Results

The systematic search in the electronic databases yielded *K* = 3,915 articles (Figure 4). Duplicates were removed (*k* = 970) and 2,718 studies were excluded during the abstract screening. Reasons for exclusion in the full text screening (*k* = 171) were: (1) other population (*k* = 31), (2) other intervention (*k* = 15), (3) no intervention offered (*k* = 14), (4) no randomized control trial or control group (*k* = 55), (5) statistical information not fully reported (*k* = 27), or (6) other reasons (*k* = 29). In total, *K* = 56 articles were included, reporting data from *k* = 53 studies with *i* = 57 independent intervention samples (see Table 7 and Appendix A for study descriptions).

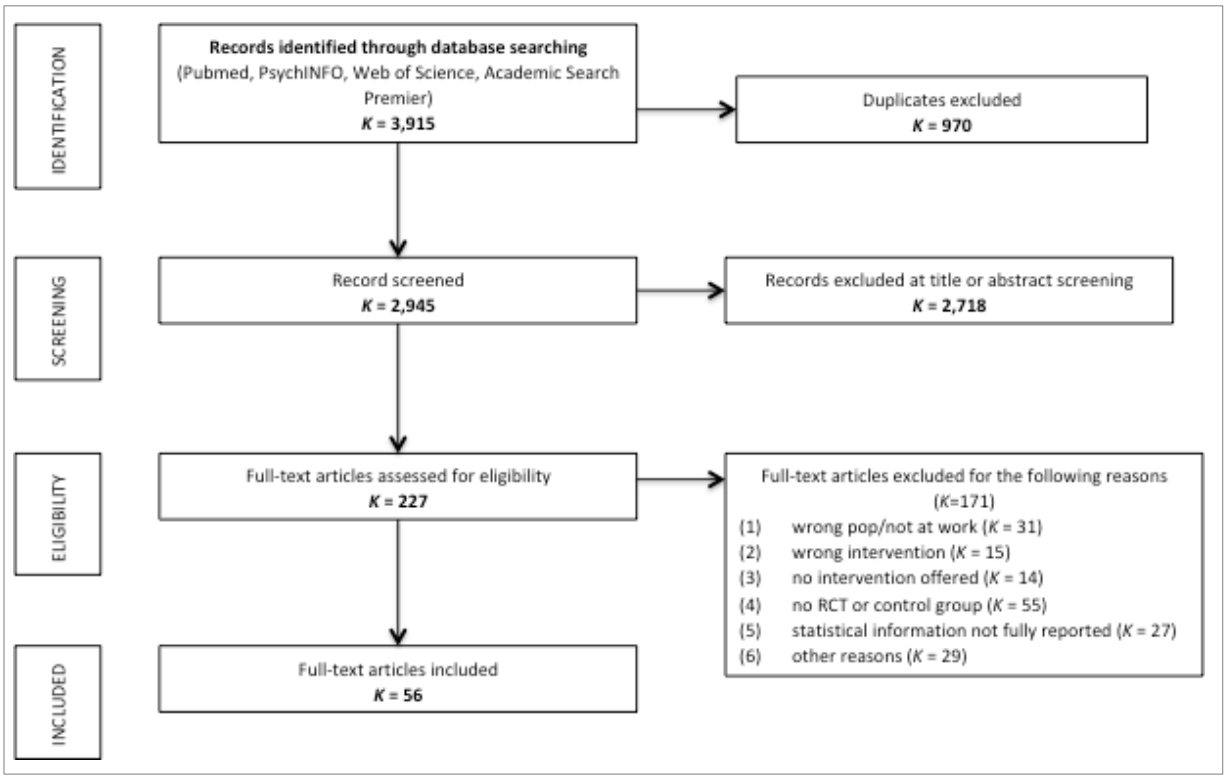

Figure 4. PRISMA flow diagram of the meta-analysis (Moher et al., 2009)

Table 7

RCT studies included in this meta-analysis

Authors (Year)	Mindfulness-program type	Control Group	Number of participants Mindfulness; Control Group	Profe-ssion	Duration in weeks	Delivery	Outcome Domains	Country
Aikens et al. (2014)	Short adaption of MBSR [d]	wait-list	44; 45	mixed	7	online	mindfulness resilience stress work engagement	USA
Alexander et al. (2015)	MT and Yoga [a]	wait-list	20; 20	health care	8	inclass	burnout mindfulness	USA
Allexandre et al. (2016)	MT combined with relaxation practices [b]	wait-list	54, 70; 37	call center	8	online, blended (online, group meetings)	burnout mindfulness productivity stress well-being	USA
Amutio et al. (2015a, 2015b)	MBSR [d]	wait-list	21; 21	health care	8	inclass	burnout mindfulness	Spain
Ancona & Mendelson (2014)	MT and Yoga [a]	wait-list	21; 22	teaching	3	inclass	burnout stress	USA
Anderson et al. (1999)	Mantra-Meditation [e]	wait-list	45; 46	teaching	5	inclass	burnout stress subsyndrom. symptoms	USA
Arredondo et al. (2017)	MT combined with compassion [g]	wait-list	21; 19	mixed	8	inclass	burnout mindfulness stress self-compassion	Spain
Asuero et al. (2014)	MT with psycho-education & personal reflection [c]	wait-list	43; 25	health care	8	inclass	burnout mindfulness subsyndrom. symptoms well-being	Spain

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Auserón et al. (2018)	MBSR combined with compassion [d]	wait-list	25; 23	health care	8	inclass	mindfulness stress self-compassion	Spain
Baby et al. (2018)	MBSR, MBCT, ACT combined [f]	active (communication training)	63; 64	health care	4	online	subsyndrom. Symptoms	New Zea-land
Bartlett et al. (2017)	Mindfulness at work program [g]	active (information group)	20; 115	public admin	5	inclass	mindfulness productivity stress subsyndrom. symptoms well-being	Aust-ralia
Van Berkel et al. (2014)	MT with psycho-education & personal reflection [c]	wait-list	129; 127	science	16	blended (inclass, e-coaching)	mindfulness stress subsyndrom. symptoms work engagement	Nether-lands
Bostock et al. (2018)	MT meditation App [e]	wait-list	128; 110	mixed	7	online (app)	stress subsyndrom. symptoms well-being	UK
Cheema et al. (2013)	MT and Yoga [a]	passive	18; 19	mixed	10	inclass	job satisfaction subsyndrom. symptoms well-being	Aust-ralia
Chin et al. (2019) & Slutsky et al. (2018)	MT [g]	active (single day mind-fulness)	31; 29	marketing	6	blended (work-shop, audio, online)	job satisfaction subsynd. symptoms well-being stress	USA
Christopher et al. (2018)	Adaption of MBSR [d]	wait-list	31; 30	law enforce-ment	8	inclass	burnout compassion mindfulness resilience stress subsyndrom. symptoms	USA

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Crain et al. (2017)	Adaption of MBSR [d]	wait-list	54; 59	teaching	8	inclass	job satisfaction mindfulness subsyndrom. symptoms well-being	USA/ CAN
Dwivedi et al. (2015)	MT and Yoga [a]	active (management lectures and physical excer-cises)	80; 80	industry	10	inclass	well-being	India
Flaxman & Bond (2010)	MT combined with ACT practices [f]	wait-list	177; 134	mixed	2	inclass	subsyndrom. Symptoms	UK
Flook et al. (2013)	MBSR [d]	wait-list	10; 8	teaching	8	inclass	burnout mindfulness compassion subsyndrom. symptoms	USA
Grégoire & Lachance (2015)	Short meditations [e]	wait-list	24; 25	call center	5	audio	mindfulness stress subsyndrom. symptoms	CAN
Harris et al. (2016)	MT and Yoga [a]	wait-list	34; 30	teaching	16	inclass	burnout mindfulness somatization stress subsyndrom. Symptoms well-being	USA
Huang et al. (2015)	Adaption of MBSR [d]	wait-list	72; 72	industry	8	inclass	stress subsyndrom. Symptoms	Tai-wan
Ireland et al. (2017)	MBSR, MBCT, ACT combined [f]	active (1hr extra break / week)	23; 21	health care	10	inclass	burnout stress	Aust-ralia

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Jennings et al. (2013)	MT with psycho-education & personal reflection [c]	wait-list	25; 25	teaching	16	inclass	burnout mindfulness somatic health subsyndrom. Symptoms well-being	USA
Klatt et al. (2009)	Short version of MBSR [d]	wait-list	22; 20	mixed	6	inclass	mindfulness stress subsyndrom. symptoms	USA
Klatt et al. (2016)	MT and Yoga [a]	wait-list	27; 30	finance	8	inclass	stress subsyndrom. symptoms work engagement	Denmark
Lacerda et al. (2018)	MT with psycho-education & personal reflection [c]	wait-list	22; 22	mixed	8	inclass	mindfulness stress subsyndrom. symptoms	Brazil
Lin et al. (2019)	MBSR, MBCT combined [f]	wait-list	55; 55	health care	8	inclass	job satisfaction resilience stress subsyndrom. symptoms well-being	China
Mackenzie et al. (2006)	Short version of MBSR [d]	wait-list	16; 14	health care	4	inclass	burnout job satisfaction well-being	CAN
Manotas et al. (2014)	Short version of MBSR [d]	wait-list	66; 65	health care	4	inclass	mindfulness somatic health stress subsyndrom. symptoms	Colum-bia
McConachie et al. (2014)	MT combined with ACT practices [f]	wait-list	78; 78	health care	1	inclass	stress subsyndrom. symptoms well-being	Scotland

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Mistretta et al. (2018)	MT combined with ACT practices [f]	active (diary and sleep monitoring)	22; 15	health care	6	inclass	burnout compassion stress subsyndrom. symptoms well-being	USA
Molek-Winiarska and Żołnierczyk-Zreda (2018)	MBSR [d]	wait-list	32; 34	industry (mine workers)	10	inclass	somatic health stress subsyndrom. symptoms	Poland
Querstret et al. (2017)	MBSR, MBCT combined [f]	wait-list	63; 64	mixed	4	online	mindfulness subsyndromal symptoms	UK
Rao et al. (2017)	MT and Yoga [a]	passive	30; 30	teaching	4	inclass	stress subsyndrom. symptoms	India
Rexroth et al. (2017) & Michel et al. (2014)	MBSR, MBCT combined [f]	wait-list	208; 204	mixed	3	online	burnout job satisfaction mindfulness stress subsyndrom. symptoms well-being	Germany
Roeser et al. (2013)	MT combinded with compassion [g]	wait-list	54; 59	teaching	8	inclass	burnout mindfulness self-compassion stress subsyndrom. symptoms	USA/ CAN
Schroeder et al. (2016)	MBSR with Compassion [d]	wait-list	16; 17	health care	4	inclass	burnout compassion mindfulness resilience stress	USA

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Sheppard et al. (1997)	Transcendental meditation [e]	Active (corporate stress management)	22; 22	public admin	12	inclass	subsyndrom. symptoms	USA
Shonin et al. (2014)	Meditation Awareness Training [e]	active (psychoeducation)	76; 76	mixed	8	blended (inclass, phone, video, 1-1call)	job satisfaction productivity stress subsyndrom. symptoms	UK
Singh et al. (2018)	Meditation [e]	active (positive behavior support)	60; 63	health care	10	inclass	burnout stress well-being	USA
Song & Lindquist (2015)	MBSR [d]	wait-list	21; 23	health care	8	inclass	mindfulness stress subsyndrom. symptoms	South Korea
Steinberg et al. (2017)	MT and Yoga [a]	wait-list	18; 18	health care	8	inclass	well-being	USA
Strub & Tarquinio (2013)	MBCT [f]	wait-list	10; 10	industry	8	inclass	burnout somatization stress subsyndrom. symptoms	Luxem-burg
Tagg (2016)	mindfulness-based stress reduction techniques [g]	active (applied behavior analysis)	35; 35	health care	1	inclass	burnout stress	USA
Taylor et al. (2016)	MBSR with compassion [d]	wait-list	26; 30	teaching	9	inclass	stress	CAN
Valley & Stallones (2017)	MBSR [d]	wait-list	11; 12	health care	8	inclass	mindfulness productivity	USA

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Verweii et al. (2018)	MBSR [d]	wait-list	80; 68	health care	8	inclass	burnout mindfulness productivity self-compassion stress subsyndromal symptoms well-being	Nether-lands
Wilson (2012)	MBAP (mindful art processing) [g]; Short version of MBSR [d]	wait-list	27, 26; 27	mixed	8	inclass	mindfulness stress subsyndrom. symptoms well-being work engagement	USA
Wolever et al. (2012)	meditation [e]; meditation (online) [e]; MT and Yoga [a]	passive	44, 52, 90; 53	finance	12	inclass, online	mindfulness productivity stress subsyndrom. symptoms	USA
Yang et al. (2018)	MBSR [d]	active (routine psychological support)	50;50	health care	8	inclass	stress subsyndrom. symptoms	China
Żołnierczyk-Zreda et al. (2016)	MT with psycho-education & personal reflection [c]	wait-list	72; 72	finance	8	inclass	somatization stress subsyndrom. symptoms	Poland

Note. Programs: ACT = Acceptance Commitment Therapy. MBAP = Mindfulness Based Art Processing. MBCT = Mindfulness Based Cognitive Therapy. MBI = Mindfulness-based program. MBSR = Mindfulness Based Stress Reduction. Treatment Categoires: [a] mindfulness training (MT) with yoga, [b] MT with relaxation, [c] MT with psychoeducation and personal reflection, [d] MBSR (original and adapted scripts), [e] meditation practice, [f] MT with elements of ACT and/or MBCT, [g] others.

3.4.1 Meta-analytical Synthesis and Sensitivity Analyses of Effects

The meta-analyses of post-intervention effects yielded significant effects in the intended direction across all review outcomes (Table 8, forest plots and funnel plots are presented in Appendix B). The number of primary effect sizes contained in the respective syntheses varied widely, ranging from $k = 43$ studies reporting on perceived stress to $k = 4$ on resilience. The programs significantly raised the mindfulness of participants ($g = 0.44$, $p < .001$; $k = 32$), but strongest effects resulted for the more distal outcomes well-being/life satisfaction ($g = 0.68$, $p = .002$; $k = 22$) and perceived stress ($g = -0.66$, $p < .001$; $k = 43$). Work-related effects were assessed in comparatively few studies, yet showing significant changes in work engagement ($g = 0.53$, $p = .022$; $k = 5$), job satisfaction ($g = 0.48$, $p = .021$, $k = 7$), and productivity ($g = 0.35$, $p = .036$, $k = 9$).

Sensitivity analyses of post-intervention effects revealed influential cases (outliers) in all outcome categories, except for mindfulness and compassion (outlier analyses are presented in Appendix B). After the exclusion of outliers, results still indicated significant between-group differences for all outcomes in the domains mental well-being and stress/health impairment, with effect sizes decreasing within a range of 0.07 (stress and burnout) to 0.17 (well-being/life satisfaction). Among work-related outcomes, only the effect on job satisfaction remained significant in the amended analyses. The positive effect size for productivity dropped considerably in strength and below the level of significance ($g = 0.15$, $p = .061$, $k = 8$) after removing the outlier, a study on meditation awareness training in a sample of office-based middle-hierarchy managers (Shonin et al., 2014). For resilience and work engagement, no amended analyses were conducted, because less than four studies remained after the exclusion of outliers.

Effects for follow-up assessments up to 12 weeks after the completion of MBPs were only reported in 18 studies (34%), which in sum did not provide enough data to analyze effects on somatization/physical illness, resilience and work-related outcomes ($k < 4$). All other outcome categories yielded significant effects in the intended direction, with effect sizes comparable to post-assessment (see Table 8). Largest effects resulted for perceived stress ($g = -0.77$, $p < .001$; $k = 15$) and subsyndromal symptoms ($g = -0.69$, $p < .001$; $k = 14$). Sensitivity analyses detected influential cases in the categories subsyndromal symptoms and perceived stress. The exclusion of those outliers lowered the effect sizes by 0.11 and 0.15 respectively, but did not affect the significance of results (subsyndromal symptoms: $g = -0.54$, $p < .001$, $k = 14$; stress: $g = -0.66$, $p < .001$, $k = 13$).

Table 8

Comparisons of the mindfulness-program groups and control groups at different assessment times

	Post (*M* = 8.42, *SD* = 5.18 weeks)				Follow-up (<= 12 weeks)			
Domain / Review Outcome	*k*	*g*	*CI*	I^2	*k*	*g*	*CI*	I^2
Mindfulness								
Mindfulness	32	0.44***	[0.32; 0.56]	52.4	11	0.45***	[0.22; 0.68]	62.1
Mental Well-being								
Well-being & Life Sat.	22	0.68**	[0.24; 1.12]	95.3	9	0.40***	[0.22; 0.58]	26.1
Compassion	8	0.61***	[0.37; 0.85]	30.7	5	0.54**	[0.20; 0.88]	41.5
Stress and Health Impairment								
Perceived Stress	43	-0.66***	[-0.88; -0.44]	89.8	15	-0.77***	[-1.06; -0.48]	82.7
Subsyndromal Symptoms	40	-0.56***	[-0.79; -0.33]	91.5	14	-0.69**	[-1.03; -0.34]	90.7
Burnout	22	-0.37**	[-0.61; -0.14]	78.2	9	-0.38***	[-0.58; -0.19]	25.3
Somatization/ Physical illness	6	-0.32*	[-0.58; -0.06]	38.5				
Work outcomes								
Work Engage	5	0.53*	[0.08; 0.98]	80.3				
Productivity	9	0.35*	[0.02; 0.68]	79.7				
Job Satisfaction	7	0.48*	[0.07; 0.89]	83.9				
Resilience								
Resilience	4	0.49***	[0.24; 0.73]	0				

Note. *k* = number of trials. *g* = standardized mean difference scores (Hedges' g). *CI* = 95% confidence intervals. I^2 = heterogeneity statistics. *M* = mean score. *SD* = standard deviation.

* $p < .05$. ** $p < .01$. *** $p < .001$.

3.4.2 Exploratory Moderator Analyses

Exploratory moderator analyses were conducted for the review outcomes mindfulness, well-being/life satisfaction, stress, subsyndromal symptoms, and burnout (see Table 8; Pincus et al., 2011). Overall, the results revealed no consistent moderating effects for any characteristics of populations, programs and methods. Some variables significantly influenced effects on individual outcomes: Programs involving more hours of attendance yielded larger effects in mindfulness ($Q[1] = 5.11$, $p = .024$, $k = 30$), burnout ($Q[1] = 12.85$, $p < .001$, $k = 21$), and well-being/life satisfaction ($Q[1] = 7.75$, $p = .005$, $k = 21$). The sample characteristics gender and occupational profession significantly moderated effects on well-being/life satisfaction (gender: $Q[1] = 6.76$, $p = .009$, $k = 22$; profession: $Q[7] = 21.39$, $p = .003$, $k = 22$), with larger effect sizes in samples including more male participants, and employees in the financial sector. Participants' level of education significantly moderated effects on well-being/life satisfaction and subsyndromal symptoms, indicating larger effects for higher educated participants (well-being $Q[1] = 6.12$, $p = .013$, $k = 5$; subsyndromal symptoms $Q[1] = 10.02$, $p = .002$, $k = 14$), whereas higher work experience was associated with larger effects in mindfulness ($Q[1] = 6.13$, $p = .013$, $k = 12$) and burnout ($Q[1] = 8.67$, $p = .003$, $k = 10$). No significant moderator effects were observed for age of participants, type of program, time span in weeks, method and location of delivery, recommended hours of practice at home, type of control group, ITT samples, or publication date (see Appendix C for detailed results).

3.4.3 Risk of Bias

Statistical testing for funnel plot asymmetry indicated a potential publication bias for the review outcomes perceived stress ($t[41] = -2.61$, $p = .013$) and mindfulness ($t[30] = 2.88$, $p < .01$). Ratings of risk of bias domains are presented in Figure 5 (see Appendix D for detailed ratings). Most "high risk" ratings were assigned in the categories "incomplete outcome data" and "other biases" ($k = 11$ out of 53 each). Risks of bias regarding outcome data either concerned unexplained attrition/exclusion of participants, or a discrepancy between the number of participants and corresponding figures in the statistical analyses (e.g., degrees of freedom). Within the category "other bias", six primary studies reported baseline imbalances, which might have affected outcomes, four included a selective sample of employees with poor mental health and in one some participants changed groups (control to MBP and vice-versa) and were not excluded from the analysis. Three studies were rated as "high risk" in the category "selective reporting" because they did not report data for at least one of the outcome scales listed in the methods section. Five studies were rated as "high risk" in the category

"random sequence generation" because non-random components in the sequence-generation process were described (e.g., volunteering participants in their preferred groups, no full randomization possible because of vacation and schedule issues). The majority of studies did not report in sufficient detail on sequence generation (k = 24) and allocation concealment (k = 45).

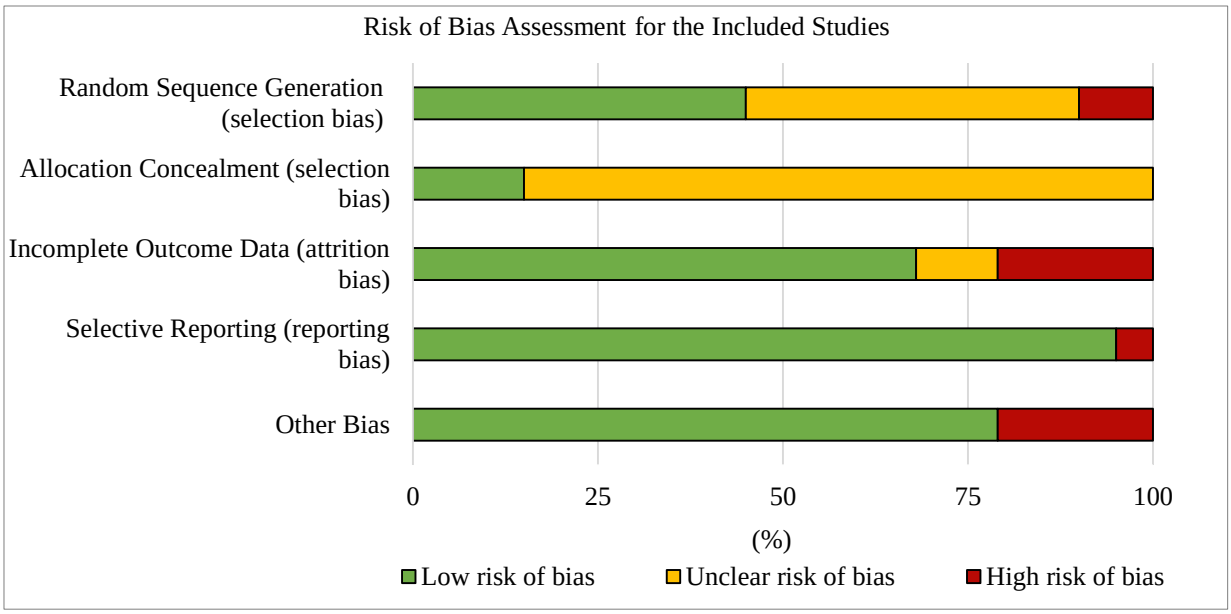

Figure 5. Risk of bias assessment for the included studies. Risk of bias was independently assessed by two reviewers. Conflicts were resolved in discussion with all authors. Blinding of the participants and personnel (performance bias) and blinding of the outcomes assessment (detection bias) were not rated because blinding in randomized controlled behavioral trials is normally not possible.

3.5 Discussion

This meta-analysis systematically analyzed the effects of mindfulness-based programs on different outcomes in occupational settings. In total, 56 articles with n = 2,689 program participants and n = 2,472 employees in control groups were included. Our analyses indicate that mindfulness in the workplace effectively reduces perceived stress and health complaints while improving well-being and work-related outcomes (work engagement, productivity, job satisfaction) – all with small to medium effect sizes ranging from g = 0.32 to 0.68 shortly after completing the program. Effects were maintained in follow-up assessments up to three months later, with effect sizes ranging from g = 0.38 to 0.77. Sensitivity analyses confirmed the robustness of findings by still yielding significant effects after excluding primary studies identified as outliers, with one exception (i.e., effects on productivity) and two outcomes not allowing further analyses due to the low number of primary effect sizes (i.e., effects on resilience and work engagement). Heterogeneity of synthesized effect sizes was medium-to-

high for the majority of review outcomes, but not explained consistently by population or program characteristics in the moderator analyses.

Our results support the conclusion of previous qualitative and quantitative reviews that mindfulness training in the workplace improves the well-being and health of participants (e.g., Eby et al., 2019; Janssen et al., 2018; Lomas et al., 2017a). Between-group effect sizes were largest for the review outcomes well-being/life satisfaction (g = 0.68) and stress (g = -0.66) and comparable in strength to those reported in meta-analyses of MBPs in healthy samples outside the occupational context (Hendriks et al., 2017; Jayawardene et al., 2017; Khoury et al., 2015; Spijkerman et al., 2016). Due to the strong increase in published RCTs in the years 2016 to 2018, this meta-analysis extends two recently published meta-analyses (Bartlett et al., 2019; Lomas et al., 2019a) by breadth of information. Our database was large enough to pool effect sizes for follow-up assessments, and to perform analyses on review outcomes for which previously not enough primary effect sizes had been reported, namely resilience (g = 0.49), job satisfaction (g = 0.48), work engagement (g = 0.53), productivity (g = 0.35), and somatization (g = 0.32). In the interpretation of results, some differences have to be considered. Compared to our inclusion criteria, Lomas et al. (2019a) applied a broader scope by including student populations (k = 35), while Bartlett et al. (2019) focused on "pure" MBPs delivered at the workplace (k = 23). Our analyses were based on 56 RCTs, of which 20 were included in Lomas et al. (2019a) and 15 in Bartlett et al. (2019) – yielding a 65% overlap of primary studies each. Noticeably, the major reason for the discrepancies was a lack of statistical information in the publication of study results, which we requested in vain the authors. Despite these differences, results largely corresponded in synthesized effect sizes for mindfulness (g = 0.44; $g_{\text{Lomas et al.}}$ = 0.39; $g_{\text{Bartlett et al.}}$ = 0.45), perceived stress (g = -0.66; $g_{\text{Lomas et al.}}$ = -0.60; $g_{\text{Bartlett et al.}}$ = -0.56), subsyndromal symptoms (g = -0.48; $g_{\text{Lomas et al.}}$ = -0.48 to -0.57; $g_{\text{Bartlett et al.}}$ = -0.38 to -0.69), and burnout (g = -0.37, $g_{\text{Lomas et al.}}$ = -0.36; $g_{\text{Bartlett et al.}}$ = -0.16 to -0.52). Effect sizes were larger in our analyses for well-being (g = 0.68; $g_{\text{Lomas et al.}}$ = 0.36; $g_{\text{Bartlett et al.}}$ = 0.46) and compassion (g = 0.61; $g_{\text{Lomas et al.}}$ = 0.42).

Empirical evidence on the proposed improvements in workplace functioning, performance and productivity is still limited, although these outcomes are frequently discussed in scientific literature (e.g., Hyland et al., 2015) and most likely present decisive arguments for implementing MBPs in for-profit organizations (e.g., Greiser & Martini, 2018). Work-related outcomes were only assessed in a small number of primary studies (k = 16) and caution must be applied in the extrapolation of results. In the main analyses, MBPs yielded significant positive effects on all three review outcomes – job satisfaction, work engagement

and productivity. However, only the increase in job satisfaction (g = 0.48) demonstrated to be robust in the sensitivity analyses. The effect on productivity (g = 0.35) was attributable to a single study on meditation awareness training in white-collar middle management (Shonin et al., 2014) and dropped below the level of significance among the remaining eight studies. The sensitivity analysis of work-engagement (g = 0.53) identified one outlying study, in which no effects were observed following a mindfulness-related multicomponent health promotion intervention (Van Berkel et al., 2014). Due to the small number of studies reporting on work-engagement (k = 5), an amended analysis was not feasible for this outcome.

Effects on job satisfaction, work engagement and productivity have not previously been synthesized meta-analytically as separate review outcomes. The preliminary nature of results is particularly pronounced in effects on productivity, due to the heterogeneous measures used to assess this outcome in the six primary studies reporting on this category. Two studies (partly) assessed productivity based on external indicators, yielding inconsistent results: Allexandre et al. (2016) report inconclusive patterns in company metrics for employee performance. Bartlett et al. (2017) investigated 'health-related lost productive time' based on self-reported 'absent days' and 'inefficient days', but only the latter significantly decreased. One study applied an observer-based instrument and found significant effects on work performance, as rated by participants' direct line managers (Shonin et al., 2014). Three studies assessed effects on self-report questionnaires – along with all other primary outcomes included in this meta-analysis. Participating in a MBP did not improve the ability to perform job roles in one study (Wolever et al., 2012); yielded marginally significant reductions in medical error rate (Verweij et al., 2018); but significantly decreased cognitive failures (Valley & Stallones, 2017).

3.5.1 Moderator Analyses

In the moderator analyses, none of the population, program or methodological characteristics explained heterogeneity systematically across review outcomes, which aligns with the findings of other reviews (e.g., Janssen et al., 2018). Regarding the program characteristics, neither the type of program, nor aspects of delivery (in class vs. online, location) significantly influenced effects on any outcome. However, our analyses might have been underpowered to detect moderating effects. First, we did not confine our analysis to one specific mindfulness training method to account for the naturally occurring high variability of workplace-specific adaptions. Second, aspects of delivery are unequally distributed with 79% programs delivered in-class and 68% delivered on-site. Previous meta-analyses across

contexts yield inconsistent results. Lomas et al. (2019a) report larger effects on health-related outcomes for standardized MBSR versions, whereas Bartlett et al. (2019) and Bamber and Morpeth (2019) did not find any moderating effects for MBP type and content. A growing body of research suggests that particular training components, meditation techniques and mindfulness practices contribute differentially to effects on some outcomes (e.g., Hunt et al., 2018; Kropp & Sedlmeier, 2019). Two recent meta-analyses indicate that programs with elements of various informal and formal meditation practices yield larger effects on negative affectivity (Schumer et al., 2018) and weight loss (Carrière et al., 2018). Considering the high relevance of time-savings, accessibility, and cost-efficiency in occupational contexts, research on these differential effects might be of interest in workplace health promotion.

The analyses of treatment dosage concur with a previously reported pattern: in line with earlier reviews (Carmody & Baer, 2009; Virgili, 2015), the duration of programs in weeks was not directly related to their effectiveness. Hours of attendance, on the other hand, were significantly associated with higher improvements in mindfulness, well-being/life satisfaction and reduction of burnout symptoms – supporting the theoretical assumption that mindfulness requires a certain amount of practice (e.g., Bishop et al., 2004; Tang et al., 2015). Laboratory studies have suggested positive short-term effects of mindfulness inductions (Leyland et al., 2019). However, how much minimum training is required to yield sustainable effects remains uncertain. In a meta-analysis of 43 studies on MBSR and MBCT the dose-response relationship was statistically significant, but unexpectedly small (Parsons et al., 2017); in an analysis of 15 RCTs evaluating online programs it seemed to be driven by an outlier (Spijkerman et al., 2016). Possibly, the dose-response relationship can only be under-stood in a more comprehensive model, including variables such as motivation, practice quality or self-efficacy (e.g., Goldberg et al., 2020).

Moderator analyses for population characteristics include several possible biases that impede a conclusive interpretation of results. Effects on well-being/life satisfaction were significantly moderated by gender, education and occupational profession; effects on subsyndromal symptoms by education; effects on mindfulness and burnout by work experience. However, the effects of gender and profession on well-being/life satisfaction might be biased by the strong effect sizes of one singular study with a rather unusual sample of midlevel managers (50% male), which were recruited across 30 companies in the financial sector (Żołnierczyk-Zreda et al., 2016). In addition, results might be skewed by the unbalanced distribution of participant characteristics among primary samples, including an overrepresentation of women and participants with college degrees. Although these

characteristics concur with the selective utilization of preventive healthcare (Dryden et al., 2012; Koopmans et al., 2012), they might rather be caused by the large number of samples working in health care (36%) and education (17%). The insignificant results regarding age might be methodologically biased. We applied a meta-analytical approach using summary statistics at the study level. Consequently, the moderator analysis on age tested whether the average age of participants within samples was associated with differences in effects between samples. Considering the multiple sources of heterogeneity across and within different occupational settings, the investigation of moderators among participant characteristics would require large multi-site trials including participants with different professional backgrounds and current occupations.

Among the formal characteristics of primary studies, neither the year of publication, nor the analyzed methodological characteristics significantly moderated any of the review outcomes. In psychotherapy research, the potential moderating effect of publication date has been controversially discussed based on studies published 1977 to 2014 (Johnsen & Friborg, 2015; Ljótsson et al., 2017). Considering that the earliest study included in our review had been published in 1997, the proposed influence of early research might not apply to research on MBPs in the occupational setting. The insignificant results for type of control group and methods for the handling of missing data align with previous reviews (e.g., Donaldson-Feilder et al., 2019; Khoury et al., 2017; Schumer et al., 2018), but deserve further attention. In our analyses only eleven primary studies (21%) compared the MBPs to active control groups and less than half (k = 21, 40%) applied statistical methods to control for systematic biases in missing data. Both methods are common indicators for the methodological quality of intervention studies (e.g., Ruiz-Canela et al., 2000), because they yield a more realistic estimation of effectiveness, which is reflected in lower between-group effect-sizes. Research on MBSR indicates rigorous active control groups can indeed yield comparable effects on outcomes other than mindfulness itself (e.g., MacCoon et al., 2012). Thus, more research is needed to identify possible unique effects of mindfulness training compared to other effective work-place health promotion programs (c.f., Goetzel et al., 2014).

3.5.2 Limitations and Future Research

Although we conducted this review according to state-of-the-art meta-analytic methods, our results are subject to several inherent limitations. We applied a broad search strategy and contacted authors to minimize publication bias among the included primary studies. For most review outcomes, no graphical or statistical funnel plot asymmetry was detected. However,

potential publication bias was observed for the effects on mindfulness and perceived stress. Results regarding these two review outcomes should therefore be interpreted with special caution, as the observed effect size might be overestimated.

The quality of primary studies was evaluated with the Cochrane Collaboration tool for assessing the risk of bias (Higgins et al., 2011). The majority of studies did not imply a high risk of bias in any of the categories – indicating an acceptable overall quality of primary studies. Most “high risk” ratings were assigned in the category “incomplete outcome data” and “other biases” (k = 11, 21% of primary studies each), “random sequence generation” (k = 5) and “selective reporting” (k = 3). Risks of bias regarding outcome data either concerned unexplained attrition/exclusion of participants or discrepancies in the number of participants across text, tables and statistical analyses. The category 'other biases' included baseline imbalances between control and intervention group in variables related to outcome measures (k = 6), selective samples of employees with poor mental health (k = 4) and participants switching bi-directionally between control and intervention groups (k = 1). Risk of bias in 'random sequence generation' was assigned mainly for manual modifications in the randomization process, such as adjusting for preferences, vacations or schedule issues. The category 'selective reporting' applied if no data were reported for at least one of the outcome scales mentioned in the methods section of an article. However, most studies did not or not in sufficient detail report on the sequence generation and the allocation concealment, resulting in a large proportion of ratings of “unclear risk of bias” in these categories. It would be beneficial to report on these aspects more precisely in future studies to facilitate the conductance and – more importantly – the interpretation of meta-analyses on health interventions.

Finally, data from primary studies was not sufficient to estimate effect sizes for long-term effects. Only 7 of 53 included studies report a follow-up period of more than 12 weeks, whereby in two of these studies the waiting list group had received the training by the time of assessment. A closer look at the results reveals a mixed picture. In some studies, the beneficial effects of mindfulness training were maintained or further improved over a period of six months (k = 3) or one and three years, respectively (each k = 1). One study reports only marginal between-group effects at four months after the program (k = 1); another study did not find any effects within one year (k = 1). The shortage of longer follow-up periods is not specific to the occupational context, but applies to the evaluation of mindfulness programs across research areas, such as general mental health prevention (Khoury et al., 2015), clinical

psychology (Galante et al., 2013; Singh & Gorey, 2018; Strauss et al., 2014), physical health (Haller et al., 2017) and primary care (Demarzo et al., 2015).

3.5.3 Implications for Practice

For organizations and corporations that consider implementing mindfulness training into their occupational health management, our results provide evidence for its effectiveness in promoting personal health and well-being. Based on the available evidence, these generally positive effects seem to be applicable across professions and individual characteristics of participants, indicating that mindfulness training is feasible and scalable in a wide range of contexts.

However, our results do not offer conclusive answers to a variety of questions and concerns that have been raised (e.g., Hyland et al., 2015; Jamieson & Tuckey, 2017). First, we only included studies evaluating mindfulness-based programs targeting individual employees. Current research suggests that organizational culture, the mindfulness of leaders, and other setting variables not only influence the collective mindfulness within corporations (Sutcliffe et al., 2016), but are also beneficially associated with individual outcomes (e.g., Pinck & Sonnentag, 2018; Reb et al., 2015). These variables might also affect the perception and acceptance of individually oriented mindfulness training within occupational health strategies. In the worst case, if mindfulness training is offered as a "means to pacify disgruntled employees, maintain the status quo, and ultimately manage and manipulate the workforce" (Hyland et al., 2015, p. 595), they might not be as effective as the results of these analyses suggest. Future studies should consider these environmental factors, which might facilitate or hinder mindfulness at different hierarchical levels within organizations.

Second, mindfulness has often been promoted as an approach to improve individual and organizational performance (e.g., Hyland et al., 2015). Some researchers base this assumption on promising results from cross-sectional research (see Mesmer-Magnus et al., 2017), others refer to hypothetical mechanisms of mindfulness (Good et al., 2016), and some build on the happy worker-productive worker thesis, suggesting that workers who experience high levels of well-being also perform well and vice versa. Although a variety of performance and productivity outcomes have been studied in quasi-experimental and uncontrolled studies with inconsistent results (Lomas et al. 2017b), productivity measures have only rarely been included in RCTs and yielded no robust significant results in our analysis. Future studies should include measures targeting individual job and task performance directly, as well as measures contributing to a corporation's overall productivity (e.g., presenteeism,

absenteeism) to provide more robust data on whether mindfulness trainings are effective in increasing performance.

In summary, our meta-analysis shows solid evidence ($k \geq 22$) that MBPs in the workplace have positive effects on perceived stress, subsyndromal symptoms, burnout and well-being, across different occupational groups and organizational structures. These effects seem to persist over a period of 3 months. In addition, our results show preliminary evidence of an increase in compassion, job satisfaction, work engagement and resilience, and a reduction in somatic complaints ($k \leq 8$). Future studies should further investigate the potential effects of MBPs on work-related outcomes, in particular on performance and productivity measures ($k = 9$) and include active control groups in their study design.

4 SCHRIFT 3: HEALTH-ORIENTED LEADERSHIP AND MENTAL HEALTH FROM SUPERVISOR AND EMPLOYEE PERSPECTIVES: A MULTILEVEL AND MULTISOURCE APPROACH

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4.1 Abstract

The link between leadership and mental health at the workplace is well established by prior research. However, most of the studies have addressed this relationship from a single-source perspective. The aim of this study was to examine how supervisor and employee ratings of health-oriented leadership correspond to each other and which sources are predictive for employee mental health. We assessed data within 99 teams (headed by 99 supervisors) containing 713 employees in 11 different companies in Southern Germany. Supervisors and their staff completed questionnaires on the supervisors' health-oriented staff-care dimensions awareness, value of health and health behavior (Health-Oriented Leadership Scale, HoL) and current mental distress (Hospital Anxiety and Depression Scale, HADS). Hierarchical linear models revealed that supervisors' self-ratings were significantly related to their employees' ratings (at the team level) only on the health behavior dimension, but not on the health awareness and value of health dimensions. Also, supervisors rated themselves significantly higher on HoL compared to their employees. Employee ratings of HoL significantly predicted their own level of mental distress (direct within-level effect), whereas supervisor ratings of HoL did not predict employees' mental distress at the team level (direct cross-level effect). Supervisors' self-ratings of HoL did not influence the relationship between employee ratings of HoL and their mental distress on an individual level (cross-level interaction). These results highlight the complex relationship between multisource assessments of HoL and employee mental health, emphasizing the importance of subjective perception for mental health. Future studies should investigate under which conditions supervisor and employee ratings correspond to each other and are predictive for mental health at the workplace.

Keywords: multilevel, multisource, health-oriented leadership, mental health, supervisor, employee

4.2 Introduction

The potentially negative impact of job demands on employees' (mental) health has been well established in previous research (Demerouti et al., 2001). Work demands can take many forms and are seen as physical, social and organizational aspects of the work that require sustained physical and/or psychological effort and are therefore associated with certain physiological and/or psychological costs (Demerouti et al., 2001). Well-studied examples are workload and work pressure, role conflicts or supervisor abuse. However, not only work demands can cause job strain, but employees who experience job strain also perceive more job demands over time (Bakker & Demerouti, 2017). Therefore, especially trough prolonged job demands, employees might enter a loss spiral of job demands and exhaustion and develop serious mental health impairments over time (e.g., Guthier et al., 2020; Hakanen et al., 2008; Magnusson-Hanson et al., 2016). These impairments lead both to high individual suffering of those affected and to a considerable impairment of work performance and productivity (McTernan et al., 2013; Montano et al., 2017; Van den Heuvel et al., 2010). Thus, the development of healthy workplaces is of central importance, as it is assumed to improve the health of employees, increase the productivity for the company and contribute to the well-being of the community at large (World Health Organization, 2005a). Creating healthy workplaces and recognizing mental distress at an early stage is therefore a central task for organizations and their representatives.

Supervisors have a special role to play here, as they bear corporate responsibility for employees in their daily working lives and influence their health in various ways (e.g., Kelloway & Barling, 2010; Kuoppala et al., 2008; Skakon et al., 2010). Supervisors design aspects of the work environment and work processes (Nielsen et al., 2008; Tuckey et al., 2012), pose demands or provide resources (Breevaart et al., 2014; Fernet et al., 2015) act as role models for their employees (Dietz et al., 2020; Kranabetter & Niessen, 2017; Yaffe & Kark, 2011) and directly interact with their employees through their leadership behavior and leadership style (Inceoglu et al., 2018; Montano et al., 2017; Van Dierendonck et al., 2004). Previous studies have shown that positive leadership behaviors and styles, such as appreciation, supervisor support, and transformational leadership, are particularly beneficial to the employees' (mental) health, while negative leadership behaviors, such as supervisor abuse, can lead to a lasting impairment of employees' (mental) health (e.g., Gilbreath & Benson, 2004; Hershcovis et al., 2007; Judge & Piccolo, 2004; Kuoppala et al., 2008; Liao et al., 2018; Schmidt et al., 2018; Schmidt et al., 2014; Stocker et al., 2010). Organizational theories and frameworks, like person-environment fit (Van Vianen, 2001), leader-member

exchange (Dulebohn et al., 2012), or the job-demand resources model (Demerouti et al., 2001), agree on the point that individual perception of leadership behavior is a driver of the association between leadership and (mental) health in organizations (Harms et al., 2017). Therefore, models of "healthy leadership" are of growing interest in occupational health science (Rudolph et al., 2020). Although the empirical evidence to differentiate "healthy leadership" from other leadership styles is controversial (e.g., from transformational leadership; Dunkl et al., 2015; Rudolph et al., 2020), health-oriented leadership (HoL) concepts can be conceptualized as the supervisor's *direct* and *explicit* engagement for the employees' health (Gurt et al., 2011).

In this study, we build on the HoL concept by Franke et al. (2014). In their concept, they consider both the supervisor's self-care, which is seen as a precondition for HoL, and the supervisor's staff-care, which takes the employees' health into focus. Self-care and staff-care can be further differentiated into the dimensions of health awareness, the value of health, and health behavior. In several studies, the positive relationship of HoL dimensions with mental health has been demonstrated (Franke et al., 2014; Klug et al., 2019; Santa Maria et al., 2019; Turgut et al., 2020). However, most of these studies have examined this relationship from a single-source (mostly from employee perspectives) in cross-sectional study designs. As a result, naturally occurring dynamics and possible crossover effects of HoL from different perspectives have been neglected, limiting any causal interpretation (Harms et al., 2017; Köppe et al., 2018). This common method bias (Podsakoff et al., 2003) might overestimate the effects of the predictors on the criterion variable, whereas other constructs might be artificially inflated, deflated, or non-significant (Podsakoff et al., 2012).

Although the requirement for multisource approaches to assess the impact of leadership on employee outcomes is not new (Conway & Huffcutt, 1997), only a few studies examined the impact of HoL on mental health from supervisor and employee perspectives (Kaluza et al., 2020; Köppe et al., 2018). The results of these studies are discussed later. Therefore, it remains unclear how supervisor ratings of their HoL are related to employee ratings and if supervisor ratings are predictive for employee mental health. To address these research questions (RQ), the first aim of the study was to test the relationship between supervisor and employee HoL ratings, and the second aim was to test which of these rating-sources (supervisors and their employees) are predictive for employee mental health.

4.2.1 RQ1 How are Supervisor and Employee Ratings Related to Each Other?

Multisource agreements are important indicators for psychometric assessments and reduce source errors (Strauss, 2005). Although multisource assessments for performance ratings are widely used in practice, the empirical evidence in terms of an interrater agreement between different rating sources is limited (Van Hooft et al., 2006). Meta-analytic findings estimated uncorrected correlations between supervisors and their subordinates on performance ratings at a level of .22 (supervisor-subordinate; Heidemeier & Moser, 2009). Furthermore, it has been assumed that correlations of different sources should be larger for observable patterns compared to non-observable constructs, as observable patterns show less ambiguity in ratings (Dai et al., 2007; Heidemeier & Moser, 2009; McKee et al., 2018). To date, there is scarce evidence of how multisource assessments of HoL are related to each other, specifically spoken whether the self-rating of supervisors in HoL corresponds to how they are seen by their teams. In line with prior findings on performance measures, we hypothesize that there should be a self-other agreement of HoL dimensions between supervisors and their employees on a team level that is significantly larger for the behavior dimension as an observable construct, compared to the awareness and value dimensions as non-observable constructs.

> *Hypothesis 1:* Multisource agreement: Supervisor ratings of HoL are positively related to the employees' averaged HoL ratings in each working team for the corresponding dimensions ([H-1a] awareness, [H-1b] value, [H-1c] behavior), with the largest relationship between behavior ratings.

However, a positive relationship between supervisor and employee ratings does not inform about whether or not self- and other ratings differ from each other. Prior research has shown that people tend to overestimate their own abilities, their performance, their chance of success, or their level of control (Meikle et al., 2016). This overestimation (often described as an operationalization of overconfidence bias) has been discussed as an adaptive process to protect one's own self-esteem (Kahneman & Tversky, 1979) and is generally linked to mental health and well-being (Dunning et al., 2004; Taylor & Brown, 1994). Furthermore, it is assumed that this overestimation should be considerably larger if the respective ability is socially desirable (Alicke, 1985). As a general tendency in human beings, the overestimation bias should also be present at the workplace (Meikle et al., 2016). Prior research has shown that people in organizations are highly interested in how they are seen by others and might, for this reason, use methods of impression management, helping them to socially succeed

(Leary & Kowalski, 1990; Stevens & Kristof, 1995). Indeed, an overconfidence bias has been shown to be related to the selection and hiring of supervisors and how their leadership competencies are perceived by others (Ronay et al., 2019). However, an overconfidence bias in supervisors has also been linked to negative or detrimental effects (e.g., aggressive or risky decision making; Malmendier & Tate, 2008). In line with these assumptions, Lee and Carpenter (2018) showed in a recent meta-analysis that supervisors report higher levels of their relationship-oriented behaviors than observers do. Atwater et al. (2005) have shown that supervisors rated themselves higher on performance ratings than their employees. In line with this empirical evidence, we propose that supervisors' own HoL ratings should significantly exceed employee HoL ratings.

> *Hypothesis 2:* Overconfidence-discrepancy: Supervisor ratings of health-oriented leadership (HoL) significantly exceed employee ratings ([H-2a] awareness, [H-2b] value, [H-2c] behavior).

4.2.2 RQ2 Which Source is Predictive for Mental Health?

In addition to the well established relationship between single-source ratings of HoL and mental health on the employee level, the question has been raised whether supervisor self-ratings are also predictive for employee mental health (direct cross-level effect; Franke et al., 2014). The extant literature on multisource assessment in HoL is limited. To our knowledge, only one study has investigated a multisource cross-level effect of HoL on employee mental health, showing a significant relationship between supervisors' health awareness and behavior with employees' exhaustion (Kaluza et al., 2020). Furthermore, previous research has shown that the quality of leader-member relationships rated by supervisors is positively associated with feeling respected and supported by employees, but not with their level of perceived stress (Chen & Tjosvold, 2013). The relationship between supervisor-rated transformational leadership and employee job stress was small but statistically significant (Sosik & Godshalk, 2000). However, most of these constructs reflect proximal health outcomes at the workplace, like job stress, job-related exhaustion or organizational support. To date, it remains unclear whether supervisor behaviors also have beneficial effects on more distal outcomes, like general mental distress. Based on previous findings, we propose that both supervisor and employee ratings of HoL significantly predict employee mental health, with larger effects for single-source ratings (i.e., employee ratings).

Hypothesis 3: Direct-within-level effect: Employee ratings of HoL are negatively related to their individual anxiety and depression symptoms ([H-3a] awareness, [H-3b] value, [H-3c] behavior).

Hypothesis 4: Direct-cross-level effect: Supervisor ratings of HoL are negatively related to the employees' averaged anxiety and depression symptoms at the team level ([H-4a] awareness, [H-4b] value, [H-4c] behavior), i.e. supervisors with high HoL staff-care self-ratings have healthier working teams.

4.2.3 RQ3 Do Supervisor Ratings Influence the Relationship Between Employee Ratings and Mental Health?

It remains unclear whether HoL ratings from supervisors influence the relationship between employees' HoL ratings and their mental health. Different psychological theories, like person-environment fit (Van Vianen, 2001), leader-member exchange (Dulebohn et al., 2012) or social learning theory (Bandura, 1986) agree on the point that employee and supervisors perceptions of leadership are highly intercorrelated and interactive in nature. In a literature review of healthy leadership Rudolph et al. (2020) theoretically suggested that leader individual differences might function as a moderator of the relationship between perceived HoL and health outcomes. Indeed several studies have demonstrated cross-level interactions in the leadership literature (also from a multisource perspective), which describe whether relationships between the lower-level variables change as a function of higher-order moderator variables (Aguinis et al., 2013). For example it was shown that the relationship between transformational leadership and mental distress on an individual employee level was moderated by how the supervisor assessed his or her own health awareness (Kranabetter & Niessen, 2017). In addition, it was shown that supervisors' perceived organizational support moderated the relationship between leader-member exchange and job satisfaction of employees (Erdogan & Enders, 2007). Applied to our study, this perspective raises the question whether supervisors' self-ratings of HoL could further enhance the positive effects of employee rated HoL on their mental health. Since the investigation of moderators on the relationship between leadership and health has been stated as an important direction for future research (Rudolph et al., 2020) and the use of multisource ratings was recommended to assess organizational aspects as possible moderator variables (Inceoglu et al., 2018), we tested whether supervisor ratings of HoL influence the relationship between employee ratings of HoL and their mental health. Therefore, in hypothesis 5, we propose the following cross-level interaction hypothesis:

Hypothesis 5: Cross-level interaction: The relationship between employee HoL ratings and their individual mental health is stronger in teams with supervisors scoring high on the respective HoL-dimensions compared to teams with supervisors scoring low on the respective HoL-dimensions ([H-5a] awareness, [H-5b] value, [H-5c] behavior).

4.3 Methods

4.3.1 Participants and Procedure

The data were gathered from 11 companies from different branches in Southern Germany. The study was approved by the ethical review committee at the University of Heidelberg, 2017562NMA. Participation in the study was voluntary, and informed consent was obtained. A trustee assigned a study code to all participants, irrespective of their organization and the scientific staff, which contained information about the employees' affiliation to their supervisors as well as to the company. Employees completed a questionnaire that assessed supervisors' HoL staff-care and their own mental distress. Supervisors completed a questionnaire that assessed their HoL staff-care as a self-rating instrument. All the participants who returned their questionnaire had the opportunity to enter a prize draw to win one of 40 vouchers worth €20 each for an online store. In total, 1,731 employees and 137 supervisors across the companies were contacted to participate in our study. A response rate of 46% for employees and 95% for supervisors yielded a sample of 803 employees and 130 supervisors who completed questionnaires. In order to obtain reliable results for the comparison between employees' and supervisors' perspectives, we included only those participants in our analyses for whom data was provided at both levels (data from employees and supervisors available). Therefore, we built up a data set matching employees to their supervisors. After the matching procedure, 734 employees and 111 supervisors remained in the sample. Due to the multilevel structure that comprises individuals in teams, we did not include supervisors matched with only one employee in the analyses and reduced the sample to teams with at least two employees. This left us with a final sample of 713 employees and 99 supervisors. The employees averaged 41.40 years of age (*SD* = 12.67); the supervisors averaged 47.68 years of age (*SD* = 9.13). Most (71.0%) of employees and 48.5% of supervisors were female. The average team size was 13.70 employees (*SD* = 12.60; range = 1–83). The average group number of respondents from participating workgroups was 7.20 employees (*SD* = 5.34; range = 2–29 employees). The percentage of respondents holding a high-school graduation degree was 43% for employees and 52% for the supervisor. From the 11 companies, three nursing homes, three hospitals, two manufacturers of parts and

accessories for motor vehicles, one recreation and holiday home, one waste management company, and one research and development company, participated.

4.3.2 Assessments

Health-oriented Leadership

Health-oriented leadership was assessed with Franke et al. (2014) Health-oriented Leadership instrument (HoL). The HoL instrument consists of different scales measuring supervisors' staff-care, as well as supervisors' and employees' self-care. All the scales include the three dimensions *health awareness* (eight items), *value of health* (three items), and *health behavior* (14 items) on a 5-point Likert-Scale. Parallel versions exist for all scales, which can be used both for self-assessment by supervisors and for external assessment by employees. Thus, the questionnaire can be used to conduct multisource assessments. The good psychometric properties of the scales have been demonstrated, showing good internal consistencies ($\alpha = 0.84$ to 0.88) as well as high construct and criterion validity (Franke et al., 2014). In this study, we assessed the supervisors' staff-care from supervisor and employee perspectives. Thus supervisors' had to rate their own health awareness (e.g., "I immediately notice when something is wrong with my employees' health"), value of health (e.g., "It is important for me to reduce health risks at my employees' workplaces"), and health behavior (e.g., "I invite my employees to inform me about health risks at their workplaces") toward their employees. In addition employees were asked to rate their supervisors' health awareness (e.g., "My supervisor immediately notices when something is wrong with my health"), value of health (e.g., "It is important for my supervisor to reduce health risks at my workplace"), and health behavior (e.g., "My supervisor invites me to inform him/her about health risks at my workplace"). Cronbach's α in our sample ranged from 0.88 to 0.92 for staff-care assessed by employees and 0.77 to 0.85 for staff-care assessed by supervisors, indicating good internal consistencies for the construct measured.

Mental Distress

Mental distress was measured with the Hospital Anxiety and Depression Scale (HADS; (Herrmann-Lingen et al., 2011). The HADS consists of two subscales measuring symptoms of *depression* (7 items) and *anxiety* (7 items) on a 4-point Likert-Scale. The psychometric properties of the HADS show good internal consistency (Cronbach's $\alpha = 0.80$) as well as a good construct and criterion validity. Cronbach's α in our sample was 0.90 for employees and 0.86 for supervisors indicating good internal consistencies for the construct measured. Due to

a high level of acceptance in non-clinical samples, the HADS is internationally used as a screening instrument for mental disorders (Bjelland et al., 2002).

4.3.3 Statistical Analyses

To account for the hierarchical structure of the data (employees [Level 1] nested within supervisors [Level 2]), we analyzed H-1 and H-3 to H-5 using mixed-effects models. According to theoretical assumptions, HoL rated by the employees represents the individual perception of each employee and was included as a predictor on the individual (team member) level. In contrast, supervisor ratings of their own HoL were included as a team level predictor because it influences the team as a whole. Thus, we used no aggregation methods to reflect the higher-order constructs of the predictor variables. Regarding the dependent variables we analyzed HoL assessed by employees on the team level to analyze whether supervisor self-ratings correspond with their team ratings (H-1). Mental distress was analyzed both on the individual level (H-3) as well as on the team level (H-4). As previous research has shown that leadership styles might vary according to age and gender of supervisors (e.g., Burke & Collins, 2001; Eagly & Johnson, 1990), we included age and gender of employees as control variables at level 1 as well as age and gender of supervisors as control variables at level 2. All analyses were performed in R with the nlme package (Bliese, 2016; Pinheiro et al., 2020) according to the guidelines of Raudenbush and Bryk (2002).

To analyze H-1 (agreement of supervisor and employee ratings), we conducted a two-step model-building process: The first step contained the null model with employee HoL ratings as dependent variables to analyze intraclass correlations (ICC[1], i.e. the percentage of variance that can be explained by group membership) of HoL ratings on the team level. The second step contained a random intercept and fixed slope model including the control variables as well as supervisor HoL ratings as Level 2 predictors to predict the employees' averaged HoL ratings in the working teams. To test H-2 (overconfidence-discrepancy), we compared supervisor and employee ratings of HoL using independent sample t-tests. To analyze H-3 to H-5, we carried out a four-step model building process with employees' mental health as dependent variable and employee (Level 1) and supervisor (Level 2) HoL ratings (awareness, value and behavior) as predictors. The first step contained the null model; the second step contained a random intercept and fixed slope model including the control variables as well as analyzing the effects of employee HoL ratings on their individual mental health (direct within level effect; H-3) and the effects of supervisor HoL ratings on the averaged mental health in the respective working team (direct cross-level effect; H-4); the

third step contained a random intercept and random slope model to assess the variance of slopes across teams; and finally, in the fourth step we conducted the cross-level interaction model to analyze whether supervisors HoL ratings moderate the relationship between employees' HoL ratings and their individual mental health across teams (H-5). In terms of centering, we used grand-mean centering for Level 2 (supervisor level) variables. On Level 1, we assumed that the absolute HoL ratings of employees are more important for their mental health as their relative position within their teams. In line with Hox (2002) we, therefore, used grand-mean centering for Level 1 variables.

Since we collected data within 11 different companies, the hierarchical data structure might imply possible company level effects. To address these, ICCs of outcomes on the company level were analyzed accordingly. Results showed ICCs < 0.05 for all employee outcomes at the company level (0.03 for awareness, 0.04 for value and 0.04 for behavior, 0.00 for depression and 0.00 for anxiety). The ICCs of supervisors' HoL at the organizational level were comparably low (.00 to .06). Given the low ICCs and to furthermore reduce the complexity of the statistical models to enhance parameter estimation, we decided not to include the company as an additional level in the models.

The high intercorrelations between the three HoL subscales awareness, value, and behavior (.74 to .78) and between the HADS scores of depression and anxiety (.93) indicate a considerable overlap of the respective subscales and a risk of stochastic multicollinearity (see Table 9). Conceptually, it can be assumed that the HoL subscales are strongly correlated, but still represent different dimensions of the construct. Therefore, we first analyzed the condition index (CI) to assess whether a robust estimation of model parameters is feasible (according to common interpretation guidelines, a CI score < 30 indicates low collinerarity and a robust estimation of the model parameters; Belsey et al., 1980). In addition, we analyzed the tolerance values of the HoL subscales. Tolerance values are defined as $1\text{-}R^2$ and represent the amount of variability in one independent variable that is not explained by the other independent variables (according to common interpretation guidelines a tolerance value < .40 suggests a cause for concern, whereas a tolerance value < .20 suggests serious stochastic multicollinearity in a model; Allison, 1999; Weisburd & Britt, 2014). To verify the three-factor solution of the HoL scales and the two-factor solution of the HADS scales, we performed confirmatory factor analyses (CFA). Analyses revealed a CI of 3.62 for HoL subscales. Tolerance values ranged from 0.33 for awareness and value to 0.37 for behavior. CFA analyses of the HoL scales showed that the three-factor model (χ^2 = 1212, *df* = 167, *RMSEA* = .09, *CFI* = .90, *SRMR* = .06), fitted the data significantly better than the one-factor

solution ($\Delta\chi^2(3) = 1655$, $p < .001$). Thus, although the different subscales of HoL were highly correlated, we decided to use the subscales instead of building a global mean score. However, given the high intercorrelations, we decided to model them separately from each other, in order to avoid masking effects by having multiple interaction terms in the statistical models and to improve the interpretability of the results. CFA analyses of the HADS scales showed that the proposed two-factor model ($\chi^2 = 510$, $df = 76$, $RMSEA = .09$, $CFI = .90$, $SRMR = .06$), fitted the data significantly better than the one-factor solution ($\Delta\chi^2(1) = 75$, $p < .001$). Therefore we decided to analyze the depression and anxiety scales separately from each other, instead of building a global mental distress score.

4.4 Results

The descriptive statistics, ICCs and intercorrelations of all variables on the individual employee level are presented in Table 9. We detected significant positive intercorrelations of the HoL dimensions on the employee and supervisor level. Employee HoL ratings showed significant negative intercorrelations with their mental distress. Interestingly, a younger age of the employees was associated with higher HoL ratings from their own perspective. In addition, supervisor female gender was associated with higher ratings of employees' HoL awareness and higher ratings of supervisors' HoL awareness and behavior. ICCs of 0.22 to 0.27 for employee HoL ratings indicate that 22% to 27% of the variability is accounted for by team membership. For mental distress, ICCs were considerably smaller and ranged from 0.04 to 0.08, indicating that only 4% to 8% of the variability in mental distress is accounted for by team membership. Overall, these results show evidence for a nested data structure that requires multilevel modeling.

4.4.1 Testing of Hypotheses

To test hypothesis 1, we conducted a two-step model building process. In step 1, we analyzed the ICCs of the HoL dimensions awareness, value and behavior, which are depicted in Table 9. As shown in Table 10, the across-team variances of the HoL dimensions ranged from 0.222 to 0.348 and the within-team variances ranged from 0.782 to 0.945. In step 2, we included age and gender as control variables as well as supervisor ratings of the corresponding dimensions to predict the averaged employee ratings in the working teams to assess the multisource agreement. We found no significant multisource agreement for awareness and value (awareness, $\gamma_{01} = 0.088$, $p = .440$; value, $\gamma_{01} = 0.158$, $p = .234$). However, the multisource agreement for behavior yielded significance ($\gamma_{01} = 0.234$, $p = .011$). Thus, only hypothesis 2c was supported, and hypotheses 2a and 2b were not.

Table 9

Summary of employees' (Level 1) and supervisors' (Level 2) multisource intercorrelations, means, and standard deviations, and ICCs on team and organizational level

Measure	*Mean*	*SD*	*ICC*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Level 1 (employee ratings)																
1. Age	41.40	12.67	.17	1	.10*	-.16**	-.14**	-.14**	.13*	.04	.15**	.10**	-.05	.04	.07	.12**
2. Gender[a]	71.00	-	.51		1	.02	-.04	-.01	-.09*	.01	.02	.43**	.14**	.08*	.17**	.24**
3. HoL awareness	3.02	1.00	.22			1	.78**	.75**	-.42**	-.32**	-.06	.10**	.08*	.04	.07	-.10**
4. HoL value	3.24	1.13	.27				1	.75**	-.38**	-.29**	-.05	-.01	.08*	.06	.10**	-.11**
5. HoL behavior	2.51	1.05	.23					1	-.33**	-.24**	-.01	.05	.12**	.04	.18**	-.04
6. Depression	4.65	3.72	.08						1	.93**	.04	-.08*	-.06	.04	-.03	.02
7. Anxiety	6.80	3.85	.04							1	.04	-.03	.00	.02	.00	.01
Level 2 (supervisor ratings)																
8. Age	47.68	9.13	.00								1	.03	-.06	-.02	.32**	.01
9. Gender[a]	48.50	-	.17									1	.27**	.05	.30**	-.02
10. HoL awareness	3.92	0.54	.06										1	.34**	.44**	.08*
11. HoL value	4.54	0.60	.02											1	.40**	.07*
12. HoL behavior	3.52	0.75	.00												1	.22**
13. Team size[b]	2.26	0.65	-													1

Note. Level 1 variables represent employee ratings (n = 713), Level 2 variables represent supervisor ratings (n = 99). Correlations are based on the individual employee level. [a]% female, gender was coded with 0 = male, 1 = female. [b]Team size was assessed categorical (1 < 5 employees, 2 = 5-20 employees, 3 > 20 employees). ICCs on Level 1 represent intraclasscorrelations on team level. ICCs on Level 2 represent intraclasscorrelations on organizational level.

Table 10

Results from multilevel modeling analyses for supervisor ratings predicting employee ratings on the HoL dimensions (multisource agreement)

	HoL awareness[1]	HoL value[2]	HoL behavior[3]
Level 1 (employee ratings)			
Intercept	3.037 (.061)***	3.267 (.073)***	2.498 (.064)***
Employees' age	-0.013 (.003)***	-0.011 (.003)***	-0.011 (.003)***
Employees' gender	0.017 (.094)	0.020 (.106)	-0.015 (.098)
Level 2 (supervisor ratings)			
Supervisors' age	-0.005 (.007)	-0.008 (.008)	-0.007 (.007)
Supervisors' gender	0.182 (0.132)	-0.045 (.155)	0.004 (.134)
Health awareness[1]/value[2]/behavior[3]	.088 (.114)	.158 (.132)	.234 (.090)*
Variance components			
Within-team (L1) variance	.782	.945	.837
Intercept (L2) variance	.222	.348	.246

Note. HoL = Health-Oriented Leadership; L1 = Level: n = 713 1; L2 = Level 2: n = 99. To assess multisource agreement, we used [(1)]awareness (L2) to predict awareness (L1), [(2)]value (L2) to predict value (L1) and [(3)] behavior (L2) to predict behavior (L1). Values in parentheses are standard errors.

* $p < .05$. ** $p < .01$. *** $p < .001$.

To test hypothesis 2, we compared employee HoL ratings with supervisor self-HoL ratings. The mean scores on employee level yielded M = 3.02 (SD = 1.00) for awareness, M = 3.24 (SD = 1.13) for value, and M = 2.51 (SD = 1.05) for behavior. Supervisors' ratings significantly exceeded employee rating on all dimensions with M = 3.92 (SD = 0.54) for awareness (t[810] = 8.78, $p < 0.001$), M = 4.54 (SD = 0.60) for value (t[810] = 11.23, $p < 0.001$) and M = 3.52 (SD = .75) for behavior (t[810] = 9.25, $p < 0.001$). Descriptive statistics are presented in Figure 6. Hence hypothesis 2 was confirmed showing that supervisor ratings of HoL significantly exceed employee ratings.

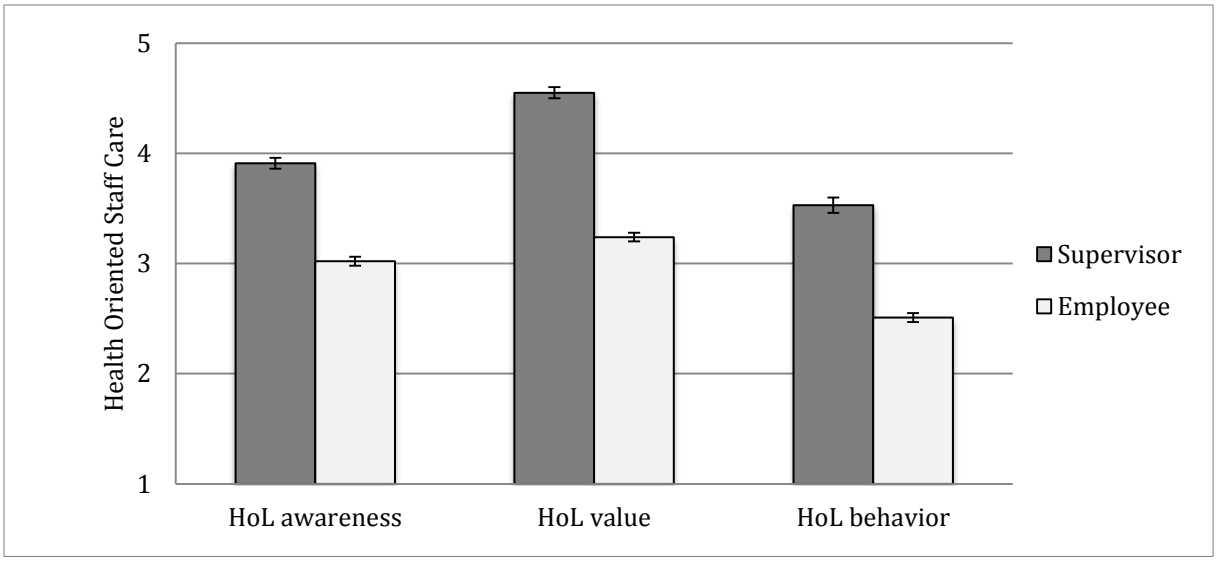

Figure 6. HoL ratings from supervisors and their employees; given are the means; error bars indicate the standard error of the mean.

To analyze H-3 to H-5, we carried out a four-step model building process. In the step 1, we calculated the ICCs of mental distress. As shown in Table 11, the across team variance of depression was 1.120 and the within team variance was 12.682, whereas the across team variance of anxiety was 0.610, and the within team variance was 14.220. In step 2, we included age and gender as control variables and analyzed the direct within- and cross-level effects. We tested the direct within level effect (H-3) by including employee HoL ratings as Level 1 predictors. There was a significant relationship of employees' HoL ratings of health awareness with their individual depression and anxiety symptoms (depression: γ_{10} = -1.456, p < 0.001; anxiety γ_{10} = -1.248, p < 0.001). In addition, we found a significant relationship of employees' HoL ratings of health value with their individual depression and anxiety symptoms (depression: γ_{10} = -1.218, p < 0.001; anxiety: γ_{10} = -0.995, p < 0.001), as well as a significant relationship of employees' HoL ratings of health behavior with their individual depression and anxiety symptoms (depression: γ_{10} = -1.114, p < .001; anxiety: γ_{10} = -0.894, p < .001). Thus, hypotheses 3a–3c were supported.

We tested the direct cross level effect (H-4) by including supervisor HoL ratings as Level 2 predictors. Results showed no significant relationship of supervisors' ratings of health awareness with employees' averaged mental distress in working teams (depression: γ_{01} = .006, p = .982; anxiety: γ_{01} = 0.223, p = .456), no significant relationship of supervisors' ratings of health value with employees' averaged mental distress in working teams (depression: γ_{01} = 0.502, p = 0.098; anxiety: γ_{01} = 0.328, p = 0.304), as well as no significant relationship of supervisors' ratings of health behavior with employees' averaged mental distress in working teams (depression: γ_{01} = 0.256, p = .294; anxiety: γ_{01} = 0.281, p = .272).

Thus, hypotheses 4a–4c were not supported. In step 3, we examined the slope variation of employee HoL ratings in the prediction of depression and anxiety, as the slope variance is a precondition for examining cross-level moderators (H-5). The variance in slopes of employees' health awareness across groups when supervisors' health awareness was included in the model is 0.210 for depression and 0.274 for anxiety. The variance in slopes of employees' health value across groups when supervisors' health value was included in the model is 0.248 for depression and 0.269 for anxiety. The variance in slopes of employees' health behavior across groups when supervisors' health behavior was included in the model is 0.319 for depression and 0.252 for anxiety. Hence, results demonstrate only small group differences for the relationship of employees' HoL ratings with employee depression and anxiety. Thus, an interaction effect seems unlikely. In step 4, we aimed to test whether health awareness, value, and behavior of supervisors moderates the relationship of employee ratings of health awareness, value, and behavior with their depression and anxiety (hypotheses 5a – 5c). Results do not support hypotheses 5a–5c, suggesting no significant cross-level interaction effect of supervisors' HoL ratings. The negative relationship between employee health awareness with depression and anxiety is not affected by supervisors' rating of health awareness (depression: Υ_{11} = 0.173, p = .467; anxiety: Υ_{11} = -0.105, p = .680). The negative relationship between employee health value and depression and anxiety is not affected by supervisors' rating of health value (depression: Υ_{11} = 0.343, p = .222; anxiety: Υ_{11} = 0.497, p = .101). Finally, the negative relationship between employee health behavior and depression and anxiety is not affected by supervisors' rating of health behavior (depression: Υ_{11} = -0.154, p = .419; anxiety: Υ_{11} = 0.197, p = .333). Thus, hypotheses 5a–5c were not supported.

Table 11

Results from multilevel modeling analyses for supervisor and employee ratings of supervisors' HoL (health awareness, value and behavior) predicting depression and anxiety symptoms.

	Depression	*Anxiety*
Model 1 Health awareness		
Level 1 (employee ratings)		
Intercept	4.704 (.180)***	6.183 (.169)***
Employees' age	0.023 (.011)*	-0.004 (.011)
Employees' gender	-0.657 (.321)*	0.148 (.345)
Health awareness	-1.456 (.132)***	-1.248 (.143)***
Level 2 (supervisor ratings)		
Supervisors' age	0.008 (.016)	0.012 (.017)
Supervisors' gender	-0.093 (.334)	-0.074 (.355)
Health awareness	0.006 (.281)	0.223 (.298)
Cross-level interaction		
Health awareness x Health awareness	0.173 (.238)	-0.105 (.255)
Variance components		
Within-team (L1) variance	12.682	14.220
Intercept (L2) variance	1.120	0.610
Slope (L2) variance	0.210	0.274
Intercept-slope (L2) covariance	-0.285	-0.046
Model 2 Health value		
Level 1 (employee ratings)		
Intercept	4.704 (.180)***	6.183 (.169)***
Employees' age	0.027 (.011)	-0.001 (.011)
Employees' gender	-0.725 (0.325)	0.107 (.350)
Health value	-1.218 (.118)***	-0.995 (.127)***
Level 2 (supervisor ratings)		
Supervisors' age	0.008 (.016)	0.020 (.017)
Supervisors' gender	-0.421 (.332)	-0.294 (.349)
Health value	0.502 (.300)	0.328 (.318)

continued on the next page

Cross-level interaction		
Health value x Health value	.343 (.281)	.497 (.303)
Variance components		
Within-team (L1) variance	12.682	14.220
Intercept (L2) variance	1.120	0.610
Slope (L2) variance	0.248	0.269
Intercept-slope (L2) covariance	-0.288	-0.111
Model 3 Health behavior		
Level 1 (employee ratings)		
Intercept	4.704 (.180)***	6.183 (.169)***
Employees' age	0.029 (.011)*	0.001 (.012)
Employees' gender	-0.707 (.333)	0.111 (.355)
Health behavior	-1.114 (.132)***	-0.894 (.141)***
Level 2 (supervisor ratings)		
Supervisors' age	0.009 (.018)	0.019 (.018)
Supervisors' gender	-0.360 (.352)	-0.268 (.368)
Health behavior	0.256 (.242)	0.281 (.254)
Cross-level interaction		
Health behavior x Health behavior	-0.154 (.191)	0.197 (.333)
Variance components		
Within-team (L1) variance	12.682	14.220
Intercept (L2) variance	1.120	0.610
Slope (L2) variance	0.319	0.252
Intercept-slope (L2) covariance	-0.239	-0.069

Note. HoL = Health Oriented Leadership; L1 = Level 1: n = 713 employees; L2 = Level 2: n = 99 supervisors (teams). Values in parentheses are standard errors.

* $p < .05$. ** $p < .01$. *** $p < .001$.

4.5 Discussion

The principal aim of the current study was to examine whether and to what extent health-oriented leadership (HoL) ratings from supervisors and employees correspond to each other and how they are linked to employees' mental health. Based on the concept of HoL (Franke et al., 2014), we assessed health awareness, the value of health, and the health behavior of supervisors from the supervisor and employee perspectives. We found that supervisor and employee ratings of HoL only correspond on the 'behavior dimension', but not on the dimension 'value of health' and 'health awareness'. The employee ratings of HoL were predictive for their mental health, but supervisor ratings were not. Also, no interaction effect was found, indicating that supervisor ratings of HoL did not influence the relationship between employee ratings of HoL and their mental health on an individual level.

The analysis of the ICCs at the employee level showed higher scores on the HoL dimensions than on the mental health of employees. Overall, 22–27% of the variance in HoL was explained by team membership, compared with only 7–8% for mental health. The ICCs for the different dimensions of HoL were comparable. These results suggest that the evaluation of leadership is more dependent on team membership than mental health. Previous studies have shown similar ICCs for health in teams of 0–10% (Kranabetter & Niessen, 2017) and leadership constructs of 20–23% (Zwingmann et al., 2014).

Intercorrelations on the individual employee level showed that younger age of the employees was associated with higher HoL ratings from their own perspective. In addition, the female gender of supervisors was associated with higher ratings of employees' HoL awareness and higher ratings of supervisors' HoL awareness and behavior. This finding suggests a gender-specific effect on HoL that is congruent with previous findings on gender differences in leadership style. For example, prior research has shown that women have a more interactive and participative and less autocratic and directive leadership style than men (Burke & Collins, 2001; Eagly & Johnson, 1990). However, these correlative results are only a first indicator of a gender-specific effect on HoL. This effect should be further investigated in future research to enable reliable conclusions to be drawn.

With regard to the self-other agreement, the multilevel analyses did not reveal significant relationships between awareness and value of health between supervisor and employee ratings (thus, hypotheses 1a and 1b were not confirmed). Thus, the supervisors' ratings of their own HoL awareness and value were not related to the average HoL ratings from their working teams. However, on the behavioral dimension, a significant relationship was obtained

between the two sources (thus, hypothesis 1c was confirmed). Accordingly, supervisors who rated themselves highly in HoL behavior were also rated highly by their work teams. This could be due to the fact that certain supervisor behaviors can be observed from third parties, while the dimensions of health awareness and value of health are not directly observable – therefore showing less ambiguity in behavior ratings (Dai et al., 2007). This is in line with current guidelines to assess psychological constructs from an inter-rater perspective, in which behaviorally anchored scales are widely used (Ohland et al., 2012).

Furthermore, the results of the study show that supervisors' HoL ratings significantly exceed their employees' ratings on all dimensions. Accordingly, supervisors rated themselves to be more aware of employee health, to have a higher value of health, and to show more health behaviors, in comparison to the assessments of their employees (thus, hypotheses 2a–2c were confirmed). These results are consistent with previous findings in the overconfidence-bias literature (Kahneman & Tversky, 1979) and impression management literature (Leary & Kowalski, 1990) showing higher ratings of supervisors on their abilities and performance measures compared to their followers (Atwater et al., 2005; Lee & Carpenter, 2018). However, it can be assumed that this discrepancy is not specific to the workplace, but rather represents a general psychological tendency that also occurs outside the workplace. As the absence of overconfidence bias has been linked to depressive symptoms (Korn et al., 2014), supervisors might profit from optimistically biased beliefs in various areas, such as mental health, job performance, or social interactions.

An examination of the relationship between HoL and mental health showed that only the subjective assessments of employees significantly predicted their mental health (thus, hypotheses 3a–3c were confirmed). However, the supervisors' assessments of their HoL showed no significant effect on the averaged health of employees in the working teams (thus, hypotheses 4a–4c were not confirmed). On the one hand, this shows that the subjective perception (appraisal) of HoL plays a central role in stress processing, which is in line with Lazarus and Folkman (1984) stress appraisal model. On the other hand, this result raises the question of how and under which conditions supervisor ratings of HoL are related to the mental health of employees and underlines the complex nature of the link between leadership and mental health (Harms et al., 2017). However, the small ICC values (0.04 to 0.08) of employees' mental distress represent an important limitation to the interpretability of these findings (LoPilato & Vandenberg, 2014). Usually, a high within-group agreement on mental distress would be needed to establish the effect of supervisor HoL ratings (as a higher-level construct) on the group average of mental health. However, the small ICCs in our sample

could indicate that the within-group mean of mental health is a rather low representation of all individuals in a group. In that case, the interpretation of the statistical cross-level direct effect as the theoretical cross-level direct effect could be considered problematic. At which level of an ICC a multilevel analysis should be considered is, however, a controversial discussion (Aguinis et al., 2013). For example, even low ICCs of .10 or even .05 might suggest that a level 2 variable explains heterogeneity of the dependent variable across teams (Kahn, 2011; Peugh, 2010). In conclusion, there are no consistent ICC size thresholds in multilevel analyses. In the light of this discussion, the multilevel results on mental health should be interpreted with caution.

Finally, our results show only small differences in slopes for the relationship of employees' HoL ratings with their own depression and anxiety across the groups. Consequently, we found no significant interaction effect between the supervisor and employee HoL ratings on the mental health of employees (thus, hypotheses 5a–5c were not confirmed). This finding shows that the mental distress of employees was related to their own perception of HoL, but this relationship did not vary depending on the supervisors' assessment.

Further research is needed to understand the complex and still unclear relationship between supervisor assessments, employee assessments, and the health effects of the two sources. Furthermore, it is important to understand when and under which conditions the assessments between supervisors and employees correspond to each other and under which conditions supervisor assessments affect the health of employees. Previous research has shown that self-other agreement might be dependent from contextual work characteristics (Ostroff et al., 2004), cultural aspects (Cullen et al., 2015) as well as personal characteristics of the supervisors, such as age, gender or personality (Bergner et al., 2016; McKee et al., 2018). Also, other leadership styles, such as authentic leadership, could moderate this relationship, which can be roughly characterized by a high degree of authenticity, self-confidence and self-regulation, transparency, and honesty of supervisors (Gardner et al., 2011). This complexity of the relationship between leadership behavior and health was demonstrated in a single-source study in which role ambiguity and climate of learning mediated the effect between leadership behavior and health, this mediation being further moderated by job autonomy (Berger et al., 2019). Future studies should also apply such mediator and moderator analyses in multisource studies. In addition to assessments of the leadership behavior and style by supervisors and employees, the attitudes of supervisors towards their employees (e.g., whether supervisors are able to take the perspectives of their

employees; Gregory et al., 2011) and the attitudes of employees towards their supervisors should also be assessed (e.g., trust in supervisors; Stedham & Skaar, 2019). This could contribute to a better understanding of the complex relationship between leadership and health.

4.5.1 Limitations and Recommendations for Future Research

Although our study contributes to the further understanding of the relationship between supervisor and employee rated HoL and employee mental health from a multisource perspective, it has some limitations that should be mentioned.

First, we used a cross-sectional study design, which clearly limits the degree to which we could make causal inferences regarding the relationships of HoL and mental health. The findings of the present study should be replicated by longitudinal or experimental designs to test the causal relationship of HoL and mental health.

Second, the small ICC values of employees' mental distress represent an important limitation to the interpretability of the cross-level findings, because it raises the question whether the group mean of mental distress is a good representation of all individuals in the group.

Third, we built our research study on the HoL concept of (Franke et al., 2014), as it is one prominent and broad framework that helps to conceptualize health-oriented leadership. We decided to use the concept of HoL, because it reflects the direct engagement of supervisors in their employees' health (Gurt et al., 2011) and it provides a psychometrically proofed questionnaire that can be used for multisource assessment purposes. In previous literature, however, the construct proliferation and the confusion of different HoL approaches have been criticized (Rudolph et al., 2020). Other approaches, e.g., broader concepts looking at different aspects of several behaviors like task-oriented, relationship-oriented, change-oriented, and passive/destructive behaviors (Inceoglu et al., 2018; Wegge et al., 2014) or other health-beneficial leadership styles (e.g., transformational leadership), can therefore add further information and should be used in future research.

Fourth, because of the complex structure of multisource designs and our limited sample size, we did not add any moderators or mediators to our models. The list of possible moderators and mediators is long and should be investigated in future research to better understand the complex interaction of leadership-employee processes from multisource perspectives.

Fifth, although the supervisor ratings of their HoL ranged from 1 to 5, mean scores where considerably high and standard deviations were considerably low on all dimensions (M = 3.92, SD = 0.54 for awareness; M = 4.54, SD = 0.60 for value and M = 3.52, SD = 0.75 for behavior). This might have led to variance restrictions on the supervisor level, reducing the possibility to detect interaction effects.

Sixth, our sample consisted of 713 employees nested within 99 teams (supervisors) across 11 different companies from different branches in Southern Germany. On the one hand, this reflects the natural variability of work and work factors and increases external validity. On the other hand, the sample might be too small and heterogeneous to detect significant cross-level interactions (Mathieu et al., 2012).

Finally, we assessed general perceived mental distress as an outcome variable. Prior studies have shown that significant results of multisource relationships appeared only for proximal constructs, which are closely connected to each other (e.g., supervisor-employee relationship and feeling respected and supported), but not for distal constructs, which are further apart from each other (e.g., supervisor-employee relationship and perceived stress; Chen & Tjosvold, 2013). Thus, general perceived mental distress could be too distal as an outcome and be influenced by many other factors despite leadership quality. Future studies should, therefore, include proximal and distal outcomes to better assess the magnitude of the relationship between multisource assessments of leadership and health outcomes.

4.5.2 Implications for Practice

Our study showed that HoL ratings significantly differed between supervisors and their staff. A significant relationship between supervisors' self-perception and the perception of their teams was only found for the behavioral dimension, while this relationship was not significant for the awareness and value dimensions. These findings have important implications for practice. This work could contribute to sensitize employees, supervisors and organizations as a whole that subjective appraisals of health-oriented leadership might differ from each other. Especially supervisors should be aware that employees' subjective perceptions of healthy leadership might differ significantly from their own self-perception. The finding that employees' subjective perception is highly related to mental health, highlights the importance for supervisors to discuss health topics openly and explicitly in their team and try to create a common understanding of how leadership can contribute to well-being at the workplace. For doing so leadership training might be a productive occupational health intervention. However, to date, the empirical evidence of the effectiveness of HoL

interventions is limited. A recent systematic review found only seven trials of HoL interventions, all of which had only moderate validity and only four of which showed an improvement in health outcomes (Stuber et al., 2020). In addition, our results suggest that training programs should be designed with both leaders and teams in mind. Team interventions for supervisors and their staff could be offered to create a common concept of health-oriented leadership and mental health in the workplace, thereby reducing discrepancies between the different perspectives (e.g., Ward et al., 2018). This, in turn, should decrease subjectivity biases and might increase self-other agreement and the impact of HoL on employee mental health. Overall, the development of effective HoL interventions represents a central task for future research in the field of occupational health (Rudolph et al., 2020).

4.5.3 Conclusion

In summary, our results show that for the mental health of employees, their own subjective perception of HoL is relevant, but the supervisors' self-perception is not. Furthermore, the supervisors' and employees' ratings of HoL were significantly related only on the health behavior dimension, but not on the health awareness and value of health dimension. This shows that the extent to which employee and supervisor perspectives of HoL correspond to each other is low and may not be well understood due to its complex nature. Future studies should aim to shed light on the complex processes involved, applying multisource research methods and including theoretically derived moderator variables.

5 SCHRIFT 4: EFFECTIVENESS OF A MINDFULNESS- AND SKILL-BASED HEALTH PROMOTING LEADERSHIP INTERVENTION ON THE SUPERVISOR AND EMPLOYEE LEVELS: A CONTROLLED MULTISITE FIELD TRIAL.

An adapted version of this chapter is currently in revision for the Special Issue on *Leadership and Health* in the *Journal of Occupational Health Psychology* as '**Vonderlin, R.**, Müller, G., Biermann, M., Schmidt, B., Kleindienst, N., Bohus, M., Lyssenko, L.: Effectiveness of a Mindfulness- and Skill-Based Health Promoting Leadership Intervention on Supervisor and Employee Levels: A controlled multisite Field Trial.'

5.1 Abstract

Acknowledging increasing demands for workforce health, new theoretical concepts of health-oriented leadership (HoL) have been introduced, emphasizing the supervisor's *direct* and *explicit* engagement in workplace health. However, empirical evidence of the effectiveness of HoL interventions for supervisors and their staff is still scarce. We developed a mindfulness- and skill-based HoL program and investigated its effectiveness in a quasi-experimental multisite field trial including supervisor and employee ratings from 12 German companies. A total of n = 117 supervisors and their employees (n = 744) completed assessments on mental distress and health-oriented leadership before and after the intervention as well as during the 3-month follow-up period. The intervention group was compared to a passive control cohort based on propensity score matching. Hierarchical linear models revealed that the supervisors who had participated at the HoL program experienced a significantly larger decrease in their own mental distress and an increase in health-oriented self-care as well as staff-care than did their matched controls (g = 0.27 to 0.55). These results were confirmed by intent-to-treat analyses. The effect on supervisors' mental distress was moderated by the frequency of their mindfulness practice and mediated by an increase of their health-oriented self-care. No significant effects were revealed between groups regarding outcomes at the employee level. However, a significant relationship between employee rated staff-care and their later mental distress was found. Overall, these findings advance our knowledge of how HoL can be effectively trained to increase participants' self- and staff-care and reduce their mental distress. Future research should explore additional moderator variables, linkages to established work stress models, and improvements of these interventions to increase their effectiveness for employees.

Keywords: mindfulness, leadership, health, intervention, controlled trial

5.2 Introduction

Globalization, digitalization and societal transformation have changed the workplace. Work processes are becoming more complex and the density, intensity and speed of many tasks are increasing (Mack et al., 2015). These developments are associated with rising psychological demands for many employees and present serious challenges for their mental and physical health (Kivimäki et al., 2006; Magnusson-Hanson et al., 2009; Melchior et al., 2007). In order to successfully cope with these developments, a key challenge for organizations is to maintain and promote the (mental) health of their workforce. It has been suggested that this explicit commitment to the mental health of the workforce "will benefit the health of employees, increase productivity for the company and will contribute to the well-being of the community at large" (World Health Organization, 2005a, p. 7). In this context, the development and evaluation of evidence-based targeted interventions has been identified as a key challenge for researchers in occupational health psychology (Bliese et al., 2017; Kelloway, 2017; Kelloway & Barling, 2010; Nielsen & Taris, 2019; Richardson & Rothstein, 2008; Schaufeli, 2004).

Supervisor behavior has been identified as an important potential influence factor, as supervisors bear corporate responsibility for employees in their daily work and can influence their health in various ways (e.g., Kelloway & Barling, 2010; Kuoppala et al., 2008; Skakon et al., 2010). Supervisors design aspects of the work environment and work processes (Nielsen et al., 2008; Tuckey et al., 2012), pose demands or provide resources (Breevaart et al., 2014; Fernet et al., 2015), act as role models for their employees (Dietz et al., 2020; Kranabetter & Niessen, 2017; Yaffe & Kark, 2011) and directly interact with their employees through their leadership behavior and leadership style (Inceoglu et al., 2018; Montano et al., 2017; Van Dierendonck et al., 2004). Consequently, a substantial amount of empirical research has established a link between leadership and various health outcomes in the workplace (Gregersen et al., 2011; Kuoppala et al., 2008; Montano et al., 2017; Schmidt et al., 2014; Van Dierendonck et al., 2004). Accordingly, leadership has been shown to be related to positive outcomes, such as psychological well-being (Nielsen et al., 2008; Skakon et al., 2010) and the organizational safety climate (Inness et al., 2010) as well as to negative outcomes, including employee stress (Harms et al., 2017), cardiovascular disease (Nyberg et al., 2009), suboptimal self-rated health over time (Schmidt et al., 2018), health-related behaviors such as alcohol use (Bamberger & Bacharach, 2006), and the frequency of employees' absenteeism and presenteeism (Schmid et al., 2017).

5.2.1 Health-oriented Leadership

Within leadership theory, several leadership styles, such as transformational leadership, empowering leadership, or authentic leadership, have been associated with employee well-being and positive health outcomes (Arnold, 2017; Macik-Frey et al., 2009; Park et al., 2017). However, given the challenges of maintaining and promoting mental health in the workforce, new theoretical concepts have been introduced that emphasize the supervisor's *direct* and *explicit* engagement in employees' mental health (Franke et al., 2014; Gurt et al., 2011). This concept of "health-oriented leadership" (HoL) has recently received growing attention even on an empirical basis (Rudolph et al., 2020; Yao et al., 2021): Previous research has shown that HoL is negatively associated with employee strain, burnout, perceived stress, irritation, and somatic complaints, while it has been shown to be positively associated with employee self-reported health, well-being, recovery and job satisfaction (Rudolph et al., 2020; Yao et al., 2021).

While empirical research has investigated the antecedents and dynamics of HoL (Rudolph et al., 2020; Yao et al., 2021), the available evidence on HoL interventions is limited, and existing studies are of low to moderate quality (Stuber et al., 2020). One particular challenge is the unclear effectiveness of these interventions on the employee level (Kuehnl et al., 2019; Kulik, 2011). A recent Cochrane review on leadership interventions concluded that "due to the very low- to moderate- quality of the evidence base, clear conclusions are currently unwarranted and well-designed studies are needed to clarify effects of supervisor training on employees' stress, absenteeism, and well-being" (Kuehnl et al., 2019, p. 2). To address this need, this study aims to investigate whether HoL and its effects on mental health can be modified through supervisor training.

We apply strategies based on the framework of HoL by Franke et al. (2014; see Figure 7a). This particular concept emphasizes the importance of supervisors' self-care as well as supervisors' staff-care. HoL further separates these two dimensions into three subdomains each: health awareness, value of health, and health behavior. However, the conceptual approach lacks specificity concerning which skills and techniques supervisors need to acquire in order to improve HoL. The study on hand aims to develop a theoretically grounded HoL intervention program based on previous research findings and to evaluate its effectiveness at both the supervisor and employee level.

Within the presented research field our study contributes by i) strengthening the theoretical basis of HoL and adding to the discussion of whether HoL is a suitable theoretical

concept for leadership interventions, ii) adding empirical evidence on the effectiveness of this intervention within a longitudinal, multilevel, and multisource design to formulate reliable conclusions about the short- and long-term effectiveness of HoL on supervisor and employee levels, therefore overcoming previous methodical limitations in the literature, and iii) providing insight into the mechanisms of HoL interventions through investigating HoL self- and staff-care as proposed determinants of change.

5.2.2 The Role of Mindfulness in HoL and Mental Health

One promising emerging approach is to combine occupational health interventions with principles of mindfulness practice (Bartlett et al., 2019; Lomas et al., 2019a; Vonderlin et al., 2020). The concept of mindfulness originates from Buddhist meditation practices and has been defined as a two-component process involving i) mental self-regulation of awareness of the present moment as well as ii) the development of a compassionate attitude towards oneself and others, which is characterized by curiosity, openness, and acceptance (Bishop et al., 2004). The level of mindfulness varies between people, indicating state and trait qualities, and can be cultivated through practice and intervention (Jamieson & Tuckey, 2017). In the workplace context, trait mindfulness has been associated with a variety of positive health and work-related outcomes, such as general mental health, emotion regulation, life satisfaction, job satisfaction, performance, and positive interpersonal relations (Mesmer-Magnus et al., 2017). Intervention studies have shown that these positive effects can also be achieved through regular mindfulness practice at workplaces (Bartlett et al., 2019; Lomas et al., 2019a; Vonderlin et al., 2020). In addition, mindfulness interventions have been found to improve leadership capabilities (Donaldson-Feilder et al., 2019; Kersemaekers et al., 2020; Nübold et al., 2020). However, these studies vary greatly in quality and strength, highlighting the need to further investigate the impact of mindfulness-based interventions on supervisors' behaviors.

Given these encouraging findings, it seems reasonable to base HoL interventions on mindfulness practice for two main reasons. First, the improvement of awareness of mental and behavioral experiences in the present moment should enable supervisors to better observe their own and their employees' emotional states, stressors, needs, and mental health status, which contributes to the awareness dimension of HoL self- and staff-care. Second, mindful awareness of the present moment is thought to reduce behavioral automaticity and increase behavioral flexibility by creating a gap between stimulus and habitual responses (Good et al., 2016). Accordingly, mindfulness training should improve supervisors' self- and staff-care

behavior in a goal oriented way and prepare the ground for effective behavior change during and after the intervention. In addition to mindfulness practice, psychoeducational elements in a HoL program should increase the supervisors' value of their own and their employees' health. Practical skills based on behavior change principles should enable supervisors to effectively change their health-related behaviors (Sheeran et al., 2017; see Figure 7a). In the following, we draw on the current literature to review promising skills, which supervisors might help to promote their health-oriented self-care and staff-care, and we further discuss the potential role of mindfulness in this context.

5.2.3 Health-promoting Self-Care

The importance of supervisors' own mental health and self-care has been underestimated in previous research and rarely investigated (Barling & Cloutier, 2017). The topic has received increasing attention due to supervisors' exposure to multiple stressors, such as high levels of responsibility, high workloads, considerable variety of tasks, high levels of complexity, or high expectations from others (Hambrick et al., 2005; Udod & Care, 2011). Furthermore, it has been assumed that supervisors' health-promoting self-care has indirect effects on employees' health via two mechanisms. First, supervisors function as role models for their employees (Dietz et al., 2020; Koch & Binnewies, 2015; Kranabetter & Niessen, 2017; Quick et al., 2007; Yaffe & Kark, 2011). Second, supervisors' poor mental health negatively affects their leadership behavior and subsequently has negative effects on employee health (Byrne et al., 2014; Kaluza et al., 2020; Li et al., 2016; Ten Brummelhuis et al., 2014). Consequently, health-promoting self-care not only affects supervisors' own health but also has the potential to impact the health of their employees. Accordingly, self-care is regarded as a basis of health-promoting leadership, and interventions should therefore include protective factors for supervisors' individual health (Franke et al., 2014; Kaluza et al., 2020).

Protective factors for individual health at the workplace include the ability to adaptively self-reflect on one's own stressors (Falon et al., 2021), the ability to choose flexible, situation-adapted coping strategies (Bonanno & Burton, 2013), and the ability to effectively recover from stressful events (Sonnentag & Fritz, 2015). Accordingly, supervisors might profit from mindfulness practice in several ways.

First, the self-regulation of attention to the present moment and the immediate experiences has been shown to allow for increased recognition of mental events in the present moment (Bishop et al., 2004). This non-judgmental awareness of thoughts, feelings, and sensations should improve supervisors' self-awareness and enable them to better observe their

present emotional states and their body's physiological response systems and stress signals (Dane, 2011) as well as being more aware of their own personal needs (Rafferty & Griffin, 2004). Indeed, qualitative analyses indicate that mindfulness-based interventions can improve supervisors' self-reflection and self-care (Rupprecht, Falke et al., 2019).

Second, mindfulness might help supervisors to choose flexible and situation-adapted coping strategies. Mindfulness has been described as a method to increase the capacity of the individual to get detached from emotions, automatic thoughts and appraisals as well as thriving action tendencies and behavioral response (Kang et al., 2013). This decreases the automaticity of mental processes in which past experiences, established schemas, and cognitive habits constrain flexible thinking (Glomb et al., 2011). Mindfulness thus might enhance supervisors' capability to respond more flexibly to a situation instead of responding to workplace events habitually and invariantly (Brown et al., 2007; Glomb et al., 2011). Consequently, this should enable supervisors to act in alignment with their own goals, needs, and values (Brown et al., 2007), as well as to help them to develop an accepting attitude towards stressors and environmental factors that cannot be changed (Kang et al., 2013). Indeed, an accepting non-judgmental attitude has been linked to an increased work-life satisfaction and more effective goal attainment in the work context (Haun et al., 2020).

Third, mindfulness might also improve supervisors' ability to effectively recover (Good et al., 2016). Recovery describes the process by which individual functional systems return to their baseline level when exposure to a workload ceases (Meijman et al., 1998). Based on the effort-recovery model (Meijman et al., 1998) and conservation of resources theory (Hobfoll, 1989), Sonnentag and Fritz (2007) postulated four strategies and experiences that significantly influence recovery from work-related stress: detachment from work, relaxation, mastery, and control. In addition, it has been shown that employees' ability to regulate their recuperation could be improved through targeted interventions (Hahn et al., 2011). Above all, detachment from work seems to be a central element in the regeneration process (Sonnentag & Fritz, 2015), as it has been linked to decreases in emotional exhaustion, fear, fatigue (Flaxman et al., 2012), health complaints, burnout, and depressive symptoms (Sonnentag & Fritz, 2007) as well as increases in life satisfaction (Safstrom & Hartig, 2013). Previous research has shown a relationship between mindfulness and recovery (Hülsheger et al., 2015). Two processes might play a special role here. First, mindfulness should decrease ruminative thinking and thus facilitate detachment from work in leisure time (Glomb et al., 2011; Hülsheger et al., 2014). Indeed, it was shown that the positive effect of mindfulness on sleep quality was mediated by detaching from work in the evening (Hülsheger et al., 2014). A subsequent study investigated

whether detachment, sleep quality, and sleep duration could be effectively improved through a short, mindfulness-based intervention. The results revealed a significant effect on the sleep-related measures, but no effect on detachment (Hülsheger et al., 2015). However, another study found significant effects of a mindfulness intervention on sleep quality as well as rumination (Querstret et al., 2017). Second, mindfulness might improve relaxation, as it has been linked to dampened stress reactions (e.g., less elevated cortisol) and faster recovery to baseline levels (Brown et al., 2012).

In sum, the literature points to several specific strategies to enhance supervisors' self-care. We hypothesize that a HoL program that incorporates elements of mindfulness, the ability to use flexible and situation-adapted coping strategies, and the ability to effectively recover has the potential to improve supervisors' self-care and promote their mental health (see Figure 7b). In addition, these strategies suggest concrete behaviors that can serve as training targets (see Figure 7c). We therefore propose the following hypotheses:

> *Hypothesis 1:* Supervisors in the health-oriented leadership training condition, in comparison to those in the control condition, will report lower mental distress.
>
> *Hypothesis 2:* Supervisors in the health-oriented leadership training condition, in comparison to those in the control condition, will report higher health-oriented self-care.

5.2.4 Health-promoting Staff-care

Supervisors' staff-care comprises two important aspects: the design of a healthy work environment (organizational leadership) and direct, personal contact with employees (Yukl, 2012). In terms of organizational leadership, supervisors should design the work environment in a way that employees can perform their tasks in a healthy way, and supervisors should pay attention to the psychological health climate in their working team. Previous literature suggests that a healthy work environment can be promoted by providing opportunities for effective breaks (e.g., Fritz et al., 2013), clear rules and limits on accessibility within and outside the working hours, to promote work-life segmentation (Dettmers, 2017; Dettmers et al., 2016; Park et al., 2011), and a healthy workplace design (e.g., Leather et al., 2003). To build a psychological safety climate in their teams, supervisors should emphasize social cooperation (Spagnolo, 1999), provide clarity in expectations, roles, and processes and share information to reduce role ambiguity (Barling & Frone, 2017; Zhou et al., 2016) as well as accept and acknowledge mistakes whenever possible (e.g., Gonzalez-Morales et al., 2018).

Regarding direct interaction between supervisor and employee (personal leadership), research has shown that a supportive and appreciative style is particularly beneficial to health, which is a shared feature of various health-beneficial leadership styles such as transformational, supportive, authentic or empowering leadership (Breevaart et al., 2014; Gregersen et al., 2014; Harms et al., 2017; Schmidt et al., 2018). Supervisors with this orientation support individual development and assist employees when they experience difficulties. Situations of overwork and underwork are avoided as much as possible (Judge & Piccolo, 2004). By focusing on their own values and goals, supervisors motivate their employees, convey the meaning and significance of work and encourage their teams to find new creative solutions to problems (Avolio & Yammarino, 2013). Furthermore, appreciative behavior and communication have been shown to be of central importance in direct interactions with employees for their well-being and mental health (e.g., Kranabetter & Niessen, 2019; Schmidt et al., 2014; Semmer et al., 2007; Stocker et al., 2014). These include, for example, social recognition and constructive feedback (Stajkovic & Luthans, 2003). The perceived appreciation of a supervisor is thought to be directly related to employees' self-concept and to increase their personal self-esteem, consequently positively impacting their job satisfaction, self-efficacy, and well-being (Semmer et al., 2007).

In this context, the supervisor's mindfulness is directly linked to the awareness dimension of health-oriented staff-care, as mindfulness has been found to enable the supervisor to notice, observe, and name their employees' stress signals, emotional states, and personal needs as well as help them cope with challenging situations (Glomb et al., 2011; Pinck & Sonnentag, 2018). In addition, mindfulness might also positively influence the supervisor's appreciation towards their employees, as it has been found to improve empathy, a compassionate attitude for others as well as perspective taking and emotional intelligence (Glomb et al., 2011; Vonderlin et al., 2020). Indeed, multisource studies have demonstrated significant relationships between supervisors' mindfulness and employees' need satisfaction and well-being (Reb et al., 2014).

In addition to organizational and personal leadership, HoL highlights the importance of supervisors' ability to deal with employees under high levels of psychological distress. To address employees under high levels of psychological distress explicitly and appropriately is centrally important at the workplace: if the stress on employees is due to occupational causes, discussions and measures to identify these causes and support the employees can prevent stress-related absences from work or illness (Hakanen et al., 2008; Magnusson-Hanson et al., 2014). However, in the case of employees experiencing severe mental suffering, supervisors

often feel insecure, helpless, or anxious (Kramer et al., 2015), and the mental distress of these employees can place demands on supervisors that in turn reduce their own well-being (Wirtz et al., 2017). HoL interventions should therefore also include elements that help supervisors adequately address employees under high psychological strain or employees indicating burnout symptoms. Acknowledging and recognizing employees might be especially important (Bergin & Jimmieson, 2020; Kranabetter & Niessen, 2016), because appreciation has been shown to buffer the detrimental effects of job stressors on well-being and health outcomes; for example, the impact of work interruptions on well-being (Stocker et al., 2014) or the impact of long working hours on job satisfaction (Stocker et al., 2010). Consequently, appreciation has been shown to positively influence the return to work in cases of psychological suffering (Nieuwenhuijsen et al., 2004).

Mindfulness might enable supervisors to adequately address employees under high levels of psychological strain, as it may help them notice, observe, and name employees' stressors, emotions, and needs with a non-judgmental attitude (Glomb et al., 2011). In addition, a mindful, compassionate communication style might help supervisors explore the current situation with warmth, empathy, and appreciation (Arendt et al., 2019) and create an atmosphere of authenticity and trust (Baron, 2016; Nübold et al., 2020). Improved flexibility to address employees' needs and respond to situational conditions could enable supervisors to help employees cope with stressful events and identify appropriate measures to manage workplace stressors (Baron et al., 2018).

In sum, the literature points to several specific strategies to enhance supervisors' staff-care. We hypothesize that a training which includes elements of mindfulness, health-promoting organizational and personal leadership behaviors, and promotes the development of the ability to adequately address employees under high levels of psychological strain has the potential to enhance supervisors' staff-care as well as their employees' mental health (see Figure 7b). These strategies suggest concrete behaviors that can serve as training targets (see Figure 7c). We therefore propose the following hypotheses:

> *Hypothesis 3:* Supervisors in the health-oriented leadership training condition, in comparison to those in the control condition, will report higher health-oriented staff-care.
>
> *Hypothesis 4:* Subordinates of supervisors in the health-oriented leadership training condition, in comparison to those in the control condition, will report lower mental distress.

Hypothesis 5: Subordinates of supervisors in the health-oriented leadership training condition, in comparison to those in the control condition, will report higher health-oriented staff-care.

5.2.5 The Need for Intervention Development and Evaluation

A large body of literature has demonstrated the beneficial effects of leadership quality on mental health at work, and many authors have concluded that intervention development represents a key challenge to be addressed by future research in occupational health psychology (Bliese et al., 2017; Kelloway, 2017; Kelloway & Barling, 2010; Nielsen & Taris, 2019; Richardson & Rothstein, 2008; Schaufeli, 2004). However, to date, little attention has been paid to leader development and mental health (Barling & Cloutier, 2017). Although some studies exist that evaluate health beneficial leadership behaviors like supervisor support (Gonzalez-Morales et al., 2018; Hammer et al., 2019), transformational leadership (Fitzgerald & Schutte, 2010) or coaching-based leadership (Peláez Zuberbuhler et al., 2020), only few studies exist that examine interventions explicitly addressing health-promoting leadership (Ellis et al., 2017; Elo et al., 2014; Gurt et al., 2011; Rigotti et al., 2014). The few interventions evaluated so far have considerable methodological and conceptual limitations (Kuehnl et al., 2019; Stuber et al., 2020). Furthermore, due to ethical and organizational difficulties, the effects of such interventions have rarely been examined at the employee level (Kelloway & Barling, 2010; Kulik, 2011).

Ellis et al. (2017) evaluated a four-hour classroom session that was delivered to 20 to 30 supervisors per session and included self-reflective elements, video-based psychoeducation of mental illness as well as teaching of supportive and conversation behaviors. They found an increase of supervisors' perceived knowledge related to mental health as well as an increase of personally- and employee-targeted well-being behavior. However, they used a quasi-experimental rolling group evaluation design, not allowing to control for time- or measurement effects. In addition, they did not use validated questionnaires to assess outcomes, but self-created instruments that might impair interpretability. Furthermore, the short duration of the intervention and the large number of participants per session might reduce the potential to provoke real and stable behavioral changes of supervisors. Elo et al. (2014) examined the effects of a 7.5-day intervention for supervisors at employee level. However, this intervention did not follow a manualized concept, but contained freely configurable contents on creative work (e.g., painting or handicrafts with natural materials), role-plays, group discussions and lectures on well-being at work. The intervention did not

show any effects on the employee level. Shann et al. (2019) investigated an online intervention for supervisors in a randomized controlled study design to provide information and reduce stigmatization of mental illness. The knowledge about mental illness of supervisors increased, the stigmatization decreased. However, the effects of the intervention could not be transferred to the workplace. These results show that a positive attitude and a high level of knowledge are not sufficient to ensure that supervisors apply intervention learning in their working environment. It therefore seems important to design interventions based on principles of behavioral change in order to enable a transfer of the learned knowledge into the daily work environment. Lastly, Rigotti et al. (2014) combined a series of intensive interventions, such as lectures, leader workshops, team workshops, diary writing and individual coaching, and examined the effectiveness at team level (including supervisors). Intervention effects appeared only in a subsample of German teams, no effects were obtained for Swedish and Finnish samples. Sustainable effects in the German subsample were observed on authentic and health promoting leadership. Although no intervention effects appeared on self-reported health outcomes (e.g., irritation and job exhaustion), the days of sickness absence and sickness presence decreased significantly. However, due to the small final sample size of 24 leaders and 142 team members they were not able to analyze intervention effects at supervisor and employee level separately, because of limited statistical power. Furthermore, due to the large number of different intervention strategies, it remains unclear whether the intervention effects are related to the change in supervisors' behavior or to the fact that employees also received an intervention.

5.2.6 Underlying Mechanisms of Health-promoting Leadership Interventions

To design and implement health-promoting leadership interventions in the future, it is of particular practical importance to know for whom and under which conditions health-promoting leadership interventions are effective. Furthermore, it is of high theoretical importance to understand through which mechanisms and pathways intervention effects are provoked. From a conceptual approach it has been argued that health promoting leadership interventions increase the health-promoting leadership of supervisors, which in turn has beneficial effects on mental health (Franke et al., 2014). Focusing on the supervisor level, one would therefore assume that an increase of mental health should be related to an increase of health-oriented self-care. Focusing on the employee level, one would assume that an increase of mental health should be related to a perceived increase of health-oriented staff-care. In addition, theoretical assumptions of mindfulness assume that mindfulness requires a certain

amount of practice (Bishop et al., 2004; Tang et al., 2015). Indeed, past research on mindfulness-based interventions demonstrated that intervention effectiveness was significantly related to the frequency of mindfulness practice (Crane et al., 2014; Morgan et al., 2014) and a recent meta-analysis on mindfulness-based interventions at the workplace showed that mindfulness programs involving more hours of attendance yielded larger effects on mindfulness, burnout, and well-being outcomes (Vonderlin et al., 2020). Thus, one would assume that supervisors who practice mindfulness more often should show a larger increase of mental health.

In sum, to shed light on the mechanisms by which health-oriented leadership interventions operate, we propose the following hypotheses:

Hypothesis 6: The intervention effect on supervisors' mental distress is moderated by their frequency of mindfulness practice.

Hypothesis 7: The intervention effect on supervisors' mental distress is mediated by an increase of their health-oriented self-care.

Hypothesis 8: The intervention effect on employees' mental distress is mediated by an increase of their own health-oriented staff-care ratings.

5.3 Methods

5.3.1 Study Design

This quasi-experimental study utilized a multisite, controlled study design, which employed a group (intervention versus passive control group) × time format. The study involved supervisor self-ratings as well as employee ratings. The participants (supervisors and their employees) received questionnaires at three time points: i) before the beginning of the courses (baseline), ii) 12 weeks later, after the third seminar module (postintervention) and iii) another 12 weeks later, after completion of the sustainability workshops (three-month follow-up). Only the supervisors received the intervention, but not their employees. The study was registered (DRKS00013635) and approved by the ethical review committee at the University of Heidelberg (2017-562N-MA). To test the feasibility of the study design and to estimate the sample size to ensure sufficient statistical power, we conducted a pilot study prior to the start of this study. The pilot data indicated small effects on employees and medium effects on supervisors. Accordingly, a sample size of 158 supervisors and 967 employees was targeted to achieve adequate statistical power ($1\text{-}\beta = 0.8$) to detect a medium effect ($f = 0.25$) for the group × time interaction on the supervisor level and a small effect ($f = 0.1$) on the employee

level. With an expected dropout rate of approximately 20% at the supervisor level and approximately 30% at the employee level, we aimed to include 198 supervisors and 1,381 employees in our study. The power analysis was conducted using the software G-Power 3 (Faul et al., 2007).

5.3.2 Participants

Intervention Group

The health-promoting leadership interventions were conducted between 09/2017 and 12/2018. Organizations from different branches in Germany were invited to participate in the study via the health insurance's company network. Incentives for the organizations included a free-of-charge implementation of the intervention and a company-specific presentation of the collected data. The organizations were eligible to participate in the study if (1) they carried out at least one complete series of seminars at intervals of four weeks each (three full-day courses, two sustainability appointments) with 10 to 13 supervisors from the same hierarchical level, (2) they were ready to conduct scientific surveys of supervisors and employees, and (3) they provided an opportunity for an information event to be offered at their workplace before the start of the study. The supervisors and their employees were selected based on the above-mentioned inclusion criteria by the organizations themselves. A total of N = 147 supervisors from K = 12 organizations registered for the intervention group (IG), and these supervisors were directly responsible for N = 1,731 employees. A trustee who was independent of the CIMH and the health insurance company prepared the questionnaires, assigning each participant a code number that contained information about his or her company and supervisor-employee connection. These questionnaires were sent to the workplaces with informed consent forms and the participants were able to take part voluntarily in the study by returning their questionnaire to the CIMH. In the information events and the informed consent forms, employees were told that the aim of the study was to evaluate a health-promoting leadership intervention. Thus, employees were not blind to the experimental condition their supervisors were in. All the participants who returned their questionnaire had the opportunity to enter a prize draw to win one of 40 vouchers worth €20 each for an online store.

Control Group

The control group included adult health care insurance holders who did not take part in the intervention program. To achieve the highest possible level of comparability, the study participants in the control group were recruited in two steps using propensity score matching

– a statistical method to build comparable control groups in observational studies (Austin, 2011). During the first step, a cohort of N = 59,846 participants was selected via propensity score matching (PSM), including their potentially relevant covariates that are routinely recorded for all health care insurance holders (age, sex, supervisor [yes/no], employment [full-/part-time], branch) and invited to participate in the study. During the second step, we used PSM to select a statistical match for each intervention and control group participant for whom psychometric data from the baseline assessment were available. To achieve optimal comparability between the groups in terms of the primary outcomes, the matching criteria used in the second step were age, sex, education, shift-work, frequency of supervisor contact, self-reported health status, mental distress and health-oriented staff-care. The additional matching criteria used on the supervisor level were health-oriented self-care, position at the company and management span; the additional matching criteria used on the employee level were overall job satisfaction and previous supervisory relationship duration.

5.3.2.1 Intervention

The health-promoting leadership intervention evaluated in this study was developed at the CIMH in cooperation with a large German health insurance company. This intervention was based on the theoretical concept of health-oriented leadership (Franke et al., 2014). HoL emphasizes the importance of health-promoting self-care and staff-care and focuses especially on the dimensions of health awareness, health behavior and the value of health (see Figure 7a). To put the theoretical concept of HoL into practice, we designed an intervention that consisted of three full-day courses (8hrs each), and two 3-hour booster sessions: (i) health-promoting self-care, (ii) health-promoting staff-care and (iii) addressing employees under stress (see Figure 7b). To address the dimension corresponding to "value of health" and to increase the participants' motivation for change, all the courses included psychoeducational elements and information transfers in clearly structured knowledge units, demonstrating their scientific backgrounds and emphasizing the importance of each topic. To address the dimension corresponding to "health awareness", all the courses were based on mindfulness practices (see Figure 7a). Mindfulness training was delivered according to the skills-based mindfulness concept developed in DBT (Linehan, 2014). Various short mindfulness exercises were practiced in which participants learned to focus and open their minds *non-judgmentally*, *effectively* and *one-mindfully* towards the present moment to *observe* what is going on inside and outside without doing anything to change; to *describe* their thoughts, feelings and sensations by adding words to their observations; and to *participate* and immerse themselves

in the present moment of their daily life. To address the dimension corresponding to "health behavior" all the courses contained practical exercises and interactive units for application to the participants' daily lives and focused on teaching practical everyday skills to foster behavioral change (see Figure 7c). After each module, the supervisors selected the most useful skills and created their own behavioral change plans (Sheeran et al., 2017). The supervisors were motivated to practice the mindfulness exercises on their own between the different modules and to integrate them into their everyday life through informal practices. In order to facilitate the integration of the exercises into the daily work routine, no fixed homework schedule was given. To promote the sustainability of this intervention and its application to the participants' everyday working lives, two three-hour booster appointments were developed to accompany the planned behavioral changes. The modules were delivered at intervals of 4 weeks. The total training time was therefore 30 hours over a period of 6 months. Figure 7 summarizes the relevant key contents and training targets of the intervention.

Module 1: Health-promoting Self-care

The module "health-promoting self-care" comprised the development and enhancement of certain central protective factors of individual health in the workplace, i.e., an adaptive self-reflection on own stressors (Falon et al., 2021), the ability to choose flexible, situation-adapted coping strategies (Bonanno & Burton, 2013) and to effectively recover from stressful events (Sonnentag & Fritz, 2015). The participants were sensitized to pay more attention to their own health status, and their current stressors and strains were identified using Pennebaker's expressive writing technique (Pennebaker & Chung, 2007). The participants were introduced to mindfulness practice as "basic skill" to control their attention, be aware of their own thoughts, emotions, and bodily sensations as well as to recognize their own stressors and limits. To select and use suitable coping strategies, the participants learned to distinguish between changeable and unchangeable stressors. The participants practiced acceptance-based techniques based on mindfulness to address unchangeable stressors. Changeable stressors were addressed by means of an evidence-based problem-solving technique to foster active coping. In addition, the participants learned how to use mindfulness skills to effectively recover from work (Reb et al., 2014; Sonnentag & Fritz, 2015).

Module 2: Health-promoting Staff-care

The module "health-promoting staff-care" comprised the development and enhancement of organizational as well as personal leadership skills. The supervisors were sensitized to the

importance of health for the efficacy and satisfaction of working teams and educated about basic psychological needs (Grawe, 2004). Mindfulness exercises were deepened and the ways in which mindfulness can contribute to health-promoting staff-care were discussed. Furthermore, regarding organizational leadership, skills were delivered and possibilities for improving healthy working conditions and measures promoting cooperative-supporting team dynamics were discussed. On the level of personal leadership, the participants determined how they could specifically address the individual needs and competencies of their employees, e.g., by formulating specific tasks. Finally appreciation, as a central leadership element, was trained with numerous communication role-playing exercises.

Module 3: Addressing Employees under Stress

In the module "addressing employees under stress", mindfulness practice was further deepened and the possibilities and limits of leadership were discussed. To reduce uncertainty, the participants were introduced to the development and symptoms of stress-related mental illness and how they can be recognized; the related observable changes in performance behavior and cognition, appearance, emotional reactions and social behavior were discussed using case studies. An example conversation was conducted based on a guideline that supervisors can apply in reaction to observed strain. Further conversation settings such as regular check-ins with employees, conversations regarding an illness, return/welcome talks and operational reintegration discussions were presented.

Module 4: Sustainability Workshops

The aim of the sustainability-training module was to support the participants in implementing the content of the training by accompanying their individual behavior change plans from the seminar modules. The two 3-hour booster sessions were divided into three parts: a reflection on the implementation of the goals, an analysis of the unimplemented goals with a focus on barriers, and planning the next steps.

a) THEORETICAL BACKGROUND[1]

b) INTERVENTION

	Self-Care	Staff-Care	Employees under stress
	Behavioral change plan	Behavioral change plan	Behavioral change plan
Skill-Training	Recovery[4]	Personal leadership[6]	Conversation settings
	Flexible Coping[3]	Organizational leadership[6]	Communication training
Psychoeducation	Why Self-Care?	Psychological needs[5]	Stress-related mental illness
Mindfulness[2]			

[1] Franke et al., 2014; [2] Glomb et al., 2011; [3] Bonanno & Burton, 2014; [4] Sonnentag & Fritz, 2015; [5] Grawe, 2004; [6] Yukl, 2012

c) BEHAVIROAL SKILL TRAINING

MINDFULNESS

- Observe: Notice your body sensations, pay attention to the present moment, control your attention, observe both inside and outside yourself
- Describe: Put words on the experience, label what you observe, unglue your interpretations and opinions
- Participate: Throw yourself completely into activities of the current moment, become one with whatever your are doing, go with the flow

FLEXIBLE COPING	RECOVERY
▪ Distinguish between changeable and unchangeable stressors ▪ Acceptance to handle with unchangeable stressors ▪ Evidence-based problem solving technique to handle with changeable stressors	▪ Detachment: End the workday with an after-work ritual; Limit your availability; Let thoughts about work go mindfully, when they arise without invitation; Keep a notebook handy to jot down "persistent" thoughts. ▪ Relaxation: Use mindfulness skills to relax ▪ Mastery & Control: Engage in activities that offer a balance to your daily work routine and where you experience yourself as self-determined and competent.
ORGANIZATIONAL LEADERSHIP	**PERSONAL LEADERSHIP**
▪ Build healthy working conditions - Be open and approachable: Give your staff the opportunity to talk to you. - Create space for breaks: Make sure you have regular breaks and the opportunity to spend them in a healthy way. - Set limits: Create "quiet times" and limited accessibility outside working hours. - Comfortable workplace: Support the healthy design of workplaces. ▪ Build healthy team dynamics - Transparency: Create clarity in expectations, roles and processes and share information. - Peculiarities: Promote a sense of belonging through rituals and traditions. - All together: Emphasize team performance and reward cooperation. - Acknowledge failures: Create a culture where learning from mistakes is possible.	▪ Support individual employees - Accompany goal achievement: Clarify not only the what, but also the how. - Encourage individual skills: Give room for further development. - Show effect and significance: Emphasize the meaningfulness of the work and the impact on others. - Avoid boredom and excessive demands: Pay attention to the individual workload. ▪ Appreciate your employees - Appreciative attitude: Separate between the person and their behavior. - Appreciation in gestures: Notice your employees. - Appreciation in behavior: Appreciate the performance of your employees. - Appreciative communication: Give your employees attention and understanding.

Figure 7. Intervention concept derived from the theoretical framework of health-oriented leadership by Franke et al. (2014).

5.3.3 Assessments

Mental Distress

As the primary outcome, the mental distress of supervisors and employees was assessed with the Hospital Anxiety and Depression Scale (Herrmann-Lingen et al., 2011; Zigmond & Snaith, 1983). The HADS is a self-report instrument consisting of two subscales that measure symptoms of *depression* (7 items) and *anxiety* (7 items) on a 4-point Likert scale. The psychometric properties of the HADS show good internal consistency (Cronbach's $\alpha = .80$) as well as good construct and criterion validity. Cronbach's α in our sample was .90 for employees and .86 for supervisors, indicating good internal consistency for the construct measured. Due to a high rate of acceptance in nonclinical samples, the HADS is internationally used as a screening instrument for mental disorders (Bjelland et al., 2002). Mental distress was assessed at both the supervisor and employee levels.

Health-promoting Leadership

As secondary outcomes, the health-promoting self-care and staff-care of supervisors was assessed using the Health Oriented Leadership Questionnaire (Franke et al., 2014). The HoL is a validated questionnaire that consists of 31 items and assesses health-promoting leadership as a multisource construct from the perspectives of both supervisors and their employees within the dimensions of *health awareness* (8 items; e.g., "I [my supervisor] immediately notice[s] when something is wrong with my employees' [my] health"), *value of health* (4 items; e.g., "It is important for me [my supervisor] to reduce health risks at my employees' [my] workplace") and *health behavior* (19 items; e.g., "I [my supervisor] invite[s] my employees [me] to inform me [him] about health risks at their [my] workplace"). These subscales demonstrated good psychometric properties as indicated by good internal consistencies ($\alpha = .84$ to .88) as well as high construct and criterion validity (Franke et al., 2014). In our sample, Cronbach's α ranged from .88 to .92 for employees and .77 to .85 for supervisors, indicating good internal consistency. We used the self-care and staff-care questionnaires as self-report instruments at the supervisor level and the staff-care questionnaire as an external reporting instrument at the employee level.

Sociodemographic Data and Adherence Rates

In addition to the psychometric instruments, sociodemographic data (age, gender, education), workplace characteristics (shift work, management span, hierarchy level, frequency of contact between supervisors and employees, employment status), as well as the

frequency of the supervisors' mindfulness practice at home (1 = never; 2 = 1-2 times/week; 3 = >2 times/week) were assessed.

5.3.4 Trainers

The intervention was facilitated by psychologists and coaches from the cooperating health insurance company, who had completed six days of advanced training on the contents of the intervention program. All the trainers were continuously supervised via monthly meetings. Training and supervision were provided by the CIMH scientific staff. The interventions were delivered at the work sites of the participating companies. To ensure their adherence to the training content, all the trainers completed a questionnaire after each module to determine whether they were able to convey the relevant content.

5.3.5 Statistical Analyses

To analyze hypotheses 1 to 5, hierarchical linear models (HLMs) with random intercepts and random slopes were estimated to test whether the changes over time were more pronounced in the intervention group than in the control group. In addition to the interaction term, all the models included the main effects of time and group (coded as 1 = intervention, 0 = control group). The HLMs were run using the lme4 package in R 4.4.0 (Bates et al., 2014; R Core Team, 2020) according to the guidelines of Bliese (2016). The restricted maximum likelihood (REML) estimation method was used to estimate the model parameters with an unrestricted covariance structure. In addition to the HLMs, independent sample t-tests were computed to compare the mean scores between the groups and report the between-group effect sizes (Hedges' g) at the postintervention and follow-up stages. To conform to the current reporting guidelines, the final analyses were based on both the available data that were observed while the supervisors were treated (excluding the missing data [observed case analysis; OC]) and the intention to treat (ITT) samples. For the OC analyses, all the participants who completed at least two of the three assessments at the different time points were analyzed, and all the participants missing more than 10% of the items were excluded. For the ITT samples, all the participants who were selected by propensity score matching were analyzed, and the missing values were imputed using multiple imputation (Rubin, 1996). The imputation model considered the existing scale values from other points in time for each outcome, age, gender and treatment allocation. Using the R package mice, 30 imputations were conducted with 30 iterations per imputation (Buuren & Groothuis-Oudshoorn, 2010).

To analyze hypothesis 6, a regression analysis was conducted to analyze whether the frequency of supervisors' mindfulness practice at post-intervention significantly predicted the within-group change of supervisors' mental distress between baseline and follow-up stage.

To analyze hypotheses 7 to 8, mediation analyses were conducted by fitting structural equation models (SEM) to the data using the lavaan package in R (Rosseel, 2012). Intervention allocation as assessed at baseline was included as predictor (X), mental distress as assessed at follow-up stage was included as dependent variable (Y), and self-care and staff-care as assessed at post-intervention stage were included as mediator variables (M). According to the hypotheses, two separate SEMs were conducted to analyze supervisors' self-care as mediator on the supervisor level, as well as employee rated staff-care as mediator on the employee level. Tests of indirect effects were conducted using 1000 bootstrap samples and 95% bias-corrected confidence intervals. P-values $\leq .05$ (two-tailed) were considered statistically significant.

5.4 Results

5.4.1 Attrition and Adherence to the Intervention

As shown by the participant flow chart (Figure 8), n = 147 supervisors were registered for the intervention group. These supervisors were directly responsible for n = 1,731 employees. The participants worked at three nursing homes, three hospitals, two manufacturers of parts and accessories for motor vehicles, one foundry, one recreation and holiday home, one waste management company, and one research and development company. Overall, n = 130 supervisors (88%) and n = 804 employees (46%) signed the informed consent forms and participated in the study at the baseline stage. Using propensity score matching, we selected n = 121 supervisors and n = 745 employees from the sample. One company declared insolvency during the study period; thus, we had to exclude their supervisors and employees for the remainder of the study. Overall, a final sample of n = 117 supervisors and n = 744 employees was included in the intervention group. During the remainder of the study, n = 103 supervisors (88%) and n = 508 (68%) employees returned their questionnaires at the postintervention stage, and n = 93 (80%) supervisors and n = 459 (62%) employees returned their questionnaires at the three-month follow-up stage. Therefore, the dropout rates ranged between 10-20% at the supervisor level and 30-40% at the employee level in the intervention group. In the intervention group, 84% of the supervisors participated in the first module (self-care), 88% participated in the second module (staff-care), and 83% participated in the third module (employees under stress). Overall, in the intervention group,

65% of the supervisors completed all three modules, 31% of the supervisors completed two of the modules and 4% of the supervisors completed only one module. Sixty percent of the supervisors practiced mindfulness one to two times per week on their own, 20% practiced it more often and 20% never practiced mindfulness.

In the control group, *n* = 848 supervisors and *n* = 5,546 employees signed the informed consent forms to participate in the study. Thus, we were able to match the eligible control participants to intervention participants with a ratio of 7:1. The final control group sample at the baseline stage consisted of *n* = 117 supervisors and *n* = 744 employees. Over the remainder of the study, *n* = 91 supervisors (78%) and *n* = 542 (73%) employees returned their questionnaires at the postintervention stage, and *n* = 90 (78%) supervisors and *n* = 525 (71%) employees returned their questionnaires at the three-month follow-up stage. Therefore, the dropout rate was 12% at the supervisor level and ranged between 27-29% at the employee level in the control group.

5.4.2 Sociodemographic Characteristics

The supervisors averaged 46.84 years old (*SD* = 10.41); the employees averaged 41.59 years old (*SD* = 12.93). Most of employees (70.4%) and 48.3% of supervisors were female. The percentage of respondents holding an A-Level degree was 41.3% for employees and 53.4% for the supervisors. Sociodemographic and workplace characteristics are depicted in Table 12.

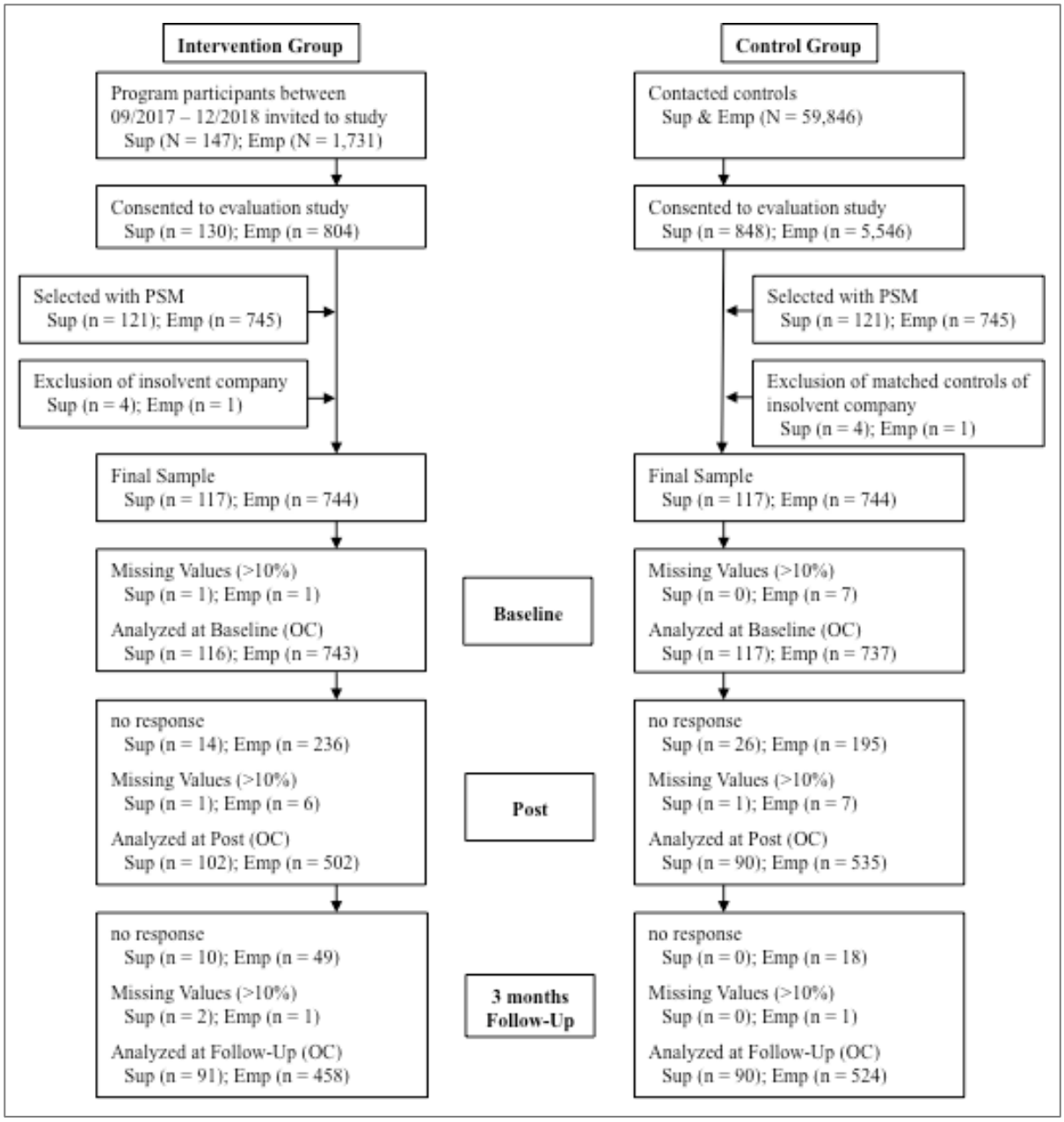

Figure 8. Participants flow chart. The flow chart shows the progression of participants throughout the study.

Table 12

Sociodemographic and work characteristics of participants at baseline

Baseline Characteristics	Intervention group				Control group			
	supervisors		employees		supervisors		employees	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Age in years								
< 25 years	1	0.9	68	9.1	1	0.9	77	10.3
26 – 34 years	16	13.7	205	27.6	21	17.9	210	28.2
35 – 44 years	29	24.8	150	20.2	23	19.7	130	17.5
45 – 54 years	49	41.9	183	24.6	36	30.8	172	23.1
> 55 years	22	18.8	138	18.5	36	30.8	155	20.8
Gender								
Female	55	47	527	70.8	58	49.6	520	69.9
Male	62	53	217	29.2	59	50.4	224	30.1
Years of school education								
9 years	10	8.5	106	14.2	23	19.7	105	14.1
10 years	43	36.8	323	43.4	33	28.2	339	45.6
13 years (A-Level)	64	54.7	315	42.3	61	52.1	300	40.3
Shift-work								
Yes	32	72.6	356	47.8	43	36.8	349	46.9
No	85	27.4	388	52.2	74	63.2	395	53.1
Hierarchy level								
Team-level	47	40.2			44	37.6		
Unit-level	58	49.6			58	49.6		
Department-level	12	10.3			15	12.8		
Management span								
< 5 employees	24	20.5			14	12		
5-20 employees	52	44.4			64	54.7		
> 20 employees	41	35			39	33.3		
Contact frequency								
Daily	106	90.6	405	54.4	107	91.5	408	54.8
1-2x/week	9	7.7	230	30.9	8	6.8	216	29.0
< 1x/week	2	1.7	109	14.7	2	1.7	120	16.1
Branches								
Automotive	18	15.4	59	7.9	18	15.4	59	7.9
Healthcare	77	65.8	623	83.8	77	65.8	623	83.8
Waste/Disposal Service	11	9.4	27	3.6	11	9.4	27	3.6
Science	11	9.4	35	4.7	11	9.4	35	4.7

Note. N = 234 supervisors (n = 117 for each condition) and N = 1488 employees (n = 744 for each condition). Due to the propensity score matching procedure participants' sociodemographic characteristics did not differ by condition.

5.4.3 Intervention Effects on Supervisor Level

No baseline imbalances were detected for any of the outcome measures; mental distress: $t(232) = 0.881$, $p = .379$; self-care: $t(232) = -1.290$, $p = .198$; staff-care: $t(232) = 0.094$, $p = .926$; appreciation: $t(232) = 0.934$, $p = .351$. The means, standard deviations and effect sizes between the groups over time are presented in Table 13 and Figure 9 for the observed cases (OC) analyses and in Table 14 for the intent to treat (ITT) sample, respectively.

Intervention Effects on Supervisors' Mental Distress

Regarding hypothesis 1, the HLM for overall mental distress (as assessed by the HADS) of supervisors showed no significant time effect ($\beta = -0.248 \pm 0.245$, $t[371] = -1.011$, $p = .313$) or group effect ($\beta = -0.974 \pm 0.858$, $t[231] = -1.136$, $p = .257$) in the OC analysis. However, the group-by-time interaction yielded significance ($\beta = -0.921 \pm 0.345$, $t[371] = -2.671$, $p = .008$), indicating a larger decrease in the intervention group over time than in the control group (Figure 9). The group-by-time interaction was significant for both subscales, i.e., for depression and anxiety (Table 13). The between-group effect sizes ranged from Hedges' $g = -0.33$ to -0.36 at the postintervention stage and from $g = -0.35$ to -0.38 at the three-month follow-up stage, indicating that the intervention group had lower mean scores of mental distress. The ITT analyses confirmed the group-by-time interaction effect of overall mental distress ($\beta = -1.051 \pm 0.441$, $t[466] = -2.755$, $p = .006$), both for the anxiety and the depression subscale (Table 14). The between-group effect sizes of the ITT analyses ranged from Hedges' $g = -0.30$ to -0.32 at the postintervention stage and from $g = -0.30$ to -0.33 at the 3-month follow-up stage, indicating that the intervention group had lower mean scores of mental distress.

Intervention Effects on Supervisor-rated Self-care and Staff-care

Regarding hypothesis 2, the HLMs for the supervisors' overall self-care (as assessed by the HoL) showed no significant time effect ($\beta = 0.045 \pm 0.024$, $t[371] = 1.865$, $p = .063$) or group effect ($\beta = 0.102 \pm 0.079$, $t[231] = 1.298$, $p = .196$) in the OC analysis; however, they exhibited a significant group-by-time interaction ($\beta = 0.101 \pm 0.034$, $t[371] = 1.932$, $p = .004$), indicating a larger increase in self-care in the intervention group over time than in the control group (Figure 9). This group-by-time interaction was significant for all the subscales, i.e., health awareness, value of health, and health behavior (Table 13). The between-group effect sizes ranged from Hedges' $g = 0.18$ to $g = 0.36$ at the postintervention stage and from $g = 0.40$ to $g = 0.59$ at the 3-month follow-up stage. The ITT analyses confirmed the group-by-time interaction effect of overall self-care ($\beta = 0.119 \pm 0.041$, $t[466] = 2.926$, $p = .004$), for all

subscales (i.e., health awareness, value of health, and health behavior [Table 14]). The between-group effect sizes of the ITT analyses ranged from Hedges' g = 0.16 to 0.28 at the postintervention stage and from g = 0.30 to 0.47 at the 3-month follow-up stage.

Regarding hypothesis 3, the HLM for the supervisors' overall staff-care (assessed by the HoL scale) showed no significant time effect (β = -0.007 ± 0.025, t[371] = -0.274, p = .784) or group effect (β = -0.005 ± 0.065, t[231] = -0.076, p = .940) in the OC analysis; however, it exhibited a significant group-by-time interaction (β = 0.093 ± 0.035, t[371] = 2.692, p = .007), indicating a larger increase in staff-care in the intervention group over time than in the control group (Figure 9). However, this group-by-time interaction was only significant for the subscale health awareness, and not for the subscales of value of health and health behavior (Table 13). The between-group effect sizes ranged from Hedges' g = 0.12 to g = 0.29 at the postintervention stage and from g = 0.19 to g = 0.39 at the 3-month follow-up stage. The ITT analyses confirmed the group-by-time interaction effect of staff-care (β = 0.093 ± 0.038, t[466] = 2.425, p = .016), especially for the subscale of health awareness, but not for the subscales of value of health or health behavior (Table 14). The between-group effect sizes of the ITT analyses ranged from Hedges' g = 0.07 to 0.26 at the postintervention stage and from g = 0.17 to 0.34 at the 3-month follow-up stage.

Testing for Mechanisms of Supervisors' Symptom-change

Regarding hypothesis 6, we analyzed whether the frequency of supervisors' mindfulness practice was significantly related to their decrease of mental distress (between baseline and follow-up stage). Results revealed that supervisors in the intervention group who practiced mindfulness more frequently exhibited a significantly larger decrease in mental distress (F[1, 92] = 5.32, p = .024, R^2 = .05).

Regarding hypothesis 7, we analyzed the mediating effect of supervisors' self-care as mechanism of their decreasing mental distress. Results showed a significant indirect effect via health-oriented self-care at follow-up mental distress (see Table 15).

5.4.4 Intervention Effects on Employee Level

No baseline imbalances were detected for any of the outcome measures; mental distress: t(1486) = 0.915, p = .361; staff-care: t(1486) = -0.050, p = .960; appreciation: t(1486) = -0.417, p = .676. The means, standard deviations and effect sizes between the groups over time are presented in Table 13 and Figure 10 for the OC data and in Table 14 for the ITT samples, respectively.

Intervention Effects on Employees' Mental Distress

Regarding hypothesis 4, the HLM for employees' overall mental distress (as assessed by the HADS) showed no significant time effect (β = -0.055 ± 0.103, t[2010] = -0.530, p = .596), no significant group effect (β = -0.409 ± 0.372, t[1485] = -1.100, p = .272), and no significant group-by-time interaction (β = -0.102 ± 0.149, t[2010] = -0.684, p = .494) in the OC analysis, indicating no difference between the intervention and control group over time (Figure 10). The group-by-time interaction was nonsignificant for both, the depression and anxiety subscale (Table 13). The between-group effect sizes ranged from Hedges' g = -0.01 to -0.10 at the postintervention stage and from g = -0.06 to -0.10 at the 3-month follow-up stage. The ITT analyses also showed a nonsignificant group-by-time interaction effect of the employees' overall mental distress (β = -0.112 ± 0.211, t[2974] = -0.530, p = .597), both for the anxiety and for the depression subscale (Table 14). The between-group effect sizes of the ITT analyses ranged from Hedges' g = -0.02 to g = -0.10 at the postintervention stage and from g = -0.05 to -0.08 at the 3-month follow-up stage.

Intervention Effects on Employee-rated Staff-care

Regarding hypothesis 5, the HLMs for the employees' perceptions of overall staff-care (as assessed by the HoL) showed no significant time effect (β = 0.003 ± 0.013, t[2010] = 1.956, p = .051), no significant group effect (β = 0.023 ± 0.065, t[1485] = 0.427, p = .670), and no significant group-by-time interaction (β = 0.004 ± 0.022, t[2010] = 0.185, p = .853) in the OC analysis, indicating no difference between the intervention and control group over time (see Figure 10). The group-by-time interaction was nonsignificant for all of the subscales, i.e., health awareness, value of health and health behavior (Table 13). However, the time effect on the behavior subscale was significant, indicating an improvement in the employees' perceptions of their supervisors' health behavior over time in both groups (Table 13). The between-group effect sizes ranged from Hedges' g = 0.03 at the postintervention stage to g = 0.01 at the 3-month follow-up stage. The ITT analyses did not indicate a significant group-by-time interaction effect on the employees' perceptions of overall staff-care (β = 0.005 ± 0.027, t[2974] = 0.194, p = .847) for any of the subscales, i.e., health awareness, value of health or health behavior (Table 14). The ITT analyses did not confirm the significant time effect on the behavior dimension (Table 14).

Testing for Mechanisms of Employees' Symptom-change

Regarding hypothesis 8, we analyzed the mediating effect of employee rated staff-care as mechanism of their decreasing mental distress. Since no intervention effect was found on the employee level, the indirect effect via health-oriented staff-care at follow-up mental distress yielded no significance. However, results revealed a significant indirect effect from employee rated staff-care on their mental distress at follow-up stage (see Table 15).

Table 13

Intervention effects, means and standard deviations based on observed cases analyses (OC)

	Supervisors									
	Intervention		Control		Effect size	HLM				
	M	*SD*	*M*	*SD*	*Hedges' g*	*Effect*	*Estimate*	*SE*	*t-value*	*df*
Mental Distress										
Anxiety						Int	6.367	0.332	19.15***	371
Baseline	5.98	3.19	6.32	3.88	- 0.10	G	- 0.452	0.471	- 0.96	231
Post	4.97	3.26	6.26	4.27	- 0.34*	T	- 0.147	0.144	- 1.02	371
Follow-up	4.72	3.39	6.04	4.06	- 0.35*	G x T	- 0.497	0.203	- 2.44*	371
Depression						Int	4.655	0.321	14.49***	371
Baseline	4.13	3.14	4.61	3.77	- 0.14	G	- 0.525	0.455	- 1.15	231
Post	3.45	3.37	4.70	4.15	- 0.33*	T	- 0.099	0.140	- 0.70	371
Follow-up	3.05	2.89	4.43	4.50	- 0.36*	G x T	- 0.430	0.197	- 2.18*	371
HoL Self-Care										
Awareness						Int	3.775	0.062	61.07***	371
Baseline	3.92	0.69	3.77	0.67	0.22	G	0.137	0.088	1.57	231
Post	4.02	0.57	3.79	0.69	0.36*	T	0.006	0.032	0.19	371
Follow-up	4.16	0.52	3.78	0.74	0.59***	G x T	0.099	0.045	2.21*	371
Value						Int	3.362	0.085	39.63***	371
Baseline	3.32	1.01	3.34	0.90	- 0.02	G	- 0.018	0.120	-0.151	231
Post	3.62	0.74	3.49	0.80	0.18	T	0.068	0.041	1.65	371
Follow-up	3.79	0.80	3.44	0.90	0.40**	G x T	0.158	0.058	2.73**	371
Behavior						Int	3.480	0.067	51.61***	371
Baseline	3.58	0.68	3.47	0.81	0.15	G	0.113	0.095	1.19	231
Post	3.79	0.69	3.59	0.80	0.27	T	0.077	0.030	2.57*	371
Follow-up	3.92	0.67	3.62	0.80	0.40**	G x T	0.091	0.042	2.16*	371
HoL Staff-Care										
Awareness						Int	4.067	0.046	88.00***	371
Baseline	3.91	0.57	4.08	0.43	- 0.34*	G	- 0.158	0.065	- 2.42*	231
Post	4.01	0.55	3.95	0.49	0.12	T	-0.069	0.027	-2.58*	371
Follow-up	4.11	0.49	3.95	0.54	0.31*	G x T	0.157	0.038	4.17***	371
Value						Int	4.399	0.055	79.88***	371
Baseline	4.55	0.58	4.42	0.64	0.21	G	0.149	0.078	1.92	231
Post	4.52	0.58	4.33	0.73	0.29*	T	- 0.008	0.038	-0.21	371
Follow-up	4.52	0.51	4.40	0.70	0.19	G x T	-0.014	0.053	-0.26	371
Behavior						Int	3.475	0.067	52.22***	371
Baseline	3.53	0.74	3.44	0.74	0.12	G	0.062	0.094	0.65	231
Post	3.73	0.62	3.56	0.69	0.25	T	0.049	0.032	1.53	371
Follow-up	3.82	0.61	3.55	0.73	0.39**	G x T	0.086	0.046	1.88	371

Employees										
Mental Distress										
Anxiety						Int	6.561	0.145	45.40***	2010
Baseline	6.22	3.90	6.51	4.06	- 0.07	G	- 0.346	0.204	-1.69	1485
Post	6.09	3.91	6.50	3.99	- 0.10	T	- 0.096	0.060	- 1.59	2010
Follow-up	5.74	3.92	6.15	4.06	- 0.10	G x T	- 0.050	0.088	- 0.57	2010
Depression						Int	4.789	0.138	34.60***	2010
Baseline	4.71	3.75	4.77	3.83	- 0.02	G	- 0.062	0.196	- 0.315	1485
Post	4.71	3.72	4.76	3.87	- 0.01	T	0.036	0.057	0.621	2010
Follow-up	4.47	3.66	4.68	3.82	- 0.06	G x T	- 0.052	0.083	- 0.63	2010
HoL Staff-Care										
Awareness						Int	3.019	0.036	84.16***	2010
Baseline	3.02	1.01	3.02	0.99	0.00	G	- 0.009	0.051	- 0.18	1485
Post	2.99	1.04	2.99	0.91	0.00	T	0.018	0.016	1.18	2010
Follow-up	3.01	1.01	3.05	0.95	- 0.04	G x T	- 0.014	0.023	- 0.64	2010
Value						Int	3.22	0.04	79.34***	2010
Baseline	3.23	1.14	3.21	1.10	0.02	G	0.009	0.057	0.15	1485
Post	3.23	1.17	3.22	1.08	0.01	T	- 0.002	0.018	- 0.12	2010
Follow-up	3.20	1.09	3.20	1.09	0.00	G x T	- 0.016	0.026	- 0.62	2010
Behavior						Int	2.497	0.037	67.77***	2010
Baseline	2.51	1.05	2.49	1.00	0.02	G	0.015	0.052	0.29	1485
Post	2.59	1.06	2.54	0.96	0.05	T	0.046	0.017	2.69**	2010
Follow-up	2.62	1.06	2.57	1.03	0.05	G x T	0.016	0.025	0.64	2010

Note. *M* = Mean. *SD* = Standard deviation. *SE* = Standard Error. *df* = degrees of freedom. HLM = Hierarchical Linear Model. G = Group (intervention versus control). T = time. GxT = group*time interaction. HADS = Hospital Anxiety and Depression Scale. HoL = Health oriented Leadership Scale. Hedges' g represents the between group effect size.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 14

Intervention effects, means and standard deviations based on ITT samples

	Supervisors									
	Intervention		Control		Effect size	HLM				
	M	*SD*	*M*	*SD*	*Hedges' g*	*Effect*	*Estimate*	*SE*	*t-value*	*df*
Mental Distress										
Anxiety						Int	6.415	0.340	18.84***	466
Baseline	6.04	3.24	6.36	3.89	- 0.09	G	-0.471	0.475	-0.99	232
Post	5.01	3.57	6.28	4.54	- 0.31*	T	-0.107	0.175	-0.62	466
Follow-up	4.83	3.89	6.08	4.43	- 0.30*	G x T	-0.514	0.242	-2.13*	466
Depression						Int	4.656	0.322	14.46***	466
Baseline	4.18	3.14	4.59	3.79	- 0.12	G	-0.531	0.455	-1.169	232
Post	3.50	3.68	4.70	4.43	- 0.30*	T	0.008	0.158	0.05	466
Follow-up	3.15	3.57	4.49	4.65	- 0.32*	G x T	- 0.527	0.227	-2.33*	466
HoL Self-Care										
Awareness						Int	3.754	0.061	61.61***	466
Baseline	3.91	0.65	3.77	0.65	0.22	G	0.134	0.086	1.56	232
Post	3.87	0.65	3.67	0.76	0.28*	T	-0.065	0.035	-1.85	466
Follow-up	3.99	0.65	3.66	0.76	0.47***	G x T	0.098	0.049	2.00*	466
Value						Int	3.365	0.085	39.80***	466
Baseline	3.32	0.97	3.34	0.87	- 0.02	G	-0.003	0.119	-0.03	232
Post	3.63	0.87	3.48	0.97	0.16	T	0.041	0.044	0.93	466
Follow-up	3.73	0.97	3.44	0.97	0.30*	G x T	0.163	0.062	2.66**	466
Behavior						Int	3.486	0.067	51.65***	466
Baseline	3.58	0.65	3.47	0.87	0.14	G	0.108	0.095	1.14	232
Post	3.78	0.76	3.58	0.87	0.25	T	0.050	0.037	1.36	466
Follow-up	3.89	0.76	3.59	0.87	0.37**	G x T	0.101	0.050	2.03*	466
HoL Staff-Care										
Awareness						Int	4.059	0.046	88.05***	466
Baseline	3.91	0.54	4.08	0.43	- 0.35**	G	-0.152	0.065	-2.33*	232
Post	4.00	0.54	3.96	0.54	0.07	T	-0.065	0.028	-2.32*	466
Follow-up	4.09	0.54	3.96	0.54	0.24	G x T	0.149	0.041	3.67***	466
Value						Int	4.397	0.056	79.23***	466
Baseline	4.55	0.54	4.42	0.65	0.22	G	0.145	0.078	1.85	232
Post	4.52	0.65	4.34	0.76	0.26	T	-0.008	0.038	-0.20	466
Follow-up	4.52	0.65	4.40	0.76	0.17	G x T	-0.016	0.054	-0.302	466
Behavior						Int	3.465	0.067	51.47***	466
Baseline	3.53	0.76	3.45	0.76	0.11	G	0.074	0.094	0.79	232
Post	3.71	0.65	3.54	0.76	0.24	T	0.034	0.037	0.92	466
Follow-up	3.79	0.76	3.53	0.76	0.34**	G x T	0.089	0.051	1.75	466

						Employees				
Mental Distress										
Anxiety						Int	6.561	0.144	45.55***	2974
Baseline	6.21	3.82	6.50	4.09	- 0.07	G	-0.347	0.204	-1.70	1468
Post	6.03	4.64	6.50	4.64	- 0.10	T	-0.138	0.080	-1.71	2974
Follow-up	5.83	4.64	6.21	4.64	- 0.08	G x T	-0.049	0.115	-0.42	2974
Depression						Int	4.773	0.138	34.62***	2974
Baseline	4.71	3.82	4.76	3.82	- 0.01	G	-0.037	0.194	-0.19	1468
Post	4.66	4.09	4.75	4.09	- 0.02	T	-0.017	0.080	-0.216	2974
Follow-up	4.48	4.64	4.68	4.09	- 0.05	G x T	-0.121	0.097	-1.24	2974
HoL Staff-Care										
Awareness						Int	3.019	0.036	83.36***	2974
Baseline	3.02	1.09	3.03	1.09	- 0.01	G	-0.007	0.051	-0.15	1468
Post	3.00	1.09	3.00	1.09	0.00	T	0.007	0.020	0.33	2974
Follow-up	3.01	1.09	3.04	1.09	- 0.03	G x T	-0.007	0.031	-0.24	2974
Value						Int	3.219	0.040	79.70***	2974
Baseline	3.23	1.09	3.21	1.09	0.02	G	0.007	0.058	0.120	1468
Post	3.23	1.36	3.22	1.36	0.01	T	0.000	0.022	0.01	2974
Follow-up	3.21	1.36	3.21	1.36	0.00	G x T	-0.011	0.032	-0.34	2974
Behavior						Int	2.509	0.037	67.48***	2974
Baseline	2.51	1.09	2.50	1.09	0.01	G	0.011	0.053	0.21	1468
Post	2.59	1.36	2.55	1.09	0.03	T	0.032	0.021	1.50	2974
Follow-up	2.61	1.36	2.56	1.09	0.04	G x T	0.021	0.033	0.63	2974

Note. *M* = Mean. *SD* = Standard deviation. *SE* = Standard Error. *df* = degrees of freedom. HLM = Hierarchical Linear Model. G = Group (intervention versus control). T = time. GxT = group*time interaction. HADS = Hospital Anxiety and Depression Scale. HoL = Health oriented Leadership Scale. Hedges' g represents the between group effect size.

* $p < .05$; ** $p < .01$; *** $p < .001$

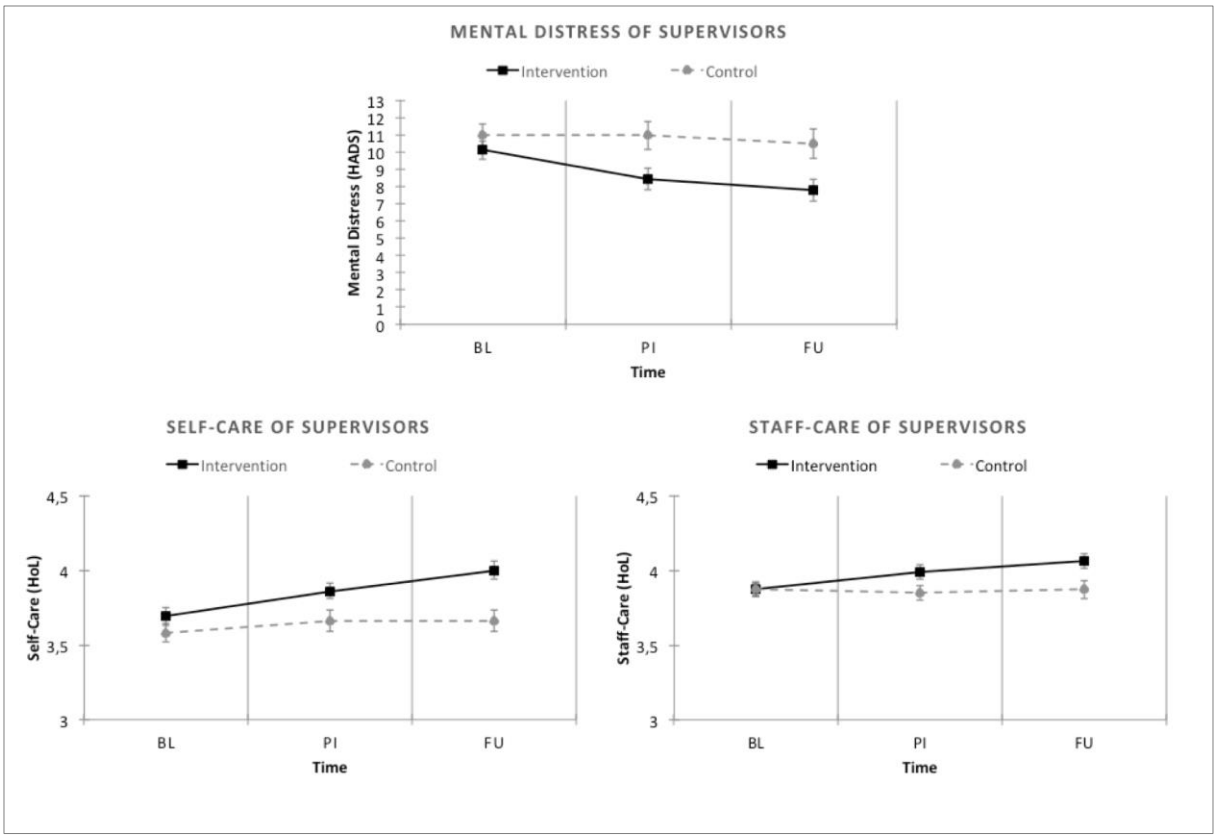

Figure 9. Means for primary and secondary outcomes on supervisor level in the intervention and control group between baseline (BL) and follow-up (FU) assessment. Error bars represent standard errors.

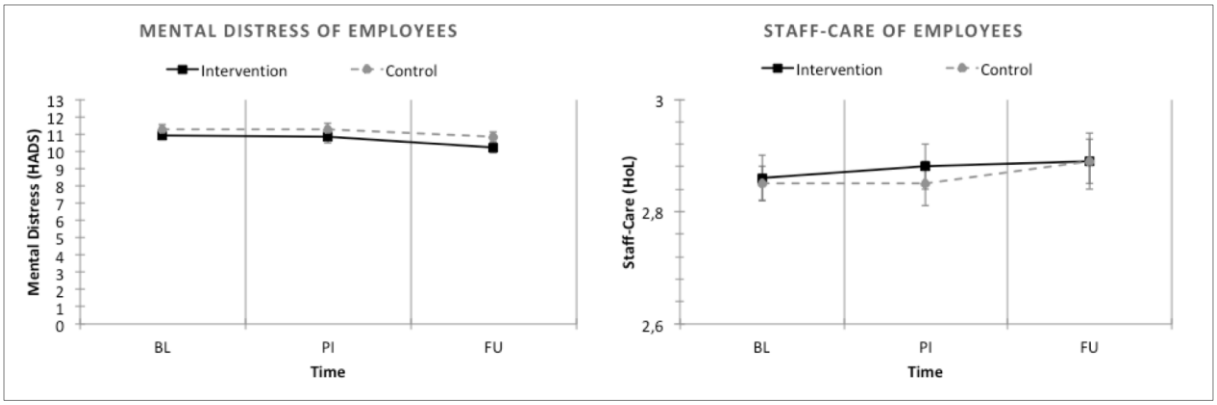

Figure 10. Means for primary and secondary outcomes on employee level in the intervention and control group between baseline (BL) and follow-up (FU) assessment. Error bars represent standard errors.

Table 15

Results from mediation analyses predicting follow-up intervention effects for supervisors via supervisor-rated self-care as well as follow-up intervention effects for employees via employee-rated staff-care.

	Estimate	SE	95% CI
Supervisors			
Total effect			
Intervention (X) → HADS (Y)	-2.855**	1.036	[-4.886, -0.825]
Total indirect effects			
Intervention (X) → Self-care (M)	0.204*	0.095	[0.018, 0.390]
Self-care (M) → HADS (Y)	-5.423***	0.737	[-6.867, -3.978]
Intervention (X) → Self-care (M) → HADS (Y)	-1.105*	0.535	[-2.154, -0.056]
Employees			
Total effect			
Intervention (X) → HADS (Y)	-0.440	0.498	[-1.446, 0.588]
Total indirect effects			
Intervention (X) → Staff-care (M)	0.031	0.067	[-0.104, 0.163]
Staff-care (M) → HADS (Y)	-2.579***	0.269	[-3.112, -2.041]
Intervention (X) → Staff-care (M) → HADS (Y)	-0.079	0.175	[-1.446, 0.588]

Note. Intervention (0 = control condition, 1 = intervention condition). HADS = Hospital Anxiety and Depression Scale. SE = standard error. Self- and staff-care (M) were assessed at post-intervention stage. HADS (Y) was assessed at follow-up stage. X = Predictor variable. M = Mediator variable. Y = dependent variable.

* $p < .05$; ** $p < .01$; *** $p < .001$

5.5 Discussion

Despite the considerable progress made in understanding health-promoting leadership, little empirical research has examined the effectiveness of interventions or strategies for improving its occurrence. We addressed this need by conducting a quasi-experimental study to examine the effectiveness of a mindfulness- and skill-based health-promoting leadership intervention at the supervisor and employee levels within a controlled, multisite field trial across 12 companies in Germany. To the best of our knowledge, this is one of the first controlled trials to evaluate the effectiveness of a health-promoting leadership intervention on both the supervisor level and the employee level.

We found that, on the supervisor level, the results of the OC analyses showed a significant decrease in supervisors' mental distress and a significant increase in the supervisors' health-oriented self-care and staff-care, with small to medium between-group effect sizes of Hedges' g ranging from $g = 0.27$ to 0.55. The results were confirmed by the ITT analyses. Thus, hypotheses 1 to 3 were supported. On the employee level, the results of both the OC analyses and the ITT analyses showed no changes in any of the outcome measures assessed, i.e., employees' mental distress and employees' perceptions of staff-care. Thus, hypotheses 4 and 5 were not supported.

The analyses of potential moderators and mediators revealed that supervisors' decrease of mental distress was significantly related to their frequency of mindfulness practice: Accordingly, supervisors who practiced mindfulness more than two times per week showed a significantly larger decrease in mental distress than the supervisors who practiced mindfulness only one to two times per week or never. Thus, hypothesis 6 was supported. In addition, mediation analyses revealed that the intervention effect of supervisors' mental distress was significantly mediated by an increase of their health-oriented self-care. Thus, hypothesis 7 was supported. On the employee level, no significant mediation effect appeared, because no significant intervention effect was shown. However, employee-rated staff-care at post-intervention significantly predicted their mental distress at follow-up stage. Thus, hypothesis 8 was not supported.

Our results support the findings of previous studies on mindfulness-based interventions in the workplace, showing an increase in participants' mental health and beneficial effects on work-related outcomes with effect sizes ranging from $g = 0.32$ to 0.77 (Bartlett et al., 2019; Lomas et al., 2019a; Vonderlin et al., 2020). While empirical evidence on the effectiveness of mindfulness-based interventions for supervisors is limited and the quality and methodology of

studies are heterogeneous, prior studies indicate small to medium effect sizes on supervisors' well-being and leadership capabilities (Donaldson-Feilder et al., 2019). However, in these prior studies, a wide range of outcomes was assessed, and only a few studies investigated direct effects on healthy leadership as an outcome. Our study adds empirical evidence to the literature that leadership capabilities can be improved by mindfulness-based interventions.

5.5.1 Intervention Effects on the Supervisor Level

Consistent with this study's hypotheses, mental distress at the supervisor level significantly decreased, while health-oriented self-care and staff-care increased. A closer look at the different dimensions of self-care and staff-care reveals that the health awareness dimension increased considerably, especially in terms of supervisors' self-care (g = 0.36 – 0.59). This result is consistent with the previous conceptual approaches that closely link leadership health awareness with the concept of mindfulness (Franke et al., 2014; Pinck & Sonnentag, 2018). Theories of healthy leadership highlight the importance of supervisors' health awareness as a prerequisite for healthy leadership (Franke et al., 2014). Thus, an increase in supervisors' health awareness to their own stress signals and those of employees should enable them to recognize mental distress at an early stage and to prevent its chronicity. In that way, they could contribute to preventing long-term consequences of psychological distress, such as sleep problems (Demerouti et al., 2004; Hakanen et al., 2008; Magnusson-Hanson et al., 2014). Regarding the health behavior dimension of self-care and staff-care, the between-group differences were significant only at the three-month follow-up stage and had similar effect sizes ranging from g = 0.39 for staff-care and g = 0.40 for self-care; the between-group differences at postintervention were nonsignificant. This shows that changes in self-care and staff-care health behavior require a certain amount of time. One possible explanation is that changes in behavior only occur when supervisors implement and apply newly learned behavior during the workday (Shamir, 2011). Additionally, we know from behavioral change studies that behavioral change indeed takes time (Klesges et al., 2005); as a rule, no more than two to three new behaviors are implemented simultaneously (Röhrle, 2008; Wilson et al., 2015). These results imply that sustainability workshops play an important role in the planning and implementation of interventions in order to accompany behavioral change in the long-term. The supervisors in the intervention group did not exhibit significant differences in staff-care health value over time compared to the control group. These findings, however, might be related to a ceiling effect. The high baseline scores of staff-care health value (M = 4.55) as measured by the 5-point Likert scales could be influenced by a social

desirability bias, which might have limited any additional increase during the intervention period.

Analyses on the mechanisms of change revealed that the intervention effect on supervisors' mental distress was significantly mediated by an increase of their health-oriented self-care. This finding is in line with theoretical assumptions of health-oriented leadership proposing that supervisors' self-care is important for their own mental health and builds a basis for health-oriented leadership (Franke et al., 2014). Analyses on moderator variables revealed that those supervisors who practiced mindfulness more frequently showed a larger decrease in mental distress. This indicates that the frequency with which supervisors implemented the contents of the seminars in their daily lives seems to be of considerable importance for their increases of mental health. Accordingly, this finding is in line with the existing empirical evidence that shows that mindfulness requires a certain amount of practice (Crane et al., 2014; Tang et al., 2015) and adds additional evidence to the controversial discussion about whether a dose-response relationship of mindfulness-based practice can be assumed (Strohmaier, 2020). In addition, a recent meta-analysis on mindfulness-based programs at the workplace showed that effects on mindfulness, burnout, and well-being outcomes were significantly related to the hours of attendance (Vonderlin et al., 2020). Although mindfulness practice was only assessed in terms of frequency instead of being measured psychometrically, these results are in line with the prior conceptual approaches that closely link mindfulness to health beneficial leadership styles (Pinck & Sonnentag, 2018). According to these approaches, mindfulness might increase supervisors' awareness, enabling them to better observe the present emotional states and exterior circumstances of their employees (Dane, 2011), to consider subordinates' personal needs (Rafferty & Griffin, 2004), and to recognize changes in the work quality or health of their subordinates (i.e., increases or decreases).

5.5.2 Nonsignificant Results on the Employee Level

Contrary to our hypotheses, we found no significant effects on employee rated health-oriented staff-care and their mental distress. The effects of leadership interventions on the employee level have rarely been investigated (Elo et al., 2014; Rigotti et al., 2014; Wasylkiw et al., 2015). Most of the results of these studies indicate that these interventions have no effects or only small effects on the employee level (Donaldson-Feilder et al., 2019). This, however, raises a question regarding the circumstances and contextual characteristics under which interventions for supervisors might have an effect on their employees. Although we

found no mediation effect of employee-rated staff-care, our mediation analyses revealed a significant effect of employee-rated staff-care on their later mental distress. However, the specific conditions under which potential changes in staff-care occur on the employee level remain unclear due to the complexity of the underlying mechanisms; thus, this topic should be addressed by future research (Berger et al., 2019; Inceoglu et al., 2018). According to a review by Inceoglu et al. (2018), several processes might play important roles in the ways in which leadership behavior affects employees' well-being, such as social-cognitive processes (e.g., self-efficacy), motivational processes (e.g., behavior regulation and need fulfillment), relational processes (e.g., trust in leadership), affective processes (e.g., supervisors and employees affective states), or identification processes (e.g., identification with the supervisor). These processes in turn could also influence the effectiveness of leadership interventions on employees. Variables that represent these processes could be assessed at the level of supervisors, employees, the organization or their interaction. On the supervisor level, for example, personality traits (such as a high level of openness) and positive social norms related to mindfulness-based interventions have been shown to positively influence treatment effectiveness (Krick & Felfe, 2020). On the employee level, a high level of openness and positive social norms regarding leadership interventions could also influence treatment effects. In addition, employees' mindfulness could also influence whether changes in supervisors' health-oriented leadership behavior are perceived. If employees have a non-judgmental awareness of their supervisors' behavior, they might be more sensitive to small changes in supervisory behavior; thus, they might refrain from imposing labels or judgments on their supervisors based on their past experiences with them. On the organizational level, for example, cultural aspects could influence how mental health at the workplace is addressed (e.g., organizational safety climate). Last but not least, interaction effects between supervisors and their employees could influence treatment effects, such as a trustful relationship. The list of possible moderator variables is long and should be investigated by future research to detect the differential effects of interventions on the employee level. In summary, more theoretical development and empirical investigations are needed to understand the possible causal mechanisms underlying these processes (Inceoglu et al., 2018).

In addition, it has been shown that behavioral change requires effort and time (Klesges et al., 2005); this is supported by our findings regarding the delayed increase in the behavioral dimensions of self-care and staff-care at the supervisor level. Correspondingly, when supervisors implement health-oriented leadership behaviors, a longer period of time is required for employees to perceive these changes. Additionally, it could be relevant whether

employees perceive their supervisors' behavioral changes as authentic and stable. This would be more likely if the new behavior is maintained over a longer period of time. Thus, characteristics of the study design (e.g., period of the study) could influence whether effects can be expected on the employee level.

5.5.3 Theoretical Implications

Our work contributes to the literature in three ways: First, we advance knowledge of how effective health-oriented leadership interventions could be designed emphasizing the importance of focusing on supervisors' self- as well as staff-care. Our study shows that supervisors' self-care as well as mental health can be effectively improved with an intervention including mindfulness and self-reflective elements, flexible and situation-adapted coping strategies, and strategies focused on effective recovery. In addition, we showed that staff-care can be effectively trained by providing practical skills for improving organizational and personal leadership as well as teaching appreciative communication. We hope that our example of an effective HoL intervention will inspire future research on HoL and contribute to the theoretical proliferation of HoL concepts (Rudolph et al., 2020; Yao et al., 2021).

Second, we aimed to overcome the methodological limitations of prior research by examining the effectiveness of this intervention within a longitudinal, multilevel, and multisource design to draw reliable conclusions about the short- and long-term effects on supervisor and employee levels. Our results showed significant short- and long-term effects on the supervisor level. However, our results indicate that intervention effects barely appear on the employee level. This shows that further efforts need to be made to improve interventions and increase their effectiveness for employees. In addition, future research should examine the mechanisms of such interventions in more detail to understand under which conditions employees perceive intervention effects.

Third, we aimed to shed light on the processes by which HoL interventions work by investigating mindfulness practice as moderator variable as well as HoL self- and staff-care as proposed mechanisms of change. Results showed that the amount of supervisors' mindfulness practice significantly moderated the intervention effect on mental distress. In addition, mediation analyses revealed that the intervention effect on mental distress is mediated by an increase of supervisors' health-oriented self-care. First, these findings point to the importance of mindfulness practice in the context of HoL. Secondly, our findings provide empirical evidence to highlight the central importance of self-care, which has been conceptually proposed as the basis of the HoL concept (Franke et al., 2014). Although no significant effect

on employees' mental distress was obtained, their ratings of staff-care were found to predict their later mental distress. Although this finding does not indicate causality, it goes beyond cross-sectional findings to suggest that supervisors' staff-care is an important determinant of employee mental health.

5.5.4 Adaptation and Improvement of Interventions

Various improvements for healthy leadership interventions can be derived from the findings of this study. First, it has been shown that supervisors who practiced mindfulness more frequently experienced a larger reduction in mental distress. However, prior studies have shown that employees find it particularly hard to be mindful at work when they face many stressors – which is when they would most benefit from it (Haun et al., 2020). Thus, regular mindfulness exercises could be accompanied by app-based interventions to promote the implementation of mindfulness practice, even when demands are especially high. Previous research results have already shown that apps can provide significant support for the implementation of routine actions (habits) in everyday life (Ouellette & Wood, 1998; Stojanovic et al., 2020). Second, a potential deterrent to our intervention could have been the time commitment required of the participants, namely 30 hours of training for supervisors over three full work days. Indeed, our results showed that only 62% of the supervisors attended all three seminar modules. Supervisors, who often work under time-limited and complex conditions, could especially benefit from an online intervention that is flexible and adaptable to individual schedules in terms of both time and location (Aikens et al., 2014). Third, it has been shown that employees' perception of supervisors' health-oriented staff-care was significantly related to their later mental distress. This illustrates that behavioral changes provoked by interventions should be made apparent to employees to increase the effectiveness of these changes in terms of their mental health. For example, supervisors could be motivated to further discuss the content of the intervention with their employees and to actively seek feedback on mental health issues in the workplace. In addition, team interventions or content-related modules for supervisors and their staff could be offered to establish a shared concept of health-oriented leadership and mental health at work (Ward et al., 2018).

5.5.5 Study Strengths and Limitations

The major strengths of this study relate to its longitudinal, multilevel, multisource, multisite, and controlled study design as well as the elaborate and theoretically based development of its intervention program. Nonetheless, several limitations should be considered when interpreting the findings of this study. First, the control group was drawn

from outside of the companies examined, and allocation to the intervention group was not randomized. This might lead to an increased risk of bias due to confounding variables (e.g., organizational culture) and result in reduced comparability between the groups. To address this limitation, we used propensity score matching to control for the major confounding variables including age, gender, and sector (Austin, 2011).

Second, this study was limited to a period of six months. As discussed earlier, prior studies have shown that behavioral change takes time (Klesges et al., 2005), which is also supported by our findings regarding the delayed increase in the behavioral dimensions of self-care and staff-care at the supervisor level. Therefore, it can be assumed that the potential effects on the employee level take more time to become apparent, which points to the need for longer time intervals in future studies.

Third, most of the participants worked in the health sector (66% of supervisors and 84% of employees). Although companies from other sectors were included in this study to reflect the naturally occurring variability of work and workplaces, these subgroups are too small to draw reliable conclusions about sector-differentiating effects.

Fourth, the participants' dropout rates were quite high in our studies. Up to 20% of the supervisors and 40% of the employees dropped out of the intervention group between the baseline stage and the follow-up stage. To avoid systematic bias due to these high dropout rates, we also analyzed ITT samples based on multiple imputation. The high dropout rate of the employees might be related to the fact that the employees in the intervention group did not receive an intervention.

Fifth, we based the intervention examined in this study on the HoL concept of Franke et al. (2014), as it is one prominent and broad framework that helps to conceptualize HoL. However, this concept remains vague on what specific content should be trained to improve health-oriented self- and staff-care. In this study, we have provided an example of specific skills that could be taught in a HoL intervention; however, these do not claim to be exhaustive and further skills could be useful to achieve this goal.

Sixth, we assessed general psychological distress using scores on the Hospital Anxiety and Depression Scale (HADS) as an outcome. In this way, we aimed to test the impact of the intervention on clinically relevant measures, which we consider to be important because HoL describes direct and explicit engagement for employee mental health. The HADS has been shown to be an accepted and valid instrument to assess subclinical anxiety and depressive symptoms in the general population (Bjelland et al., 2002). Indeed, previous studies have

shown a significant association between work stress and psychosocial working conditions with depression and anxiety symptoms (Hakanen et al., 2008; Kranabetter & Niessen, 2019; Magnusson-Hanson et al., 2009; Melchior et al., 2007). However, other health and work-related outcomes may also be of interest, e.g., more widespread subclinical symptoms such as exhaustion and strain or positive health indicators such as general or work-specific well-being. In addition to questionnaire data, other dependent variables such as biological markers or cost data could be of interest in future research.

Finally, the limited insight into the mechanisms and mediating variables of the intervention effects represent limitations of our study. For example, we only assessed the frequency of mindfulness practice and not participants' individual level of trait or state mindfulness. In future research, the mechanisms by which HoL training influences leadership and mental health should receive greater attention. Future studies should assess additional process-based mediation variables (e.g., mindfulness, appreciation, recovery) to gain deeper insight into the ways in which health-oriented leadership interventions affect various outcomes at supervisor and employee levels. Ambulatory assessment methodology might also be used to further enhance our understanding of the mechanisms responsible for the effects of HoL training by assessing variables on a daily level under real time conditions before, during, and after intervention to detect dynamical changes. Another future research direction involves exploring which variables on the employee level enhance or decrease effectiveness for followers (e.g., potential negative effects of employees' hostility or potential positive effects of employees' mindfulness).

5.5.6 Practical Implications

Although additional studies that extend our training design and investigate the mechanisms underlying our findings are desirable, our results suggest that health-oriented leadership interventions may be a useful methodology for organizations to enhance their supervisors' explicit engagement in their employees' mental health. In the light of increased psychological demands of modern work due to globalization, digitalization and societal transformation, efforts such as these can help organizations manage the transition to the modern working world and at the same time maintain the mental health and productivity of their workforce (Mack et al., 2015; World Health Organization, 2005a). Furthermore, our findings suggest that HoL interventions can be implemented in a variety of different organizations and work settings. In this way, many supervisors can be reached to reduce their insecurity, helplessness, and anxiety towards dealing with employees' psychological strain

(Kramer et al., 2015). Furthermore, this can contribute to reducing the stigmatization of mental distress or illnesses in the community at large. Our finding that the intervention effects did not appear on the employee level provides realistic expectations for organizations and highlights the need to further improve interventions. This finding also suggests that leadership development is *one* important part within a holistic organizational health policy. Therefore, leadership interventions should not replace other health-promoting measures, but complement them in a meaningful way in order to establish a holistic health policy in companies.

5.5.7 Conclusion

Our study showed that a mindfulness- and skill-based intervention could effectively improve supervisors' health-oriented self-care and staff-care as well as their mental health. Importantly, these effects on self-care and staff-care were present when considering supervisors' self-ratings, but not when considering employee-ratings. Moderator and mediator analyses revealed that supervisors' decrease of mental distress was significantly related to their amount of mindfulness practice, and that the intervention effect on supervisors' mental distress was mediated by an increase of their health-oriented self-care. On the employee level, employee-rated staff-care was significantly related to their level of mental distress across time. These findings have important theoretical and practical implications as they indicate that supervisors' explicit engagement in mental health by health-oriented self- and staff-care represents an important determinant of workplace mental health on different levels (supervisor and employee level). In addition, our results indicate that supervisors' self- and staff-care can be effectively enhanced by leadership interventions. This might inform decision makers in companies that are considering the implementation of health-oriented leadership interventions for their supervisors. Future research should examine additional moderating and mediating variables of intervention effects and identify new ways in which these interventions could be improved to increase their effectiveness for employees.

6 ALLGEMEINE DISKUSSION

Übergreifendes Ziel dieser Dissertation war es, die Folgen psychischer Belastung in der Arbeitswelt und Möglichkeiten zur effektiven Prävention psychischer Störungen zu untersuchen. Dabei sollte die Wirksamkeit achtsamkeitsbasierter Programme in der Arbeitswelt geprüft und deren Integration im Kontext der gesunden Führung empirisch untersucht werden.

Im ersten Abschnitt dieser Arbeit konnte gezeigt werden, dass psychischen Belastungen eine enorme sozioökonomische Bedeutung in der Arbeitswelt zukommt. Die Ergebnisse legen nahe, dass schwer belastete Personen mit durchschnittlich 72 Fehltagen aufgrund psychischer Belastung 27mal so viele Fehltage aufweisen wie nicht belastete Personen. Die entstehenden zusätzlichen Kosten für die Arbeitgeber belaufen sich aufgrund von Absentismus dadurch auf rund 7230 Euro pro Jahr. Zusätzliche Kosten aufgrund von Präsentismus, d.h. dem Erscheinen bei der Arbeit trotz Erkrankung und somit reduzierter Leistungsfähigkeit, wird in Studien auf das Drei- bis Vierfache geschätzt (Goetzel et al., 2014). Diese Ergebnisse legen nahe, dass eine effektive Förderung der psychischen Gesundheit bei der Arbeit und eine frühzeitige Prävention möglicher psychischer Störungen neben der Reduktion individuellen Leidens der Betroffenen auch ein enormes Potential zur Kostenreduktion besitzt. Die Prävention psychischer Störungen kann daher als eine gesamtgesellschaftliche Aufgabe betrachtet werden, deren Ausgestaltung Vorteile für die Gesellschaft, für die Arbeitgeber und den einzelnen Mitarbeitenden mit sich bringen (World Health Organization, 2005a).

Im zweiten Abschnitt dieser Arbeit konnte gezeigt werden, dass achtsamkeitsbasierte Programme auch am Arbeitsplatz zahlreiche positive Effekte zur Folge haben. In einer umfangreichen Übersichtsarbeit von insgesamt 56 randomisiert-kontrollierten Studien zeigten sich mittlere Effektstärken zwischen den Gruppen auf gesundheitsbezogenen Variablen (z.B. Wohlbefinden, Stress, subsyndromale Symptome, Burnout und auch somatischen Beschwerden), die bis zu 12 Wochen nach der Intervention bestehen blieben. Neben den gesundheitsbezogenen Effekten zeigten sich zudem positive mittlere Effekte auf arbeitsbezogenen Variablen wie Arbeitsengagement, Produktivität oder Arbeitszufriedenheit. Die Ergebnisse dieser Übersichtsarbeit weisen darauf hin, dass achtsamkeitsbasierte Programme eine vielversprechende Möglichkeit darstellen, Prävention und Gesundheitsförderung am Arbeitsplatz effektiv zu gestalten. Die Steigerung von gesundheits- und arbeitsbezogenen Variablen stellt gleichermaßen eine empirische Basis für die Annahme dar,

dass Präventionsangebote am Arbeitsplatz Vorteile für einzelne Mitarbeitende sowie die Arbeitgeber mit sich bringen.

Im dritten Abschnitt dieser Arbeit wurde in einer querschnittlichen Erhebung die zentrale Bedeutung von Führung für die Gesundheit am Arbeitsplatz untersucht. Dabei wurde der Zusammenhang zwischen gesunder Führung und psychischer Gesundheit in verschiedenen Unternehmen und Arbeitsteams sowohl aus der Sicht der Führungskräfte als auch aus der Sicht der Mitarbeitenden analysiert. Die Ergebnisse zeigten, dass die Führungskräfte ihre gesunde Führung deutlich höher einschätzten als ihre Mitarbeitenden. Signifikante Zusammenhänge zwischen den Einschätzungen der Führungskräfte und ihren Mitarbeitenden zeigten sich nur auf der Verhaltensdimension der gesunden Führung, nicht aber auf den Dimensionen Bewusstsein und Stellenwert der Gesundheit der Führungskräfte. Die Einschätzungen der Führungskräfte wiesen keinen signifikanten Zusammenhang mit der psychischen Gesundheit ihrer Mitarbeitenden auf. Die von den Mitarbeitenden subjektiv eingeschätzte gesunde Führung ihrer Führungskräfte zeigte allerdings einen signifikanten Zusammenhang mit ihrer psychischen Gesundheit auf. Diese Ergebnisse legen nahe, dass die Förderung der gesunden Führung ein wichtiger Baustein in der betrieblichen Gesundheitsförderung darstellt. Gleichzeitig legt die geringe Übereinstimmung zwischen Mitarbeitenden und ihren Führungskräften sowie der fehlende Zusammenhang zwischen der Einschätzung der Führungskräfte und der Mitarbeitergesundheit nahe, dass das Thema *gesunde Führung* am Arbeitsplatz deutlich stärker thematisiert und durch Interventionen gefördert werden sollte. Somit könnte die gesunde Führung gesteigert, die Gesundheit der Führungskräfte und ihrer Mitarbeitenden gefördert, sowie ein gemeinsames Verständnis von Führung und Gesundheit am Arbeitsplatz geschaffen werden.

Im vierten Abschnitt dieser Arbeit wurde schließlich die konzeptionelle Entwicklung einer achtsamkeits- und skillbasierten Intervention zur gesunden Führung dargestellt und deren Wirksamkeit und Wirkmechanismen in einem quasiexperimentellen Studiendesign evaluiert. Die Evaluation erfolgte in 12 verschiedenen Unternehmen und umfasste insgesamt 117 Führungskräfte und 744 Mitarbeitende in der Experimentalgruppe. Es zeigten sich signifikante Effekte auf der Führungskräfteebene bei der gesunden Selbst- und Mitarbeiterführung sowie der psychischen Gesundheit, verglichen zur Kontrollgruppe. Die Interventionseffekte auf die Gesundheit der Führungskräfte wurden durch einen Anstieg der gesunden Selbstführung vermittelt. Außerdem zeigte sich, dass gerade die Führungskräfte am stärksten von der Intervention profitierten, die häufiger eigenständige Achtsamkeitsübungen durchführten. Auf Mitarbeiterebene konnten keine signifikanten Effekte der Intervention auf

die gesunde Mitarbeiterführung und psychische Gesundheit in der Experimentalgruppe, verglichen zur Kontrollgruppe nachgewiesen werden. Es zeigte sich jedoch, dass die gesunde Mitarbeiterführung aus Sicht der Mitarbeitenden auch im Längsschnitt einen signifikanten Zusammenhang mit der psychischen Gesundheit aufwies. Die Ergebnisse dieser Studie weisen darauf hin, dass achtsamkeitsbasierte Programme zur Gesundheitsförderung und zur Förderung der gesunden Führung gleichermaßen eingesetzt werden können. Die Ausweitung der Effektivität dieser Programme stellt vor allem auf der Ebene der Mitarbeitenden eine zentrale Aufgabe für zukünftige Forschung dar.

6.1 Integration der Ergebnisse in die bisherige Forschung und Ausblick für zukünftige Forschung

6.1.1 Die Bedeutung der Prävention psychischer Störungen am Arbeitsplatz

Im ersten Abschnitt dieser Arbeit zeigte sich, dass die psychische Belastung signifikant mit der Anzahl der Arbeitsunfähigkeitstage in den nächsten beiden Jahren sowie mit resultierenden Krankheitskosten verknüpft war. Diese Ergebnisse weisen darauf hin, dass nicht nur psychische Störungen, sondern bereits leichte und moderate psychische Belastungen einen enormen Produktivitätsverlust aufgrund von krankheitsbedingten Fehltagen bedeuten. Bei einem geschätzten durchschnittlichen Produktivitätsverlust pro AU-Tag von 105 Euro in Deutschland (BAuA, 2014) betragen die zusätzlichen Kosten aufgrund von Abwesenheit durch psychische Belastungen 504 Euro für Mitarbeitende mit leichter Belastung, 2.615 Euro für Mitarbeitende mit mittleren Belastungen und 7.230 Euro für Mitarbeitende mit schweren psychischen Belastungen. Die Kosten aufgrund von Präsentismus werden auf das Drei- bis Vierfache geschätzt (Goetzel et al., 2014). Gerade in der modernen Arbeitswelt, die durch Globalisierung und Digitalisierung erhöhte Anforderungen an die psychische Gesundheit der Mitarbeitenden stellt, zeigen diese Ergebnisse die erhebliche Relevanz der Gesundheitsförderung in Unternehmen auf. Die Ergebnisse bieten eine Grundlage für die Annahme, dass sich durch effektive Präventionsmaßnahmen neben der Reduzierung individuellen Leidens der Betroffenen auch die Produktivität von Unternehmen steigern lässt (World Health Organization, 2005a). Ergebnisse einer groß angelegten britischen Interventionsstudie zeigten, dass durch ein effektives Präventionsprogramm für 500 Mitarbeitende am Arbeitsplatz die Kosten durch die Reduktion von Präsentismus und Absentismus um £387,722 gesenkt werden konnten bei einem Investitionsaufwand von £40,000 für die Entwicklung und Implementierung der Intervention. Dies entspricht einem beträchtlichen *return of investment* von mehr als 9 zu 1, wobei die positiven Effekte für das

Gesundheitssystem in diesen Analysen noch nicht eingerechnet wurden (McDaid et al., 2011; Mills et al., 2007). Insgesamt lässt sich sagen, dass die Prävention psychischer Störungen und die Gesundheitsförderung in den letzten Jahren enorm an Stellenwert gewonnen hat, die Weiterentwicklung und (ökonomische) Evaluation dieser Programme wird derzeit als zentrale Aufgabe für die zukünftige Forschung angesehen (Herman & Jané-Llopis, 2005).

Hinzu kommt, dass die psychische Belastung ebenfalls einen signifikanten Einfluss auf die Krankheitskosten aufgrund psychischer Störungen hatte. Der Nutzen der psychologischen Gesundheitsförderung in Unternehmen geht daher über den Nutzen einzelner Unternehmen hinaus und stellt auch einen gesamtgesellschaftlichen Nutzen dar. Die Prävention psychischer Störungen kann somit insgesamt als gesamtgesellschaftliche Aufgabe begriffen werden (Saxena et al., 2006). Die WHO beschreibt die Vorteile der Prävention am Arbeitsplatz daher so, dass sowohl individuelles Leiden der Betroffenen gemindert, sozioökonomische Belastungen für die Gesellschaft reduziert und die Arbeitsleistung und Produktivität von Unternehmen gesteigert werden kann (World Health Organization, 2005a).

6.1.2 Achtsamkeitsbasierte Ansätze zur Prävention psychischer Störungen in der Arbeitswelt

Im zweiten Abschnitt dieser Arbeit zeigte sich, dass achtsamkeitsbasierte Programme auch am Arbeitsplatz erfolgreich eingesetzt werden können. Dabei geht die Effektivität über eine reine Gesundheitsförderung hinaus. Die Ergebnisse der Übersichtsarbeit ergaben, dass neben gesundheitsbezogenen Variablen auch arbeitsbezogene Variablen positiv beeinflusst werden können. Diese Ergebnisse stehen im Einklang mit bisherigen Reviews und Meta-Analysen, die eine Effektivität von achtsamkeitsbasierten Programmen in bestimmten Berufsgruppen oder bezogen auf bestimmte abhängige Variablen nahelegen (z.B. Iancu et al., 2018; Slemp et al., 2019). Diese Erkenntnisse untermauern empirisch die angenommenen gesamtgesellschaftlichen Vorteile von Gesundheitsprogrammen für das Individuum, den Arbeitgeber und die Gesellschaft (World Health Organization, 2005a). Weiterhin stehen diese Effekte im Einklang mit bisherigen Überlegungen, die Achtsamkeit am Arbeitsplatz auch mit zentralen Aspekten der Arbeitsleistung in Verbindung brachten (Good et al., 2016; Hyland et al., 2015). Entscheidend ist jedoch die Erkenntnis, dass achtsamkeitsbasierte Programme auch am Arbeitsplatz über verschiedene Arbeitskontexte und Berufsgruppen hinweg wirksam eingesetzt werden können. Obwohl bereits große und namhafte Unternehmen solche achtsamkeitsbasierten Programme eingeführt und etabliert haben, wurde aus empirischer

Sicht immer wieder in Frage gestellt, ob diese auch im Arbeitskontext als effektiv angesehen werden können (Gelles, 2015; Schaufenbuel, 2015).

Der positive Effekt achtsamkeitsbasierter Programme auf gesundheits- und arbeitsbezogene Variablen zeigt sich im Einklang mit bisherigen Überlegungen, die Achtsamkeit als zentrale persönliche Ressource im Rahmen des JD-R Modells einzuordnen (Modellannahmen 2, 5 und 6; siehe auch Grover et al., 2017). Die Betrachtung der Achtsamkeit als persönliche Ressource im JD-R Modell führt darüber hinaus zu weiteren Modellannahmen, die in zukünftiger Forschung untersucht werden sollten. So sollte Achtsamkeit als persönliche Ressource mit anderen arbeitsbezogenen Ressourcen korrelieren und den negativen Zusammenhang zwischen Arbeitsanforderungen und Belastungssymptomen abmildern (Modellannahmen 3 und 5). Erste Untersuchungen zeigen bereits, dass emotionale Anforderungen durch die Arbeit bei Menschen mit geringer Achtsamkeit mit mehr psychischem Stress einhergehen als bei Menschen mit hoher Achtsamkeit (Grover et al., 2017). Darüber hinaus sollte untersucht werden, ob Achtsamkeit auf langfristige Sicht zur Schaffung weiterer Ressourcen beiträgt und durch sogenanntes *job-crafting* die Gesundheit der Mitarbeitenden auch nach der Intervention weiter stärkt (Modellannahme 8).

In der Interventionsforschung sollte untersucht werden, welche arbeitsbezogenen Kontextfaktoren die Wirksamkeit von achtsamkeitsbasierten Programmen beeinflussen. So konnte beispielsweise gezeigt werden, dass soziale Normen in bestimmten Berufsgruppen, in diesem Fall Polizeibeamte, die Effektivität von achtsamkeitsbasierten Programmen maßgeblich beeinflussen (Krick & Felfe, 2020). Das Verständnis über diese Moderatorvariablen kann helfen, achtsamkeitsbasierte Programme gezielt und kosteneffizient an die Anforderung von bestimmten Berufs- oder Zielgruppen anzupassen. Weitere Moderatorvariablen könnten beispielsweise auf der Ebene der Unternehmenskultur, der Teamkultur oder auch des einzelnen Individuums vorliegen. Neben potentiellen Moderatorvariablen sollten in zukünftigen Forschungsarbeiten potentielle Wirkmechanismen achtsamkeitsbasierter Programme weiter untersucht werden.

Zuletzt zeigt die systematische Literaturübersicht, dass achtsamkeitsbasierte Programme am Arbeitsplatz in bisherigen Studien vorrangig auf Ebene der Mitarbeitenden untersucht wurden. Weitere Variablen, wie die Veränderungen der Unternehmenskultur und Führung werden zwar ebenfalls diskutiert (Rupprecht, Koole et al., 2019; Sutcliffe et al., 2016), die empirische Datengrundlage zur Effektivität von Interventionen auf diesen Ebenen ist jedoch

weiterhin zu gering, um gesicherte Schlussfolgerungen zu ziehen (Rupprecht, Koole et al., 2019).

6.1.3 Die Bedeutung gesunder Führung für die psychische Gesundheit am Arbeitsplatz

Zahlreiche bisherige Studien haben die Bedeutung gesunder Führung für die psychische Gesundheit am Arbeitsplatz herausgestellt (Rudolph et al., 2020). Bisherige Studien haben diesen Zusammenhang jedoch vorwiegend aus einer einzigen Perspektive untersucht – in den meisten Fällen aus der Perspektive der Mitarbeitenden. Die Ergebnisse aus dem dritten Abschnitt dieser Arbeit zeigen signifikante Zusammenhänge zwischen der von den Mitarbeitenden eingeschätzten gesunden Führung und ihrer psychischen Gesundheit. Damit stehen diese Ergebnisse im Einklang mit bisherigen Befunden, die negative Zusammenhänge zwischen gesunder Führung und psychischer Belastung, Burnout, wahrgenommenem Stress, Irritation und somatischen Beschwerden sowie positive Zusammenhänge zwischen gesunder Führung und Wohlbefinden, Erholungsprozessen und der Arbeitszufriedenheit der Mitarbeitenden aufweisen konnten (Rudolph et al., 2020; Yao et al., 2021). Außerdem stehen diese Ergebnisse im Einklang mit Annahmen des JD-R Modells, in dem die gesunde Führung als Ressource eingeordnet werden kann und somit einen gesundheitsförderlichen Effekt nahelegt (Schaufeli, 2015). Gleichzeitig weiten die Ergebnisse aus dem dritten Abschnitt dieser Arbeit die Befunde bisheriger Studien aus, indem der Zusammenhang zwischen den Einschätzungen der Führungskräfte mit den Einschätzungen der Mitarbeitenden untersucht wurde. Die Tatsache, dass ein signifikanter Zusammenhang zwischen den Einschätzungen der Führungskräfte und ihren Mitarbeitenden nur auf der Verhaltensdimension nachgewiesen werden konnte, steht im Einklang mit bisherigen Erkenntnissen zu Multisource-Untersuchungen, in denen konkrete Verhaltensitems die größten Übereinstimmungen zeigten (Dai et al., 2007; Heidemeier & Moser, 2009). Diese Befunde legen nahe, dass verhaltensbezogene Skalen im Rahmen von Feedbackprozessen zwischen Führungskräften und Mitarbeitenden eingesetzt werden sollten, um die Ambiguität in den Angaben zu verringern. Der fehlende Zusammenhang zwischen den Einschätzungen der gesunden Führung durch die Führungskräfte und der Mitarbeitergesundheit erscheint auf den ersten Blick ernüchternd; dies legt jedoch auch nahe, dass das Thema gesunde Führung in Unternehmen explizit thematisiert werden sollte, um ein gemeinsames Verständnis von gesunder Führung zwischen Führungskräften und Mitarbeitenden zu schaffen. Hier zeigt sich die Relevanz effektiver Interventionsprogramme, um das Thema im Unternehmenskontext zu platzieren. Trotz der zahlreichen Studien, die in den letzten Jahren den Zusammenhang

zwischen gesunder Führung und unterschiedlichen gesundheits- und arbeitsbezogenen Variablen untersucht haben, gibt es allerdings nur wenige Studien dazu, wie gesunde Führung durch gezielte Interventionsmaßnahmen gefördert werden kann. Auf Basis der Ergebnisse der Metaanalyse im zweiten Abschnitt dieser Arbeit lässt sich vermuten, dass die Achtsamkeit eine vielversprechende Grundlage bildet, um Interventionen zur gesunden Führung zu gestalten.

6.1.4 Die Förderung gesunder Führung durch achtsamkeitsbasierte Ansätze

Im vierten Abschnitt dieser Arbeit wurden bisherige theoretische Überlegungen zur Rolle der Achtsamkeit im Rahmen der gesunden Führung dargestellt. Die Ergebnisse aus Abschnitt vier zeigen, dass eine achtsamkeits- und skillbasierte Intervention für Führungskräfte die gesunde Führung signifikant fördert und die psychische Gesundheit der Führungskräfte stärken kann. Dabei zeigte sich, dass vor allem diejenigen Führungskräfte von dem Programm profitierten, die regelmäßig eigenständige Achtsamkeitsübungen durchführten. Positive Effekte zeigten sich dabei sowohl auf der gesunden Selbst- als auch der gesunden Mitarbeiterführung und der psychischen Gesundheit. Diese Ergebnisse stehen im Einklang mit den Ergebnissen der Metaanalyse (Studie 2), die positive Effekte von Achtsamkeitsprogrammen auf eine Vielzahl von gesundheits- und arbeitsbezogenen Variablen aufzeigte. Zudem werden diese Ergebnisse dadurch ergänzt, dass sich achtsamkeitsbasierte Programme auch auf Führungsebene einsetzen lassen und führungsbezogene Outcomevariablen effektiv verändert werden können. Dies steht im Einklang mit ersten bisherigen Studien, die positive Effekte der Achtsamkeit auf Führungsqualität aufzeigen konnten (Donaldson-Feilder et al., 2019). Die Forschung zu Achtsamkeit bei Führungskräften steht jedoch erst in ihren Anfängen. Variablen, die den positiven Effekt von Achtsamkeitsinterventionen auf die gesunde Führung vermitteln, sind noch nicht ausreichend identifiziert. Die bisherige Studienlage bezieht sich vielmehr auf konzeptionelle Überlegungen sowie querschnittliche und qualitative Analysen, die potentielle Mediationsvariablen zwischen Achtsamkeit und gesundheits- sowie arbeitsbezogenen Outcomevariablen diskutieren (Donaldson-Feilder et al., 2019; Rupprecht, Falke et al., 2019). Qualitative Analysen legen dabei nahe, dass achtsamkeitsbasierte Programme sowohl Fähigkeiten der Selbstführung (*mindful task management*, *self-care* und *self-reflection*) als auch Fähigkeiten der Mitarbeiterführung (*relating to others* und *adapting to change*) beeinflussen. Diese Überlegungen stehen im Einklang mit den Ergebnissen der Mediationsanalysen aus dem vierten Abschnitt dieser Arbeit, die nahelegen, dass der

gesundheitsförderliche Effekt der achtsamkeitsbasierten Führungskräfteintervention auf Führungsebene durch einen Anstieg der gesunden Selbstführung vermittelt wird.

Auf der Ebene der Mitarbeitenden konnten keine Effekte der Intervention nachgewiesen werden, obwohl die Führungskräfte selbst einen Anstieg ihrer gesunden Mitarbeiterführung berichteten. Dies ist in erster Linie darauf zurückzuführen, dass nur die Führungskräfte, nicht aber die Mitarbeitenden an der Intervention teilgenommen haben. Der Befund, dass die Mitarbeitenden Veränderungen im Führungsverhalten der Führungskräfte nicht beobachten konnten, obwohl die Führungskräfte dies angaben, steht im Einklang mit den Ergebnissen der querschnittlichen Analyse im dritten Abschnitt. Demnach wiesen die Einschätzungen der gesunden Führung durch die Führungskräfte und der Mitarbeitenden nur geringfügige Zusammenhänge auf. Der Befund, dass keine indirekten Effekte der Intervention auf die Gesundheit der Mitarbeitenden beobachtet werden konnten, obwohl die Führungskräfte einen Anstieg der gesunden Mitarbeiterführung berichteten, steht im Einklang mit den Ergebnissen der querschnittlichen Analyse, demnach kein Zusammenhang zwischen den Einschätzungen der gesunden Führung durch die Führungskräfte mit der Gesundheit der Mitarbeitenden beobachtet werden konnte. Neben den fehlenden Interventionseffekten auf Mitarbeiterebene zeigte sich jedoch ein signifikanter Zusammenhang zwischen der subjektiv wahrgenommenen gesunden Führung mit der psychischen Gesundheit zum späteren Messzeitpunkt. Diese Ergebnisse replizieren den querschnittlich signifikanten Zusammenhang zwischen subjektiv wahrgenommener Mitarbeiterführung und psychischer Gesundheit (Studie 3) im Längsschnitt. Die Ergebnisse deuten daher insgesamt darauf hin, dass die subjektive Wahrnehmung der Mitarbeiterführung aus Sicht der Mitarbeitenden eine wichtige Determinante für deren psychische Gesundheit bei der Arbeit darstellt. Dies hat wichtige Implikationen für die Gestaltung von Führungsinterventionen zur Gesundheitsprävention. Anstelle der isolierten Schulung von Führungskräften sollte daher auch der Einbezug der Mitarbeitenden in diese Maßnahmen in Betracht gezogen werden, um die positiven Effekte der Intervention auf Mitarbeiterebene auszuweiten.

Auch wenn die Ergebnisse dieser Studie eine Effektivität der Intervention auf Führungsebene aufzeigen, bleiben viele Forschungsfragen unbeantwortet. Der fehlende Interventionseffekt auf Mitarbeiterebene wirft die Frage auf, ob der Interventionseffekt auf Führungskräfteebene tatsächlich durch die Intervention oder vielmehr durch andere Kontextfaktoren beeinflusst sein könnte. Die Tatsache, dass die Führungskräfte durch eine Teilnahme an der Intervention mit insgesamt 30 Stunden viel Zeit für die Teilnahme investiert haben, könnte im Sinne einer Dissonanzreduktion zu Veränderungen in den Fragebogen-

erhebungen geführt haben. Um solche potentiellen Effekte in zukünftigen Studien ausschließen zu können, sollten aktive Kontrollgruppen eingeschlossen werden, um den Zeitaufwand in Experimental- und Kontrollgruppe konstant zu halten. Zudem könnten die Interventionseffekte auf Führungskräfteebene durch soziale Erwünschtheit beeinflusst worden sein, demnach die Führungskräfte ihre „erfolgreiche“ Teilnahme an der Intervention durch Veränderungen im Antwortverhalten darstellen wollen. Zukünftige Studien sollten demnach Skalen zur sozialen Erwünschtheit in den Datenerhebungen mit einbeziehen, um für mögliche Effekte der sozialen Erwünschtheit zu kontrollieren.

Obwohl in der Interventionsstudie Mediator- und Moderatoranalysen durchgeführt wurden, um erste Erkenntnisse über mögliche Wirkmechanismen zu erlangen, bleiben weitere Forschungsfragen zu den vermittelnden Effekten der Intervention unbeantwortet. Zukünftige Studien sollten demnach untersuchen, welche Effekte die verschiedenen Inhalte der Intervention haben und welche prozessbasierten Variablen die beobachtbaren Effekte provozieren, z.B. welche Bedeutung prozessbasierte Variablen wie Achtsamkeit, Wertschätzung, Emotionsregulation oder auch Kommunikationstechniken haben. Weiterhin sollte analysiert werden, welche Bedeutung den Rahmenbedingungen der Intervention zukommt, z.B. das Vermittlungsformat (online oder Präsenz) oder implizite Inhalte, wie die Hausaufgaben. Zuletzt ist es von enormer theoretischer Bedeutung besser zu verstehen ob und unter welchen Bedingungen sich Führungsverhalten auf Mitarbeiterebene auswirkt und welche Variablen diesen Zusammenhang moderieren. Wirkmechanismen und Moderator-variablen sind noch nicht ausreichend identifiziert, und bis heute ist der komplexe Zusammenhang zwischen Führungsverhalten und Mitarbeitergesundheit noch nicht vollständig verstanden (Inceoglu et al., 2018). Inceoglu et al. (2018) zufolge könnten verschiedene Prozesse eine wichtige Rolle dabei spielen, wie sich das Führungsverhalten auf das Wohlbefinden der Mitarbeitenden auswirkt, z.B. sozial-kognitive Prozesse (z.B. Selbstwirksamkeit oder psychologisches Empowerment), motivationale Prozesse (z.B. Handlungsspielraum, Bedeutung der Arbeit), Beziehungsprozesse (z.B. Unterstützung, Vertrauen), affektive Prozesse (z.B. Affekt der Führungskraft oder der Mitarbeitenden) oder Identifikationsprozesse (z.B. Identifizierung mit der Gruppe oder der Führungskraft). Diese Prozesse wiederum könnten sowohl den Zusammenhang zwischen Führungskräfte- und Mitarbeiterratings, als auch die Wirksamkeit von Führungsinterventionen auf Mitarbeiterebene moderieren und sollten in zukünftigen Studien weiter untersucht werden.

6.1.5 Weiterentwicklung von Präventionsprogrammen in der Arbeitswelt

Aus den Ergebnissen dieser Studie lassen sich verschiedene Verbesserungen für Interventionen zur gesunden Führung ableiten. Erstens konnte gezeigt werden, dass die Führungskräfte, die häufiger Achtsamkeit praktizierten, eine größere Reduktion der psychischen Belastung erfuhren. Allerdings zeigten frühere Studien, dass es Mitarbeitenden besonders schwer fällt, bei der Arbeit achtsam zu sein, wenn sie vielen Stressoren ausgesetzt sind, also dann, wenn sie am meisten davon profitieren würden (Haun et al., 2020). So könnten regelmäßige Achtsamkeitsübungen durch app-basierte Interventionen begleitet werden, um die Umsetzung der Achtsamkeitspraxis zu fördern, auch oder gerade wenn die Anforderungen besonders hoch sind. Frühere Forschungsergebnisse konnten bereits zeigen, dass Apps die Umsetzung von Routinehandlungen (Gewohnheiten) im Alltag deutlich unterstützen können (Ouellette & Wood, 1998; Stojanovic et al., 2020). Zweitens stellt der erhöhte Zeitbedarf von 30 Trainingsstunden über drei volle Arbeitstage hinweg, einen möglichen Nachteil dieser Intervention dar. In der Tat zeigten die Ergebnisse, dass nur 62% der Führungskräfte alle drei Seminarmodule besuchten. Führungskräfte, die oft unter zeitlich begrenzten und komplexen Bedingungen arbeiten, könnten so besonders von einer Online-Intervention profitieren, die zeitlich und örtlich flexibel und an individuelle Zeitpläne anpassbar ist (Aikens et al., 2014). Drittens konnte gezeigt werden, dass die Wahrnehmung der gesundheitsorientierten Fürsorge der Vorgesetzten durch die Mitarbeitenden signifikant mit ihrer späteren psychischen Belastung zusammenhängt. Dies verdeutlicht, dass Verhaltensänderungen, die durch Interventionen provoziert werden, den Mitarbeitenden deutlich gemacht werden sollten, um die Wirksamkeit dieser Veränderungen in Bezug auf ihre psychische Gesundheit zu erhöhen. So könnten beispielsweise Vorgesetzte motiviert werden, die Inhalte der Intervention mit ihren Mitarbeitenden weiter zu besprechen, um dann aktiv nach Feedback zu Themen der psychischen Gesundheit am Arbeitsplatz zu fragen. Darüber hinaus könnten Teaminterventionen oder inhaltliche Module für Vorgesetzte und ihre Mitarbeitende angeboten werden, um ein gemeinsames Konzept für gesundheitsorientierte Führung und psychische Gesundheit am Arbeitsplatz zu etablieren (Ward et al., 2018). Eine weitere Möglichkeit wäre es, die Seminarkonzepte *Lebe Balance* für Mitarbeitende (Bohus et al., 2013; Lyssenko et al., 2015, 2016; Lyssenko et al., 2019) und *Führung in Balance* für Führungskräfte anzubieten und in einem 4-Felder Studiendesign mögliche Synergieeffekte zu untersuchen (Gruppe 1: Führung und Lebe Balance; Gruppe 2: nur Führung in Balance; Gruppe 3: nur Lebe Balance; Gruppe 4: keine Schulung). Zuletzt sollte darauf hingewiesen werden, dass Führung alleine zwar ein wichtiger Faktor für die Gestaltung gesunder

Arbeitsbedingungen darstellt, weitere Maßnahmen zur Verhältnis- und Verhaltensprävention am Arbeitsplatz jedoch nicht ersetzen kann und sollte (Wieland et al., 2009).

6.2 Stärken und Limitationen der Dissertationsarbeit

Die Stärken dieser Dissertation beziehen sich sowohl auf konzeptionelle als auch auf methodische Aspekte. Zunächst wurden im Rahmen dieser Dissertation unterschiedliche Erhebungsinstrumente und Auswertungsmethoden genutzt. Im ersten Abschnitt der Arbeit wurden sowohl Fragebogendaten als auch reale Kostendaten in einem längsschnittlichen Studiendesign kombiniert. Im zweiten Abschnitt wurden meta-analytische Auswertungsmethoden genutzt, um bisherige empirische Arbeiten zusammenzufassen und statistisch zu kombinieren. Im dritten Abschnitt wurden Fragebogendaten in mehreren Unternehmen sowohl auf Führungskräfte- als auch auf Mitarbeiterebene erhoben, um so den multifaktoriellen und komplexen Zusammenhang zwischen Führung und Gesundheit besser zu verstehen. Im vierten Abschnitt der Arbeit wurde schließlich die Entwicklung einer Intervention zur gesunden Führung basierend auf theoretischen Ansätzen und vor dem Hintergrund aktueller wissenschaftlicher Erkenntnisse ausführlich beschrieben und deren Wirksamkeit und potentielle Wirkmechanismen sowohl auf Führungs- als auch auf Mitarbeiterebene untersucht. Die Evaluation von Intervention in kontrollierten Untersuchungsdesigns unter Einbezug von Mehrebenen- und Multisourcedaten konnte so in der bisherigen Forschung kaum umgesetzt werden (Kulik, 2011). Auch aus diesen Gründen wurde das Forschungsprojekt im September 2019 von der American Psychological Association (APA), der Society for Occupational Health Psychology (SOHP) sowie des National Institute for Occupational Safety and Health (NIOSH) mit dem Best Intervention Award ausgezeichnet (American Psychological Association, 2019; siehe Anhang F).

Dennoch unterliegt diese Dissertation einigen wichtigen allgemeinen Limitationen, die bei der Interpretation der Ergebnisse beachten werden sollten. Im Folgenden werden die Limitationen dargestellt, die sich bei der Betrachtung der gesamten Dissertation ergeben und die über die Limitationen der einzelnen Teilstudien hinausgehen. Zunächst basieren die verschiedenen Studien hauptsächlich auf Fragebogendaten, die zu verschiedenen Messzeitpunkten im Abstand von jeweils ca. drei Monaten erhoben wurden. Gerade um Einblicke in die Wirkmechanismen von achtsamkeitsbasierten Interventionen zu erhalten, wären weitere Methoden der Datenerhebung wünschenswert gewesen. So könnten beispielsweise durch Tagebuch- oder Ambulatory Assessment Studien dynamische Mediationsvariablen im alltäglichen Leben, in diesem Falle am Arbeitsplatz, untersucht

werden. Von Interesse wäre so beispielsweise, wie sich Veränderungen in der Achtsamkeit prozesshaft im Arbeitsalltag entwickeln. Weiterhin wäre es interessant zu untersuchen, ob sich die Interventionseffekte auch auf psychobiologischen Variablen widerspiegeln.

Während in Studie 1 die Kostendaten analysiert wurden, um die sozioökonomische Bedeutung psychischer Belastungen am Arbeitsplatz zu analysieren, wurde eine ökonomische Evaluation der Intervention nicht vorgenommen. In zukünftigen Arbeiten sollte untersucht werden, ob die Effekte der Intervention auf die mittels Fragebögen erhobene psychische Belastung auch Effekte auf ökonomischen Kennzahlen mit sich bringt (z.B. Arbeitsunfähigkeitstage).

Eine weitere Limitation stellt die begrenzte Einsicht in vermittelnde und moderierende Variablen dar. In den Teilstudien wurden vor allem Zusammenhangsmaße und Interventionseffekte analysiert. Der Wirkmechanismus (Mediation) oder die Rahmenbedingungen (Moderation), wie achtsamkeitsbasierte Programme am Arbeitsplatz wirken, bleibt in diesen Studien weitgehend unbeantwortet. Weitere Analysen sind notwendig, um die Wirkweise besser zu verstehen und Variablen zu bestimmen, welche die Wirksamkeit begünstigen oder reduzieren. Hier wäre besonders interessant, einen möglichen Zusammenhang zwischen der Dosis von Achtsamkeit und möglichen Interventionseffekten weiter zu untersuchen. Die bisherigen Ergebnisse hierzu lassen keine klare Schlussfolgerung zu, so zeigte sich in der Meta-Analyse ein signifikanter Moderatoreffekt der Anwesenheits-stunden von Achtsamkeitsinterventionen nur auf die Achtsamkeit, das Wohlbefinden und das Burnout der Teilnehmenden, nicht aber auf deren Stressempfindungen oder subsyndromale Symptome. In der Interventionsstudie zeigte sich ein signifikanter Effekt der Häufigkeit der Achtsamkeitsübungen auf die Belastungsreduktion.

Eine weitere Limitation ist, dass die Ergebnisse (v.a. aus Studie 1 und 3) nicht kausal interpretiert werden dürfen. Auch wenn die Ergebnisse aus Studie 1 aufgrund des längsschnittlichen Studiendesigns eine kausale Interpretationen nahe legen, sollten Kausalitätsaussagen nur nach sorgfältigen experimentellen Untersuchungsmethoden formuliert werden. So könnte in Studie 1 die psychische Belastung zu Arbeitsunfähigkeitstagen führen und gleichzeitig das Ausmaß der Arbeitsunfähigkeitstage wiederum die psychische Belastung beeinflussen (z.B. aufgrund des Wegfallens von Ressourcen durch die Arbeit). In Studie 3 könnte sich die gesunde Führung auf die psychische Belastung der Mitarbeitenden auswirken, eine psychische Belastung aber wiederum dazu führen, dass die eigene Führungskraft als weniger gesundheitsorientiert bewertet wird.

Eine weitere Limitation der gesamten Arbeit ist, dass zur Erhebung der psychischen Belastung lediglich ein Instrument, nämlich die Hospital Anxiety and Depression Scale (HADS) eingesetzt wurde. Auf der einen Seite können so die Ergebnisse aus den verschiedenen Teilstudien besser verglichen werden, auf der anderen Seite könnten aber auch weitere Aspekte von Mitarbeitergesundheit von Interesse sein, wie z.B. arbeitsbezogene Variablen wie Erschöpfung und Burnout oder aber positiv formulierte Outcomevariablen wie Wohlbefinden oder Arbeitszufriedenheit.

Eine weitere Limitation, welche die gesamte Arbeit betrifft, ist in der Tatsache begründet, dass in der Dissertation vor allem auf die Aspekte der Achtsamkeit und der gesunden Führung fokussiert wurde. Im Rahmen des JD-R Modell lassen sich jedoch viele weitere Ressourcen und Stressoren einordnen, die bei der gesunden Gestaltung von Arbeit und der Prävention psychischer Störungen am Arbeitsplatz eine zentrale Rolle spielen könnten. Eine weitere Herausforderung stellt schließlich die Konstruktproliferation der gesunden Führung dar (Rudolph et al., 2020). Dabei sollten unterschiedliche Konzepte gesunder Führung integriert und im Rahmen anderer Führungsstile verortet werden (z.B. *transformational leadership* oder *authentic leadership*). Ebenso sollte die Einbettung dieser Konzepte in bisherige Theorien zur Beschreibung von psychischer Gesundheit am Arbeitsplatz erfolgen (z.B. JD-R).

6.3 Implikationen für die Praxis

Die Ergebnisse dieser Dissertation legen nahe, dass die Prävention psychischer Störungen als gesamtgesellschaftliche Aufgabe begriffen werden sollte, wobei die Prävention am Arbeitsplatz einen wichtigen Baustein dabei darstellt. Die im ersten Abschnitt der Arbeit dargestellten erheblichen Kosten durch psychische Belastungen sollte Unternehmen sensibilisieren, Maßnahmen zur betrieblichen Gesundheitsprävention zu planen und durchzuführen, um so sowohl die Gesundheit der Mitarbeitenden zu fördern, aber auch deren Arbeitsleistung und die Produktivität des Unternehmens zu erhalten und zu stärken. Damit das Potential zur Kosteneinsparung ausgeschöpft werden kann, ist es jedoch notwendig, effektive Maßnahmen einzusetzen, die die psychische Belastung nachhaltig reduzieren. Diese Arbeit zeigt auf, dass sich durch achtsamkeitsbasierte Programme sowohl auf Mitarbeiterebene als auch auf Führungsebene signifikante Verbesserungen auf einer Vielzahl gesundheits- und arbeitsbezogener Variablen erzielen lassen. Besonders erfolgsversprechend scheint es dabei zu sein, Interventionsprogramme auf verschiedenen Ebenen im Unternehmen anzubieten, das heißt, neben der Schulung von Führungskräften auch Schulungen für Mitarbeitende durchzuführen oder sogar Teamschulungen in Betracht zu ziehen. Dabei zeigen

die Ergebnisse dieser Arbeit, dass achtsamkeitsbasierte Präventionsprogramme über unterschiedliche Branchen und Arbeitskontexte hinweg effektiv eingesetzt werden können. Die einzelnen Präventionsprogramme sollten im Rahmen einer ganzheitlich und strategisch geführten Gesundheitspolitik im Unternehmen etabliert werden. Dazu gehören auch die regelmäßige Erfassung psychischer Belastungsfaktoren im Rahmen von Gefährdungsanalysen und die Ableitung von zielgerichteten Maßnahmen, um das gesunde Arbeitsklima nachhaltig zu verbessern.

Neben den Vorteilen für die Unternehmen stellt die arbeitsplatzbezogene Prävention auch einen erheblichen gesellschaftlichen Nutzen dar. Bei Betrachtung der Stichprobe zeigte sich im Vergleich zu bisherigen Präventionsprogrammen, dass ein erheblicher Anteil männlicher Personen mit mittlerem Bildungsniveau an den Präventionsmaßnahmen teilgenommen hat. Bisherige Ergebnisse zur Inanspruchnahme von Präventionsmaßnahmen deuten auf eine besonders selektive Stichprobe von weiblichen Teilnehmerinnen mit hohem Bildungsniveau hin (siehe Lyssenko et al., 2015). Dies zeigt, dass durch die Prävention am Arbeitsplatz im Rahmen eines niederschwelligen Zugangs Bevölkerungsschichten erreicht werden können, die sonst eher keine Präventionsangebote wahrgenommen hätten. Durch die Verankerung von Präventionsangeboten im alltäglichen Leben der Menschen (u.a. am Arbeitsplatz) können so der Zugang erleichtert und mögliche Hindernisse bei der Inanspruchnahme abgebaut werden.

7 ZUSAMMENFASSUNG

Im Zuge der Globalisierung, Digitalisierung und des gesellschaftlichem Wandels, hat sich die Arbeitswelt in den letzten Jahren stark verändert. Diese Veränderungen stellen erhöhte Anforderungen an die psychische Gesundheit der Beschäftigten. Die Prävention psychischer Störungen am Arbeitsplatz und die Frage, wie Arbeit gesund gestaltet werden kann, gewinnt daher zunehmend an Bedeutung. Eine zentrale Rolle nimmt dabei die Führungskraft ein, da diese maßgeblich die Arbeitsumgebung und die Arbeitsprozesse gestaltet und im direkten Kontakt mit ihren Mitarbeitenden steht. Zudem haben in den letzten Jahren achtsamkeitsbasierte Programme zur Prävention psychischer Störungen enorm an Bedeutung gewonnen, deren Wirksamkeit im Arbeitskontext jedoch oft in Frage gestellt wurde. Ziel dieser Dissertation war es daher, die Wirksamkeit und die potentiellen Wirkmechanismen achtsamkeitsbasierter Programme in der Arbeitswelt zu prüfen und deren Integration im Rahmen der gesunden Führung zu untersuchen. Zu diesem Zweck war die vorliegende Dissertation in insgesamt vier Abschnitte gegliedert.

Im ersten Abschnitt wurde der Effekt psychischer Belastungen von $N = 2.287$ Studienteilnehmern im Hinblick auf deren Arbeitsunfähigkeitstage und Krankheitskosten in den folgenden zwei Jahren geprüft, um die langfristigen ökonomischen Folgen psychischer Belastungen zu erörtern und die Relevanz von Präventionsangeboten aus einer sozioökonomischen Perspektive zu beurteilen. Die Ergebnisse zeigten einen signifikanten Zusammenhang zwischen subjektiv erlebter psychischer Belastung und späteren Arbeitsunfähigkeitstagen bzw. Krankheitskosten. So zeigte sich, dass schwer belastete Personen 27mal so viele Arbeitsunfähigkeitstage im ersten Jahr und 10mal so viele Arbeitsunfähigkeitstage im zweiten Jahr aufweisen verglichen mit Personen ohne psychische Belastungen. Außerdem zeigten schwer belastete Personen 11fach erhöhte Krankenkosten im ersten Jahr und 6fach erhöhte Krankheitskosten im zweiten Jahr, verglichen mit nicht belasteten Personen. Interessanterweise zeigten sich schon bei leichten und mittleren psychischen Belastungen signifikant erhöhte Arbeitsunfähigkeitstage und Krankheitskosten (2fach bis 11fach erhöht). Diese Ergebnisse verdeutlichen die sozioökonomische Relevanz psychischer Belastungen und bilden eine Grundlage für die Annahme, dass durch effektive Präventionsmaßnahmen sowohl individuelles Leid gelindert als auch sozioökonomische Kosten reduziert werden können.

Im zweiten Abschnitt wurde in Form einer Übersichtsarbeit der aktuelle Forschungsstand zu achtsamkeitsbasierten Programmen in der Arbeitswelt skizziert und deren Wirksamkeit

und potentielle Wirkmechanismen metaanalytisch geprüft. Über k = 56 randomisiert-kontrollierte Interventionsstudien hinweg zeigten sich kleine bis mittlere Effekte (g = 0.32 bis 0.77) auf unterschiedlichen gesundheitsbezogenen Variablen (z.B. Wohlbefinden, Stress, subsyndromale Symptome, Burnout und somatische Beschwerden) sowie arbeitsbezogenen Variablen (z.B. Arbeitsengagement, Arbeitszufriedenheit und Produktivität), die bis zu 12 Wochen nach der Intervention bestehen blieben. Diese Ergebnisse legen nahe, dass achtsamkeitsbasierte Programme effektiv in verschiedenen Arbeitskontexten eingesetzt werden können und somit eine gute Grundlage zur Prävention psychischer Störungen in der Arbeitswelt bilden.

Im dritten Abschnitt dieser Arbeit wurde der Zusammenhang zwischen gesunder Führung und psychischer Gesundheit aus Perspektive von Führungskräften und deren Mitarbeitenden in einem querschnittlichen Studiendesign mit Hilfe von Mehrebenenanalysen untersucht, um den komplexen Zusammenhang zwischen Führung und Gesundheit besser zu verstehen. Dabei zeigte sich, dass die Einschätzungen der gesunden Führung zwischen Führungskräften und ihren Mitarbeitenden deutlich abweichen und nur auf konkreten Verhaltensdimensionen signifikante Zusammenhänge aufweisen. Die subjektive Wahrnehmung der gesunden Führung von den Mitarbeitenden zeigte einen signifikanten Zusammenhang mit deren psychischer Gesundheit, nicht aber die Selbsteinschätzungen der Führungskräfte. Insgesamt weisen diese Ergebnisse darauf hin, dass die subjektive Wahrnehmung gesunder Führung eine wichtige Determinante für die psychische Gesundheit bei der Arbeit darstellt, dass das Thema gesunde Führung jedoch expliziter im Arbeitskontext ausgestaltet werden sollte, um ein gemeinsames Verständnis von gesunder Führung zwischen Führungskräften und Mitarbeitenden zu schaffen.

Im vierten Abschnitt dieser Arbeit wurde dargestellt, wie die gesunde Führung mit Hilfe einer gezielten Intervention gefördert werden kann und welche Rolle das Konzept der Achtsamkeit dabei einnimmt. Die achtsamkeitsbasierte Intervention umfasste drei Seminartage (à 8 Stunden) zu i) gesunder Selbstführung, ii) gesunder Mitarbeiterführung und iii) Umgang mit psychisch belasteten Mitarbeitenden sowie zwei Nachhaltigkeitstermine (à 3 Stunden). Anschließend wurden die Wirksamkeit sowie potentielle Wirkmechanismen der Intervention in einem quasiexperimentellen Studiendesign sowohl auf Ebene der Führungskräfte als auch auf Ebene der Mitarbeitenden empirisch geprüft. In 12 Unternehmen nahmen insgesamt 117 Führungskräfte an der Intervention teil. Die Führungskräfte und deren 744 Mitarbeitende machten Angaben zu ihrer psychischen Belastung sowie zur gesunden Führung zu drei Messzeitpunkten (Prä, Post, 3 Monate Follow-Up). Diese Angaben wurden

mit einer passiven Kontrollgruppe, basierend auf Propensity Score Matching, verglichen. Hierarchische lineare Modelle ergaben, dass die Führungskräfte in der Interventionsgruppe eine signifikant stärkere Abnahme der psychischen Belastung und eine Zunahme der gesunden Selbst- und Mitarbeiterführung im Zeitverlauf aufzeigten als die gematchten Kontrollpersonen (g = 0,27 bis 0,55). Der signifikante Interventionseffekt auf die psychische Belastung der Führungskräfte wurde durch die Häufigkeit der selbstständig durchgeführten Achtsamkeitsübungen moderiert und durch eine Zunahme der gesunden Selbstführung vermittelt. Auf Mitarbeiterebene ergaben sich keine signifikanten Effekte zwischen den Gruppen im Zeitverlauf. Es zeigte sich jedoch ein signifikanter Zusammenhang zwischen der subjektiv erlebten gesunden Führung und der späteren psychischen Belastung. Dies deutet darauf hin, dass die gesunde Führung eine wichtige Determinante der psychischen Gesundheit von Mitarbeitenden darstellt. Insgesamt tragen diese Ergebnisse zu unserem Verständnis bei, wie eine gesunde Führung effektiv trainiert werden kann. Die Ergebnisse weisen jedoch gleichermaßen auf die Herausforderung hin, Interventionsprogramme weiter zu verbessern, um deren Effektivität auf Mitarbeiterebene zu erhöhen. Diese Dissertation trägt insgesamt dazu bei, die Bedeutung der Prävention psychischer Störungen in der Arbeitswelt zu verdeutlichen und Möglichkeiten aufzuzeigen, wie eine effektive Prävention in Unternehmen ausgestaltet werden kann.

8 LITERATURVERZEICHNIS

Alle Studien, die in die Meta-Analyse eingeschlossen wurden sind gekennzeichnet mit (*)

Aas, R. W., Ellingsen, K. L., Lindøe, P., & Möller, A. (2008). Leadership qualities in the return to work process: a content analysis. *Journal of Occupational Rehabilitation, 18*(4), 335-346.

Aguinis, H., Gottfredson, R. K., & Culpepper, S. A. (2013). Best-practice recommendations for estimating cross-level interaction effects using multilevel modeling. *Journal of Management, 39*(6), 1490-1528.

*Aikens, K. A., Astin, J., Pelletier, K. R., Levanovich, K., Baase, C. M., Park, Y. Y., & Bodnar, C. M. (2014). Mindfulness goes to work: Impact of an online workplace intervention. *Journal of Occupational Environmental Medicine*, *56*(7), 721-731.

*Alexander, G. K., Rollins, K., Walker, D., Wong, L., & Pennings, J. (2015). Yoga for self-care and burnout prevention among nurses. *Workplace Health & Safety*, *63*(10), 462-470.

Alicke, M., D. (1985). Global self-evaluation as determined by the desirability and controllability of trait adjectives. *Journal of Personality and Social Psychology*, *49*(6), 1621-1630.

*Allexandre, D., Bernstein, A. M., Walker, E., Hunter, J., Roizen, M. F., & Morledge, T. (2016). A web-based mindfulness stress management program in a corporate call center: a randomized clinical trial to evaluate the added benefit of onsite group support. *Journal of Occupational and Environmental Medicine, 58*(3), 254-264.

Allison, P. D. (1999). *Multiple regression: A primer*. Pine Forge Press.

Alonso, J., Angermeyer, M., Bernert, S., Bruffaerts, R., Brugha, T., Bryson, H., de Girolamo, G., de Graaf, R., & Demyttenaere, K. (2004). Disability and quality of life impact of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatrica Scandinavica, 109*, 38-46.

American Psychological Association (2019). *Best Intervention Competition*. Retrieved 21 March 2020 from https://www.apa.org/about/awards/niosh-best?tab=1

*Amutio, A., Martínez-Taboada, C., Delgado, L. C., Hermosilla, D., & Mozaz, M. J. (2015a). Acceptability and effectiveness of a long-term educational intervention to reduce physicians' stress-related conditions. *Journal of Continuing Education in the Health Professions*, *35(4)*, 255-260.

*Amutio, A., Martínez-Taboada, C., Hermosilla, D., & Delgado, L. C. (2015b). Enhancing relaxation states and positive emotions in physicians through a mindfulness training program: A one-year study. *Psychology, Health & Medicine, 20(6),* 720-731.

*Ancona, M. R., & Mendelson, T. (2014). Feasibility and preliminary outcomes of a yoga and mindfulness intervention for school teachers. *Advances in School Mental Health Promotion, 7*(3), 156-170.

*Anderson, V. L., Levinson, E. M., Barker, W., & Kiewra, K. R. (1999). The effects of meditation on teacher perceived occupational stress, state and trait anxiety, and burnout. *School Psychology Quarterly, 14*(1), 3-25.

Apostel, E., Syrek, C. J., & Antoni, C. H. (2018). Turnover intention as a response to illegitimate tasks: The moderating role of appreciative leadership. *International Journal of Stress Management, 25*(3), 234-249.

Arendt, J. F., Pircher Verdorfer, A., & Kugler, K. G. (2019). Mindfulness and leadership: Communication as a behavioral correlate of leader mindfulness and its effect on follower satisfaction. *Frontiers in Psychology, 10,* 667.

Arnold, K. A. (2017). Transformational leadership and employee psychological well-being: A review and directions for future research. *Journal of Occupational Health Psychology, 22*(3), 381-393.

*Arredondo, M., Sabaté, M., Valveny, N., Langa, M., Dosantos, R., Moreno, J., et al. (2017). A mindfulness training program based on brief practices (M-PBI) to reduce stress in the workplace: A randomised controlled pilot study. *International Journal of Occupational and Environmental Health, 23(1),* 40-51.

*Asuero, A. M., Queraltó, J. M., Pujol-Ribera, E., Berenguera, A., Rodriguez-Blanco, T., & Epstein, R. M. (2014). Effectiveness of a mindfulness education program in primary health care professionals: A pragmatic controlled trial. *Journal of Continuing Education in the Health Professions, 34*(1), 4-12.

*Auserón, G. A., Viscarret, M. R. E., Goñi, C. F., Rubio, V. G., Pascual, P. P., & Sainz de Murieta García de Galdeano, E. (2018). Evaluación de la efectividad de un programa de mindfulness y autocompasión para reducir el estrés y prevenir el burnout en profesionales sanitarios de atención primaria. *Atención Primaria, 50(3),* 141-150.

Atwater, L., Waldman, D., Ostroff, C., Robie, C., & Johnson, K. M. (2005). Self–other agreement: Comparing its relationship with performance in the US and Europe. *International Journal of Selection and Assessment, 13*(1), 25-40.

Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research*, *46*(3), 399-424.

Avolio, B. J., & Yammarino, F. J. (2013). *Transformational and charismatic leadership: The road ahead*. Emerald Group Publishing.

Baas, M., Nevicka, B., & Ten Velden, F. S. (2014). Specific mindfulness skills differentially predict creative performance. *Personality and Social Psychology Bulletin*, *40*(9), 1092-1106.

*Baby, M., Gale, C., & Swain, N. (2019). A communication skills intervention to minimise patient perpetrated aggression for healthcare support workers in New Zealand: A cluster randomised controlled trial. *Health & Social Care in the Community, 27(1),* 170-181.

Bakker, A. B., & Demerouti, E. (2014). Job demands–resources theory. In C. Cooper & P. Chen (Eds.), *Wellbeing: A complete reference guide* (pp. 37-64). Wiley-Blackwell.

Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273-285.

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology*, *10*(2), 170-180.

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD–R approach. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*:389-411.

Bamber, M. D., & Morpeth, E. (2019). Effects of mindfulness meditation on college student anxiety: A meta-analysis. *Mindfulness, 10*(2), 203-214.

Bamberger, P. A., & Bacharach, S. B. (2006). Abusive supervision and subordinate problem drinking: Taking resistance, stress and subordinate personality into account. *Human Relations*, *59*(6), 723-752.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.

Barling, J., & Cloutier, A. (2017). Leaders' mental health at work: Empirical, methodological, and policy directions. *Journal of Occupational Health Psychology*, *22*(3), 394-406.

Barling, J., & Frone, M. R. (2017). If only my leader would just do something! Passive leadership undermines employee well-being through role stressors and psychological resource depletion. *Stress & Health*, *33*(3), 211-222.

Barns, R. (2017). *Distress, wellbeing and mindfulness amongst mental health professionals*. Doctoral Dissertation, University of Sheffield, Sheffield.

Baron, L. (2016). Authentic leadership and mindfulness development through action learning. *Journal of Managerial Psychology*, *31*(1), 296-311.

Baron, L., Rouleau, V., Grégoire, S., & Baron, C. (2018). Mindfulness and leadership flexibility. *Journal of Management Development*, *37*(2), 165-177.

*Bartlett, L., Lovell, P., Otahal, P., & Sanderson, K. (2017). Acceptability, feasibility, and efficacy of a workplace mindfulness program for public sector employees: A pilot randomized controlled trial with informant reports. *Mindfulness, 8*(3), 639-654.

Bartlett, L., Martin, A., Neil, A. L., Memish, K., Otahal, P., Kilpatrick, M., & Sanderson, K. (2019). A systematic review and meta-analysis of workplace mindfulness training randomized controlled trials. *Journal of Occupational Health Psychology*, *24*(1), 108-126.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2014). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*, 1-48.

BAuA [Bundesanstalt für Arbeitsschutz und Arbeitsmedizin] (2014). *Sicherheit und Gesundheit bei der Arbeit 2014: Unfallverhütungsbericht Arbeit*. Bönen, Germany: Druck & Verlag Kettler GmbH. Retrieved 12 Jul 2020 from https://www.baua.de/DE/Angebote/Publikationen/Berichte/Suga-2014.pdf?__blob=publicationFile&v=8

Belsey, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*. New York: Wiley.

Berger, R., Czakert, J. P., Leuteritz, J. P., & Leiva, D. (2019). How and when do leaders influence employees' well-being? Moderated mediation models for job demands and resources. *Frontiers in Psychology*, *10*, 2788.

Bergin, A. J., & Jimmieson, N. L. (2020). The importance of supervisor emotion recognition for praise and recognition for employees with psychological strain. *Anxiety, Stress, & Coping*, *33*(2), 148-164.

Bergner, S., Davda, A., Culpin, V., & Rybnicek, R. (2016). Who overrates, who underrates? Personality and its link to self–other agreement of leadership effectiveness. *Journal of Leadership & Organizational Studies*, *23*(3), 335-354.

Bijl, R. V., de Graaf, R., Hiripi, E., Kessler, R. C., Kohn, R., Offord, D. R., Ustun, T. B., Vicente, B., Vollebergh, W. A., & Walters, E. E. (2003). The prevalence of treated and untreated mental disorders in five countries. *Health Affairs*, *22*(3), 122-133.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., & Velting, D. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science Practice, 11*(3), 230-241.

Bjelland, I., Dahl, A. A., Haug, T. T., & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale: an updated literature review. *Journal of Psychosomatic Research*, *52*(2), 69-77.

Bliese, P. (2016). *Multilevel modelling in R (2.6). A brief introduction to R, the multilevel package and the nlme package.* Retrieved 14 April 2021 from https://cran.r-project.org/doc/contrib/Bliese_Multilevel.pdf

Bliese, P. D., Edwards, J. R., & Sonnentag, S. (2017). Stress and well-being at work: A century of empirical trends reflecting theoretical and societal influences. *Journal of Applied Psychology*, *102*(3), 389-402.

Bloch, P., Toft, U., Reinbach, H. C., Clausen, L. T., Mikkelsen, B. E., Poulsen, K., & Jensen, B. B. (2014). Revitalizing the setting approach–supersettings for sustainable impact in community health promotion. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1), 1-15.

Bloom, D. E., Cafiero, E., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L. R., Fathima, S., Feigl, A. B., Gaziano, T., Hamandi, A., & Mowafi, M. (2011). *The global economic burden of noncommunicable diseases*. Geneva: World Economic Forum. Retrieved 22 Apr 2020 from http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomic BurdenNonCommunicableDiseases_2011.pdf

Boellinghaus, I., Jones, F. W., & Hutton, J. (2014). The role of mindfulness and loving-kindness meditation in cultivating self-compassion and other-focused concern in health care professionals. *Mindfulness*, *5*(2), 129-138.

Bohus, M., Lyssenko, L., Wenner, M., & Berger, M. (2013). *Lebe Balance: das Programm für innere Stärke und Achtsamkeit*. Georg Thieme Verlag.

Bonanno, G. A., & Burton, C. L. (2013). Regulatory flexibility: An individual differences perspective on coping and emotion regulation. *Perspectives on Psychological Science, 8*(6), 591-612.

Bonat, W. H., Jørgensen, B., Kokonendji, C. C., Hinde, J., & Demétrio, C. G. (2018). Extended Poisson–Tweedie: Properties and regression models for count data. *Statistical Modelling*, *18*(1), 24-49.

*Bostock, S., Crosswell, A., Prather, A., & Steptoe, A. (2018). Mindfulness on-the-go: Effects of a mindfulness meditation app on work stress and well-being. *Journal of Occupational Health Psychology, 24(1)*, 127-138.

Bourgin, J., Tebeka, S., Mallet, J., Mazer, N., Dubertret, C., & Le Strat, Y. (2020). Prevalence and correlates of psychotic-like experiences in the general population. *Schizophrenia Research*, *215*, 371-377.

Breevaart, K., Bakker, A., Hetland, J., Demerouti, E., Olsen, O. K., & Espevik, R. (2014). Daily transactional and transformational leadership and daily employee engagement. *Journal of Occupational and Organizational Psychology*, *87*(1), 138-157.

Brennan, C., Worrall-Davies, A., McMillan, D., Gilbody, S., & House, A. (2010). The Hospital Anxiety and Depression Scale: a diagnostic meta-analysis of case-finding ability. *Journal of Psychosomatic Research*, *69*(4), 371-378.

Brouwer, S., Reneman, M. F., Bültmann, U., Van der Klink, J. J., & Groothoff, J. W. (2010). A prospective study of return to work across health conditions: perceived work attitude, self-efficacy and perceived social support. *Journal of Occupational Rehabilitation*, *20*(1), 104-112.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, *18*(4), 211-237.

Brown, K. W., Weinstein, N., & Creswell, J. D. (2012). Trait mindfulness modulates neuroendocrine and affective responses to social evaluative threat. *Psychoneuroendocrinology*, *37*(12), 2037-2041.

Burke, S., & Collins, K. M. (2001). Gender differences in leadership styles and management skills. *Women in Management Review*, *16*(5), 244-257.

Burton, A., Burgess, C., Dean, S., Koutsopoulou, G. Z., & Hugh-Jones, S. (2017). How effective are mindfulness-based interventions for reducing stress among healthcare professionals? A systematic review and meta-analysis. *Stress and Health*, *33*(1), 3-13.

Buuren, S. V., & Groothuis-Oudshoorn, K. (2010). Mice: Multivariate imputation by chained equations in R. *Journal of Statistical Software*, 1-68.

Byrne, A., Dionisi, A. M., Barling, J., Akers, A., Robertson, J., Lys, R., Wylie, J., & Dupré, K. (2014). The depleted leader: The influence of leaders' diminished psychological resources on leadership behaviors. *The Leadership Quarterly*, *25*(2), 344-357.

Campion, J., Bhui, K., & Bhugra, D. (2012). European Psychiatric Association (EPA) guidance on prevention of mental disorders. *European Psychiatry*, *27*(2), 68-80.

Carmody, J., & Baer, R. A. (2009). How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. *Journal of Clinical Psychology*, *65*(6), 627-638.

Carpenter, J. K., Conroy, K., Gomez, A. F., Curren, L. C., & Hofmann, S. G. (2019). The relationship between trait mindfulness and affective symptoms: A meta-analysis of the Five Facet Mindfulness Questionnaire (FFMQ). *Clinical Psychology Review, 74*, 101785.

Carrière, K., Khoury, B., Günak, M., & Knäuper, B. (2018). Mindfulness-based interventions for weight loss: a systematic review and meta-analysis. *Obesity Reviews*, *19*(2), 164-177.

*Cheema, B. S., Houridis, A., Busch, L., Raschke-Cheema, V., Melville, G. W., Marshall, P. W., Chang, D., Machliss, B., Lonsdale, C., Bowman, J., & Colagiuri, B. (2013). Effect of an office worksite-based yoga program on heart rate variability: Outcomes of a randomized controlled trial. *BMC Complementary and Alternative Medicine*, *13*(1), e82.

Chen, N. Y. F., & Tjosvold, D. (2013). Inside the leader relationship: constructive controversy for team effectiveness in China. *Journal of Applied Social Psychology*, *43*(9), 1827-1837.

*Chin, B., Slutsky, J., Raye, J., & Creswell, J. D. (2019). Mindfulness training reduces stress at work: A randomized controlled trial. *Mindfulness, 10(4)*, 627-638.

Chirico, F. (2017a). The forgotten realm of the new and emerging psychosocial risk factors. *Journal of Occupational Health Psychology*, *59*(5), 433-435.

Chirico, F. (2017b). Is burnout a syndrome or an occupational disease? Instructions for occupational physicians. *Epidemiologia e Prevenzione*, *41*(5-6), 294-298.

Chirico, F., Heponiemi, T., Pavlova, M., Zaffina, S., & Magnavita, N. (2019). Psychosocial risk prevention in a global occupational health perspective. A descriptive analysis. *International Journal of Environmental Research and Public Health*, *16*(14), 2470.

*Christopher, M. S., Hunsinger, M., Goerling, L. R. J., Bowen, S., Rogers, B. S., Gross, C. R., et al. (2018). Mindfulness-based resilience training to reduce health risk, stress reactivity, and aggression among law enforcement officers: A feasibility and preliminary efficacy trial. *Psychiatry Research, 264*, 104-115.

Clark, D. M. (2018). Realizing the mass public benefit of evidence-based psychological therapies: the IAPT program. *Annual Review of Clinical Psychology*, *14*, 159-183.

Cochran, W. G. (1954). The combination of estimates from different experiments. *Biometrics*, *10*(1), 101-129.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Lawrence Erlbaum.

Conway, J. M., & Huffcutt, A. I. (1997). Psychometric properties of multisource performance ratings: A meta-analysis of subordinate, supervisor, peer, and self-ratings. *Human Performance*, *10*(4), 331-360.

*Crain, T. L., Schonert-Reichl, K. A., & Roeser, R. W. (2017). Cultivating teacher mindfulness: Effects of a randomized controlled trial on work, home, and sleep outcomes. *Journal of Occupational Health Psychology, 22(2)*, 138-152.

Crane, C., Crane, R. S., Eames, C., Fennell, M. J., Silverton, S., Williams, J. M. G., & Barnhofer, T. (2014). The effects of amount of home meditation practice in Mindfulness Based Cognitive Therapy on hazard of relapse to depression in the Staying Well after Depression Trial. *Behaviour Research and Therapy*, *63*, 17-24.

Cullen, K. L., Gentry, W. A., & Yammarino, F. J. (2015). Biased self-perception tendencies: Self-enhancement/self-diminishment and leader derailment in individualistic and collectivistic cultures. *Applied Psychology*, *64*(1), 161-207.

Dai, G., Stiles, P., Hallenbeck, G., & De Meuse, K. P. (2007). *Self-other agreement on leadership competency ratings: The moderating effects of rater perspectives and rating ambiguity.* Annual Meeting of the Academy of Management Philadelphia, PA.

DAK Psychoreport (2019). *Entwicklung der psychischen Erkrankungen im Job: Langzeitanalyse 1997-2018.* Retrieved 20 July 2020 from https://www.dak.de/dak/bundesthemen/dak-psychoreport-2019-dreimal-mehr-fehltage-als-1997-2125486.html

Dane, E. (2011). Paying attention to mindfulness and its effects on task performance in the workplace. *Journal of Management*, *37*(4), 997-1018.

Demarzo, M. M., Montero-Marin, J., Cuijpers, P., Zabaleta-del-Olmo, E., Mahtani, K. R., Vellinga, A., Vicens, C., López-del-Hoyo, Y., & García-Campayo, J. (2015). The efficacy of mindfulness-based interventions in primary care: a meta-analytic review. *The Annals of Family Medicine*, *13*(6), 573-582.

Demerouti, E., Bakker, A. B., & Bulters, A. J. (2004). The loss spiral of work pressure, work–home interference and exhaustion: Reciprocal relations in a three-wave study. *Journal of Vocational Behavior*, *64*(1), 131-149.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*(3), 499-512.

Demerouti, E., Le Blanc, P. M., Bakker, A. B., Schaufeli, W. B., & Hox, J. (2009). Present but sick: a three-wave study on job demands, presenteeism and burnout. *Career Development International*, *14*(1), 50-68.

Dettmers, J. (2017). How extended work availability affects well-being: The mediating roles of psychological detachment and work-family-conflict. *Work & Stress*, *31*(1), 24-41.

Dettmers, J., Vahle-Hinz, T., Bamberg, E., Friedrich, N., & Keller, M. (2016). Extended work availability and its relation with start-of-day mood and cortisol. *Journal of Occupational Health Psychology*, *21*(1), 105-118.

Deutsche Rentenversicherung Bund (2020). *Rentenversicherung in Zeitreihen*. DRV-Schriften, 26. Auflage. Retrieved 14 April 2021 from https://www.deutsche-rentenversicherung.de/SharedDocs/Downloads/DE/Statistiken-und-Berichte/statistikpublikationen/rv_in_zeitreihen.html

Dietz, C., Zacher, H., Scheel, T., Otto, K., & Rigotti, T. (2020). Leaders as role models: Effects of leader presenteeism on employee presenteeism and sick leave. *Work & Stress*, *34*(3), 300-322.

Donaldson-Feilder, E., Lewis, R., & Yarker, J. (2019). What outcomes have mindfulness and meditation interventions for managers and leaders achieved? A systematic review. *European Journal of Work and Organizational Psychology*, *28*(1), 11-29.

Dryden, R., Williams, B., McCowan, C., & Themessl-Huber, M. (2012). What do we know about who does and does not attend general health checks? Findings from a narrative scoping review. *BMC Public Health*, *12*(1), 1-23.

Dulebohn, J. H., Bommer, W. H., Liden, R. C., Brouer, R. L., & Ferris, G. R. (2012). A meta-analysis of antecedents and consequences of leader-member exchange: Integrating the past with an eye toward the future. *Journal of Management*, *38*(6), 1715-1759.

Dunkl, A., Jiménez, P., Žižek, S. Š., Milfelner, B., & Kallus, W. K. (2015). Similarities and differences of health-promoting leadership and transformational leadership. *Naše Gospodarstvo/Our Economy*, *61*(4), 3-13.

Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment: Implications for health, education, and the workplace. *Psychological Science in the Public Interest*, *5*(3), 69-106.

*Dwivedi, U., Kumari, S., Akhilesh, K. B., & Nagendra, H. R. (2015). Well-being at workplace through mindfulness: Influence of yoga practice on positive affect and aggression. *Ayu*, *36*(4), 375-379.

Eagly, A. H., & Johnson, B. T. (1990). Gender and leadership style: A meta-analysis. *Psychological Bulletin*, *108*(2), 233-256.

Eaton, J., Qureshi, O., Salaria, N., & Ryan, G. (2018). *The Lancet Commission on Mental Health and Sustainable Development: Evidence for action on mental health and global development*: *Evidence for action on mental health and global development.* Mental Health Innovation Network, Centre for Global Mental Health, London, UK: London School of Hygiene and Tropical Medicine. Retrieved 4 Aug 2020 from https://www.mhinnovation.net/sites/default/files/downloads/resource/Lancet%20Commission_policy%20brief_MHIN2.v3.pdf

Eby, L. T., Allen, T. D., Conley, K. M., Williamson, R. L., Henderson, T. G., & Mancini, V. S. (2019). Mindfulness-based training interventions for employees: A qualitative review of the literature. *Human Resource Management Review*, *29*(2), 156-178.

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, *315*(7109), 629-634.

Ekman, M., Granström, O., Omérov, S., Jacob, J., & Landén, M. (2013). The societal cost of depression: evidence from 10,000 Swedish patients in psychiatric care. *Journal of Affective Disorders*, *150*(3), 790-797.

Ellis, A. M., Casey, T. W., & Krauss, A. D. (2017). Setting the foundation for well-being: evaluation of a supervisor-focused mental health training. *Occupational Health Science*, *1*(1-2), 67-88.

Elo, A. L., Ervasti, J., Kuosma, E., & Mattila-Holappa, P. (2014). Effect of a leadership intervention on subordinate well-being. *Journal of Management Development*, *33*(3), 182-195.

Enga, K. F., Brækkan, S. K., Hansen-Krone, I. J., & Hansen, J.-B. (2012). Emotional states and future risk of venous thromboembolism. *Thrombosis and Haemostasis*, *107*(3), 485-493.

Erdogan, B., & Enders, J. (2007). Support from the top: Supervisors' perceived organizational support as a moderator of leader-member exchange to satisfaction and performance relationships. *Journal of Applied Psychology*, *92*(2), 321-330.

Escuriex, B. F., & Labbé, E. E. (2011). Health care providers' mindfulness and treatment outcomes: A critical review of the research literature. *Mindfulness*, *2*(4), 242-253.

Falon, S. L., Karin, E., Boga, D., Gucciardi, D. F., Griffin, B., & Crane, M. F. (2021). A clustered-randomized controlled trial of a self-reflection resilience-strengthening intervention and novel mediators. *Journal of Occupational Health Psychology*, *26*(1), 1-19.

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

Fernet, C., Trépanier, S. G., Austin, S., Gagné, M., & Forest, J. (2015). Transformational leadership and optimal functioning at work: On the mediating role of employees' perceived job characteristics and motivation. *Work & Stress*, *29*(1), 11-31.

Fitzgerald, S., & Schutte, N. S. (2010). Increasing transformational leadership through enhancing self-efficacy. *Journal of Management Development*, *29*(5), 495-505.

*Flaxman, P. E., & Bond, F. W. (2010). Acceptance and commitment training: Promoting psychological flexibility in the workplace. In R. H. Baer (Ed.), *Assessing mindfulness and acceptance processes in clients: Illuminating the theory and practice of change*, (pp. 282-306). Oakland: New Harbinger Publications.

Flaxman, P. E., Ménard, J., Bond, F. W., & Kinman, G. (2012). Academics' experiences of a respite from work: Effects of self-critical perfectionism and perseverative cognition on postrespite well-being. *Journal of Applied Psychology*, *97*(4), 854-865.

*Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013). Mindfulness for teachers: A pilot study to assess effects on stress, burnout, and teaching efficacy. *Mind, Brain, and Education*, *7*(3), 182-195.

Font, H., Roelandt, J. L., Behal, H., Geoffroy, P. A., Pignon, B., Amad, A., Simioni, N., Vaiva, G., Thomas, P., & Duhamel, A. (2018). Prevalence and predictors of no lifetime utilization of mental health treatment among people with mental disorders in France: findings from the ‘Mental Health in General Population’ (MHGP) survey. *Social Psychiatry and Psychiatric Epidemiology*, *53*(6), 567-576.

Franke, F., Felfe, J., & Pundt, A. (2014). The impact of health-oriented leadership on follower health: Development and test of a new instrument measuring health-promoting leadership. *German Journal of Human Resource Management*, *28*(1-2), 139-161.

Fritz, C., Ellis, A. M., Demsky, C. A., Lin, B. C., & Guros, F. (2013). Embracing work breaks. *Organizational Dynamics*, *42*(4), 274-280.

Galante, J., Iribarren, S. J., & Pearce, P. F. (2013). Effects of mindfulness-based cognitive therapy on mental disorders: a systematic review and meta-analysis of randomised controlled trials. *Journal of Research in Nursing*, *18*(2), 133-155.

Gardner, W. L., Cogliser, C. C., Davis, K. M., & Dickens, M. P. (2011). Authentic leadership: A review of the literature and research agenda. *The Leadership Quarterly*, *22*(6), 1120-1145.

Gelles, D. (2015). *Mindful work: How meditation is changing business from the inside out*. New York: Houghton Mifflin Harcourt.

Geue, K., Strauß, B., & Brähler, E. (2016). *Diagnostische Verfahren in der Psychotherapie*. Göttingen, Germany: Hogrefe.

Gilbreath, B., & Benson, P. G. (2004). The contribution of supervisor behaviour to employee psychological well-being. *Work & Stress*, *18*(3), 255-266.

Glomb, T. M., Duffy, M. K., Bono, J. E., & Yang, T. (2011). Mindfulness at work. In *Research in Personnel and Human Resources Management* (Vol. 30, pp. 115-157). Emerald Group Publishing Limited.

Goetzel, R. Z., Henke, R. M., Tabrizi, M., Pelletier, K. R., Loeppke, R., Ballard, D. W., Grossmeier, J., Anderson, D. R., Yach, D., & Kelly, R. K. (2014). Do workplace health promotion (wellness) programs work? *Journal of Occupational and Environmental Medicine*, *56*(9), 927-934.

Goetzel, R. Z., Long, S. R., Ozminkowski, R. J., Hawkins, K., Wang, S., & Lynch, W. (2004). Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting US employers. *Journal of Occupational and Environmental Medicine*, *46*(4), 398-412.

Goldberg, S. B., Knoeppel, C., Davidson, R. J., & Flook, L. (2020). Does practice quality mediate the relationship between practice time and outcome in mindfulness-based stress reduction? *Journal of Counseling Psychology*, *67*(1), 115-122.

Gonzalez-Morales, M. G., Kernan, M. C., Becker, T. E., & Eisenberger, R. (2018). Defeating abusive supervision: Training supervisors to support subordinates. *Journal of Occupational Health Psychology*, *23*(2), 151-162.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., Baer, R. A., Brewer, J. A., & Lazar, S. W. (2016). Contemplating mindfulness at work: An integrative review. *Journal of Management*, *42*(1), 114-142.

Grawe, K. (2004). *Psychological therapy*. Göttingen, Germany: Hogrefe Publishing.

Gregersen, S., Kuhnert, S., Zimber, A., & Nienhaus, A. (2011). Leadership behaviour and health-current research state. *Gesundheitswesen, 73*(1), 3-12.

Gregersen, S., Vincent-Höper, S., & Nienhaus, A. (2014). Health-relevant leadership behaviour: A comparison of leadership constructs. *German Journal of Human Resource Management, 28*(1-2), 117-138.

*Grégoire, S., & Lachance, L. (2015). Evaluation of a brief mindfulness-based intervention to reduce psychological distress in the workplace. *Mindfulness, 6*(4), 836-847.

Gregory, B. T., Moates, K. N., & Gregory, S. T. (2011). An exploration of perspective taking as an antecedent of transformational leadership behavior. *Leadership & Organization Development Journal, 32*(8), 807-816.

Greiser, C., & Martini, J. P. (2018). *Unleashing the power of mindfulness in corporations*. Boston Consulting Group. Retrieved 15 Dec 2019 from http://image-src.bcg.com/Images/BCG-Unleashing-the-Power-of-Mindfulness-in-Corporations-Apr-2018_tcm9-190679.pdf

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*(1), 35-43.

Grover, S. L., Teo, S. T., Pick, D., & Roche, M. (2017). Mindfulness as a personal resource to reduce work stress in the job demands-resources model. *Stress and Health, 33*(4), 426-436.

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical Psychology Review, 37*, 1-12.

Gurt, J., Schwennen, C., & Elke, G. (2011). Health-specific leadership: is there an association between leader consideration for the health of employees and their strain and well-being? *Work & Stress, 25*(2), 108-127.

Guthier, C., Dormann, C., & Voelkle, M. C. (2020). Reciprocal effects between job stressors and burnout: A continuous time meta-analysis of longitudinal studies. *Psychological Bulletin, 146*(12), 1146-1173.

Hahn, V. C., Binnewies, C., Sonnentag, S., & Mojza, E. J. (2011). Learning how to recover from job stress: effects of a recovery training program on recovery, recovery-related self-efficacy, and well-being. *Journal of Occupational Health Psychology, 16*(2), 202-216.

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress*, *22*(3), 224-241.

Halbesleben, J. R. (2006). Sources of social support and burnout: a meta-analytic test of the conservation of resources model. *Journal of Applied Psychology, 91*(5), 1134-1145.

Haller, H., Winkler, M. M., Klose, P., Dobos, G., Kuemmel, S., & Cramer, H. (2017). Mindfulness-based interventions for women with breast cancer: an updated systematic review and meta-analysis. *Acta Oncologica*, *56*(12), 1665-1676.

Hambrick, D. C., Finkelstein, S., & Mooney, A. C. (2005). Executive job demands: New insights for explaining strategic decisions and leader behaviors. *Academy of Management Review, 30*(3), 472-491.

Hammer, L. B., Wan, W. H., Brockwood, K. J., Bodner, T., & Mohr, C. D. (2019). Supervisor support training effects on veteran health and work outcomes in the civilian workplace. *Journal of Applied Psychology*, *104*(1), 52-69.

Han, S. H., & Oh, E. G. (2020). The link between transformational leadership and work-related performance: moderated-mediating roles of meaningfulness and job characteristics. *Leadership & Organization Development Journal*, *41*(4), 519-533.

Hannula, J. A., Lahtela, K., Järvikoski, A., K. Salminen, J., & Mäkelä, P. (2006). Occupational Functioning Scale (OFS)–an instrument for assessment of work ability in psychiatric disorders. *Nordic Journal of Psychiatry*, *60*(5), 372-378.

Hanssen, M., Bak, M., Bijl, R., Vollebergh, W., & Van Os, J. (2005). The incidence and outcome of subclinical psychotic experiences in the general population. *British Journal of Clinical Psychology*, *44*(2), 181-191.

Harms, P., Credé, M., Tynan, M., Leon, M., & Jeung, W. (2017). Leadership and stress: A meta-analytic review. *The Leadership Quarterly*, *28*(1), 178-194.

*Harris, A. R., Jennings, P. A., Katz, D. A., Abenavoli, R. M., & Greenberg, M. T. (2016). Promoting stress management and wellbeing in educators: Feasibility and efficacy of a school-based yoga and mindfulness intervention. *Mindfulness*, *7*(1), 143-154.

Hasan, M. M., & Dunn, P. K. (2011). Two Tweedie distributions that are near-optimal for modelling monthly rainfall in Australia. *International Journal of Climatology*, *31*(9), 1389-1397.

Haun, V. C., Nübold, A., & Rigotti, T. (2020). Being mindful at work and at home: A diary study on predictors and consequences of domain-specific mindfulness. *Journal of Occupational Health Psychology*, *25*(5), 315-329.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York, NY: Guilford Press.

Hedges, L., & Olkin, I. (1985). *Statistical methods for meta analysis*. Orlando, Florida: Academic Press.

Heidemeier, H., & Moser, K. (2009). Self–other agreement in job performance ratings: A meta-analytic test of a process model. *Journal of Applied Psychology*, *94*(2), 353-370.

Hendriks, T., de Jong, J., & Cramer, H. (2017). The effects of yoga on positive mental health among healthy adults: a systematic review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, *23*(7), 505-517.

Herman, H., & Jané-Llopis, E. (2005). Mental health promotion in public health. *Promotion & Education*, *12*(2), 42-47.

Herrmann-Lingen, C., Buss, U., & Snaith, P. (2011). *Hospital Anxiety and Depression Scale - German Version (HADS-D)*. Huber.

Hershcovis, M. S., Turner, N., Barling, J., Arnold, K. A., Dupré, K. E., Inness, M., LeBlanc, M. M., & Sivanathan, N. (2007). Predicting workplace aggression: a meta-analysis. *Journal of Applied Psychology*, *92*(1), 228-238.

Higgins, J. P., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., Savović, J., Schulz, K. F., Weeks, L., & Sterne, J. A. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *British Medical Journal*, *343*, e5928.

Higgins, J. P., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine*, *21*(11), 1539-1558.

Higgins, J. P. T., & Green, S. (2008). *Cochrane handbook for systematic reviews of interventions*. John Wiley & Sons Ltd.

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal*, *327*, 557-560.

Hinz, A., & Brähler, E. (2011). Normative values for the hospital anxiety and depression scale (HADS) in the general German population. *Journal of Psychosomatic Research*, *71*(2), 74-78.

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, *44*(3), 513-524.

Hox, J. (2002). *Quantitative methodology series, Multilevel analysis techniques and applications*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

*Huang, S. L., Li, R. H., Huang, F. Y., & Tang, F. C. (2015). The potential for mindfulness-based intervention in workplace mental health promotion: results of a randomized controlled trial. *PloS One*, *10*(9), e0138089.

Hülsheger, U. R., Alberts, H. J., Feinholdt, A., & Lang, J. W. (2013). Benefits of mindfulness at work: the role of mindfulness in emotion regulation, emotional exhaustion, and job satisfaction. *Journal of Applied Psychology*, *98*(2), 310-325.

Hülsheger, U. R., Feinholdt, A., & Nübold, A. (2015). A low-dose mindfulness intervention and recovery from work: Effects on psychological detachment, sleep quality, and sleep duration. *Journal of Occupational and Organizational Psychology*, *88*(3), 464-489.

Hülsheger, U. R., Lang, J. W., Depenbrock, F., Fehrmann, C., Zijlstra, F. R., & Alberts, H. J. (2014). The power of presence: the role of mindfulness at work for daily levels and change trajectories of psychological detachment and sleep quality. *Journal of Applied Psychology*, *99*(6), 1113-1128.

Hunt, M., Al-Braiki, F., Dailey, S., Russell, R., & Simon, K. (2018). Mindfulness training, yoga, or both? Dismantling the active components of a mindfulness-based stress reduction intervention. *Mindfulness*, *9*(2), 512-520.

Hwang, Y. S., Bartlett, B., Greben, M., & Hand, K. (2017). A systematic review of mindfulness interventions for in-service teachers: A tool to enhance teacher wellbeing and performance. *Teaching and Teacher Education*, *64*, 26-42.

Hyland, P. K., Lee, R. A., & Mills, M. J. (2015). Mindfulness at work: A new approach to improving individual and organizational performance. *Industrial and Organizational Psychology*, *8*(4), 576-602.

Iancu, A. E., Rusu, A., Măroiu, C., Păcurar, R., & Maricuțoiu, L. P. (2018). The effectiveness of interventions aimed at reducing teacher burnout: A meta-analysis. *Educational Psychology Review*, *30*(2), 373-396.

Inceoglu, I., Thomas, G., Chu, C., Plans, D., & Gerbasi, A. (2018). Leadership behavior and employee well-being: An integrated review and a future research agenda. *The Leadership Quarterly*, *29*(1), 179-202.

Inness, M., Turner, N., Barling, J., & Stride, C. B. (2010). Transformational leadership and employee safety performance: A within-person, between-jobs design. *Journal of Occupational Health Psychology*, *15*(3), 279-290.

*Ireland, M. J., Clough, B., Gill, K., Langan, F., O'Connor, A., & Spencer, L. (2017). A randomized controlled trial of mindfulness to reduce stress and burnout among intern medical practitioners. *Medical Teacher, 39(4),* 409-414.

Irving, J. A., Dobkin, P. L., & Park, J. (2009). Cultivating mindfulness in health care professionals: A review of empirical studies of mindfulness-based stress reduction (MBSR). *Complementary Therapies in Clinical Practice, 15*(2), 61-66.

Jacobs, S. J., & Blustein, D. L. (2008). Mindfulness as a coping mechanism for employment uncertainty. *The Career Development Quarterly, 57*(2), 174-180.

James, S. L., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., & Abdelalim, A. (2018). Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet, 392*(10159), 1789-1858.

Jamieson, S. D., & Tuckey, M. R. (2017). Mindfulness interventions in the workplace: A critique of the current state of the literature. *Journal of Occupational Health Psychology*, *22*(2), 180-193.

Janssen, M., Heerkens, Y., Kuijer, W., Van Der Heijden, B., & Engels, J. (2018). Effects of Mindfulness-Based Stress Reduction on employees' mental health: A systematic review. *PloS One*, *13*(1), e0191332.

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

*Jennings, P. A., Frank, J. L., Snowberg, K. E., Coccia, M. A., & Greenberg, M. T. (2013). Improving classroom learning environments by Cultivating Awareness and Resilience in Education (CARE): Results of a randomized controlled trial. *School Psychology Quarterly, 28*(4), 374-390.

Johns, G. (2010). Presenteeism in the workplace: A review and research agenda. *Journal of Organizational Behavior, 31*(4), 519-542.

Johnsen, T. J., & Friborg, O. (2015). The effects of cognitive behavioral therapy as an anti-depressive treatment is falling: A meta-analysis. *Psychological Bulletin, 141*(4), 747-768.

Judge, T. A., & Piccolo, R. F. (2004). Transformational and transactional leadership: a meta-analytic test of their relative validity. *Journal of Applied Psychology*, *89*(5), 755-768.

Kabat-Zinn, J. (1990). *Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Dell Publishing.

Kahn, J. H. (2011). Multilevel modeling: overview and applications to research in counseling psychology. *Journal of Counseling Psychology, 58*(2), 257-271.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263-292.

Kaluza, A. J., Boer, D., Buengeler, C., & van Dick, R. (2020). Leadership behaviour and leader self-reported well-being: A review, integration and meta-analytic examination. *Work & Stress*, *34*(1), 34-56.

Kaluza, A. J., Schuh, S. C., Kern, M., Xin, K., & van Dick, R. (2020). How do leaders' perceptions of organizational health climate shape employee exhaustion and engagement? Toward a cascading-effects model. *Human Resource Management, 59*(4), 359-377.

Kang, Y., Gruber, J., & Gray, J. R. (2013). Mindfulness and de-automatization. *Emotion Review*, *5*(2), 192-201.

Kelloway, E. K. (2017). Mental health in the workplace: Towards evidence-based practice. *Canadian Psychology, 58*(1), 1-6.

Kelloway, E. K., & Barling, J. (2010). Leadership development as an intervention in occupational health psychology. *Work & Stress*, *24*(3), 260-279.

Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, *31*(6), 1041-1056.

Kersemaekers, W. M., Vreeling, K., Verweij, H., van der Drift, M., Cillessen, L., van Dierendonck, D., & Speckens, A. E. (2020). Effectiveness and feasibility of a mindful leadership course for medical specialists: a pilot study. *BMC Medical Education, 20*(1), 34.

Khoury, B., Knäuper, B., Schlosser, M., Carrière, K., & Chiesa, A. (2017). Effectiveness of traditional meditation retreats: A systematic review and meta-analysis. *Journal of Psychosomatic Research, 92,* 16-25.

Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of Psychosomatic Research*, *78*(6), 519-528.

Kivimäki, M., Virtanen, M., Elovainio, M., Kouvonen, A., Väänänen, A., & Vahtera, J. (2006). Work stress in the etiology of coronary heart disease – a meta-analysis. *Scandinavian Journal of Work, Environment & Health*, *32*(6), 431-442.

*Klatt, M. D., Buckworth, J., & Malarkey, W. B. (2009). Effects of low-dose mindfulness-based stress reduction (MBSR-ld) on working adults. *Health Education & Behavior*, *36*(3), 601-614.

*Klatt, M. D., Sieck, C., Gascon, G., Malarkey, W., & Huerta, T. (2016). A healthcare utilization cost comparison between employees receiving a worksite mindfulness or a diet/exercise lifestyle intervention to matched controls 5 years post intervention. *Complementary Therapies in Medicine*, *27*, 139-144.

Klesges, L. M., Estabrooks, P. A., Dzewaltowski, D. A., Bull, S. S., & Glasgow, R. E. (2005). Beginning with the application in mind: designing and planning health behavior change interventions to enhance dissemination. *Annals of Behavioral Medicine*, *29*(2), 66-75.

Klingbeil, D. A., & Renshaw, T. L. (2018). Mindfulness-based interventions for teachers: A meta-analysis of the emerging evidence base. *School Psychology Quarterly*, *33*(4), 501-511.

Klug, K., Felfe, J., & Krick, A. (2019). Caring for oneself or for others? How consistent and inconsistent profiles of health-oriented leadership are related to follower strain and health. *Frontiers in Psychology*, *10*, 2456.

Koch, A. R., & Binnewies, C. (2015). Setting a good example: Supervisors as work-life-friendly role models within the context of boundary management. *Journal of Occupational Health Psychology*, *20*(1), 82-92.

Kohn, R., Saxena, S., Levav, I., & Saraceno, B. (2004). The treatment gap in mental health care. *Bulletin of the World Health Organization*, *82*, 858-866.

König, U., Heinzel-Gutenbrunner, M., Meinlschmidt, G., Maier, W., & Bachmann, C. J. (2019). Einfluss des sozioökonomischen Status auf Gesundheitskosten für Kinder und Jugendliche mit Störungen des Sozialverhaltens. *Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz*, *62*(9), 1057-1066.

Koopmans, B., Nielen, M. M., Schellevis, F. G., & Korevaar, J. C. (2012). Non-participation in population-based disease prevention programs in general practice. *BMC Public Health*, *12*(1), 856.

Köppe, C., Kammerhoff, J., & Schütz, A. (2018). Leader-follower crossover: exhaustion predicts somatic complaints via StaffCare behavior. *Journal of Managerial Psychology*, *33*(3), 297-310.

Korn, C. W., Sharot, T., Walter, H., Heekeren, H. R., & Dolan, R. J. (2014). Depression is related to an absence of optimistically biased belief updating about future life events. *Psychological Medicine*, *44*(3), 579-592.

Kramer, I., Oster, S., & Blum, M. (2015). *Führungskräfte sensibilisieren und Gesundheit fördern – Ergebnisse aus dem Projekt "iga.Radar"*. Retrieved 14 Apr 2021 from https://www.iga-info.de/fileadmin/redakteur/Veroeffentlichungen/iga_Reporte/Dokumente/iga-Report_29_Fuehrungskraefte_sensibilisieren_Gesundheit_foerdern.pdf

Kranabetter, C., & Niessen, C. (2016). How managers respond to exhausted employees. *Journal of Personnel Psychology*, *15*(3), 106-115.

Kranabetter, C., & Niessen, C. (2017). Managers as role models for health: Moderators of the relationship of transformational leadership with employee exhaustion and cynicism. *Journal of Occupational Health Psychology*, *22*(4), 492-502.

Kranabetter, C., & Niessen, C. (2019). Appreciation and depressive symptoms: The moderating role of need satisfaction. *Journal of Occupational Health Psychology*, *24*(6), 629-640.

Krick, A., & Felfe, J. (2020). Who benefits from mindfulness? The moderating role of personality and social norms for the effectiveness on psychological and physiological outcomes among police officers. *Journal of Occupational Health Psychology*, *25*(2), 99-112.

Kropp, A., & Sedlmeier, P. (2019). What makes mindfulness-based interventions effective? An examination of common components. *Mindfulness*, *10*, 2060-2072.

Kuehnl, A., Seubert, C., Rehfuess, E., von Elm, E., Nowak, D., & Glaser, J. (2019). Human resource management training of supervisors for improving health and well-being of employees. *Cochrane Database of Systematic Reviews* (9), CD010905.

Kulik, C. T. (2011). Climbing the higher mountain: The challenges of multilevel, multisource, and longitudinal research designs. *Management and Organization Review*, *7*(3), 447-460.

Kuoppala, J., Lamminpää, A., Liira, J., & Vainio, H. (2008). Leadership, job well-being, and health effects – a systematic review and a meta-analysis. *Journal of Occupational and Environmental Medicine*, *50*(8), 904-915.

Kurz, C. F. (2017). Tweedie distributions for fitting semicontinuous health care utilization cost data. *BMC Medical Research Methodology*, *17*(1), 1-8.

Kwon, M. J. (2020). Occupational health inequalities by issues on gender and social class in labor market: Absenteeism and presenteeism across 26 OECD countries. *Frontiers in Public Health, 8,* 84.

*Lacerda, S. S., Little, S. W., & Kozasa, E. H. (2018). A stress reduction program adapted for the work environment: A randomized controlled trial with a follow-up. *Frontiers in Psychology, 9,* e668.

Laynard, R., Clark, D., Knapp, M., & Mayraz, G. (2007). Cost-benefit analysis of psychological therapy. *National Institute Economic Review, 202*(1), 90-98.

Lazarus, R. S., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. Springer Publishing Company.

Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin*, *107*(1), 34-47.

Leather, P., Beale, D., & Sullivan, L. (2003). Noise, psychosocial stress and their interaction in the workplace. *Journal of Environmental Psychology*, *23*(2), 213-222.

Lebuda, I., Zabelina, D. L., & Karwowski, M. (2016). Mind full of ideas: A meta-analysis of the mindfulness – creativity link. *Personality and Individual Differences, 93,* 22-26.

Lee, A., & Carpenter, N. C. (2018). Seeing eye to eye: A meta-analysis of self-other agreement of leadership. *The Leadership Quarterly*, *29*(2), 253-275.

Lesener, T., Gusy, B., & Wolter, C. (2019). The job demands-resources model: A meta-analytic review of longitudinal studies. *Work & Stress*, *33*(1), 76-103.

Leyland, A., Rowse, G., & Emerson, L. M. (2019). Experimental effects of mindfulness inductions on self-regulation: Systematic review and meta-analysis. *Emotion*, *19*(1), 108-122.

Li, Y., Wang, Z., Yang, L. Q., & Liu, S. (2016). The crossover of psychological distress from leaders to subordinates in teams: The role of abusive supervision, psychological capital, and team performance. *Journal of Occupational Health Psychology*, *21*(2), 142-153.

Liao, Z., Yam, K. C., Johnson, R. E., Liu, W., & Song, Z. (2018). Cleansing my abuse: A reparative response model of perpetrating abusive supervisor behavior. *Journal of Applied Psychology*, *103*(9), 1039-1056.

*Lin, L., He, G., Yan, J., Gu, C., & Xie, J. (2019). The effects of a modified mindfulness-based stress reduction program for nurses: A randomized controlled trial. *Workplace Health & Safety, 67(3),* 111-122.

Linehan, M. (2014). *DBT skills training manual* (2nd ed.). Guilford Press.

Linehan, M. M. (1993a). *Cognitive-behavioral treatment of borderline personality disorder*. Guilford Press.

Linehan, M. M. (1993b). *Skills training manual for treating borderline personality disorder*. Guilford Press.

Ljótsson, B., Hedman, E., Mattsson, S., & Andersson, E. (2017). The effects of cognitive–behavioral therapy for depression are not falling: A re-analysis of Johnsen and Friborg (2015). *Psychological Bulletin, 143*(3), 321–325.

Lohaus, D., & Habermann, W. (2019). Presenteeism: A review and research directions. *Human Resource Management Review*, *29*(1), 43-58.

Lohaus, D., Habermann, W., Kertoubi, I. E., & Röser, F. (2020). Working while ill is not always bad – positive effects of Presenteeism. *Frontiers in Psychology, 11*, 4059.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2017a). The impact of mindfulness on the wellbeing and performance of educators: A systematic review of the empirical literature. *Teaching and Teacher Education, 61*, 132-141.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2019a). Mindfulness-based interventions in the workplace: An inclusive systematic review and meta-analysis of their impact upon wellbeing. *The Journal of Positive Psychology*, *14*(5), 625-640.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2019b). A systematic review and meta-analysis of the impact of mindfulness-based interventions on the well-being of healthcare professionals. *Mindfulness*, *10*(7), 1193-1216.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., Hart, R., & Eiroa-Orosa, F. J. (2017b). The impact of mindfulness on well-being and performance in the workplace: an inclusive systematic review of the empirical literature. *European Journal of Work and Organizational Psychology*, *26*(4), 492-513.

LoPilato, A. C., & Vandenberg, R. J. (2014). The not-so-direct cross-level direct effect. In C. E. Lance & E. J. Vandenberg (Eds.), *More statistical and methodological myths and urban legends* (pp. 292-308). New York, NY: Taylor & Francis.

Luken, M., & Sammons, A. (2016). Systematic review of mindfulness practice for reducing job burnout. *American Journal of Occupational Therapy*, *70*(2), 1-5.

Luppa, M., Heinrich, S., Angermeyer, M. C., König, H. H., & Riedel-Heller, S. G. (2007). Cost-of-illness studies of depression: a systematic review. *Journal of Affective Disorders*, *98*(1-2), 29-43.

Lyons, J. B., & Schneider, T. R. (2009). The effects of leadership style on stress outcomes. *The Leadership Quarterly*, *20*(5), 737-748.

Lysaght, R. M., & Larmour-Trode, S. (2008). An exploration of social support as a factor in the return-to-work process. *Work & Stress*, *30*(3), 255-266.

Lyssenko, L., Müller, G., Kleindienst, N., Schmahl, C., Berger, M., Eifert, G., Kölle, A., Nesch, S., Ommer-Hohl, J., & Wenner, M. (2015). Life Balance – a mindfulness-based mental health promotion program: conceptualization, implementation, compliance and user satisfaction in a field setting. *BMC Public Health*, *15*(1), 1-10.

Lyssenko, L., Müller, G., Kleindienst, N., Schmahl, C., Berger, M., Eifert, G., Kölle, A., Nesch, S., Ommer-Hohl, J., & Wenner, M. (2016). Effectiveness of a mindfulness-based mental health promotion program provided by health coaches. *Psychotherapy and Psychosomatics*, *85*(6), 375-377.

Lyssenko, L., Müller, G., Kleindienst, N., Schmahl, C., Berger, M., Eifert, G., Kölle, A., Nesch, S., Ommer-Hohl, J., & Wenner, M. (2019). Long-term outcome of a mental health promotion program in Germany. *Health Promotion International*, *34*(3), 532-540.

MacCoon, D. G., Imel, Z. E., Rosenkranz, M. A., Sheftel, J. G., Weng, H. Y., Sullivan, J. C., Bonus, K. A., Stoney, C. M., Salomons, T. V., & Davidson, R. J. (2012). The validation of an active control intervention for Mindfulness Based Stress Reduction (MBSR). *Behaviour Research and Therapy*, *50*(1), 3-12.

Macik-Frey, M., Quick, J. C., & Cooper, C. L. (2009). Authentic leadership as a pathway to positive health. *Journal of Organizational Behavior*, *30*(3), 453-458.

Mack, O., Khare, A., Krämer, A., & Burgartz, T. (2015). *Managing in a VUCA World*. Basel: Springer.

Mack, S., Jacobi, F., Gerschler, A., Strehle, J., Höfler, M., Busch, M. A., Maske, U. E., Hapke, U., Seiffert, I., & Gaebel, W. (2014). Self-reported utilization of mental health services in the adult German population–evidence for unmet needs? Results of the DEGS1-Mental Health Module (DEGS1-MH). *International Journal of Methods in Psychiatric Research*, *23*(3), 289-303.

*Mackenzie, C. S., Poulin, P. A., & Seidman-Carlson, R. (2006). A brief mindfulness-based stress reduction intervention for nurses and nurse aides. *Applied Nursing Research*, *19*(2), 105-109.

Magnavita, N. (2018). Medical surveillance, continuous health promotion and a participatory intervention in a small company. *International Journal of Environmental Research and Public Health*, *15*(4), 662.

Magnusson-Hanson, L. L., Chungkham, H. S., Åkerstedt, T., & Westerlund, H. (2014). The role of sleep disturbances in the longitudinal relationship between psychosocial working conditions, measured by work demands and support, and depression. *Sleep*, *37*(12), 1977-1985.

Magnusson-Hanson, L. L., Peristera, P., Chungkham, H. S., & Westerlund, H. (2016). Longitudinal mediation modeling of unhealthy behaviors as mediators between workplace demands/support and depressive symptoms. *PloS One*, *11*(12), e0169276.

Magnusson-Hanson, L. L., Theorell, T., Bech, P., Rugulies, R., Burr, H., Hyde, M., Oxenstierna, G., & Westerlund, H. (2009). Psychosocial working conditions and depressive symptoms among Swedish employees. *International Archives of Occupational and Environmental Health*, *82*(8), 951-960.

Malmendier, U., & Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics*, *89*(1), 20-43.

*Manotas, M., Segura, C., Eraso, M., Oggins, J., & McGovern, K. (2014). Association of brief mindfulness training with reductions in perceived stress and distress in Colombian health care professionals. *International Journal of Stress Management*, *21*(2), 207-225.

Martin, A., Sanderson, K., & Cocker, F. (2009). Meta-analysis of the effects of health promotion intervention in the workplace on depression and anxiety symptoms. *Scandinavian Journal of Work, Environment & Health*, *31*(1), 7-18.

Mathieu, J. E., Aguinis, H., Culpepper, S. A., & Chen, G. (2012). Understanding and estimating the power to detect cross-level interaction effects in multilevel modeling. *Journal of Applied Psychology*, *97*(5), 951-966.

*McConachie, D. A. J., McKenzie, K., Morris, P. G., & Walley, R. M. (2014). Acceptance and mindfulness-based stress management for support staff caring for individuals with intellectual disabilities. *Research in Developmental Disabilities*, *35*(6), 1216-1227.

McCullagh, P., & Nelder, J. A. (1989). *Generalized linear models* (2nd ed.). Chapman and Hall.

McDaid, D., King, D., Park, A. L., & Parsonage, M. (2011). Promoting well-being in the workplace. In M. Knapp, D. McDaid, & M. Parsonage (Eds.), *Mental health promotion and mental illness prevention: The economic case* (pp. 22). Department of Health: UK, London.

McKee, R. A., Lee, Y. t., Atwater, L., & Antonakis, J. (2018). Effects of personality and gender on self–other agreement in ratings of leadership. *Journal of Occupational and Organizational Psychology, 91*(2), 285-315.

McTernan, W. P., Dollard, M. F., & LaMontagne, A. D. (2013). Depression in the workplace: An economic cost analysis of depression-related productivity loss attributable to job strain and bullying. *Work & Stress, 27*(4), 321-338.

Meijman, T. F., Mulder, G., Drenth, P., & Thierry, H. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry, & C. J. d. Wolff (Eds.), *Handbook of Work and Organizational Psychology* (pp. 5-33). Psychology Press Ltd.

Meikle, N. L., Tenney, E. R., & Moore, D. A. (2016). Overconfidence at work: Does overconfidence survive the checks and balances of organizational life? *Research in Organizational Behavior, 36*, 121-134.

Melchior, M., Caspi, A., Milne, B. J., Danese, A., Poulton, R., & Moffitt, T. E. (2007). Work stress precipitates depression and anxiety in young, working women and men. *Psychological Medicine, 37*(8), 1119-1129.

Mesmer-Magnus, J., Manapragada, A., Viswesvaran, C., & Allen, J. W. (2017). Trait mindfulness at work: A meta-analysis of the personal and professional correlates of trait mindfulness. *Human Performance, 30*(2-3), 79-98.

Meyer, M., Wehner, K., & Cichon, P. (2017). Krankheitsbedingte Fehlzeiten in der deutschen Wirtschaft im Jahr 2016. In B. Badura, A. Ducki, H. Schröder, J. Klose, & M. Meyer (Eds.), *Fehlzeiten-Report 2017* (pp. 281-474). Springer-Verlag.

Michalak, J., Heidenreich, T., & Bohus, M. (2006). Achtsamkeit und Akzeptanz in der Psychotherapie: Gegenwärtiger Forschungsstand und Forschungsentwicklung. *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie, 54*(4), 241-253.

*Michel, A., Bosch, C., & Rexroth, M. (2014). Mindfulness as a cognitive–emotional segmentation strategy: An intervention promoting work–life balance. *Journal of Occupational and Organizational Psychology, 87(4)*, 733-754.

Mills, P. R., Kessler, R. C., Cooper, J., & Sullivan, S. (2007). Impact of a health promotion program on employee health risks and work productivity. *American Journal of Health Promotion, 22*(1), 45-53.

*Mistretta, E. G., Davis, M. C., Temkit, M. H., Lorenz, C., Darby, B., & Stonnington, C. M. (2018). Resilience training for work-related stress among health care workers: Results of a randomized clinical trial comparing in-person and smartphone-delivered interventions. *Journal of Occupational and Environmental Medicine, 60(6),* 559-568.

Moher D, Liberati A, Tetzlaff J, Altman DG, & the PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med 6*(7): e1000097.

*Molek-Winiarska, D., & Żołnierczyk-Zreda, D. (2018). Application of mindfulness-based stress reduction to a stress management intervention in a study of a mining sector company. *International Journal of Occupational Safety and Ergonomics, 24(4),* 546-556.

Moll, S., Frolic, A., & Key, B. (2015). Investing in compassion: exploring mindfulness as a strategy to enhance interpersonal relationships in healthcare practice. *Journal of Hospital Administration*, *4*(6), 36-45.

Montano, D., Reeske, A., Franke, F., & Hüffmeier, J. (2017). Leadership, followers' mental health and job performance in organizations: A comprehensive meta-analysis from an occupational health perspective. *Journal of Organizational Behavior*, *38*(3), 327-350.

Morgan, L. P., Graham, J. R., Hayes-Skelton, S. A., Orsillo, S. M., & Roemer, L. (2014). Relationships between amount of post-intervention mindfulness practice and follow-up outcome variables in an acceptance-based behavior therapy for Generalized Anxiety Disorder: The importance of informal practice. *Journal of Contextual Behavioral Science*, *3*(3), 173-178.

Morgan, P., Simpson, J., & Smith, A. (2015). Health care workers' experiences of mindfulness training: a qualitative review. *Mindfulness*, *6*(4), 744-758.

Mrazek, A. J., Mrazek, M. D., Cherolini, C. M., Cloughesy, J. N., Cynman, D. J., Gougis, L. J., Landry, A. P., Reese, J. V., & Schooler, J. W. (2019). The future of mindfulness training is digital, and the future is now. *Current Opinion in Psychology*, *28*, 81-86.

Müller, G., Pfinder, M., Schmahl, C., Bohus, M., & Lyssenko, L. (2019). Cost-effectiveness of a mindfulness-based mental health promotion program: economic evaluation of a nonrandomized controlled trial with propensity score matching. *BMC Public Health*, *19*(1), 1-12.

National Business Group on Health (2019). *The employer investment in employee wellbeing: Tenth Annual Employer-Sponsored Health and Well-being Survey*. Business Group on Health. Retrieved 18 December 2020 from https://www.businessgrouphealth.org/en/resources/the-employer-investment-in-employee-well-being-tenth-annual-employer-sponsored-health

Nelder, J. A., & Wedderburn, R. W. (1972). Generalized linear models. *Journal of the Royal Statistical Society: Series A, 135*(3), 370-384.

Nielsen, K., Randall, R., Yarker, J., & Brenner, S. O. (2008). The effects of transformational leadership on followers' perceived work characteristics and psychological well-being: A longitudinal study. *Work & Stress, 22*(1), 16-32.

Nielsen, K., & Taris, T. W. (2019). Leading well: Challenges to researching leadership in occupational health psychology – and some ways forward. *Work & Stress, 33*(2), 107-118.

Nieuwenhuijsen, K., Verbeek, J., De Boer, A., Blonk, R., & Van Dijk, F. (2004). Supervisory behaviour as a predictor of return to work in employees absent from work due to mental health problems. *Occupational and Environmental Medicine, 61*(10), 817-823.

Nübold, A., Van Quaquebeke, N., & Hülsheger, U. R. (2020). Be(com)ing real: A multi-source and an intervention study on mindfulness and authentic leadership. *Journal of Business and Psychology, 35*(4), 469-488.

Nuevo, R., Chatterji, S., Fraguas, D., Verdes, E., Naidoo, N., Arango, C., & Ayuso-Mateos, J. L. (2011). Increased risk of diabetes mellitus among persons with psychotic symptoms: results from the WHO World Health Survey. *The Journal of Clinical Psychiatry, 72*(12), 1592-1599.

Nyberg, A., Alfredsson, L., Theorell, T., Westerlund, H., Vahtera, J., & Kivimäki, M. (2009). Managerial leadership and ischaemic heart disease among employees: the Swedish WOLF study. *Occupational and Environmental Medicine, 66*(1), 51-55.

OECD (2018a). *GDP per hour worked (indicator)*. Organisation for Economic Cooperation and Development. Retrieved 12 November 2018 from https://www.oecd-ilibrary.org/economics/gdp-per-hour-worked/indicator/english_1439e590-en

OECD (2018b). *Health at a Glance: Europe 2018: State of Health in the EU Cycle*. Paris, France: OECD Publishing. Retrieved 10 Jul 2020 from https://doi.org/10.1787/health_glance_eur-2018-en. Accessed 10 Jul 2020

Ohland, M. W., Loughry, M. L., Woehr, D. J., Bullard, L. G., Felder, R. M., Finelli, C. J., Layton, R. A., Pomeranz, H. R., & Schmucker, D. G. (2012). The comprehensive assessment of team member effectiveness: Development of a behaviorally anchored rating scale for self-and peer evaluation. *Academy of Management Learning & Education*, *11*(4), 609-630.

Ostafin, B. D., & Kassman, K. T. (2012). Stepping out of history: Mindfulness improves insight problem solving. *Consciousness and Cognition*, *21*(2), 1031-1036.

Ostroff, C., Atwater, L. E., & Feinberg, B. J. (2004). Understanding self-other agreement: A look at rater and ratee characteristics, context, and outcomes. *Personnel Psychology*, *57*(2), 333-375.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, *124*(1), 54-74.

Park, J. G., Kim, J. S., Yoon, S. W., & Joo, B. K. (2017). The effects of empowering leadership on psychological well-being and job engagement. *Leadership & Organization Development Journal*, *38*(3), 350-367.

Park, Y., Fritz, C., & Jex, S. M. (2011). Relationships between work-home segmentation and psychological detachment from work: the role of communication technology use at home. *Journal of Occupational Health Psychology*, *16*(4), 457-467.

Parsons, C. E., Crane, C., Parsons, L. J., Fjorback, L. O., & Kuyken, W. (2017). Home practice in mindfulness-based cognitive therapy and mindfulness-based stress reduction: a systematic review and meta-analysis of participants' mindfulness practice and its association with outcomes. *Behaviour Research and Therapy*, *95*, 29-41.

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., Chisholm, D., Collins, P. Y., Cooper, J. L., & Eaton, J. (2018). The Lancet Commission on global mental health and sustainable development. *The Lancet*, *392*(10157), 1553-1598.

Peláez Zuberbuhler, M. J., Salanova, M., & Martínez, I. M. (2020). Coaching-based leadership intervention program: a controlled trial study. *Frontiers in Psychology*, *10*, 3066.

Pennebaker, J. W., & Chung, C. K. (2007). Expressive writing, emotional upheavals, and health. In H. S. Friedman & R. C. Silver (Eds.), *Foundations of health psychology* (pp. 263–284). Oxford University Press.

Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology*, *48*(1), 85-112.

Pignon, B., Schürhoff, F., Szöke, A., Geoffroy, P. A., Jardri, R., Roelandt, J. L., Rolland, B., Thomas, P., Vaiva, G., & Amad, A. (2018). Sociodemographic and clinical correlates of psychotic symptoms in the general population: findings from the MHGP survey. *Schizophrenia Research*, *193*, 336-342.

Pinck, A. S., & Sonnentag, S. (2018). Leader mindfulness and employee well-being: the mediating role of transformational leadership. *Mindfulness*, *9*(3), 884-896.

Pincus, T., Miles, C., Froud, R., Underwood, M., Carnes, D., & Taylor, S. J. (2011). Methodological criteria for the assessment of moderators in systematic reviews of randomised controlled trials: a consensus study. *BMC Medical Research Methodology*, *11*(1), e14.

Pinheiro, J. C., Bates, D., DebRoy, S., Sarkar, D., & Team, R. C. (2020). *nlme: Linear and Nonlinear Mixed Effects Models.* R Package Version 3.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879-903.

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*, 539-569.

Poulton, R., Caspi, A., Moffitt, T. E., Cannon, M., Murray, R., & Harrington, H. (2000). Children's self-reported psychotic symptoms and adult schizophreniform disorder: a 15-year longitudinal study. *Archives of General Psychiatry*, *57*(11), 1053-1058.

*Querstret, D., Cropley, M., & Fife-Schaw, C. (2017). Internet-based instructor-led mindfulness for work-related rumination, fatigue, and sleep: Assessing facets of mindfulness as mechanisms of change. A randomized waitlist control trial. *Journal of Occupational Health Psychology*, *22*(2), 153-169.

Quick, J. C., & Henderson, D. F. (2016). Occupational stress: Preventing suffering, enhancing wellbeing. *International Journal of Environmental Research and Public Health*, *13*(5), 459-470.

Quick, J. C., Macik-Frey, M., & Cooper, C. L. (2007). Managerial dimensions of organizational health: The healthy leader at work. *Journal of Management Studies*, *44*(2), 189-205.

Rafferty, A. E., & Griffin, M. A. (2004). Dimensions of transformational leadership: Conceptual and empirical extensions. *The Leadership Quarterly*, *15*(3), 329-354.

*Rao, M., Metri, K. G., Raghuram, N., & Hongasandra, N. R. (2017). Effects of mind sound resonance technique (yogic relaxation) on psychological states, sleep quality, and cognitive functions in female teachers: A randomized, controlled trial. *Advances in Mind-Body Medicine, 31(1)*, 4-9.

Raudenbush, S. W. (1994). Random effects models. In H. Coopers & L. V. Hedges (Eds.), *The handbook of research synthesis* (pp. 301-320). Russell Sage Foundation.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Sage Publishing.

Reb, J., Chaturvedi, S., Narayanan, J., & Kudesia, R. S. (2019). Leader mindfulness and employee performance: A sequential mediation model of LMX quality, interpersonal justice, and employee stress. *Journal of Business Ethics, 160*(3), 745-763.

Reb, J., Narayanan, J., & Chaturvedi, S. (2014). Leading mindfully: Two studies on the influence of supervisor trait mindfulness on employee well-being and performance. *Mindfulness, 5*(1), 36-45.

Reb, J., Narayanan, J., & Ho, Z. W. (2015). Mindfulness at work: Antecedents and consequences of employee awareness and absent-mindedness. *Mindfulness, 6*(1), 111-122.

Rennert, D., Kliner, K., & Richter, M. (2020). Arbeitsunfähigkeit. In F. Knieps & H. Pfaff (Eds.), *BKK Gesundheitsreport 2019: Psychische Gesundheit und Arbeit Zahlen, Daten, Fakten* (pp. 55–150). MWW Medizinische Wissenschaftliche Verlagsgesellschaft.

*Rexroth, M., Michel, A., & Bosch, C. (2017). Promoting well-being by teaching employees how to segment their life domains. *Zeitschrift für Arbeits- und Organisationspsychologie, 61*, 197-212.

Richardson, K. M., & Rothstein, H. R. (2008). Effects of occupational stress management intervention programs: a meta-analysis. *Journal of Occupational Health Psychology, 13*(1), 69-93.

Rigotti, T., Holstad, T., Mohr, G., Stempel, C., Hansen, E., Loeb, C., Isaksson, K., Otto, K., Kinnunen, U., & Perko, K. (2014). *Rewarding and Sustainable Healthpromoting Leadership*. German Federal Institute for Occupational Safety and Health.

Robertson, I., Leach, D., Doerner, N., & Smeed, M. (2012). Poor health but not absent: prevalence, predictors, and outcomes of presenteeism. *Journal of Occupational and Environmental Medicine, 54*(11), 1344-1349.

*Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., Oberle, E., Thomson, K., Taylor, C., & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology*, *105*(3), 787-804.

Röhrle, B. (2008). Die Forschungslage zur Prävention psychischer Störungen und zur Förderung psychischer Gesundheit. *Verhaltenstherapie und Psychosoziale Praxis*, *40*(2), 343-347.

Ronay, R., Oostrom, J. K., Lehmann-Willenbrock, N., Mayoral, S., & Rusch, H. (2019). Playing the trump card: Why we select overconfident leaders and why it matters. *The Leadership Quarterly*, *30*(6), 101316.

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software*, *48*(2), 1-36.

Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association*, *91*(434), 473-489.

Rudaz, M., Twohig, M. P., Ong, C. W., & Levin, M. E. (2017). Mindfulness and acceptance-based trainings for fostering self-care and reducing stress in mental health professionals: A systematic review. *Journal of Contextual Behavioral Science*, *6*(4), 380-390.

Rudolph, C. W., Murphy, L. D., & Zacher, H. (2020). A systematic review and critique of research on "healthy leadership". *The Leadership Quarterly*, *31*(1), 101335.

Ruiz-Canela, M., Martínez-González, M. A., & Irala, J. (2000). Intention to treat analysis is related to methodological quality. *British Medical Journal*, *320*, 1007-1008.

Rupprecht, S., Falke, P., Kohls, N., Tamdjidi, C., Wittmann, M., & Kersemaekers, W. (2019). Mindful leader development: how leaders experience the effects of mindfulness training on leader capabilities. *Frontiers in Psychology*, *10*, 1081.

Rupprecht, S., Koole, W., Chaskalson, M., Tamdjidi, C., & West, M. (2019). Running too far ahead? Towards a broader understanding of mindfulness in organisations. *Current Opinion in Psychology*, *28*, 32-36.

Safstrom, M., & Hartig, T. (2013). Psychological detachment in the relationship between job stressors and strain. *Behavioral Sciences*, *3*(3), 418-433.

Santa Maria, A., Wolter, C., Gusy, B., Kleiber, D., & Renneberg, B. (2019). The impact of health-oriented leadership on police officers' physical health, burnout, depression and well-being. *Policing: A Journal of Policy and Practice*, *13*(2), 186-200.

Saxena, S., Jané-Llopis, E., & Hosman, C. (2006). Prevention of mental and behavioural disorders: implications for policy and practice. *World Psychiatry, 5*(1), 5-14.

Schaufeli, W. B. (2004). The future of occupational health psychology. *Applied Psychology*, *53*(4), 502-517.

Schaufeli, W. B. (2015). Engaging leadership in the job demands-resources model. *Career Development International*, *20*(5), 446-463.

Schaufenbuel, K. (2015). Why Google, Target, and General Mills are investing in Mindfulness. *Harvard Business Review*. Retrieved 9 Sept 2019 from https://mindleader.org/wp-content/uploads/2017/08/HARVARD-BUSINESS-REVIEW_Why-Google-is-investing-in-Mindfulness.pdf

Schmid, J. A., Jarczok, M. N., Sonntag, D., Herr, R. M., Fischer, J. E., & Schmidt, B. (2017). Associations between supportive leadership behavior and the costs of absenteeism and Presenteeism: an epidemiological and economic approach. *Journal of Occupational and Environmental Medicine*, *59*(2), 141-147.

Schmidt, B., Herr, R. M., Jarczok, M. N., Baumert, J., Lukaschek, K., Emeny, R. T., Ladwig, K. H., & Investigators, K. (2018). Lack of supportive leadership behavior predicts suboptimal self-rated health independent of job strain after 10 years of follow-up: findings from the population-based MONICA/KORA study. *International Archives of Occupational and Environmental Health*, *91*(5), 623-631.

Schmidt, B., Loerbroks, A., Herr, R. M., Wilson, M. G., Jarczok, M. N., Litaker, D., Mauss, D., Bosch, J. A., & Fischer, J. E. (2014). Associations between supportive leadership and employees self-rated health in an occupational sample. *International Journal of Behavioral Medicine*, *21*(5), 750-756.

Schmidt, B., Schneider, M., Seeger, P., van Vianen, A., Loerbroks, A., & Herr, R. M. (2019). A comparison of job stress models: associations with employee well-being, absenteeism, presenteeism, and resulting costs. *Journal of Occupational and Environmental Medicine*, *61*(7), 535-544.

Schneider, A., Hilbert, S., Hamann, J., Skadsem, S., Glaser, J., Löwe, B., & Bühner, M. (2017). The implications of psychological symptoms for length of sick leave: burnout, depression, and anxiety as predictors in a primary care setting. *Deutsches Ärzteblatt International*, *114*(17), 291-297.

*Schroeder, D. A., Stephens, E., Colgan, D., Hunsinger, M., Rubin, D., & Christopher, M. S. (2016). A brief mindfulness-based intervention for primary care physicians: A pilot randomized controlled trial. *American Journal of Lifestyle Medicine, 12(1),* 83-91.

Schuh, S. C., Zheng, M. X., Xin, K. R., & Fernandez, J. A. (2019). The interpersonal benefits of leader mindfulness: A serial mediation model linking leader mindfulness, leader procedural justice enactment, and employee exhaustion and performance. *Journal of Business Ethics*, *156*(4), 1007-1025.

Schumer, M. C., Lindsay, E. K., & Creswell, J. D. (2018). Brief mindfulness training for negative affectivity: A systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology*, *86*(7), 569-583.

Seedat, S., Scott, K. M., Angermeyer, M. C., Berglund, P., Bromet, E. J., Brugha, T. S., Demyttenaere, K., De Girolamo, G., Haro, J. M., & Jin, R. (2009). Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. *Archives of General Psychiatry*, *66*(7), 785-795.

Segal, Z. J., Williams, M. G., & Teasdale, J. D. (2002). *Mindfulness based cognitive therapy for depression: a new approach to preventing relapses*. Guildford Press.

Semmer, N., Jacobshagen, N., Meier, L., & Elfering, A. H. (2007). Occupational stress research: The stress-as-offense-to-self perspective. In S. McIntyre & J. Houdmont (Eds.), *Occupational Health Psychology: European Perspectives on Research, Education and Practice* (pp. 41-58). Nottingham University Press.

Semmer, N. K., Jacobshagen, N., Meier, L. L., Elfering, A., Beehr, T. A., Kälin, W., & Tschan, F. (2015). Illegitimate tasks as a source of work stress. *Work & Stress*, *29*(1), 32-56.

Shamir, B. (2011). Leadership takes time: Some implications of (not) taking time seriously in leadership research. *The Leadership Quarterly*, *22*(2), 307-315.

Shann, C., Martin, A., Chester, A., & Ruddock, S. (2019). Effectiveness and application of an online leadership intervention to promote mental health and reduce depression-related stigma in organizations. *Journal of Occupational Health Psychology*, *24*(1), 20-35.

Sheeran, P., Klein, W. M., & Rothman, A. J. (2017). Health behavior change: Moving from observation to intervention. *Annual Review of Psychology*, *68*, 573-600.

*Sheppard, W. D., Staggers, F. J., & John, L. (1997). The effects of a stress management program in a high security government agency. *Anxiety, Stress, & Coping*, *10*(4), 341-350.

*Shonin, E., Van Gordon, W., Dunn, T. J., Singh, N. N., & Griffiths, M. D. (2014). Meditation awareness training (MAT) for work-related wellbeing and job performance: A randomised controlled trial. *International Journal of Mental Health and Addiction*, *12*(6), 806-823.

*Singh, S. K., & Gorey, K. M. (2018). Relative effectiveness of mindfulness and cognitive behavioral interventions for anxiety disorders: meta-analytic review. *Social Work in Mental Health*, *16*(2), 238-251.

Skakon, J., Nielsen, K., Borg, V., & Guzman, J. (2010). Are leaders' well-being, behaviours and style associated with the affective well-being of their employees? A systematic review of three decades of research. *Work & Stress*, *24*(2), 107-139.

Slemp, G. R., Jach, H. K., Chia, A., Loton, D. J., & Kern, M. L. (2019). Contemplative interventions and employee distress: A meta-analysis. *Stress and Health*, *35*(3), 227-255.

*Slutsky, J., Chin, B., Raye, J., & Creswell, J. D. (2018). Mindfulness training improves employee well-being: A randomized controlled trial. *Journal of Occupational Health Psychology*, *24(1)*, 139-149.

Smith, S. A. (2014). Mindfulness-based stress reduction: An intervention to enhance the effectiveness of nurses' coping with work-related stress. *International Journal of Nursing Knowledge*, *25*(2), 119-130.

*Song, Y., & Lindquist, R. (2015). Effects of mindfulness-based stress reduction on depression, anxiety, stress and mindfulness in Korean nursing students. *Nurse Education Today*, *35*(1), 86-90.

Sonnentag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, *12*(3), 204-221.

Sonnentag, S., & Fritz, C. (2015). Recovery from job stress: The stressor-detachment model as an integrative framework. *Journal of Organizational Behavior*, *36*(1), 72-103.

Sosik, J. J., & Godshalk, V. M. (2000). Leadership styles, mentoring functions received, and job-related stress: a conceptual model and preliminary study. *Journal of Organizational Behavior*, *21*(4), 365-390.

Spagnolo, G. (1999). Social relations and cooperation in organizations. *Journal of Economic Behavior & Organization*, *38*(1), 1-25.

Spijkerman, M., Pots, W. T. M., & Bohlmeijer, E. T. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review*, *45*, 102-114.

Spinhoven, P., Ormel, J., Sloekers, P., Kempen, G., Speckens, A., & Van Hemert, A. (1997). A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychological Medicine*, *27*(2), 363-370.

Spitzer, R. L., Kroenke, K., Linzer, M., Hahn, S. R., Williams, J. B., Degruy, F. V., Brody, D., & Davies, M. (1995). Health-related quality of life in primary care patients with mental disorders: results from the PRIME-MD 1000 study. *Journal of the American Medical Association*, *274*(19), 1511-1517.

Stajkovic, A. D., & Luthans, F. (2003). Behavioral management and task performance in organizations: conceptual background, meta-analysis, and test of alternative models. *Personnel Psychology*, *56*(1), 155-194.

Statistisches Bundesamt (2016). *Volkswirtschaftliche Gesamtrechnungen - Reflexionen 2016*. Wiesbaden. Retrieved 14 Apr 2021 from https://www.destatis.de/DE/Methoden/WISTA-Wirtschaft-und-Statistik/2016/03/vgr-reflexionen-2016-032016.pdf?__blob=publicationFile

Statistisches Bundesamt (2020). *Krankheitskostenrechnung*. Statistisches Bundesamt. Retrieved 27 April from https://www.gbe-bund.de/gbe/

Stedham, Y., & Skaar, T. B. (2019). Mindfulness, trust, and leader effectiveness: a conceptual framework. *Frontiers in Psychology*, *10*, 1588.

Steel, Z., Marnane, C., Iranpour, C., Chey, T., Jackson, J. W., Patel, V., & Silove, D. (2014). The global prevalence of common mental disorders: a systematic review and meta-analysis 1980–2013. *International Journal of Epidemiology*, *43*(2), 476-493.

*Steinberg, B. A., Klatt, M., & Duchemin, A. M. (2017). Feasibility of a mindfiilness-based intervention for surgical intensive care unit personnel. *American Journal of Critical Care*, *26(1)*, 10-18.

Sterne, J. A., Becker, B. J., & Egger, M. (2005). The funnel plot. In H. R. Rothstein, A. J. Sutton, & M. Borenstein (Eds.), *Publication bias in meta-analysis: Prevention, assessment and adjustments* (pp. 75-98). John Wiley & Sons, Ltd.

Stevens, C. K., & Kristof, A. L. (1995). Making the right impression: A field study of applicant impression management during job interviews. *Journal of Applied Psychology*, *80*(5), 587-606.

Stocker, D., Jacobshagen, N., Krings, R., Pfister, I. B., & Semmer, N. K. (2014). Appreciative leadership and employee well-being in everyday working life. *German Journal of Human Resource Management*, *28*(1-2), 73-95.

Stocker, D., Jacobshagen, N., Semmer, N. K., & Annen, H. (2010). Appreciation at work in the Swiss armed forces. *Swiss Journal of Psychology*, *69*(2), 117-124.

Stocker, D., Keller, A. C., Meier, L. L., Elfering, A., Pfister, I. B., Jacobshagen, N., & Semmer, N. K. (2019). Appreciation by supervisors buffers the impact of work interruptions on well-being longitudinally. *International Journal of Stress Management*, *26*(4), 331-343.

Stojanovic, M., Grund, A., & Fries, S. (2020). App-Based Habit Building Reduces Motivational Impairments During Studying–An Event Sampling Study. *Frontiers in Psychology*, *11*, 167.

Strauss, C., Cavanagh, K., Oliver, A., & Pettman, D. (2014). Mindfulness-based interventions for people diagnosed with a current episode of an anxiety or depressive disorder: a meta-analysis of randomised controlled trials. *PloS One*, *9*(4), e96110.

Strauss, J. P. (2005). Multi-source perspectives of self-esteem, performance ratings, and source agreement. *Journal of Managerial Psychology*, *20*(6), 464-482.

Strauss, J. S. (1969). Hallucinations and delusions as points on continua function: Rating scale evidence. *Archives of General Psychiatry*, *21*(5), 581-586.

Strohmaier, S. (2020). The relationship between doses of mindfulness-based programs and depression, anxiety, stress, and mindfulness: a dose-response meta-regression of randomized controlled trials. *Mindfulness*, *11*, 1315–1335.

Strömberg, C., Aboagye, E., Hagberg, J., Bergström, G., & Lohela-Karlsson, M. (2017). Estimating the effect and economic impact of absenteeism, presenteeism, and work environment–related problems on reductions in productivity from a managerial perspective. *Value in Health*, *20*(8), 1058-1064.

*Strub, L., & Tarquinio, C. (2013). Mindfulness-Based Cognitive Therapy (MBCT) program with workers in an industrial setting: a pilot study. *Sante Mentale au Quebec*, *38*(1), 207-225.

Stuber, F., Seifried-Dübon, T., Rieger, M. A., Gündel, H., Ruhle, S., Zipfel, S., & Junne, F. (2020). The effectiveness of health-oriented leadership interventions for the improvement of mental health of employees in the health care sector: a systematic review. *International Archives of Occupational and Environmental Health*, *94*, 203-220.

Sutcliffe, K. M., Vogus, T. J., & Dane, E. (2016). Mindfulness in organizations: A cross-level review. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*, 55-81.

*Tagg, R. (2016). *Decreasing stress In paraprofessionals working with children with autism using a brief, blended mindfulness intervention*. Doctoral Dissertation, Alliant International University, San Diego.

Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, *16*(4), 213-225.

*Taylor, C., Harrison, J., Haimovitz, K., Oberle, E., Thomson, K., Schonert-Reichl, K., & Roeser, R. W. (2016). Examining ways that a mindfulness-based intervention reduces stress in public school teachers: A mixed-methods study. *Mindfulness*, *7*(1), 115-129.

Taylor, S. E., & Brown, J. D. (1994). Positive illusions and well-being revisited: separating fact from fiction. *Psychological Bulletin*, *116*(1), 21-27.

R Core Team (2020). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

Tebeka, S., Geoffroy, P. A., Dubertret, C., & Le Strat, Y. (2021). Sadness and the continuum from well-being to depressive disorder: findings from a representative US population sample. *Journal of Psychiatric Research*, *132*, 50-54.

Tebeka, S., Pignon, B., Amad, A., Le Strat, Y., Brichant-Petitjean, C., Thomas, P., Vaiva, G., Roelandt, J. L., Benradia, I., & Etain, B. (2018). A study in the general population about sadness to disentangle the continuum from well-being to depressive disorders. *Journal of Affective Disorders*, *226*, 66-71.

Ten Brummelhuis, L. L., Haar, J. M., & Roche, M. (2014). Does family life help to be a better leader? A closer look at crossover processes from leaders to followers. *Personnel Psychology*, *67*(4), 917-949.

Trowbridge, K., & Mische-Lawson, L. (2016). Mindfulness-based interventions with social workers and the potential for enhanced patient-centered care: A systematic review of the literature. *Social Work in Health Care*, *55*(2), 101-124.

Tuckey, M. R., Bakker, A. B., & Dollard, M. F. (2012). Empowering leaders optimize working conditions for engagement: a multilevel study. *Journal of Occupational Health Psychology*, *17*(1), 15-27.

Turgut, S., Schlachter, S., Michel, A., & Sonntag, K. (2020). Antecedents of health-promoting leadership and workload as moderator. *Journal of Leadership & Organizational Studies*, *27*(2), 203-214.

Udod, S. A., & Care, W. D. (2011). Nurse managers' work stressors and coping experiences: unravelling the evidence. *Nursing Leadership*, *24*(3), 57-72.

Uhle, T., & Treier, M. (2015). *Betriebliches Gesundheitsmanagement*. Berlin, Heidelberg: Springer.

Vallée, A., Wiernik, E., Kab, S., Lemogne, C., Goldberg, M., Zins, M., & Blacher, J. (2021). Association of depressive symptoms and socioeconomic status in determination of blood pressure levels and hypertension: the CONSTANCES population based study. *Journal of Affective Disorders*, *279*, 282-291.

*Valley, M. A., & Stallones, L. (2017). Effect of mindfulness-based stress reduction training on health care worker safety. *Journal of Occupational and Evironmental Medicine*, *59*(10), 935-941.

*Van Berkel, J., Boot, C. R., Proper, K. I., Bongers, P. M., & van der Beek, A. J. (2014). Effectiveness of a worksite mindfulness-based multi-component intervention on lifestyle behaviors. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1), 9.

Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazar, S. W., Kerr, C. E., & Gorchov, J. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, *13*(1), 36-61.

Van den Heuvel, S. G., Geuskens, G. A., Hooftman, W. E., Koppes, L. L., & Van den Bossche, S. N. (2010). Productivity loss at work; health-related and work-related factors. *Journal of Occupational Rehabilitation*, *20*(3), 331-339.

Van Dierendonck, D., Haynes, C., Borrill, C., & Stride, C. (2004). Leadership behavior and subordinate well-being. *Journal of Occupational Health Psychology*, *9*(2), 165-175.

Van Hooft, E. A., Van Der Flier, H., & Minne, M. R. (2006). Construct validity of multi-source performance ratings: An examination of the relationship of self-, supervisor-, and peer-ratings with cognitive and personality measures. *International Journal of Selection and Assessment*, *14*(1), 67-81.

Van Os, J., Hanssen, M., Bijl, R. V., & Ravelli, A. (2000). Strauss (1969) revisited: a psychosis continuum in the general population? *Schizophrenia Research*, *45*(1-2), 11-20.

Van Vianen, A. (2001). Person–organisation fit: The match between theory and methodology: Introduction to the special issue. *Applied Psychology*, *50*(1), 1-4.

Verdoux, H., & Van Os, J. (2002). Psychotic symptoms in non-clinical populations and the continuum of psychosis. *Schizophrenia Research*, *54*(1-2), 59-65.

*Verweij, H., van Ravesteijn, H., van Hooff, M. L., Lagro-Janssen, A. L., & Speckens, A. E. (2018). Mindfulness-based stress reduction for residents: a randomized controlled trial. *Journal of General Internal Medicine*, *33*(4), 429-436.

Viechtbauer, W. (2005). Bias and efficiency of meta-analytic variance estimators in the random-effects model. *Journal of Educational and Behavioral Statistics*, *30*(3), 261-293.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*(3), 1-48.

Viechtbauer, W., & Cheung, M. W. L. (2010). Outlier and influence diagnostics for meta-analysis. *Research Synthesis Methods*, *1*(2), 112-125.

Vignoli, M., Muschalla, B., & Mariani, M. G. (2017). Workplace phobic anxiety as a mental health phenomenon in the job demands-resources model. *BioMed Research International*, *2017*, https://doi.org/10.1155/2017/3285092.

Virgili, M. (2015). Mindfulness-based interventions reduce psychological distress in working adults: a meta-analysis of intervention studies. *Mindfulness*, *6*(2), 326-337.

Viswesvaran, C., Sanchez, J. I., & Fisher, J. (1999). The role of social support in the process of work stress: A meta-analysis. *Journal of Vocational Behavior*, *54*(2), 314-334.

Vonderlin, R., Biermann, M., Bohus, M., & Lyssenko, L. (2020). Mindfulness-based programs in the workplace: a meta-analysis of randomized controlled trials. *Mindfulness*, *11*, 1579–1598.

Vos, T., Barber, R. M., Bell, B., Bertozzi-Villa, A., Biryukov, S., Bolliger, I., Charlson, F., Davis, A., Degenhardt, L., & Dicker, D. (2015). Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, *386*(9995), 743-800.

Ward, M. E., De Brún, A., Beirne, D., Conway, C., Cunningham, U., English, A., Fitzsimons, J., Furlong, E., Kane, Y., & Kelly, A. (2018). Using co-design to develop a collective leadership intervention for healthcare teams to improve safety culture. *International Journal of Environmental Research and Public Health*, *15*(6), 1182.

Wasylkiw, L., Holton, J., Azar, R., & Cook, W. (2015). The impact of mindfulness on leadership effectiveness in a health care setting: a pilot study. *Journal of Health Organization and Management*, *29*(7), 893-911.

Wegge, J., Shemla, M., & Haslam, S. A. (2014). Leader behavior as a determinant of health at work: Specification and evidence of five key pathways. *German Journal of Human Resource Management, 28*(1-2), 6-23.

Weisburd, D., & Britt, C. (2014). *Statistics in criminal justice*. Springer.

World Health Organization (2002). *Prevention and promotion in mental health*. World Health Organization. Retrieved 14 Jul 2020 from https://apps.who.int/iris/bitstream/handle/10665/42539/9241562161.pdf

World Health Organization (2005a). *Mental health policies and programmes in the workplace*. World Health Organization. Retrieved 30 Nov 2020 from https://apps.who.int/iris/bitstream/handle/10665/43337/9241546794_eng.pdf

World Health Organization (2005b). *Mental health: facing the challenges, building solutions: report from the WHO European Ministerial Conference*. WHO Regional Office Europe. Retrieved 14 Apr 2021 from https://www.euro.who.int/__data/assets/pdf_file/0008/96452/E87301.pdf

Wieland, R., Winizuk, S., & Hammes, M. (2009). Führung und Arbeitsgestaltung – Warum gute Führung allein nicht gesund macht [Leadership and job design. Why good leadership is not sufficient for health promotion]. *Arbeit*, *18*(4), 282-297.

*Wilson, D. M. (2012). *Effects of mindfulness-based art processing (MBAP) on the well-being and job performance of working adults: Evaluating a novel intervention*. Doctoral Dissertation, Sofia University, Paolo Alto.

Wilson, K., Senay, I., Durantini, M., Sánchez, F., Hennessy, M., Spring, B., & Albarracín, D. (2015). When it comes to lifestyle recommendations, more is sometimes less: A meta-analysis of theoretical assumptions underlying the effectiveness of interventions promoting multiple behavior domain change. *Psychological Bulletin*, *141*(2), 474-509.

Wirtz, N., Rigotti, T., Otto, K., & Loeb, C. (2017). What about the leader? Crossover of emotional exhaustion and work engagement from followers to leaders. *Journal of Occupational Health Psychology*, *22*(1), 86-97.

*Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: a randomized controlled trial. *Journal of Occupational Health Psychology*, *17*(2), 246-258.

Wolever, R. Q., Schwartz, E. R., & Schoenberg, P. L. (2018). Mindfulness in corporate America: Is the Trojan horse ethical? *The Journal of Alternative and Complementary Medicine*, *24*(5), 403-406.

Yaffe, T., & Kark, R. (2011). Leading by example: the case of leader OCB. *Journal of Applied Psychology*, *96*(4), 806-826.

*Yang, J., Tang, S., & Zhou, W. (2018). Effect of mindfulness-based stress reduction therapy on work stress and mental health of psychiatric nurses. *Psychiatria Danubina, 30(2),* 189-196.

Yao, L., Li, P., & Wildy, H. (2021). Health-promoting leadership: concept, measurement, and research framework. *Frontiers in Psychology*, *12*, 350.

Yukl, G. (2012). Effective leadership behavior: What we know and what questions need more attention. *Academy of Management Perspectives*, *26*(4), 66-85.

Zavras, D. (2020). Testing the Dual-State-Process assumption in the preventive care services use. *Journal of Health and Social Sciences*, *5*(1), 127-140.

Zhou, Q., Martinez, L. F., Ferreira, A. I., & Rodrigues, P. (2016). Supervisor support, role ambiguity and productivity associated with presenteeism: A longitudinal study. *Journal of Business Research*, *69*(9), 3380-3387.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361-370.

*Żołnierczyk-Zreda, D., Sanderson, M., & Bedyńska, S. (2016). Mindfulness-based stress reduction for managers: a randomized controlled study. *Occupational Medicine*, *66*(8), 630-635.

Zwingmann, I., Wegge, J., Wolf, S., Rudolf, M., Schmidt, M., & Richter, P. (2014). Is transformational leadership healthy for employees? A multilevel analysis in 16 nations. *German Journal of Human Resource Management*, *28*(1-2), 24-51.

9 TABELLENVERZEICHNIS

10 ABBILDUNGSVERZEICHNIS

11 TABELLARISCHER ANHANG

11.1 Anhang A: Beschreibungen der Primärstudien in der Metaanalyse

Aikens et al. (2014)

Citation	Aikens, K. A., Astin, J., Pelletier, K. R., Levanovich, K., Baase, C. M., Park, Y. Y., & Bodnar, C. M. (2014). Mindfulness goes to work: Impact of an online workplace intervention. *Journal of Occupational and Environmental Medicine*, 56, 721-731.
Aim of study	"The objective of this study was to determine whether a mindfulness program, created for the workplace, was both practical and efficacious in decreasing employee stress while enhancing resiliency and well-being."
Methods	**Study Design:** RCT
Participants	**Population:** general employees **Sample Size (randomized):** *N* = 89 **Age in Years, M(SD):** n.r.(n.r.); 18 - 65 **Sex (% female):** n.r. **Country:** Midland, Michigan, U.S. **Type of company:** Chemical Company
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: in company or during traveling Duration/Time: 7 weeks; 1x 1h-session/week; 1-2h home-practice/week Kind of mindfulness: shortened program of traditional MBSR; two components: focusing attention; acceptance, curiosity & openness Delivery: online applied training **Control Group No. 1:** Mindfulness waitlist-control group Type of Control Group: Wait-list control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention; follow-up (6 months after treatment; only intervention group) **Mindfulness:** Five Facets of Mindfulness Questionnaire (FFMQ; Baer, 2006): Observe, Describe, Act aware, Nonreact, Nonjudge **Stress:** The Perceived Stress Scale (PSS-14; Cohen, 1983) **Resilience:** Connor-Davidson Resilience Scale (CD-RISC; Singh, 2010) **Work Engagement:** Shirom-Vigor-Scale (Shirom, 2003): Physical Strength, Cognitive liveliness, Emotional energy **Lifestyle:** 6 self-formulated items
Notes	n.a.

Alexander et al. (2015)

Citation	Alexander, G. K., Rollins, K., Walker, D., Wong, L., & Pennings, J. (2015). Yoga for self-care and burnout prevention among nurses. *Workplace Health & Safety*, *63*(10), 462-470.
Aim of study	"The purpose of this pilot-level randomized controlled trial was to examine the efficacy of to improve self-care and reduce burnout among nurses."
Methods	**Study Design:** RCT
Participants	**Population:** Nurses **Sample Size (randomized):** *N* = 40 **Age in Years, M(SD):** 46,38 (10,23) **Sex (% female):** 97,5% female **Country:** USA **Type of company:** hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** yoga group Setting: Environmental service department Duration/Time: 8 weekly sessions Kind of mindfulness: yoga and meditation Delivery: in-class **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre-intervention, post-intervention **Healthy behavior:** Health Promoting Lifestyle Profile II (HPLP II; Walker, & Hill-Polerecky, 1996) **Mindfulness:** Freibourg Mindfulness Inventory (FMI; Walach et al., 2006) **Burnout:** Maslach Burnout Inventory (MBI; Maslach, Jackson, & Leiter, 1986)
Notes	n.a.

Allexandre et al. (2016)

Citation	Allexandre, D., Bernstein, A. M., Walker, E., Hunter, J., Roizen, M. F. & Morledge, T.J. (2016). A web-based mindfulness stress management program in a corporate call center - A randomized clinical trial to evaluate the added benefit of onsite group support. *Journal of Occupational and Environmental Medicine, 58*, 254-264.
Aim of study	"[…] to (1) assess whether the WSM program can be an effective and engaging stress management program in the workplace and (2) determine the extent to which adding group support improves engagement, retention, and effectiveness."
Methods	**Study Design:** RCT
Participants	**Population:** Most employees are debt collectors. Other employees are customer service or fraud representatives. **Sample Size (randomized):** *N* = 161 **Age in Years, M(SD):** 40 (12,6) **Sex (% female):** 83,2% **Country:** Ohio **Type of company:** call center
Programs	**Number of Intervention Groups:** 3 **Intervention Group No. 1:** Online mindfulness stress reduction (WSM) **Intervention Group No. 2:** WSM + weekly group meeting (WSMg1) **Intervention Group No. 3:** WSM, weekly group meeting + expert clinical support (WSMg2) Setting: Online (at home or at work), Group sessions at work, Sessions with clinical experts at work Duration/Time: 8 weeks Kind of mindfulness: The WSM program is an 8-week online, interactive, educational program based on mindfulness meditation. Details of the intervention have been described in Morledge et al. (2013) Delivery: online, at work **Control Group No. 1:** Wait-list control group (CTL) Type of Control Group: wait-list control
Outcomes	**Time points for assessment:** baseline, post intervention (8 weeks), follow-up (16 weeks, 1 year) **Perceived Stress:** Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) **Emotional exhaustion, professional efficacy:** Maslach Burnout Inventory – General Survey (MBI; Maslach, Jackson, & Leiter, 1996) **Mindfulness:** Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003) **Emotional well-being, emotional role-functioning, vitality:** RAND Corporation's Medical Outcomes Study Short Form-36 (Hays, Sherbourne, & Mazel, 1993)
Notes	n.a.

Amutio et al. (2015)

Citation	Amutio, A., Martínez-Taboada, C., Hermosilla, D., & Delgado, L. C. (2015). Enhancing relaxation states and positive emotions in physicians through a mindfulness training program: A one-year study. *Psychology, Health & Medicine*, 20, 720-731. Amutio, A., Martínez-Taboada, C., Delgado, L. C., Hermosilla, D., & Mozaz, M. J. (2015). Acceptability and effectiveness of a long-term educational intervention to reduce physicians' stress-related conditions. *Journal of Continuing Education in the Health Professions*, 35, 255-260.
Aim of study	"The present article focuses on the impact of a mindfulness-based stress reduction (MBSR) program on improving well-being (i.e. relaxation states and related positive emotions) in a longitudinal study for a period of one year."
Methods	**Study Design:** RCT
Participants	**Population:** actively employed physicians **Sample Size (randomized):** *N* = 42 **Age in Years, M(SD):** 47.31(9.42) **Sex (% female):** 57.1% female **Country:** Basque Country (Spain) **Type of company:** Medical College
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** experimental group Setting: group training course with instructor, practice with CD Duration/Time: 8 weekly sessions; 1x 8h retreat-session; 0,75h home-practice/day Kind of mindfulness: MBSR program based on the psycho-educational model of Krasner et al. (2009) Delivery: in-class **Control Group No. 1:** control group Type of Control Group: Wait-list control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention; follow-up (10 months after treatment; only intervention group) **Mindfulness:** Five Facets of Mindfulness Questionnaire (FFMQ; Spanish version of Cebolla et al., 2012): Observe, Describe, Act aware, Nonreact, Nonjudge **Relaxation:** Smith Relaxation States Inventory (SRSI-3; Smith, 2007c): basic relaxation, positive energy, mindfulness, transcendence
Notes	n.a.

Ancona and Mendelson (2014)

Citation	Ancona, M. R., & Mendelson, T. (2014). Feasibility and preliminary outcomes of a yoga and mindfulness intervention for school teachers. *Advances in School Mental Health Promotion*, *7*, 156-170.
Aim of study	"This pilot study explored the feasibility and preliminary outcomes of a 6-session yoga and mindfulness intervention for teachers (p.158). The program's aim is to provide stress management skills for teachers working in under-resourced areas with high levels of occupational stress." (p.161)
Methods	**Study Design:** Pilot study, randomized on school level
Participants	**Population:** Elementary and middle school teachers **Sample Size (randomized):** *N* = 43 **Age in Years, M(SD):** 20 to 50 and older **Sex (% female):** 81.4% **Country:** Baltimore (USA) **Type of company:** School
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Intervention Setting: in spacious, unused classrooms Duration/Time: 6 sessions over three weeks 45min, twice per week Instruction to meditate at home and at work twice the day for 20min Kind of mindfulness: The teacher intervention is based on HLF's yoga and mindfulness curriculum for youth and was designed by Ali Smith, Atman Smith, and Andres Gonzalez, founders of the Holistic Life Foundation, Inc. (not by researchers, but by individuals with intimate knowledge of the target community. Delivery: in school after lesson **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pretest & posttest (after 3 weeks intervention), change score **Teacher Stress:** Teacher Stress Inventory (TSI; Fimian, 1984) **Emotional Burnout:** Subscale „Emotional Exhaustion" of the Maslach Burnout Inventory-Educators Survey; Self-report (MBI-ES; Maslach et al., 1986)
Notes	n.a.

Anderson et al. (1999)

Citation	Anderson, V. L., Levinson, E. M., Barker, W., & Kiewra, K. R. (1999). The effects of meditation on teacher perceived occupational stress, state and trait anxiety, and burnout. *School Psychology Quarterly*, *14*, 3.
Aim of study	"[…] the purpose of the current study was to assess the efficacy of a 5-week Standardized Meditation program as a means of daily stress management for teachers." (p.9)
Methods	**Study Design:** RCT
Participants	**Population:** Full-time teachers from Pennsylvania, Illinois, and Missouri, teaching at elementary, middle or high school level **Sample Size (randomized):** *N* = 91 **Age in Years, M(SD):** 22-60 **Sex (% female):** 85 % **Country:** Pennsylvania, Illinois, and Missouri (USA) **Type of company:** school
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Experimental Group Setting: at school and at home Duration/Time: 5 weeks; 1,5h once per week Kind of mindfulness: the "program in meditation was designed by the lead author based on programs thaught by the American Meditation Society; an introduction to the benefits of meditating, its application in the life of a teacher, instruction in a basic mantra meditation practice, instruction in a basic pranayama (breathing) practice, group practice of the techniques, discussion of experiences, and encouragement to establish a routine of regular practice." Delivery: instruction to meditate 20min twice daily at home and at school **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre, post (after 5 weeks), follow-up (after 9 weeks) **Occupational stress:** The Teacher Stress Inventory (TSI; Fimian, 1988), self-report **State Anxiety, Trait Anxiety:** State-Trait Anxiety Inventory for Adults (STAI-A; Spielberger, 2010) **Perceived Burnout:** Maslach Burnout Inventory (2nd edition)-Educators Survey Version (Maslach et al., 1986)
Notes	n.a.

Arredondo et al. (2017)

Citation	Arredondo, M., Sabaté, M., Valveny, N., Langa, M., Dosantos, R., Moreno, J., & Botella, L. (2017). A mindfulness training program based on brief practices (M-PBI) to reduce stress in the workplace: a randomised controlled pilot study. *International Journal of Occupational and Environmental Health*, *23*, 40-51
Aim of study	"the purpose of this pilot, controlled study was to assess in employee-volunteers the efficacy of an 8-weeks M-BIP training program in reducing stress and increasing mindfulness ability and increasing the HRV. Additionally the changes in self-compassion, decentering, and the burnout syndrome were assessed." (p.2)
Methods	**Study Design:** RCT
Participants	**Population:** workplace sample at the private international clinical research organization company **Sample Size (randomized):** $N = 40$ **Age in Years, M(SD):** 36.6 (5.6) **Sex (% female):** 77.5 % **Country:** Barcelona, Spain **Type of company:** private international clinical research organization company
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Experimental Group Setting: at the workplace Duration/Time: 8 weeks; 1,5h once per week + 3hr. retreat Kind of mindfulness: "The M-PBI is a mindfulness program with brief integrated practices. It is based on progressive experiential learning that promotes the practice of focusing attention on a particular object (such as the breath or body sensa- tions), in order to increase the ability of the mind to be in the present without reactivity. Moreover, it includes compassion, open awareness practices, and practices to improve the HRV." Delivery: at the workplace **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre, post (after 8 weeks), follow-up (after 12 weeks) **Perceived stress:** Perceived Stress Scale (PSS; Cohen et al., 1983), self-report **Mindfulness:** Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) **Self-Compassion:** Self-Compassion Scale (SCS; Neff 2003) **Decentering:** Experiences Questionnaire-Decentering (EQ-D; Fresco et al., 2007) **Burnout:** Maslach Burnout Inventory – General Survey (MBI-GS; Schaufeli et al. 1996) **Heart Rate Variability:** To record all R-R intervals, a Polar® H7 hear rate sensor was used.
Notes	n.a.

Asuero et al. (2014)

Citation	Asuero, A. M., Queraltó, J. M., Pujol-Ribera, E., Berenguera, A., Rodriguez-Blanco, T., & Epstein, R. M. (2014). Effectiveness of a mindfulness education program in primary health care professionals: A pragmatic controlled trial. *Journal of continuing education in the health professions, 34*, 4-12.
Aim of study	"This study assessed the effectiveness of a training program for primary health care professionals designed to reduce burnout and mood disturbance, increase empathy, and develop mindfulness." (p.4)
Methods	**Study Design:** pragmatic RCT
Participants	**Population:** health care professionals **Sample Size (randomized):** *N* = 68 **Age in Years, M(SD):** 47 (8); n.r. **Sex (% female):** 92 **Country:** Catalonia, Spain **Type of company:** Hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: at work Duration/Time: 8 weeks; 1x 2.5h-session/week (plus a 1-day session of 8 hours) Kind of mindfulness: modeled after the intensive phase of Krasner's study; emphasis of mindfulness in everyday activities with contemplation-meditation exercises (mindfulness meditation with focus on the present-moment experience and contemplate nonjudgmentally bodily sensations, breathing, sounds, and thoughts) Delivery: training applied inclass **Control Group No. 1:** mindfulness waitlist-control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention **Mindfulness:** Five Facets of Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006): Observe, Describe, Act aware, Nonreact, Nonjudge **Burnout:** Maslach Burnout Inventory (MBI); subscales: emotional exhaustion, depersonalization, and personal accomplishment **Mood Disturbance:** short version of the Profile of Mood States (POMS) Questionnaire; subscales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, and fatigue-inertia **Empathy:** Jefferson Questionnaire; subscales: compassionate care, perspective taking, and "standing in the patient's shoes."
Notes	n.a.

Auseron (2018)

Citation	Auserón, G. A., Viscarret, M. R. E., Goñi, C. F., Rubio, V. G., & Pascual, P. P. (2018). Evaluación de la efectividad de un programa de mindfulness y autocompasión para reducir el estrés y prevenir el burnout en profesionales sanitarios de atención primaria. *Atención Primaria*, *50*, 141-150.
Aim of study	"[…] evaluate the effectiveness of a Mindfulness and Self-Compassion Program on the levels of stress and burnout in Primary Care health professionals."
Methods	**Study Design:** RCT
Participants	**Population:** health care professionals **Sample Size (randomized):** *N* = 45 **Age in Years, M(SD):** 49,9 (8,2) **Sex (% female):** 84,4% **Country:** Spain **Type of company:** Hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** experimental group Setting: n.r. Duration/Time: 2.5h /week for 8 weeks Kind of mindfulness: Mindfulness and Self-Compassion training program (MBSR & MSC) Delivery: in-class **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre, post **Mindfulness:** Five Facets of Mindfulness Questionnaire (FFMQ; Cebolla, García-Palacios, Banos, Botella, 2012) **Stress:** Perceived Stress Questionnaire (PSQ; Sanz-Carrillo, García-Campayo, Rubio, Santed, Montoro, 2002) **Compassion:** Self-Compassion Scale (SCS; Neff, 2003) **Burnout:** Maslach Burnout Inventory (MBI; Seisdedos, 1997)
Notes	n.a.

Baby et al. (2018)

Citation	Baby, M., Gale, C., & Swain, N. (2018). A communication skills intervention to minimise patient perpetrated aggression for healthcare support workers in New Zealand: A cluster randomised controlled trial. *Health Soc Care Community, 27*, 170-181.
Aim of study	"This study aimed to evaluate the effect of an intervention (communication skills training) to reduce the experience of aggression for healthcare support workers."
Methods	**Study Design:** RCT
Participants	**Population:** health care support workers **Sample Size (randomized):** *N* = 127 **Age in Years, M(SD):** NA **Sex (% female):** 78% female **Country:** New Zealand **Type of company:** nongovernmental organizations (NGOs) and District Health Boards (DHB)
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Setting: group and online Duration/Time: 4 sessions Kind of mindfulness: Modules based on mindfulness programs developed by Kabat-Zinn (2003), Segal, Williams and Teasdale (2002), Shapiro, Astin, Bishop and Cordova (2005) and Harris (2009). Videos based on 'Online Mindfulness Course for Pain' (Leov, 2015) Delivery: online **Control Group No. 1:** "It's all about communication" Type of Control Group: active control
Outcomes	**Time points for assessment:** pre-intervention, post-intervention, 3 months follow up, 6 months follow up **Perceived level of patient aggression:** Perception of Prevalence of Aggression Scale (POPAS-NZ; Oud, 2000) **Psychological distress:** Kessler Psychological Distress Scale (K10; Kessler et al., 2003) **Trauma:** Impact of Events Scale-Revised (IES-R; Weiss & Marmar, 1997) **Interpersonal communication competence:** Interpersonal Communication Competence Scale (ICCS; Rubin & Marin, 1994)
Notes	n.a.

Bartlett et al. (2017)

Citation	Bartlett, L., Lovell, P., Otahal, P., & Sanderson, K. (2017). Acceptability, feasibility, and efficacy of a workplace mindfulness program for public sector employees: a pilot randomized controlled trial with informant reports. *Mindfulness, 8,* 639-654.
Aim of study	"This study evaluated a pilot 5-week Mindfulness at Work Program (MaWP) for acceptability, feasibility, and efficacy in relation to stress and related mental health and productivity problems for public sector employees."
Methods	**Study Design:** RCT
Participants	**Population:** public administration employees **Sample Size (randomized):** *N* = 135 **Age in Years, M(SD):** **Sex (% female):** **Country:** Australia **Type of company:** Public services
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness at Work Pilot Intervention Setting: interactive classes with an expert mindfulness teacher Duration/Time: 5 weeks Kind of mindfulness: Based on the guidebook *Mindfulness for Dummies* (Alidina & Adams, 2014) and the MBSR curriculum (Kabat-Zinn, 2013) Delivery: in-class, at work **Control Group No. 1:** Self-help information ressources Type of Control Group: active control
Outcomes	**Time points for assessment:** pre intervention, post intervention (5 weeks) **Mindfulness:** Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003) **Stress:** Perceived Stress Scale (PSS-14; Cohen et al., 1983; Virgili, 2013) **Psychological Distress:** Kessler-10 Scale (K-10; Kessler et al., 2005) **Health related quality of life:** Assessment of Quality of Life (AQoL-4D; Hawthorne et al., 1999) **Sleep quality:** Jenkins' Sleep Scale (JSS; Jenkins et al., 1988) **Job stressors (demand, control, security):** Household Income Labour Dynamics in Australia Survey (HILDA; Wooden et al., 2002) **Productivity:** Total lost productive days
Notes	n.a.

Van Berkel et al. (2014)

Citation	Van Berkel, J., Boot, C. R., Proper, K. I., Bongers, P. M., & van der Beek, A. J. (2014). Effectiveness of a worksite mindfulness-related multi-component health promotion intervention on work engagement and mental health: results of a randomized controlled trial. *PloS one, 9*, e84118.
Aim of study	"The aim of the present study was to evaluate the effectiveness of a worksite mindfulness-related multicomponent health promotion intervention on work engagement, mental health, need for recovery and mindfulness" (p.1)
Methods	**Study Design:** RCT
Participants	**Population:** employees from two Dutch research institutes **Sample Size (randomized):** *N* = 257 **Age in Years, M(SD):** Intervention Group: M = 46.0 (9.4); Control Group: M = 45.1 (9.6) **Sex (% female):** Intervention Group: 63.6%; Control Group: 71.1% **Country:** Netherlands **Type of company:** governmental research institute
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** intervention group Setting: online at home and at worksite outside working hours (4 to 17 participants per group) Duration/Time: The total duration of the intervention was six months. The Mindful VIP intervention comprised 8 weeks of in-company mindfulness-related training (90 minutes per session) with homework exercises, followed by 8 sessions of e-coaching. Kind of mindfulness: Mindful Vitality in practice (VIP) intervention (van Berkel, Proper, Boot, Bongers, & van der Beek) consisting of mindfulness training, e-coaching , and several supporting elements (ie, fruit and vegetables, lunch walking routes, a buddy system) Delivery: online, in-class, hand-outs containing homework exercises, a mindfulness exercise booklet, and an audio disc with relaxation exercises **Control Group No. 1:** control group Type of Control Group: unspecified (ALL participants were granted access to an intranet webpage containing links to various health promotion activities of the participating research institutes, e.g, in-company fitness)
Outcomes	**Time points for assessment:** pre (baseline), post (6 months from baseline), follow-up (12 months from baseline) **Work engagement:** Utrecht Work Engagement Scale'' (UWES; Schaufeli, 2003) **General mental health:** SF-36 Vitality Scale (Van der Zee, & Sanderman 1993) **Need for Recovery:** 11-item Need for Recovery Scale (van Veldhoven & Broersen, 2003) **Mindfulness:** MAAS (Brown & Ryan, 2003)
Notes	n.a.

Bostock et al. (2018)

Citation	Bostock, S., Crosswell, A. D., Prather, A. A., & Steptoe, A. (2018). Mindfulness on-the-go: Effects of a mindfulness meditation app on work stress and well-being. *Journal of Occupational Health Psychology.* Advance online publication.
Aim of study	The purpose of this study was to examine the effects of a mindfulness meditation program delivered via smartphones on outcomes related to work stress. p 2
Methods	**Study Design:** RCT
Participants	**Population:** mixed **Sample Size (randomized):** *N* = 238 **Age in Years, M(SD):** 35,5 (7,7) **Sex (% female):** 59,2% female **Country:** UK **Type of company:** pharmaceutical and high tech companies
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** meditation Setting: Headspace App, at work Duration/Time: 8 weekly sessions Kind of mindfulness: meditation Delivery: audio, video, app **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre-intervention, post-intervention (10 weeks from baseline) **Psychological well-being:** Warwick Edinburgh Mental Well-being Scale (Tennant et al., 2007) **Daily well-being:** positive emotions ratings provided five times throughout 1 working day following daily diary methodology (Almeida, 2005; Bolger, Davis, & Rafaeli, 2003) **Psychological distress:** Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) **Job strain:** Whitehall II Study Questionnaire (16 items) (Bosma et al., 1997; Kuper & Marmot, 2003) **Workplace social support:** five statements ranked on a 4-point scale
Notes	n.a.

Cheema et al. (2013)

Citation	Cheema, B. S., Houridis, A., Busch, L., Raschke-Cheema, V., Melville, G. W., Marshall, P. W., ... & Colagiuri, B. (2013). Effect of an office worksite-based yoga program on heart rate variability: outcomes of a randomized controlled trial. *BMC complementary and alternative medicine*, *13*, 82.
Aim of study	"The purpose of this study was to determine if an office worksite-based hatha yoga program could improve physiological stress, evaluated via heart rate variability (HRV), and associated health-related outcomes in a cohort of office workers." (p.1)
Methods	**Study Design:** RCT
Participants	**Population:** university staff **Sample Size (randomized):** *N* = 37 **Age in Years, M(SD):** 38 (12); 21-58 **Sex (% female):** 81.1 **Country:** Sydney, Australia **Type of company:** University of Western Sydney
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: in company Duration/Time: 10 weeks; 3x 0.83h-session/week Kind of mindfulness: Hatha yoga program (based on the Yoga Synergy Water Sequence, created by Simon Borg Olivier and Bianca Machliss) Delivery: training applied inclass **Control Group No. 1:** passive control group Type of Control Group: passive control group
Outcomes	**Time points for assessment:** pre-intervention (week 0); post-intervention (week 11) **HRV and heart rate:** high frequency spectral power component of HRV (measured in absolute units; ms2); heart rate: average number of beats per minute during the 10-minute recording **Musculoskeletal fitness:** push-up test, side-bridge test, sit-and-reach test **Quality of Life:** Medical Outcomes Trust Short-form 36 Health Status Questionnaire (SF36) **Anxiety:** State-Trait Anxiety Inventory (STAI) **Job Satisfaction:** Job Descriptive Index (JDI): supervision, co-workers, work, pay and promotion; Job in General (JIG)
Notes	n.a.

Chin et al. (2019)

Citation	Chin, B., Slutsky, J., Raye, J., & Creswell, J. D. (2019). Mindfulness training reduces stress at work: A randomized controlled trial. *Mindfulness*, 10, 627-638.
Aim of study	"Here, we conducted a two-arm RCT at work among employees of a digital marketing firm comparing the efficacy of a high-dose 6 week mindfulness training to a low-dose single-day mindfulness training for improving multiple measures of employee well-being assessed using ecological momentary assessment."
Methods	**Study Design:** RCT
Participants	**Population:** employees of a digital marketing firm **Sample Size (randomized):** *N* = 60 **Age in Years, M(SD):** 30,52 (7,8) **Sex (% female):** 66,7% **Country:** USA **Type of company:** Digital marketing firm
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** High-Dosage Mindfulness Training (HDMT) Setting: Duration/Time: 6 week period Kind of mindfulness: based on the Unified Mindfulness system (Young, 2016) Delivery: online video series and homework **Control Group No. 1:** Low-Dosage Mindfulness Training (LDMT) Type of Control Group: active control
Outcomes	**Time points for assessment:** pre intervention, post intervention **Perceived stress:** Perceived Stress Scale (PSS; Cohen & Williamson, 1988) **Coping efficacy and success** **Positive affect** **Negative affect**
Notes	n.a.

Christopher et al. (2018)

Citation	Christopher, M. S., Hunsinger, M., Goerling, R. J., Bowen, S., Rogers, B. S., Gross, C. R. et al. (2018). Mindfulness-based resilience training to reduce health risk, stress reactivity, and aggression among law enforcement officers: A feasibility and preliminary efficacy trial. *Pschiatry Research, 264*, 104-115.
Aim of study	"The primary objective of this study was to assess feasibility and gather preliminary outcome data on Mindfulness-Based Resilience Training (MBRT) for law enforcement officers."
Methods	**Study Design:** RCT
Participants	**Population:** law enforcement officers **Sample Size (randomized):** *N* = 61 **Age in Years, M(SD):** 43,99 (6,04) **Sex (% female):** 10% **Country:** USA **Type of company:** law enforcement agencies
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Experimental Group Setting: Duration/Time: 8 weeks; 2h once per week + 6h class in week 7 Kind of mindfulness: Based on a Mindfulness-Based Stress Reduction (Kabat-Zinn, 1990) framework Delivery: in-class **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre, post (8 weeks), follow-up (12 weeks) **Alcohol use, anxiety, depression, sleep difficulties:** PROMIS **Suicidal ideation:** Concise Health Risk Tracking Scale (Trivedi et al., 2011) **Stress:** Police Stress Questionnaire (PSQ; McCreary & Thompson, 2006) **Burnout:** Oldenbourg Burnout Inventory (OLBI; Demerouti et al., 2003; Halbesleben & Demerouti, 2005) **Mindfulness:** Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF; Bohlmeijer et al., 2011) **Resilience:** Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) **Psychological flexibility:** Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) **Self-Compassion:** Self-Compassion Scale-Short Form (SCS-SF; Raes et al., 2011) **Anger, Aggression:** Buss-Perry Aggression Questionnaire-Short Form (BPAQ-SF; Bryant & Smith, 2001)
Notes	n.a.

Crain et al. (2017)

Citation	Crain, T. L., Schonert-Reichl, K. A., & Roeser, R. W. (2017). Cultivating teacher mindfulness: Effects of a randomized controlled trial on work, home, and sleep outcomes. *Journal of Occupational Health Psychology*, *22*, 138-.
Aim of study	The current study utilizes a RCT design and examines whether or not randomization to a WMT for public school teachers who volunteer for the program is associated with outcomes in three domains: work, home, and sleep. (p.2)
Methods	**Study Design:** RCT
Participants	**Population:** teachers **Sample Size (randomized):** *N* = 113 **Age in Years, M(SD):** 46.9(9.2.) **Sex (% female):** 89% **Country:** USA/Canada **Type of company:** school
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: at work Duration/Time: 8 weeks; 1.38 h-session/week; encouraged to practice at home Kind of mindfulness: Work Mindfulness Training based off of established MBSR techniques (approximately 60% of material) and was developed specifically for educators. Delivery: in class **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention (8 weeks from baseline); follow-up (3 months from post intervention) **Mindfulness:** Five Factor Mindfulness Questionnaire (FFM; Baer et al., 2008) **Job rumination at home:** two items taken from a broader inventory of teacher stress and coping items (Lambert, McCarthy, & Abbott-Shim, 2001) **Satisfaction and mood:** Previous survey items were used as a basis for creating new, single item context specific indicators of satisfaction (Ho & Au, 2006) and mood (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) **Sleep quality, sleep quantity, and sleepiness:** Measures of sleep quantity and quality were drawn from Kahneman et al. (2004)
Notes	n.a.

Dwivedi et al. (2015)

Citation	Dwivedi, U., Kumari, S., Akhilesh, K. B., & Nagendra, H. R. (2015). Well-being at workplace through mindfulness: Influence of Yoga practice on positive affect and aggression. *Ayu*, *36*, 375-379.
Aim of study	"The present study examined the effect of mindfulness developed through *Yoga* practices on aggression and PA among working professionals involved in CWB." (p. 375)
Methods	**Study Design:** RCT
Participants	**Population:** Participants from a private enterprise in Engineering Department of information technology sector in Pune **Sample Size (randomized):** *N* = 160 **Age in Years, M(SD):** Yoga group: 28,29 (5,21); Control group: 27,20 (4,14) **Sex (% female):** 45% (n=72) **Country:** India **Type of company:** a private enterprise in Engineering Department of information technology sector
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Yoga group Setting: Offered within the organization's campus Duration/Time: 10 weeks; 1 h daily, 5 days a week Kind of mindfulness: Theory and postures (35 min; Yogic theory on Rajayoga, Bhaktiyoga, Karmayoga Jnanayoga, and Satvik diet. Asanas covered were Suryanamaskara (sun salutations), Trikonasana (triangle pose), Virabhadrasana (warrior pose), Parsvakonasana (sides angle pose), Vrikshasana (tree pose), Ardha Matsyendrasana (half twist pose), and Bhujangasana (cobra pose)); Breathing (15 min): Bhastrika (bellows breathing), Kapalabhati (skull shining breathing), Anuloma-Viloma (alternate nostril breathing), and Bhramari (bee breathing); Meditation (10 min): Dhyana and Yoganidra. Delivery: n. r. **Control Group No. 1:** control Group Type of Control Group: active control group
Outcomes	**Time points for assessment:** Baseline (pre intervention), 10 week (post intervention) **Counterproductive workplace behavior:** Counterproductive Workplace Behavior Checklist (CWB‐C; Spector et al. 2004) **Agression:** Aggression Questionnaire (Buss & Perry, 1992) **Positive affectivity:** positive and negative affect schedule (PANAS-X; Watson et al. 1999)
Notes	n. a.

Flaxman and Bond (2010)

Citation	Flaxman, P. E., & Bond, F. W. (2010). Worksite stress management training: Moderated effects and clinical significance. *Journal of Occupational Health Psychology, 15*(4), 347-358.
Aim of study	**"**This study aimed to provide a rigorous and detailed evaluation of the impact of a worksite SMT program and to address some of the conceptual and methodological issues that exist within the worksite SMT literature.**"** (p. 356)
Methods	**Study Design:** RCT
Participants	**Population:** employees from various departments within two organizations, including council tax, environmental health, housing and social services (welfare), education, finance, and libraries **Sample Size (randomized):** *N* = 311 **Age in Years, M(SD):** 41(n.r.), 18-63 **Sex (% female):** n.r. **Country:** U.K. **Type of company:** local government organizations in London
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** SMT group Setting: during working hours Duration/Time: 6 months, 3 sessions, 2,5-3 hours each (2 in consecutive weeks, 1 three months later) Kind of mindfulness: SMT program adopted the principles and techniques of ACT; a mindfulness-based CBT, emphasizing the intimate link between mindfulness and values-based action skills (Flaxman & Bond, 2006; eyes-closed mindfulness (meditative) exercises, cognitive defusion exercises, values and goals clarification Exercises) Delivery: in-class **Control Group No. 1:** waiting list control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** baseline (Time 1), three months after two initial training sessions (Time 2), and another three months after a final training session (Time 3) **General psychological distress:** general health questionnaire (GHQ-12; Goldberg & Williams, 1988)
Notes	n.a.

Flook et al. (2013)

Citation	Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013). Mindfulness for teachers: A pilot study to assess effects on stress, burnout, and teaching efficacy. *Mind, Brain, and Education*, *7*, 182-195.
Aim of study	adapt MBSR for teachers and to conduct a preliminary evaluation by assessing outcomes across variety of self-report and objective measures that may be impacted by mindfulness training, including observation of classroom teaching practices, computerized tasks related to attention and emotion regulation, and *saliva* sampling for cortisol as a physiological stress index.
Methods	**Study Design:** RCT, pilot trial
Participants	**Population:** public elementary school teachers **Sample Size (randomized):** *N* = 18 **Age in Years, M(SD):** 43.06 (9.87), 25-56 **Sex (% female):** 16/18 (88,89%) **Country:** U.S. **Type of company:** school
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1: i**ntervention group Setting: n.r. Duration/Time: eight weeks, 2.5 hours/week, plus a day-long immersion (6 hours), totaling approximately 26 hours of group practice and instruction Kind of mindfulness: standard MBSR curriculum was adapted for teachers to focus on integrating skills into the classroom Delivery: in class & outside of class with guided recordings **Control Group No. 1:** control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** Pre-test (during 4 weeks), post-test (after 8 week intervention during 3 weeks) **Psychological Distress:** GSI; Symptom Checklist 90-R (Derogatis, 1994) **Mindfulness:** Five-Facet Mindfulness Scale (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) **Self-Compassion:** Self-Compassion Scale (SCS) **Burnout:** The Maslach Burnout Inventory – Educators Survey (MBI-ES) **Teacher Classroom Behavior:** The Classroom Assessment Scoring System (CLASS); observational coding system **Cortisol Measurement:** Saliva samples to measure cortisol (nmol/L) **Neuropsychological and attentional tasks:** The Cambridge Neuropsychological Test Automated Battery (CANTAB); The Rapid Visual Information Processing task (RVP) & The Affective Go/No-Go task (AGN) **Mindfulness Practice Compliance:** Participants in the mindfulness training group completed practice logs on a weekly basis.
Notes	n.a.

Grégoire and Lachance (2015)

Citation	Grégoire, S., & Lachance, L. (2015). Evaluation of a brief mindfulness-based intervention to reduce psychological distress in the workplace. *Mindfulness, 6,* 836-847.
Aim of study	"[…] its aim was to develop a brief and flexible MBI for call center employees and assess its effect on mindfulness, psychological distress, and client satisfaction."
Methods	**Study Design:** RCT, switching-replication
Participants	**Population:** employees of a call center working for a financial institution **Sample Size:** *N* = 49 **Age in Years, M(SD):** 35.8, 26-57 **Sex (% female):** 91% **Country:** Canada **Type of company:** call center of a financial institution
Programs	**Number of Intervention Groups:** *2* **Intervention Group No. 1:** Group 1 (first EG then CG) **Intervention Group No. 2:** Group 2 (first CG then EG) Setting: at workplace Duration/Time: 5 weeks Kind of mindfulness: brief body scans and sitting meditation sessions covered five different themes, one for each week (attention to physical sensations, attention to the breath, attention to sounds and silence, attention to emotions, and awakening confidence), and they were based on the following processes: attention and awareness, acceptance and openness, decentering, letting go, focusing on the present moment, and the practice of being fully aware during every-day activities. Delivery: at workplace, 15min daily audio sessions **Control Group No. 1:** Control Group (Group 1 & 2 switched roles) Type of Control Group: control
Outcomes	**Time points for assessment:** t1 (week 1), t2 (week 6), t3 (week 11) **Mindfulness:** Mindfulness Attention Awareness Scale (MAAS) **Stress:** Psychological Stress Measure (PSM-9) **Anxiety and Depression:** five-item subscale of the same name of the Psychological Distress Manifestation Scale (PDMS) **Level of fatigue:** Fatigue Scale **Negative affect:** subscale of the same name of the Positive and Negative Affect Schedule (PANAS)
Notes	n.a.

Harris et al. (2016)

Citation	Harris, A. R., Jennings, P. A., Katz, D. A., Abenavoli, R. M., & Greenberg, M. T. (2016). Promoting stress management and well-being in educators: Feasibility and efficacy of a school-based yoga and mindfulness intervention. *Mindfulness, 7*, 143-154.
Aim of study	**"**In the current study, we investigate the feasibility and efficacy of a new yoga-based CI, CALM (Community Approach to Learning Mindfully), as a support for educator well-being. CALM is based in gentle yoga and mindfulness practice and is hypothesized to improve emotional functioning and stress management as well as teaching, health, and well-being (see Fig. 1). The innovative, school-based, daily, morning format of CALM was designed to increase accessibility and promote skill transfer." (p. 144)
Methods	**Study Design:** RCT
Participants	**Population:** teachers **Sample Size (randomized):** *N* = 64 **Age in Years, M(SD):** 43 (12,53), 21-69 **Sex (% female):** 88% **Country:** USA **Type of company:** two middle schools
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** intervention group Setting: inclass, before school Duration/Time: 16 weeks, 4x20min sessions weekly (asked to visit at least two per week and to practice individually) Kind of mindfulness: CALM is based in gentle yoga and mindfulness practices (Harris and Hudecek, 2013) Delivery: inclass **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** Pre (in the Fall of year 1), post (in the Spring of year 1) **Mindfulness:** Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) **Affect:** Positive and Negative Affect Schedule—Short Form (PANAS; Thompson, 2007; Watson, Clark, & Tellegen, 1988) **Emotion Regulation:** Emotion Regulation Questionnaire (ERQ; Gross and John, 2003) **Distress Tolerance:** Distress Tolerance Scale (DTS; Simons, & Gaher, 2005) **Relational Trust:** Teacher-Teacher Relational Trust (Bryk, & Schneider, 2002) **Teaching Efficacy:** subset of items from the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran, & Hoy, 2001)

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	Time Urgency: nine items assessed feelings of task-related time pressure and general hurry (Landy et al. 1991) **Perceived Stress:** four items from the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) **Professional Burnout:** Maslach Burnout Inventory—Educators Survey (MBI; Maslach, & Jackson, 1981) **Physical symptoms:** Daily Physical Symptoms scale (Larsen, & Kasimatis, 1991) **Sleep-related impairment:** PROMIS Sleep-Related Impairment scale (Buysse, Yu, Moul, Germain, Stover, Dodds, et al., 2010) **Blood pressure** **Cortisol**
Notes	n.a.

Huang et al. (2015)

Citation	Huang, S. L., Li, R. H., Huang, F. Y., & Tang, F. C. (2015). The potential for mindfulness-based intervention in workplace mental health promotion: Results of a randomized controlled trial. *PloS one, 10*, e0138089.
Aim of study	**"**This study aims to intensively evaluate the effectiveness of mindfulness-based intervention (MBI) on mental illness risks (including psychological distress, prolonged fatigue, and perceived stress) and job strain (job control and job demands) for employees with poor mental health." (p.1)
Methods	**Study Design:** RCT
Participants	**Population:** industrial full-time employees **Sample Size (randomized):** *N* = 144 **Age in Years, M(SD):** intervention group: 42,4 (n.r.), control group 42,7 (n.r.) **Sex (% female):** Intervention group: 50%, control group: 31,9% **Country:** Taiwan **Type of company:** Two large-scale manufacturing factories
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** intervention group Setting: during paid working hours at the workplace (in factory) Duration/Time: 8 weeks, 2 hours training weekly, 45min homework practice daily Kind of mindfulness: MBI program based on the Mindfulness-Based Stress Reduction (MBSR) curriculum structure developed in the Stress Reduction Clinic of the University of Massachusetts Medical School, but without an all-day class (Kabat-Zinn, 1990) Delivery: in-class, homework **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** T1 (pre-intervention); T2 (mid-intervention); T3 (post intervention); T4 (four weeks after intervention); T5 (eight weeks after intervention) **Psychological Distress:** Chinese Health Questionnaire (CHQ-12; Cheng & Williams, 1986) **Fatigue:** Checklist Individual Strength questionnaire (CIS; Lewis, & Wessely, 1992) **Perceived Stress:** Perceived Stress Scale (PSS-10; Chinese Version by Wang, Cheng, Boyd, Zhang, Jia, & Qiu, 2011)) **Job Strain:** subscales job control and job demands of the Job Content Questionnaire (JCQ; Chinese Version by Cheng, Luh, & Guo, 2003)
Notes	n.a.

Ireland et al. (2017)

Citation	Ireland, M. J., Clough, B., Gill, K., Langan, F., O'Connor, A., & Spencer, L. (2017). A randomized controlled trial of mindfulness to reduce stress and burnout among intern medical practitioners. *Medical Teacher*, 39, 409-414.
Aim of study	The aim of the current study was to examine the efficacy of a mindfulness-based intervention to reduce stress and burnout among intern doctors working in a large hospital emergency department. (p.410)
Methods	**Study Design:** RCT
Participants	**Population:** intern doctors **Sample Size (randomized):** *N* = 44 **Age in Years, M(SD):** 26.88(4.79.) **Sex (% female):** 64% **Country:** Australia **Type of company:** major metropolitan hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: at work Duration/Time: 10 weeks; 1h-session/week; encouraged to practice at home Kind of mindfulness: mix mindfulness education and Practice; Mindfulness-Based Stress Reduction, Mindfulness-Based Cognitive Therapy, and Acceptance and Commitment Therapy Delivery: in class **Control Group No. 1:** active control group Type of Control Group: active control group
Outcomes	**Time points for assessment:** pre-intervention; mid-intervention (5 weeks from baseline); post-intervention (10 weeks from baseline) **Burnout:** Copenhagen Burnout Inventory (CBI; Kristensen et al. 2005) **Perceived Stress:** Perceived Stress Scale (PSS; Cohen et al. 1983)
Notes	n.a.

Jennings et al. (2013)

Citation	Jennings, P. A., Frank, J. L., Snowberg, K. E., Coccia, M. A., & Greenberg, M. T. (2013). Improving classroom learning environments by Cultivating Awareness and Resilience in Education (CARE): Results of a randomized controlled trial. *School Psychology Quarterly, 28*, 374-390.
Aim of study	We test the effectiveness of the Cultivating Awareness and Resilience in Education (CARE) model of professional development on teacher's well-being, classroom efficacy, burnout, stress, and health.
Methods	**Study Design:** RCT
Participants	**Population:** teacher **Sample Size (randomized):** *N* = 53 **Age in Years, M(SD):** 36 (n.r.) 22-60 **Sex (% female):** 89% **Country:** U.S. **Type of company:** public schools
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Intervention group Setting: n. r. Duration/Time: 30-hr program presented in four day-long sessions over 4–6 weeks (2-day weekend session (12 hours), a 1-day session 2 and 4 weeks after the initial sessions, a 1-day booster session one month later) Kind of mindfulness: CARE (Bash, 2005) combines emotion skills instruction, mindful awareness practices, and compassion building activities Delivery: in-class **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** Pretest; Posttest **Affect:** Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) **Depression:** The Center for Epidemiologic Studies Depression Scale (CES-D-20; Radloff, 1977) **Physical Symptoms:** The Daily Physical Symptoms (Larsen & Kasimatis, 1997) **Emotion Regulation:** Emotion Regulation Questionnaire (Gross, 2002) **Efficacy:** Teachers' Sense of Efficacy Questionnaire (TSES; Tschannen-Moran & Woolfolk Hoy, 2001) **Burnout:** Maslach Burnout Inventory (Educators' Survey) (MBI; Maslach, Jackson, & Leiter, 1997) **Time Pressure:** The Time Urgency Scale (TUS; Landy, Rastegary Thayer, & Colvin, 1991) **Mindfulness:** The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)
Notes	n.a.

Klatt et al. (2009)

Citation	Klatt, M. D., Buckworth, J., & Malarkey, W. B. (2009). Effects of low-dose mindfulness-based stress reduction (MBSR-ld) on working adults. *Health Education & Behavior, 36*, 601-614.
Aim of study	"[…] the purpose of this study was to determine whether the MBSR-ld program would produce a statistically significant decrease in symptoms of stress and yield adherence rates that mimicked those of traditional MBSR interventions (85%)." (p. 603)
Methods	**Study Design:** RCT
Participants	**Population:** university staff **Sample Size (randomized):** *N* = 42 **Age in Years, M(SD):** 45 (2.03); 18-60 **Sex (% female):** 75 **Country:** USA **Type of company:** Midwestern University
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: on campus Duration/Time: 6 weeks; 1x 1h-session/week Kind of mindfulness: MBSR-short (breathing, relaxation, body scans, gentle yoga movement) Delivery: training applied inclass **Control Group No. 1:** control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention **Stress:** Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) **Sleep Quality:** Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989): Participant Sleep Quality, Sleep Latency, Sleep Duration, Habitual Sleep Efficiency, Sleep Disturbances, Use of Sleep Medications, and Daytime Dysfunction **Mindfulness:** Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) -cognitive, emotional, physical, interpersonal, and general domains **Salivary Cortisol:** collected using a Salivette
Notes	n.a.

Klatt et al. (2017)

Citation	Klatt, M., Norre, C., Reader, B., Yodice, L., & White, S. (2017). Mindfulness in motion: A mindfulness-based intervention to reduce stress and enhance quality of sleep in Scandinavian employees. *Mindfulness*, *8*(2), 481-488.
Aim of study	"This study examined the effectiveness of the Danish translation of MIM and investigated the ability of MIM to reduce stress while enhancing quality of sleep and work engagement in bank employees of a non-American culture"
Methods	**Study Design:** RCT
Participants	**Population:** bank employees **Sample Size (randomized):** *N* = 57 **Age in Years, M(SD):** 42.9 (9.3); 18-60 **Sex (% female):** 69 **Country:** Copenhagen, Denmark **Type of company:** bank
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: worksite Duration/Time: 8 weeks; 1x 1h-session/week Kind of mindfulness: Mindfulness in Motion (MIM), includes reflective writing, community sharing among participants, mindfulness instruction and meditation, yoga, and relaxing music. Delivery: training applied inclass **Control Group No. 1:** control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** pre-intervention; week 8: post-intervention; follow up 9 weeks after intervention (intervention group only) **Stress:** Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) **Sleep Quality:** Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989): Participant Sleep Quality, Sleep Latency, Sleep Duration, Habitual Sleep Efficiency, Sleep Disturbances, Use of Sleep Medications, and Daytime Dysfunction **Work Engagement:** Utrecht Work Engagement Scale-9 (UWES-9; Schaufeli et al. 2006)- positive attitude towards job, increase or decrease of positive work elements
Notes	n.a.

Lacerda et al. (2018)

Citation	Lacerda, S. S., Little, S. W., & Kozasa, E. H. (2018). A stress reduction program adapted for the work environment: A randomized controlled trial with a follow-up. *Frontiers in Psychology*, *9*, 668.
Aim of study	"[…] to evaluate an in situ stress reduction program, named PROGRESS, developed to meet the specific needs of workers in a business context and to research its impact upon non-severe psychiatric symptoms, stress, anxiety, depression, processing speed/attention and mindfulness."
Methods	**Study Design:** RCT
Participants	**Population:** n.r. **Sample Size (randomized):** *N* = 44 **Age in Years, M(SD):** 36,6 (9,85) **Sex (% female):** 54,5 **Country:** Brazil **Type of company:** n.r.
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Progress-Group Setting: n.r. Duration/Time: 1 hour/week, 8 weeks Kind of mindfulness: Delivery: in-class **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre-intervention, post-intervention; 8-week follow-up **Mindfulness:** Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) **Psychiatric Symptoms:** Self-Report Questionnaire-20 (SRQ-20; Mari & Williams, 1985) **Stress:** Lipp Stress Symptoms Inventory (ISSL; Lipp, 2000) **Depression:** Beck Depression Inventory (BDI; Beck et al., 1961) **Anxiety:** Beck Anxiety Inventory (BAI; Beck, Epstein, Brown & Steer, 1988) **Processing Speed:** Digit-Symbol (DS WAIS- III; Wechsler, 2004)
Notes	n.a.

Lin et al. (2019)

Citation	Lin, L., He, G., Yan, J., Gu, C., & Xie, J. (2019). The Effects of a Modified Mindfulness-Based Stress Reduction Program for Nurses: A Randomized Controlled Trial. *Workplace Health & Safety*, 67, 111-122.
Aim of study	The purpose of the study was to evaluate the effects of a modified mindfulness-based stress reduction (MBSR) program on the levels of stress, affect, and resilience among nurses in general hospitals in mainland China.
Methods	**Study Design:** RCT
Participants	**Population:** nurses **Sample Size (randomized):** *N* = 110 **Age in Years, M(SD):** 31.5 (6.9) **Sex (% female):** 93% **Country:** China **Type of company:** hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: at work Duration/Time: 8 weeks; 2h-session/week; 20 minutes of formal mindfulness practice at home daily for 6 days a week for 8 weeks Kind of mindfulness: mindfulness-based group intervention generally based on the principles and exercises of MBSR (Kabat-Zinn, 1990) and MBCT (Teasdale et al., 2000). Delivery: in class **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention (8 weeks from baseline); follow-up (3 months from baseline) **Perceived Stress:** Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983; Chinese Version: Yang & Huang, 2003) **Positive and Negative Affect:** Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; Chinese Version: Huang, Yang, & Li, 2003) **Resilience:** Connor–Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003; Chinese Version: Yu & Zhang, 2007) **Job Satisfaction**: The McCloskey/Mueller Satisfaction Scale (MMSS; Mueller & McCloskey, 1990; Chinese Version: He, Zhang, & Bai, 2008)
Notes	n.a.

Mackenzie et al. 2006

Citation	Mackenzie, C. S., Poulin, P. A., & Seidman-Carlson, R. (2006). A brief mindfulness-based stress reduction intervention for nurses and nurse aides. *Applied Nursing Research, 19*, 105-109.
Aim of study	"The purposes of this study were to address the relative dearth of research on mindfulness training with nonclinical populations in general and practicing nurses and nurse aides specifically, and to describe and evaluate the efficacy of a brief version of the traditional MBSR program."
Methods	**Study Design:** RCT
Participants	**Population:** nurses **Sample Size (randomized):** *N* = 30 **Age in Years, M(SD):** 46.7 (7.34); n.r. **Sex (% female):** 96.7 **Country:** Canada **Type of company:** hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness Intervention group Setting: at work Duration/Time: 4 weeks; 1x 0.5h-session/week Kind of mindfulness: "a shortened version of the traditional MBSR program that synthesizes its main elements, is congruent with its underpinning philosophy, and is easier to incorporate into nurses' work schedules" Delivery: training applied inclass **Control Group No. 1:** waitlist-control group Type of Control Group: waitlist control group
Outcomes	**Time points for assessment:** pre-intervention; post-intervention **Burnout:** Maslach Burnout Inventory (Maslach, Jackson, & Leiter, 1996) **Relaxation:** Smith Relaxation Dispositions Inventory (SRDI; Smith, 2001) **Job Satisfaction:** Intrinsic Job Satisfaction subscale from the Job Satisfaction Scale (JSS; Koeske, Kirk, Koeske, & Rauktis, 1994) **Life Satisfaction:** Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) **Sense of Coherence:** Orientation to Life Questionnaire (OLQ; Antonovsky, 1987)
Notes	n.a.

Manotas et al. (2014)

Citation	Manotas, M., Segura, C., Eraso, M., Oggins, J., & McGovern, K. (2014). Association of brief mindfulness training with reductions in perceived stress and distress in Colombian health care professionals. *International Journal of Stress Management*, *21*, 207-225.
Aim of study	**"**This randomized, controlled study was designed to (a) replicate the benefits of mindfulness-based interventions in a community sample of health care employees at La Fundación Santa Fe de Bogota in Bogota, Colombia, a new population and geographic area; and (b) examine the efficacy of a 4-week mindfulness intervention."
Methods	**Study Design:** RCT
Participants	**Population:** health care providers **Sample Size (randomized):** *N* = 131 **Age in Years, M(SD):** 39,05 (8,11), 25-59 **Sex (% female):** 90,2 **Country:** Colombia **Type of company:** La Fundación Santa Fe de Bogota (FSFB)
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** experimental group Setting: at the hospital but could not be scheduled during work time Duration/Time: 4 weeks, one 2hr weekly session Kind of mindfulness: "adaptation of MBSR that taught the main elements of an MBSR course" Delivery: in-class, homework **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** Pre- and post-intervention **Psychological distress:** Spanish version of Brief Symptom Inventory-18 (BSI-18; Derogatis, 2001) **Stress:** Spanish version of Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) **Mindfulness:** Spanish version of FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)
Notes	n.a.

McConachie et al. (2014)

Citation	McConachie, D. A. J., McKenzie, K., Morris, P. G., & Walley, R. M. (2014). Acceptance and mindfulness-based stress management for support staff caring for individuals with intellectual disabilities. *Research in Developmental Disabilities, 35*, 1216-1227.
Aim of study	**"**This study examines the effectiveness of an acceptance and mindfulness-based stress management workshop on the levels of psychological distress and well-being of support staff working with individuals with ID and challenging behaviour."
Methods	**Study Design:** RCT
Participants	**Population:** support staff **Sample Size (randomized):** *N* = 156 **Age in Years, M(SD):** n.r. (n.r.), 19-69 **Sex (% female):** 74,2 **Country:** Scotland **Type of company:** Independent care organizations working with individuals with intellectual disability (ID)
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** intervention group Setting: n.r. Duration/Time: full day workshop, followed by a half day refresher session after six weeks Kind of mindfulness: ACT (detailed protocol: Bon, & Hayes, 2002) Delivery: in-class, homework **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** Pre/time 1, after six weeks at the refresher session (post/time 2), follow-up after a further six weeks (time 3) **Psychological distress:** General Health Questionnaire-12 (GHQ-12; Goldberg, 1992) **Psychological well-being:** Warwick-Edinburgh Mental Well-Being Scale (WEMWBS: Tennant et al., 2007) **Staff perception of work stressors:** Staff Stressor Questionnaire (SSQ: Hatton et al., 1999) **Experiential avoidance/psychological inflexibility:** Acceptance and Action Questionnaire-II (AAQ-II: Bond et al., 2011) **Thought suppression:** White Bear Suppression Inventory (WBSI: Wegner & Zanakos, 1994)
Notes	n.a.

Mistretta et al. (2018)

Citation	Mistretta, E. G., Davis, M. C., Temkit, M. H., Lorenz, C., Darby, B., & Stonnington, C. M. (2018). Resilience training for work-related stress among health care workers: results of a randomized clinical trial comparing in-person and smartphone-delivered interventions. *Journal of Occupational and Environmental medicine, 60,* 559-568.
Aim of study	The aim of this study was to assess whether an in-person mindfulness-based resilience training (MBRT) program or a smartphone-delivered resiliency-based intervention improved stress, well-being, and burnout in employees at a major tertiary health care institution. (p.559)
Methods	**Study Design:** RCT
Participants	**Population:** health care **Sample Size (randomized):** *N* = 37 **Age in Years, M(SD):** 47.35 (11,07) **Sex (% female):** 91,9% **Country:** USA **Type of company:** major tertiary health care institution (the Mayo Clinic)
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness-based resilience training (MBRT) with aspects of MBSR and ACT Setting: at work Duration/Time: 6 weeks Kind of mindfulness: Mindfulness-based resilience training incorporates two practices: learning mindfulness skills to deal effectively with unpleasant/ unwanted thoughts or experiences; and learning resilience skills to foster positive growth and behavior in keeping with one's intentions and values. Delivery: at work, audio **Control Group No. 1:** active control group Type of Control Group: active control, diary and sleep monitoring
Outcomes	**Time points for assessment:** baseline, post intervention (6 weeks from baseline), follow-up (3 months) **Depression, Anxiety and Stress:** Depression, Anxiety, and Stress Scales (DASS-21) **Well-being:** WHO (Five) Well-Being Index (WHO-5) **Work-related burnout:** MBI-Human Services Survey (MBI-HSS) **Compassion:** Self-Compassion Scale (SCS); Compassion for Others Scale
Notes	n.a.

Michel, 2014

Citation	Michel, A., Bosch, C., & Rexroth, M. (2014). Mindfulness as a cognitive–emotional segmentation strategy: An intervention promoting work–life balance. *Journal of Occupational and Organizational Psychology, 87(4)*, 733-754.
Aim of study	**"**In this study, the authors design and evaluate an intervention teaching mindfulness as a cognitive–emotional segmentation strategy to promote work–life balance."
Methods	**Study Design:** RCT
Participants	**Population:** participants in various occupations **Sample Size (randomized):** *N* = 412 **Age in Years, M(SD):** 41.41 (9.40) **Sex (% female):** 71.1% **Country:** Germany **Type of company:** n.r.; diverse
Programs	**Number of Intervention Groups:** 2 **Intervention Group No. 1:** experimental group Setting: n.r., probably at home Duration/Time: 3 weeks; PART A = basic information and practical exercises of approximately 20 min for the weekend, PART B = daily task of approximately 3–5 min for the following five working days (information and instructions online in a written, downloadable format; audio files for the mindfulness exercises were available on the project homepage; reminders per SMS or e-mail were offered) Kind of mindfulness: mindfulness intervention consisted of exercises related to mindfulness-based cognitive therapy (MBCT, Segal et al., 2002) and mindfulness-based stress reduction (MBSR, Kabat-Zinn, 1982, 2006) (Module 1: Reflecting segmentation, Module 2: Mindfulness and being in the present moment, Module 3: Mindfulness and coping with undesired thoughts and feelings) Delivery: Online instructions, audio files **Control Group No. 1:** control group Type of Control Group: passive control
Outcomes	**Time points for assessment:** pre, post, 2-week follow-up **Mindfulness:** seven items of the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) **Psychological detachment from work during time off:** respective 4-item subscale of the Recovery Experience Questionnaire (Sonnentag & Fritz, 2007) **Strain-based work-family conflict off:** 3-item subscale for strain-based WFC from the WFC Scale (Carlson, Kacmar, & Williams, 2000) adapted to focus on private life rather than family life **Satisfaction with work-life balance:** four items from the Satisfaction with Work–Family Balance Scale (Valcour, 2007)
Notes	n.a.

Molek-Winiarska & Żołnierczyk-Zreda (2018)

Citation	Molek-Winiarska, D., & Żołnierczyk-Zreda, D. (2018). Application of mindfulness-based stress reduction to a stress management intervention in a study of a mining sector company. *International Journal of Occupational Safety and Ergonomics*, 1-11.
Aim of study	The aim of this article was to check whether mindfulness-based stress reduction (MBSR) is an effective intervention in reducing work-related stress in the case of workers in a Coppermine (p.546)
Methods	**Study Design:** RCT
Participants	**Population:** copper mine workers **Sample Size (randomized):** *N* = 66 **Age in Years, M(SD):** 40.41 (7.08) **Sex (% female):** 0% **Country:** Poland **Type of company:** industrial
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Intervention Setting: at work Duration/Time: four 8-h group sessions, one 8-h group session (Mindfulness Day) over a period of 10 weeks Kind of mindfulness: The stress management intervention – MBSR training Delivery: inclass **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pretest, posttest **Work-related stress:** Karasek's job content questionnaire (JCQ; Polish version) **Mental health:** 28-item general health questionnaire (GHQ-28)
Notes	n.a.

Querstret, 2017

Citation	Querstret, D., Cropley, M., & Fife-Schaw, C. (2017). Internet-based instructor-led mindfulness for work-related rumination, fatigue, and sleep: Assessing facets of mindfulness as mechanisms of change A randomized waitlist control trial. *Journal of Occupational Health Psychology*, 22, 153-169.
Aim of study	**"**This study aimed to extend our theoretical understanding of how mindfulness-based interventions exert their positive influence on measures of occupational health. Employing a randomised waitlist control study design, we sought to: (1) assess an Internet-based instructor-led mindfulness intervention for its effect on key factors associated with 'recovery from work', specifically, work-related rumination, fatigue and sleep quality; (2) assess different facets of mindfulness (acting with awareness, describing, non-judging, and non-reacting) as mechanisms of change; and (3) assess whether the effect of the intervention was maintained over time by following up our participants after three and six months."
Methods	**Study Design:** RCT
Participants	**Population:** nursing/medicine (26.3%), healthcare (e.g., dieticians, physiotherapists; 20.3%), administration (19.5%), education (14.4%), management (8.5%), police (6.8%), and other (4.2%) **Sample Size (randomized):** *N* = 118 **Age in Years, M(SD):** 40.68 (10.45), 21-62 **Sex (% female):** 80.5% **Country:** Great Britain **Type of company:** diverse
Programs	**Number of Intervention Groups:** 2 **Intervention Group No. 1:** Intervention group (INT) Setting: n.r. Duration/Time: four weeks, 20-30min formal practice daily Kind of mindfulness: similar to 8-week mindfulness program (MBSR) Delivery: online **Control Group No. 2:** Waitlist control (WLC) Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre-treatment (T1) and post-treatment (T2) and were followed up at three months (T3) and six months (T4) post-treatment **Work-related rumination:** Work-Related Rumination Questionnaire (WRRQ, Cropley, Michalianou, Pravettoni, & Millward, 2012) **Work-related fatigue:** Occupational Fatigue Exhaustion Recovery scale (OFER, Winwood, Bakker, & Winefield, 2007) **Sleep quality:** Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds III, Monk, Berman, & Kupfer, 1988) **Mindfulness:** Five Facet Mindfulness Questionnaire Short form (FFMQ-SF; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011)
Notes	n.a.

Rao et al. (2017)

Citation	Rao, M., Metri, K. G., Raghuram, N., & Hongasandra, N. R. (2017). Effects of mind sound resonance technique (yogic relaxation) on psychological states, sleep quality, and cognitive functions in female teachers: A randomized, controlled trial. *Advances in Mind-Body Medicine, 31*, 4-9.
Aim of study	"[…] to determine the efficacy of 1 month of MSRT practice on a number of variables, including psychological states, cognitive function, sleep quality, and fatigue in female teachers."
Methods	**Study Design:** RCT
Participants	**Population:** Teacher **Sample Size (randomized):** *N* = 60 **Age in Years, M(SD):** 41,5 (8,5) **Sex (% female):** 100% **Country:** India **Type of company:** school
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** MSRT Group Setting: silent room Duration/Time: 30 min/ day; 5 days/ week, 4 weeks Kind of mindfulness: "The mind sound resonance technique (MSRT) is a mindfulness-based yoga technique consisting of recitation of a mantra that repeatedly generates a sound resonance throughout the body" Delivery: in-class **Control Group No. 1:** control group Type of Control Group: passive
Outcomes	**Time points for assessment:** pre-intervention, post-intervention **Stress:** Perceived Stress Scale (PSS-10; Cohen, Kamarck & Mermelstein, 1983) **Sleep Quality:** Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1988) **Cognitive Function:** Digit Letter Substitution Test (DLST) **State Anxiety, Trait Anxiety:** State-Trait Anxiety Inventory for Adults (STAI-A; Spielberger, 2010) **Psychological Distress:** general health questionnaire (GHQ-12; Goldberg & Williams, 1988) **Self-esteem:** Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965)
Notes	n.a.

Rexroth et al. (2017)

Citation	Rexroth, M., Michel, A., & Bosch, C. (2017). Promoting well-being by teaching employees how to segment their life domains. *Zeitschrift für Arbeits- und Organisationspsychologie*
Aim of study	"Based on boundary theory, this study aims to evaluate whether mindfulness as a cognitive–emotional segmentation strategy has not only positive effects on work–life balance-related outcomes"
Methods	**Study Design:** RCT
Participants	**Population:** working adults **Sample Size (randomized):** *N* = 246 **Age in Years, M(SD):** 41,41 (9,4) **Sex (% female):** 71,1% **Country:** Germany **Type of company:** mixed
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Setting: online Duration/Time: 3 weeks Kind of mindfulness: "Building on boundary theory (Ashforth et al., 2000; Nippert-Eng, 1996) and a two-component model of mindfulness comprising self-regulation of attention and mindful orientation to experiences (Bishop et al., 2004), we composed an online-based intervention that should enable participants to better manage the boundary between their life domains." Delivery: online (audio) **Control Group No. 1:** Wait-list control group Type of Control Group: wait-list control
Outcomes	**Time points for assessment:** pre, post, follow-up (2 weeks) **Mindfulness:** Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) **Burnout:** Oldenburg Burnout Inventory (OLBI; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Demerouti et al., 2003) **Life Satisfaction**: single-item scale (Lucas & Donnellan, 2011)
Notes	n.a.

Roeser et al. (2013)

Citation	Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., ... & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology*, *105*, 787-804.
Aim of study	"Our purpose in this study was to test the feasibility and efficacy of a professional development program for teachers aimed at the reduction of job stress and symptoms of burnout through mindfulness training (MT)."
Methods	**Study Design:** RCT
Participants	**Population:** teachers **Sample Size (randomized):** *N* = 113 **Age in Years, M(SD):** 46,9 (9,2), 27-64 **Sex (% female):** 89% **Country:** Canada, U.S. **Type of company:** public schools
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness group Setting: after school Duration/Time: 8 weeks, 11 sessions, 36hrs in total Kind of mindfulness: Mindfulness Training Program (Benn, Akiva, Arel, & Roeser, 2012) Delivery: in-class, homework **Control Group No. 1:** Control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** Baseline/T1, post-program/T2 (after 8 week intervention), follow-up/T3 (after 3 months) **Mindfulness:** Five Factor Mindfulness Questionnaire (FFM; Baer et al., 2008) **Focused attention and WMC:** Operation Span Task (Ospan; Turner & Engle, 1989) **Occupational self-compassion:** modified Neff's Self-Compassion Scale (Neff, 2003) **Occupational stress:** 7 items from Classroom Appraisal of Resources and Demands (CARD; Lambert, McCarthy, & Abbott-Shim, 2001) and 2 additional items used in another paper before (Roeser, & Medley, 1997) **Occupational burnout:** Maslach Burnout Inventory (MBI; Maslach et al., 2001) **Symptoms of anxiety and depression**: State subscale of the State–Trait Anxiety Inventory (STAI) for Adults (Kendall, Finch, Auerbach, Hooke, & Mikulka, 1976) and the Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996) **Teacher absences from work:** teachers' self-reported number of days absent from work due to illness as a behavioral indicator of stress and burnout

continued on the next page

	Physiological indicators of stress: indicators of sympathetic nervous arousal and limbic-hypothalamic-pituitary-adrenal (L-HPA) axis functioning; blood pressure; heart rate **Salivary cortisol**: with a home stress kit **Program acceptability and feasibility measures**: a MT program evaluation survey
Notes	n.a.

Schroeder et al. (2016)

Citation	Schroeder, D. A., Stephens, E., Colgan, D., Hunsinger, M., Rubin, D., & Christopher, M. S. (2018). A brief mindfulness-based intervention for primary care physicians: a pilot randomized controlled trial. *American Journal of Lifestyle Medicine*, *12*, 83-91.
Aim of study	"[…] to explore whether a brief MBI, compared with a waitlist control group, would reduce burnout and stress and increase mindfulness, compassion, and resilience from baseline to 3-month follow-up in a group of physicians."
Methods	**Study Design:** RCT, pilot
Participants	**Population:** health care providers **Sample Size (randomized):** *N* = 33 **Age in Years, M(SD):** 42,76 (8,43), 32-61 **Sex (% female):** 73 **Country:** USA **Type of company:** family medicine and internal medicine departments at Providence Health and Services
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** experimental group Setting: at the hospital but could not be scheduled during work time Duration/Time: 4 weeks, 13-hour weekend training program plus 2-hour follow-up sessions scheduled at 2 and 4 weeks after the weekend Kind of mindfulness: "modified version of MBSR, with added elements of compassion skills training, brief mindfulness techniques designed to be used at work, and SLO (speaking, listening, observing) conversation exercises" Delivery: in-class **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre, post, follow-up (after 3 months) **Mindfulness:** Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) **Resilience:** Brief Resilience Scale (BRS; Smith, Dalen, Wiggins, Tooley, Christopher & Bernard, 2008) **Stress:** Perceived Stress Scale (PSS-10; Cohen, Kamarck & Mermelstein, 1983) **Compassion:** Santa Clara Brief Compassion Scale (SCBCS; Hwang, Plante & Lackey, 2008) **Burnout:** Maslach Burnout Inventory (MBI; Maslach, & Jackson, 1981, 1986)
Notes	n.a.

Sheppard et al. (1997)

Citation	Sheppard, W. D., Staggers Jr, F. J., & John, L. (1997). The effects of a stress management program in a high security government agency. *Anxiety, Stress, and Coping, 10*, 341-350.
Aim of study	"This study arose from a request to implement a stress management program in a high-security U.S. government agency worksite reported to be highly stressful. The task was to create a simple, but effective, short-term intervention that would alleviate the subjective perception of workplace stress that many of the employees were reporting. The agency already had a commercial stress management package within its health care department, "Manage Your Stress" ("Manage", 1980), but it had fallen into disuse. We decided to resurrect this program as an educational control and measure its impact as well as that of a frequently researched meditation technique, Transcendental Meditation. For indicators of intervention impact we relied on blood pressure and self-report measures of well-being" (p. 342)
Methods	**Study Design:** RCT
Participants	**Population:** Managers (l5%), clerical (26%), and technical (59%) staff **Sample Size (randomized):** *N* = 44 **Age in Years, M(SD):** 50,5 (n.r.) **Sex (% female):** 15% **Country:** U.S. **Type of company:** high-security government agency
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** TM group Setting: at work Duration/Time: 12 weeks, 1h-sessions every two weeks (11hrs.), 20min individual practice at home (5hrs.) Kind of mindfulness: Transcendental Meditation (TM) Delivery: in-class, individual practice **Control Group No. 1:** CSM group Type of Control Group: active (Corporate Stress Management)
Outcomes	**Time points for assessment:** Basline, 3 months (after intervention), 3 years (follow-up) **Blood pressure:** () **State and trait anxiety:** State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) **Depression:** IPAT Depression Scale (Krug & Laughlin, 1976) **Self-concept:** Tennessee Self-concept Scale (Roid & Fitts, 1989)
Notes	n.a.

Shonin, 2014

Citation	Shonin, E., Van Gordon, W., Dunn, T. J., Singh, N. N., & Griffiths, M. D. (2014). Meditation Awareness Training (MAT) for work-related well-being and job performance: A randomised controlled trial. *International Journal of Mental Health and Addiction*, *12(6)*, 806-823.
Aim of study	The objective of the present study was to undertake an empirical investigation to evaluate the effect of a secular Buddhist-derived MBI known as Meditation Awareness Training (MAT; Van Gordon, Shonin, Sumich, Sundin, & Griffiths, 2014b) on work-related well-being and job performance in full-time employees
Methods	**Study Design:** RCT
Participants	**Population:** office-based employees with middle management responsibility **Sample Size (randomized):** *N* = 152 **Age in Years, M(SD):** 40,03 (8,39), MAT = 40.14 (8.11), Active Control = 39.91 (8.67) **Sex (% female):** 56,9, MAT = 56.9%, Active Control = 56.9% **Country:** UK **Type of company:** mixed
Programs	**Number of Intervention Groups:** 2 **Intervention Group No. 1:** MAT group Setting: n.r. Duration/Time: 8 weeks, one 90min workshop weekly Kind of mindfulness: secular Buddhist-derived MBI known as Meditation Awareness Training (MAT; Van Gordon, Shonin, Sumich, Sundin, & Griffiths, 2014b) Delivery: in-class, 2 one-to-one support session of 50min, daily practice **Control Group No. 2:** Control group Type of Control Group: active (cognitive-behavioural theory and principles)
Outcomes	**Time points for assessment:** Baseline, Endpoint (8 weeks), Follow-up (3 months) **Work-Related Stress:** the UK Health and Safety Executive (HSE) Management Standards Work-related Stress Indicator (WSIT; Cousins, MacKay, Clarke, Kelly, Kelly, & McCaig, 2004) **Job satisfaction:** Abridged Job in General Scale (AJIGS; Russel, Spitzmuller, Lin, Stanton, Smith, & Ironson, (2004) **Emotional Distress:** Depression, Anxiety, and Stress Scale (DASS; Lovibond & Lovibond, 1995) **Work performance:** Role-Based Performance Scale (RBPS; Welbourne, Johnson, & Erez, 1998)

Singh et al. (2018)

Citation	Singh, N. N., Lancioni, G. E., Medvedev, O. N., Myers, R. E., Chan, J., McPherson, C. L., ... & Kim, E. (2018). Comparative effectiveness of caregiver training in mindfulness-based positive behavior support (MBPBS) and positive behavior support (PBS) in a randomized controlled trial. *Mindfulness*, 1-13.
Aim of study	"[…] aimed to evaluate the comparative effectiveness of training caregivers in MBPBS and PBS."
Methods	**Study Design:** RCT
Participants	**Population:** caregivers from community group homes that provided services to people with intellectual and developmental disabilities **Sample Size (randomized):** *N* = 123 **Age in Years, M(SD):** 43,4 (9,28) **Sex (% female):** 71% **Country:** USA **Type of company:** mixed
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1: MBPBS** Setting: at work Duration/Time: 7-day course spread over 10 weeks Kind of mindfulness: MBPBS (mindfulness based positive behavior support) Delivery: in-class **Control Group No. 1: PBS** Type of Control Group: active control (positive behavior support)
Outcomes	**Time points for assessment:** pre, post **Stress:** Perceived Stress Scale-10 (PSS-10; Cohen et al. 1983) **Quality of life:** Professional Quality of Life (ProQOL; Stamm, 2010)
Notes	n.a.

Song and Lindquist (2015)

Citation	Song, Y., & Lindquist, R. (2015). Effects of mindfulness-based stress reduction on depression, anxiety, stress and mindfulness in Korean nursing students. *Nurse Education Today, 35*, 86-90.
Aim of study	"the purpose of this study was to examine whether MBSR is effective, and has potential as an intervention to decrease depression, anxiety and stress, and to improve mindfulness of Korean nursing students."
Methods	**Study Design:** RCT
Participants	**Population:** undergraduate nursing students (1st–4th grades) from KN University College of Nursing in South Korea **Sample Size (randomized):** *N* = 50 **Age in Years, M(SD):** MBSR: 19.6 (1.7); WL: 19.5 (2.0) **Sex (% female):** MBSR: 81%; WL: 82.6% **Country:** South Korea **Type of company:** University College of Nursing
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** MBSR treatment group Setting: n.r. Duration/Time: 8 weeks, weekly one 2h session Kind of mindfulness: MBSR; main contents were the standard elements of yoga, sitting, walking, breath-work, body scan, and eating meditation Delivery: in-class **Control Group No. 1:** waiting-list control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pretest- posttest **Depression, Anxiety, Stress:** Depression, Anxiety and Stress Scale-21 (DASS-21; Psychology Foundation of Australia, 2013) **Mindfulness:** Mindfulness Attention Awareness Scale (MAAS) Korean version (Park, 2006)
Notes	n.a.

Steinberg et al. (2017)

Citation	Steinberg, B. A., Klatt, M., & Duchemin, A. M. (2017). Feasibility of a mindfulness-based intervention for surgical intensive care unit personnel. *American Journal of Critical Care*, *26*, 10-18.
Aim of study	"[…] to determine the feasibility of this intervention in a real-world working population."
Methods	**Study Design:** RCT, pilot
Participants	**Population:** hospital health care workers (Surgical Intensive Care Unit) **Sample Size (randomized):** *N* = 32 **Age in Years, M(SD):** 44,1 (11,5) **Sex (% female):** 88% **Country:** USA **Type of company:** large academic medical center (level I trauma center)
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** MBI group Setting: at work (conference room) during work hours Duration/Time: 1h/ session, 1 session/ week, 8 weeks Kind of mindfulness: "combination of mindfulness and light yoga practices with music" Delivery: in-class **Control Group No. 1:** Wait-list control group Type of Control Group: wait-list control
Outcomes	**Time points for assessment:** pre, post (after 8 week intervention) **Burnout:** Maslach Burnout Inventory (MBI; Maslach, Jackson & Leiter, 1996) **Professional Quality of Life:** ProQOL (Stamm, 2005) **Work Engagement:** Utrecht Work Engagement Scale (UWES; Schaufeli, Bakker & Salanova, 2006)
Notes	n.a.

Strub and Tarquinio (2013)

Citation	Strub, L., & Tarquinio, C. (2013). Effets de la Mindfulness-Based Cognitive Therapy (MBCT) sur le stress et les symptômes associés dans un contexte industriel: Une étude-pilote contrôlée et randomisée. *Santé mentale au Québec*, *38*, 207-225.
Aim of study	**"**The transposition of the princeps model has been the subject of a controlled and randomized experimental trial performed on a non-clinical population working in an industrial environment to assess the effect of the aforesaid program on stress and associated symptoms."
Methods	**Study Design:** RCT, Pilot
Participants	**Population:** employes, managers europeens, managers de departement, et superviseurs de department **Sample Size (randomized):** *N* = 20 **Age in Years, M(SD):** n.r. (n.r.) **Sex (% female):** 40% female **Country:** Luxembourg **Type of company:** d'une usine de metallurgie
Programs	**Number of Intervention Groups: 1** **Intervention Group No. 1:** MBCT group Setting: at work Duration/Time: for 4h session every two months Kind of mindfulness: MBCT and "here-and-now"-exercises Delivery: in-class and practice at home **Control Group No. 1:** control group Type of Control Group: passive
Outcomes	**Time points for assessment:** pre, post **Perceived stress:** Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983 ; Cohen, & Williamson, 1988) **Work-related stress:** Le stress au travail (Legeron., 2003) **Burnout:** Maslach Burnout Inventory (MBI; Maslach, & Jackson, 1981, 1986) **General health:** General Health Questionnaire (GHQ-28; Goldberg, & Hillier (1979) **Depression:** Beck Depression Inventory (BDI; Beck et al., 1961)
Notes	n.a.

Tagg, 2016

Citation	Tagg, R. (2016). *Decreasing stress in paraprofessionals working with children with autism using a brief, blended mindfulness intervention*. Doctoral Dissertation, Alliant International University, San Diego.
Aim of study	"1. Will participation in the blended stress-reduction program decrease the perceived stress of the ABA paraprofessionals? 2. Will participation in the blended stress-reduction program decrease the level of occupational burnout of the ABA paraprofessionals? 3. Will participation in the blended stress-reduction program increase the mindfulness behaviors of the ABA paraprofessionals?"
Methods	**Study Design:** RCT
Participants	**Population:** ABA paraprofessionals **Sample Size (randomized):** *N* = 70 **Age in Years, M(SD):** 22 (n.r.), 18-51 **Sex (% female):** n.r. **Country:** USA **Type of company:** agencies which provide Applied Behavior Analysis (ABA) services to children with a diagnosis of or at risk ASD
Programs	**Number of Intervention Groups:** 2 **Intervention Group No. 1:** Mindfulness Group Setting: n.r. Duration/Time: 2h workshop on day one, then 9-11min guided mindfulness activities during the next four days as homework Kind of mindfulness: Kabat-Zinn Delivery: in-class, homework **Control Group No. 2:** ABA Group Type of Control Group: active
Outcomes	**Time points for assessment:** Pre-test (within the three days before the start of the intervention period), Post-test (within two days of the end of the intervention period) **Burnout:** Maslach Burnout Inventory – Human Services Inventory (MBI-HSS) (Maslach Burnout Inventory Manual, 1996) **Perceived stress:** Perceived Stress Scale - 10 Items (PSS-10; Cohen, Kamarck, & Mermelstein, 1983) **Mindfulness:** Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)
Notes	n.a.

Taylor et al. (2016)

Citation	Taylor, C., Harrison, J., Haimovitz, K., Oberle, E., Thomson, K., Schonert-Reichl, K., & Roeser, R. W. (2016). Examining ways that a mindfulness-based intervention reduces stress in public school teachers: A mixed-methods study. *Mindfulness, 7*, 115-129.
Aim of study	"to examine four potential ways by which the MBI reduced teacher stress, including by (1) increasing their efficacy for regulating emotion on the job; (2) improving their ways of coping with stress at work; (3) increasing their efficacy for forgiving colleagues and students at work following conflict, as well as the tendency to do so; and (4) increasing teachers' tendency to feel compassion for people generally, and for challenging students in particular"
Methods	**Study Design:** RCT
Participants	**Population:** elementary and secondary school teachers **Sample Size (randomized):** *N* = 59 **Age in Years, M(SD):** median = 47 (n.r.), 28-63 **Sex (% female):** 90% female **Country:** Canada **Type of company:** public schools
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness training group Setting: in a public school setting Duration/Time: 9 weeks, 11 sessions, 36 total contact hours plus 16 hours homework Kind of mindfulness: Stress Management and Relaxation Training (SMART; Cullen and Brito 2014) Delivery: in-class, homework **Control Group No. 1:** Waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre, post (after 9 week intervention), follow-up (4 months post-intervention) **Occupational Stress:** 7 items from the Classroom appraisal of resources and demands: school-age version (CARD; Lambert, McCarthy, & Abbott-Shim, 2001) and two additional items **Efficacy for Regulating Emotion at Work:** nine self-created items **Dispositional Compassion:** Santa Clara Brief Compassion Scale (Hwang. Plante, & Lackey 2008) **Dispositional and Situation-Specific Forgiveness:** Tendency to Forgive scale (TFF; Brown, & Ryan, 2003), stimulated-recall method of assessing forgiveness (Brown, & Phillips, 2005) **Efficacy for Forgiving Others at Work:** two self-created items **Teachers' Coping at Work:** interview
Notes	n.a.

Valley et al. (2017)

Citation	Valley, M. A., & Stallones, L. (2017). Effect of mindfulness-based stress reduction training on health care worker safety. *Journal of Occupational and Environmental Medicine, 59*, 935-941.
Aim of study	"[…] to determine: (1) the MBSR intervention results in a greater decrease in cognitive failure […]; (2) the MBSR intervention results in a greater increase in safety compliance […]; (3) the MBSR intervention results in a greater increase in safety participation […]; (4) if the MBSR program leads to a sustained decrease in self-reported workplace cognitive failure and safety compliance and participation among hospital care workers 6 months after completing the intervention."
Methods	**Study Design:** RCT
Participants	**Population:** hospital health care workers **Sample Size (randomized):** *N* = 23 **Age in Years, M(SD):** n.r **Sex (% female):** 91% **Country:** Colorado **Type of company:** hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Mindfulness-based Stress Reduction (MBSR) Setting: n.r. Duration/Time: 8 weeks, 2,5-hour weekly sessions plus one 7-hour session Kind of mindfulness: guided instruction in mindfulness meditation focusing on breathing, gentle stretching and yoga, and group discussions about improving awareness Delivery: in-class **Control Group No. 1:** Wait-list control group Type of Control Group: wait-list control
Outcomes	**Mindfulness:** Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003) **Productivity:** Workplace Cognitive Failure (Wallace & Chen, 2005) **Workplace Safety Performance:** Workplace Safety Performance (Neal, Griffin & Hart, 2000)
Notes	n.a.

Verweij et al. (2018)

Citation	Verweij, H., van Ravesteijn, H., van Hooff, M. L., Lagro-Janssen, A. L., & Speckens, A. E. (2018). Mindfulness-based stress reduction for residents: A randomized controlled trial. *Journal of General Internal Medicine*, *33*, 429-436.
Aim of study	"[…] to determine the effectiveness of MBSR in reducing burnout in residents."
Methods	**Study Design:** RCT
Participants	**Population:** Residents **Sample Size (randomized):** *N* = 148 **Age in Years, M(SD):** 31,2 (4,6) **Sex (% female):** 88% **Country:** Netherlands **Type of company:** University Medical Center
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Intervention group Setting: n. r. Duration/Time: 2,5h/ session, 1 session/week, 8 weeks Kind of mindfulness: MBSR-program including body scan, yoga, meditation and psycho-education about stress Delivery: in-class **Control Group No. 1:** waitlist control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** Pretest; Posttest **Burnout:** Maslach Burnout Inventory (MBI; Maslach et al.,1986) **Subsyndromal Symptoms:** Penn State Worry Questionnaire (Meyer, Miller, Metzger & Borkovec, 1990) **Work-Home-Conflict:** Survey Work-home Interaction NijmeGen (SWING; Geurts, Taris, Kompier, Dikkers, Van Hooff & Kinnunen, 2005) **Mindfulness:** Mindfulness Questionnaire Short Form (Bohlmeijer, ten Klooster, Fledderus, Veehof & Baer, 2011) **Self-Compassion:** Self-Compassion Scale Short Form (Raes, Pommier, Neff & Van Gucht, 2011) **Well-being:** Mental Health Continuum-Short Form (MHCSF; Keyes,2002) **Empathy:** Jefferson Scale of Physician Empathy (Hojat, Mangione, Nasca et al., 2001) **Productivity:** Questions regarding *medical errors* developed by Pins et al. (Prins, Van der Heijden, Hoekstra-Weebers et al., 2009)
Notes	n.a.

Wilson (2012)

Citation	Wilson, D. M. (2012). *Effects of mindfulness-based art processing (MBAP) on the well-being and job performance of working adults: Evaluating a novel intervention*. Doctoral Dissertation, Sofia University, Paolo Alto.
Aim of study	**"**The present study assessed the effects of a novel mindfulness-based intervention, Mindfulness-Based Art Processing (MBAP), on the well-being and job performance of a working adult population. Essentially, MBAP combines positive psychology and art processing techniques with mindfulness-based practices, such as those found in a low-dose mindfulness-based stress reduction (MBSR-ld) program in an attempt to synergize the benefits of each modality"
Methods	**Study Design:** RCT
Participants	**Population:** a company specialized in information technology (2000 employees), a company specialized in clean energy resources (1000 employees, a specialized in wellness services, such as massage therapy, acupuncture, and energy healing (200 employees), and an organization comprising of mental health and social service practitioners (150 employees) **Sample Size (randomized):** $N = 80$ **Age in Years, M(SD):** n.r. (n.r.); 23-64 **Sex (% female):** 66,3% **Country:** Austin, Texas **Type of company:** three diverse companies and a non-profit organization
Programs	**Number of Intervention Groups:** 2 **Intervention Group No. 1:** MBSR-low-dose (MBSR-ld) Setting: n.r. Duration/Time: 8 weeks, 1-hour weekly meetings, 4x 20min individual practice at work weekly (with CD and DVD) Kind of mindfulness: to be trained in the mindfulness activities outlined by the MBSR-ld program (Klatt et al., 2009) Delivery: in-class, homework **Intervention Group No. 2:** MBAP group Setting: n.r. Duration/Time: 8 weeks, 1hr weekly session, 4x 20min homework activities each week Kind of mindfulness: Mindfulness-Based Art Processing (MBAP) is oriented towards increasing mindful awareness and well-being; participants engaged in multiple mindfulness activities and completed a number of art projects with different mediums. They processed their experiences and art by themselves, in dyads, and in small and large groups; Mindfulness-based art therapy (MBAT; Monti et al., 2006) Delivery: in-class, homework **Control Group No. 1:** No-treatment group (No-Tx) Type of Control Group:

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Outcomes	**Time points for assessment:** pre-treatment, post-treatment, 4-week follow-up **Work motivation:** Work Motivation Form-Employee (WMF-E; Deci & Ryan, 1985; Kasser, Davey, & Ryan, 1992) **Work engagement:** Utrecht Work Engagement Scale (UWES; Schaufeli & Bakker, 2003) **Subjective well-being:** Satisfaction with Life Scale (SWLS; Diener et al., 1985) **Psychological well-being:** Scales of Psychological Well-being (SPWB; Ryff, 1989) **Perceived stress:** Perceived Stress Scale (PSS-10; Cohen, Kamarck, & Mermelstein, 1983) **Sleep quality:** Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1988) **Mindfulness:** Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer, Smith, Lykins, Button, Krietemeyer, & Sauer, 2008)
Notes	n.a.

Wolever et al. (2012)

Citation	Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: A randomized controlled trial. *Journal of Occupational Health Psychology*, *17*, 246-258.
Aim of study	**"**We propose to expand the current literature by using a larger RCT to evaluate the effectiveness of two mind-body workplace stress reduction programs designed to be highly accessible to employees: a mindfulness-based stress management intervention and a therapeutic yoga-based stress reduction program."
Methods	**Study Design:** RCT
Participants	**Population:** employees of a national insurance carrier **Sample Size (randomized):** *N* = 239 **Age in Years, M(SD):** 42,9 (n.r.); Control: 42.7 (9.7), Mindfulness: 44.3 (9.4), Yoga: 41.6 (10.1) **Sex (% female):** 76,6% (Control = 81,1%, Mindfulness = 77,1%, Yoga = 73,3%) **Country:** U.S.A. **Type of company:** insurance carrier
Programs	**Number of Intervention Groups:** 2 **Intervention Group No. 1:** Mindfulness Group Setting: two Mindfulness at Work programs designed to be delivered at worksites Duration/Time: 12 weeks, 14-hours long, 1 hour weekly, 2-hr session at week 10 Kind of mindfulness: The Mindfulness at Work program teaches mindfulness practices that explicitly target work-related stress, work-life balance, and self-care. These practices are relatively brief (5–15 min) and are specifically designed to be used at work. The program itself is also designed to be delivered at worksites; Baer, 2003; Kabat-Zinn, 1994; Wilbur, Engler & Brown, 1984 Delivery: one group in-person in a classroom and other group online virtual classroom that allowed for real-time bidirectional communication **Intervention Group No. 2:** Yoga group Setting: at two worksites (one in Hartford, CT and one in Walnut Creek, CA) Duration/Time: 12 weeks, one hour weekly Kind of mindfulness: Viniyoga Stress Reduction Programm (American Viniyoga Institute AVI), for managing stress including asanas (physical postures of yoga), breathing techniques, guided relaxation, mental techniques, and education about starting a home practice Delivery: in-class, instructional handouts for short yoga breaks at home and at work and 50% received a DVD to support home practice **Control Group No. 1:** control group Type of Control Group: passive control (controls were given a list of resources available to all employees of the national insurance carrier with discounted fitness programs, employee assistance programs, behavioral health services for depression, chair massage sessions, and wellness coaching opportunities)

continued on the next page

Outcomes	**Time points for assessment:** pre, post **PSS total score:** Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) **Sleep quality:** Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, (1989) **Mood and pain:** Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) **Productivity:** Work Limitations Questionnaire (WLQ; Lerner, Amick, Rogers, Malspeis, Bungay, & Cynn, 2001) **Mindfulness:** Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) **Blood pressure, breathing rate, HRV**
Notes	n.a.

Yang et al. (2018)

Citation	Yang, J., Tang, S., & Zhou, W. (2018). Effect of mindfulness-based stress reduction therapy on work stress and mental health of psychiatric nurses. *Psychiatria Danubina, 30*, 189-196.
Aim of study	"[…], stress intervention on psychiatric nurses was conducted through the use of mindfulness therapy, and the effect of such intervention on the mental health of psychiatric nurses was examined."
Methods	**Study Design:** RCT
Participants	**Population:** Psychiatric Nurses **Sample Size (randomized):** *N* = 100 **Age in Years, M(SD):** 29,5 (7,1) **Sex (% female):** 68% **Country:** China **Type of company:** hospital
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** Setting: nurse station Duration/Time: 8 weekly sessions Kind of mindfulness: relaxation, mindfulness breathing, mindfulness meditation Delivery: in-class **Control Group No. 1:** control group Type of Control Group: active control group
Outcomes	**Time points for assessment:** pre-intervention, post-intervention **General Distress:** Symptom Checklist 90 (SCL; Wang, Yu, Shen, Ye, Hu, Yu et al. 2017) **Depression:** Self-Rating Depression Scale (SDS; Peng, Zhang, Tan, Li, Yan et al., 2013) **Anxiety:** Self-Rating Anxiety Scale (SAS; Hao, Li, Yang, Yang & Petridis, 2016) **Stress:** Nursing Stress Scale (NSS; Li & Liu, 2000)
Notes	n.a.

Żołnierczyk-Zreda et al. (2016)

Citation	Żolnierczyk-Zreda, D., Sanderson, M. & Bedyńska, S. (2016). Mondfulness-based stress reduction for managers: A randomized controlled study. *Occupational Medicine, 66,* 630-635.
Aim of study	"To examine the potential for work-related stress management using MBSR for middle-level Managers who are considered to be particularly affected by the negative effects of stress related to organizational restructuring."
Methods	**Study Design:** RCT
Participants	**Population:** Middle-level managers **Sample Size (randomized):** *N* = 156 **Age in Years, M(SD):** 39,4 (8,4), 28-56 **Sex (% female):** 49% female **Country:** Poland **Type of company:** companies in the financial and service sectors, such as insurance companies, banks and advertising agencies
Programs	**Number of Intervention Groups:** 1 **Intervention Group No. 1:** MBSR group Setting: n.r. Duration/Time: 8 weeks, weekly 180-min group sessions, one 7h session Kind of mindfulness: MBSR Delivery: in-class and homework (6x 20min each week) **Control Group No. 1:** control group Type of Control Group: waitlist control
Outcomes	**Time points for assessment:** pre-intervention, post-intervention **Work-related stress:** Occupational Stress Indicator (OSI-2; Cooper, Sloan, Williams, 1988) **Positive and negative affect:** Bradburn's Affect Experience Index (AEI; Bradburn, 1969) **Self-esteem:** Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) **Subjectively perceived physical health:** Health Questionnaire (HQ) scale (Widerszal-Bazyl, Cieślak, & Najmiec, 1995)
Notes	n.a.

11.2 Anhang B: Forest- und Funnel plots der Metaanalyse

- **B1.1:** Mindfulness Post-Intervention
- **B1.2:** Mindfulness Follow-Up
- **B2.1:** Well-being Post-Intervention
- **B2.2:** Well-being Follow-Up
- **B3.1:** Compassion Post-Intervention
- **B3.2:** Compassion Follow-Up
- **B4.1:** Stress Post-Intervention
- **B4.2:** Stress Follow-Up
- **B5.1:** Subynd. Symptoms Post-Intervention
- **B5.2:** Subsynd. Symptoms Follow-Up
- **B6.1:** Burnout Post-Intervention
- **B6.2:** Burnout Follow-Up
- **B7.1:** Somatization / Phsyical Illness Post-Intervention
- **B8.1:** Work Engagement Post-Intervention
- **B9.1:** Productivity Post-Intervention
- **B10.1:** Job Satisfaction Post-Intervention
- **B11.1:** Resilience Post-Intervention

In the **forest plots**, each box represents a standardized mean comparison score (Hedges' g) of the mindfulness vs. control group in a certain primary study. The box sizes symbolize the inverse of the sampling variance, resulting in larger dots for more precise studies or larger sample sizes, respectively. Error bars indicate 95% Confidence Intervals.

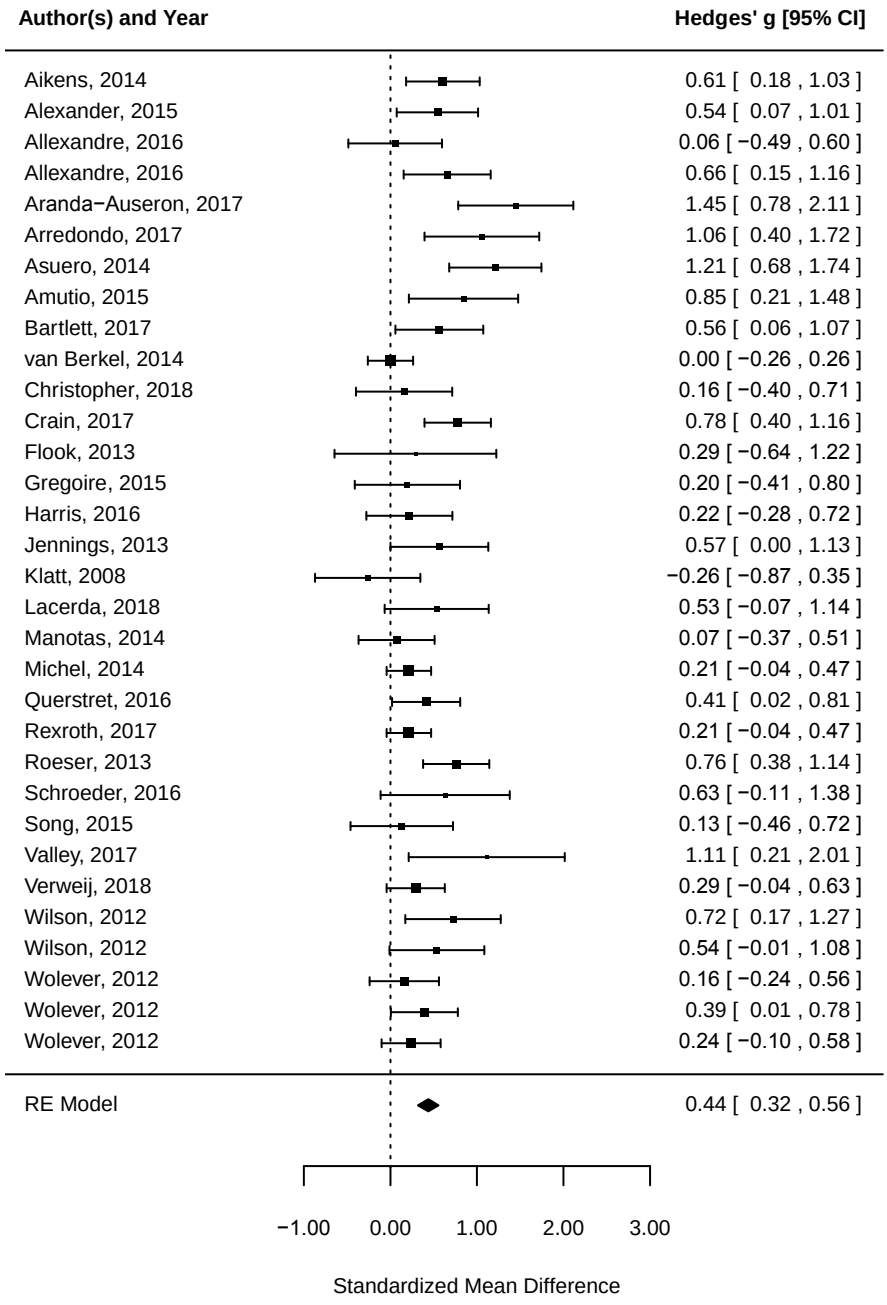
In the **funnel plots**, standardized mean comparison scores and study precision scores (standard error) are presented.

Cook's distance is a statistical method to examine what effect the deletion of single studies has on the fitted values of all studies simultaneously (Cook & Weisberg, 1982). According to Viechtbauer & Cheung (2010), the Cook's distance value can be interpreted as the Mahalanobis distance between the entire set of predicted values once with the single study included and once with the single study excluded from the model fitting.

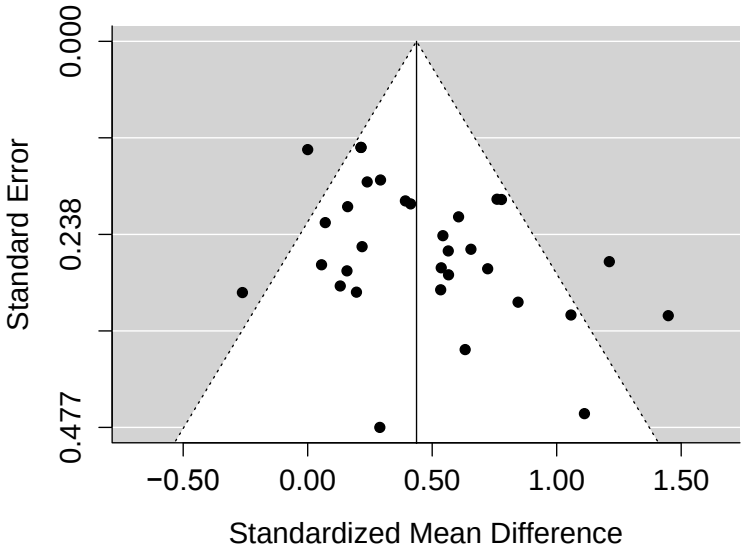
Egger's regression test was used to analyze funnel plot asymmetry (Egger, Smith, Schneider, & Minder, 1997). For the regression test for funnel plot asymmetry a weighted regression model with multiplicative dispersion and standard error as predictor was used. Significance indicates funnel plot asymmetry, which in turn indicates a high risk of publication bias.

B1.1: Mindfulness Post-Intervention

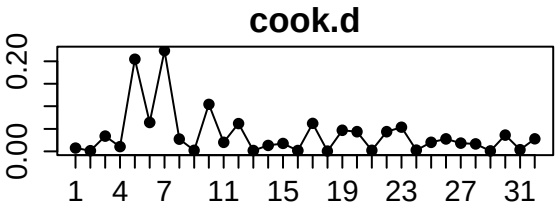
B1.1.1: Forest Plot



B1.1.2: Funnel Plot



B1.1.3: Outlier Analysis (Cook's distance)



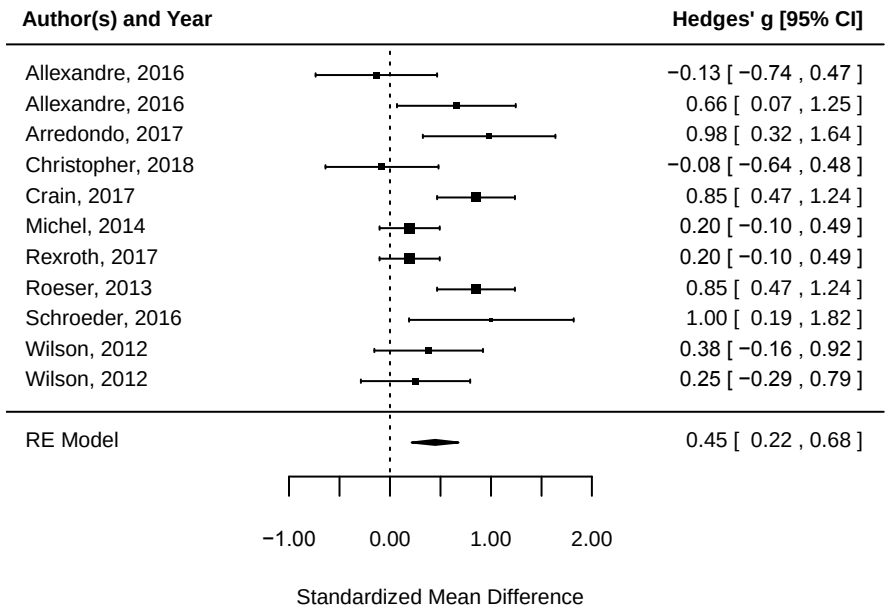
B1.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

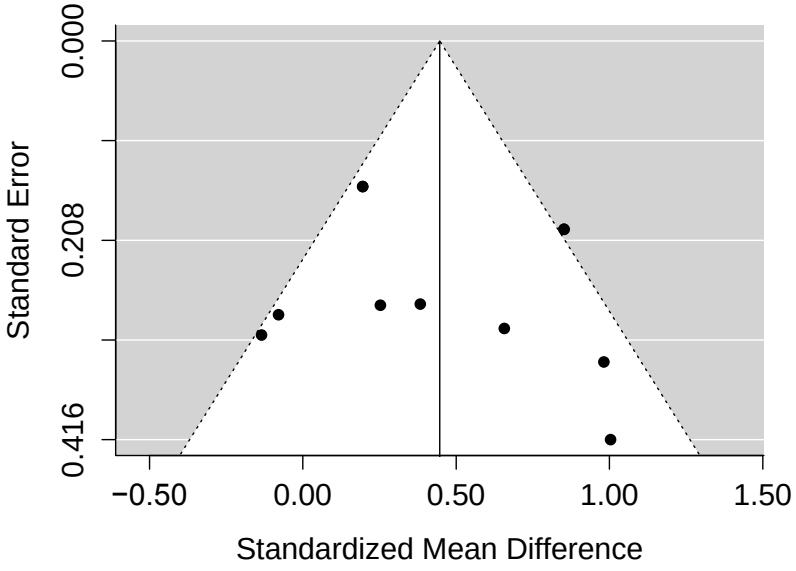
$t(30) = 2.88$, $p < .01$

B1.2: Mindfulness Follow-Up

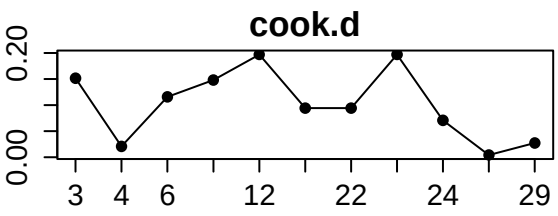
B1.2.1: Forest Plot



B1.2.2: Funnel Plot



B1.2.3: Outlier Analysis (Cook's distance)



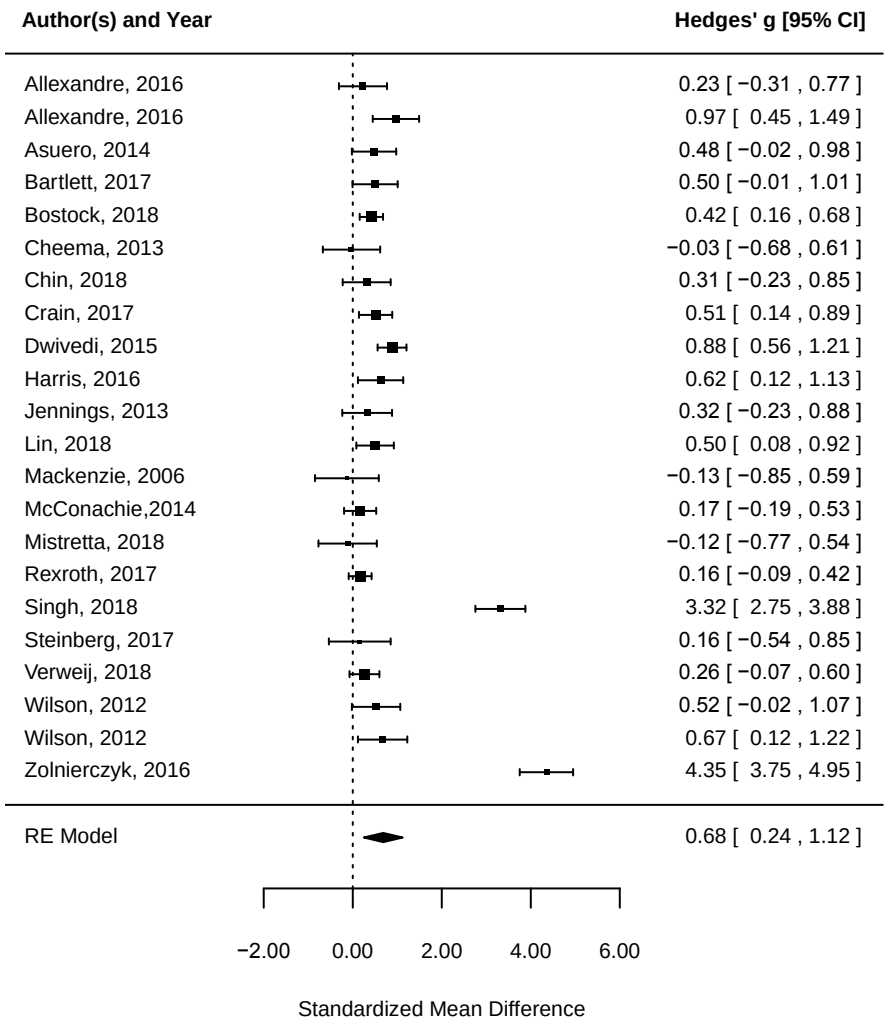
B1.2.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

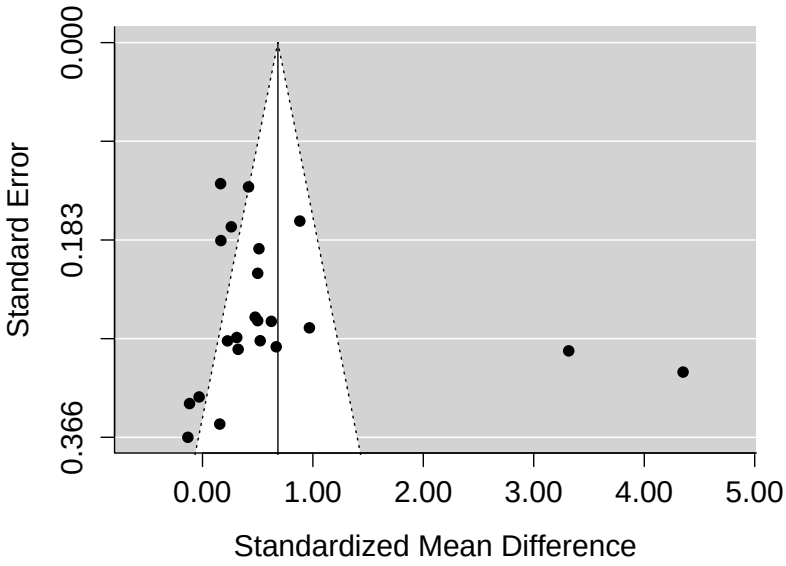
$t(9) = 0.70$, $p = .504$

B2.1: Well-being Post-Intervention

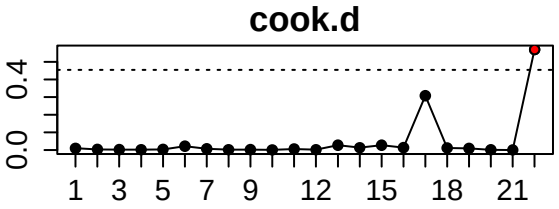
B2.1.1: Forest Plot



B2.1.2: Funnel Plot



B2.1.3: Outlier Analysis (Cook's distance)



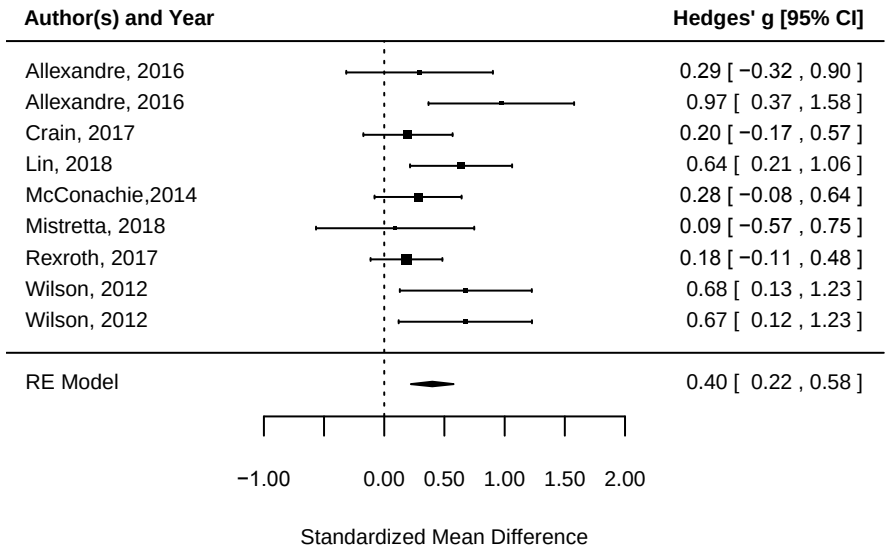
B2.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

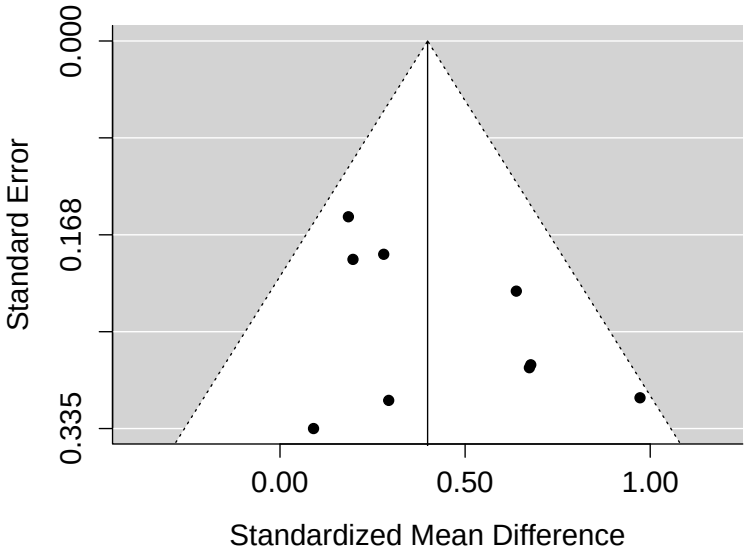
$t(20) = 1.14$, $p = .269$

B2.2: Well-being Follow-Up

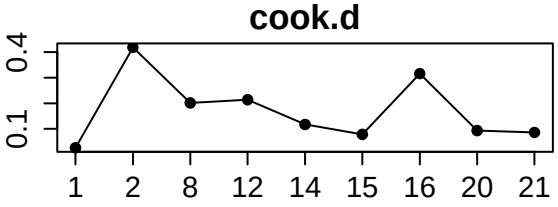
B2.2.1: Forest Plot



B2.2.2: Funnel Plot



B2.2.3: Outlier Analysis (Cook's distance)



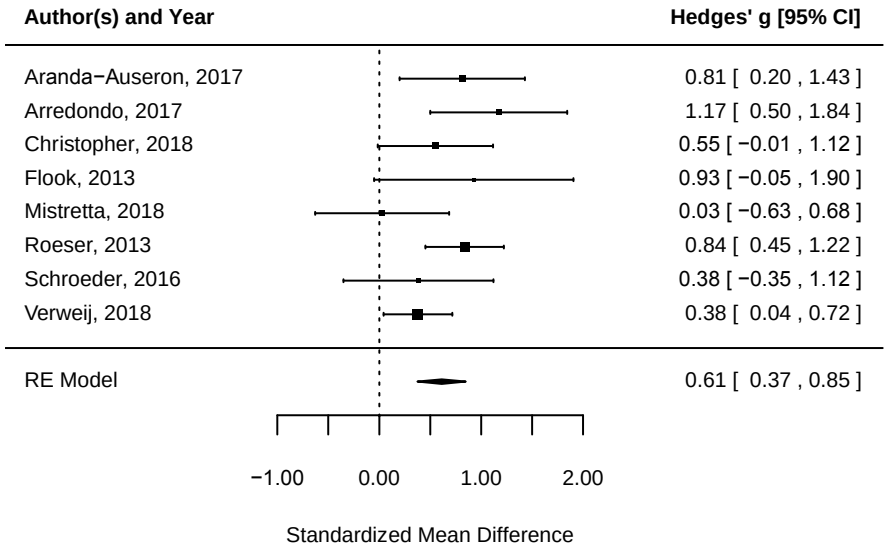
B2.2.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

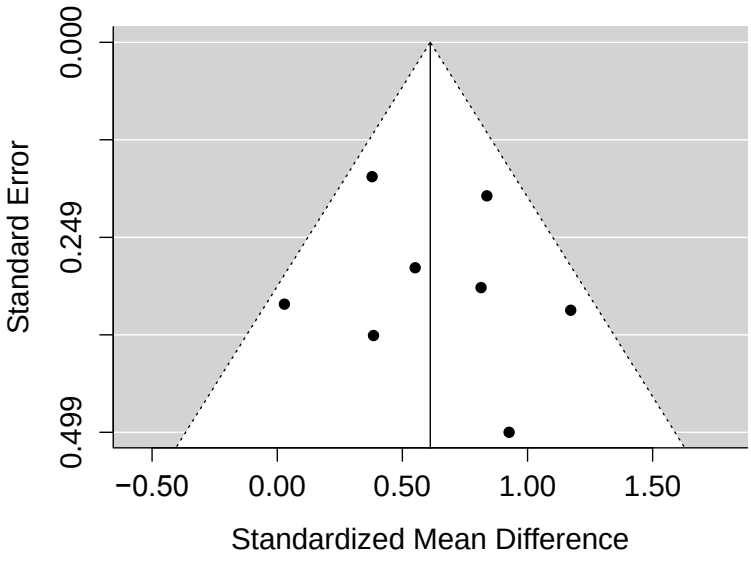
$t(7) = 1.71$, $p = .131$

B3.1: Compassion Post-Intervention

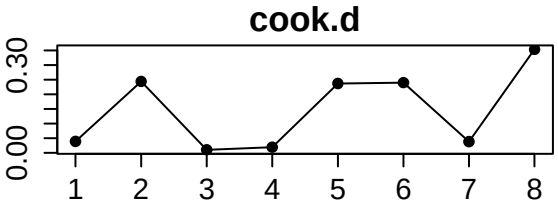
B3.1.1: Forest Plot



B3.1.2: Funnel Plot



B3.1.3: Outlier Analysis (Cook's distance)



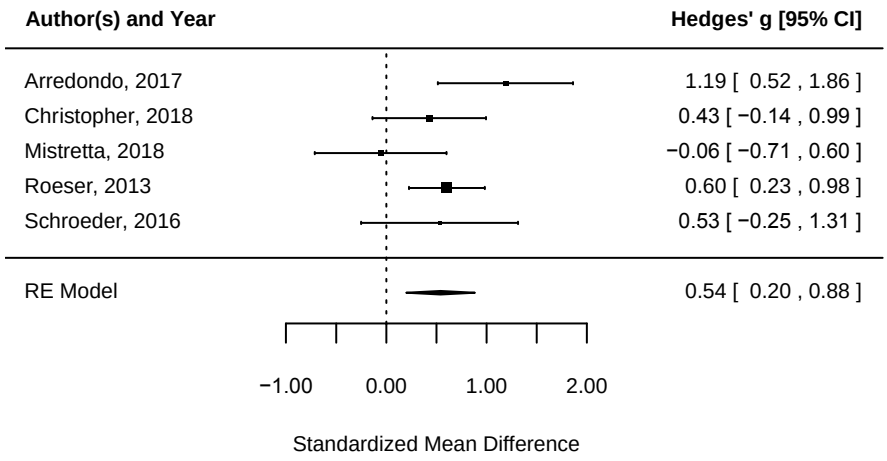
B3.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

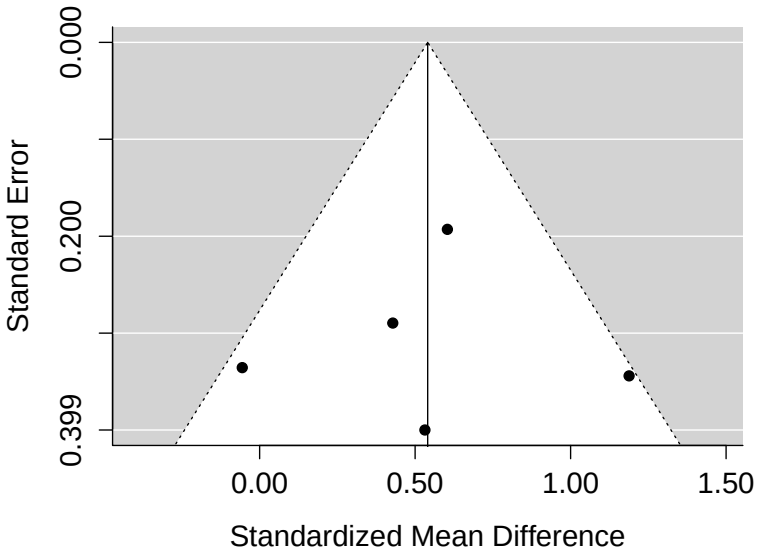
$t(6) = 0.45$, $p = .667$

B3.2: Compassion Follow-Up

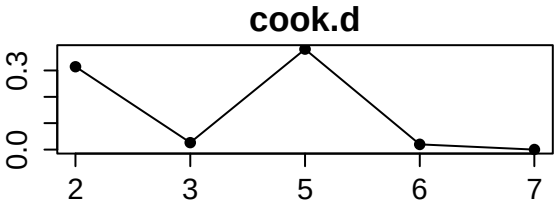
B3.2.1: Forest Plot



B3.2.2: Funnel Plot



B3.2.3: Outlier Analysis (Cook's distance)



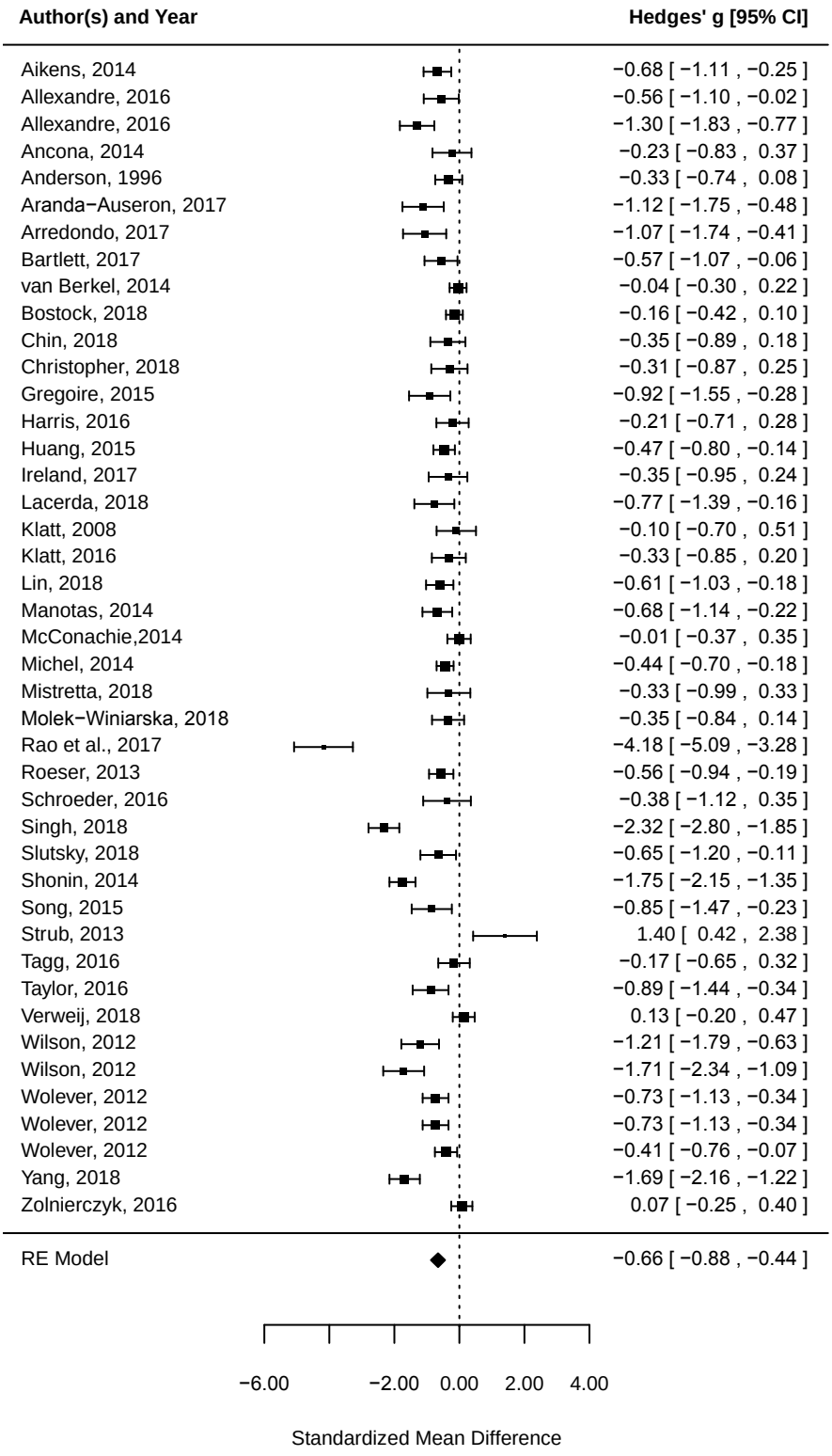
B3.2.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

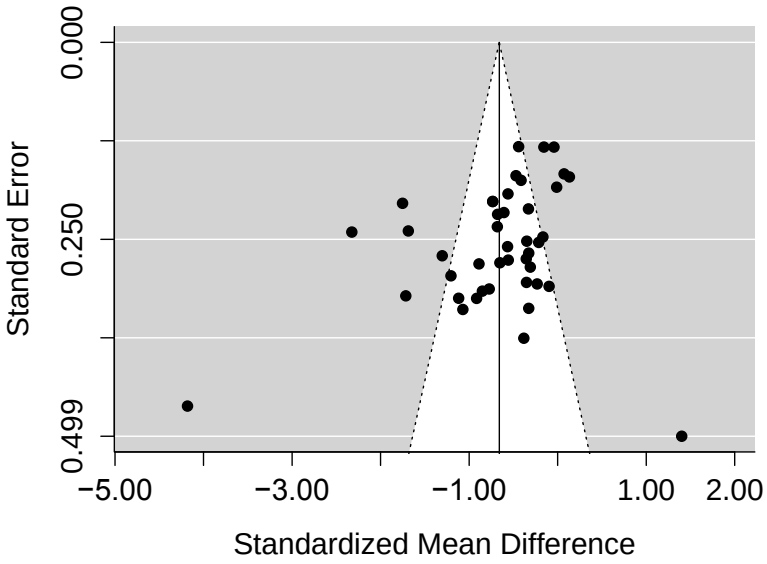
$t(3) = -0.12$, $p = .912$

B4.1: Stress Post-Intervention

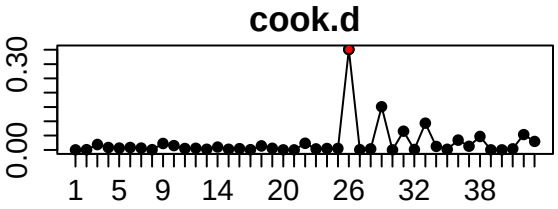
B4.1.1: Forest Plot



B4.1.2: Funnel Plot



B4.1.3: Outlier Analysis (Cook's distance)



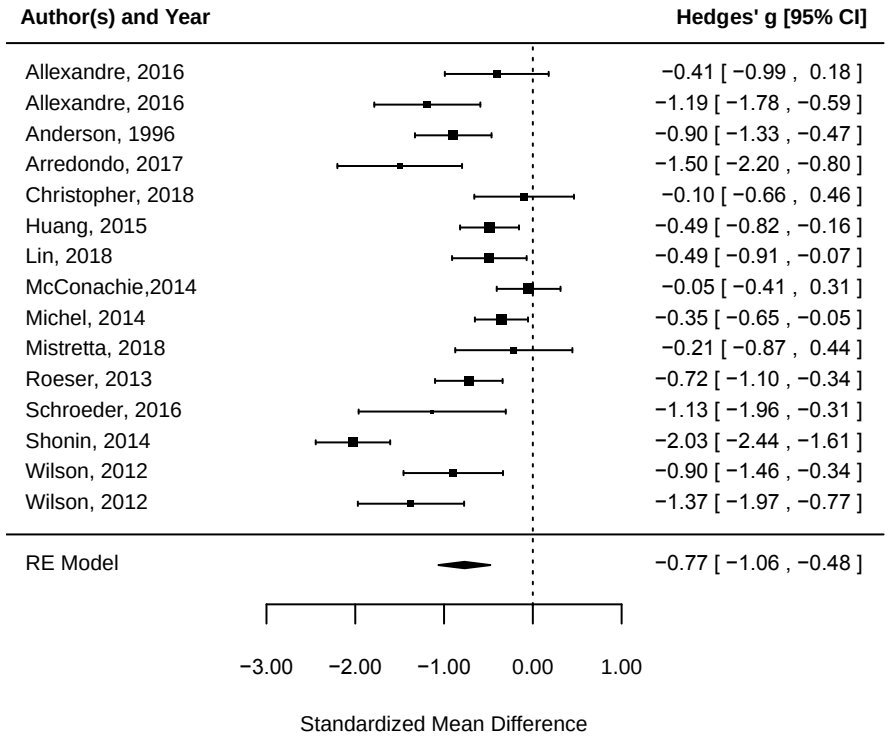
B4.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

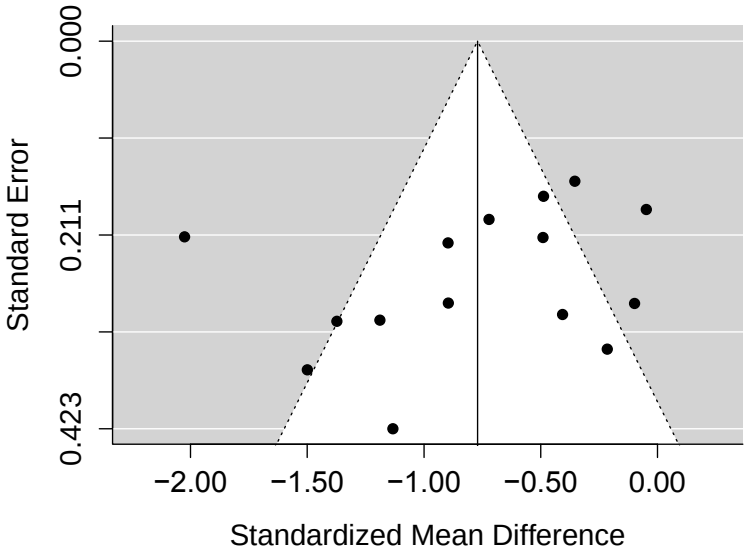
$t(41) = -2.61$, $p = .013$

B4.2: Stress Follow-Up

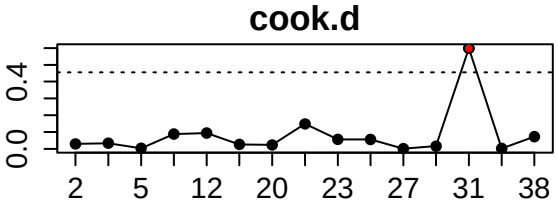
B4.2.1: Forest Plot



B4.2.2: Funnel Plot



B4.2.3: Outlier Analysis (Cook's distance)



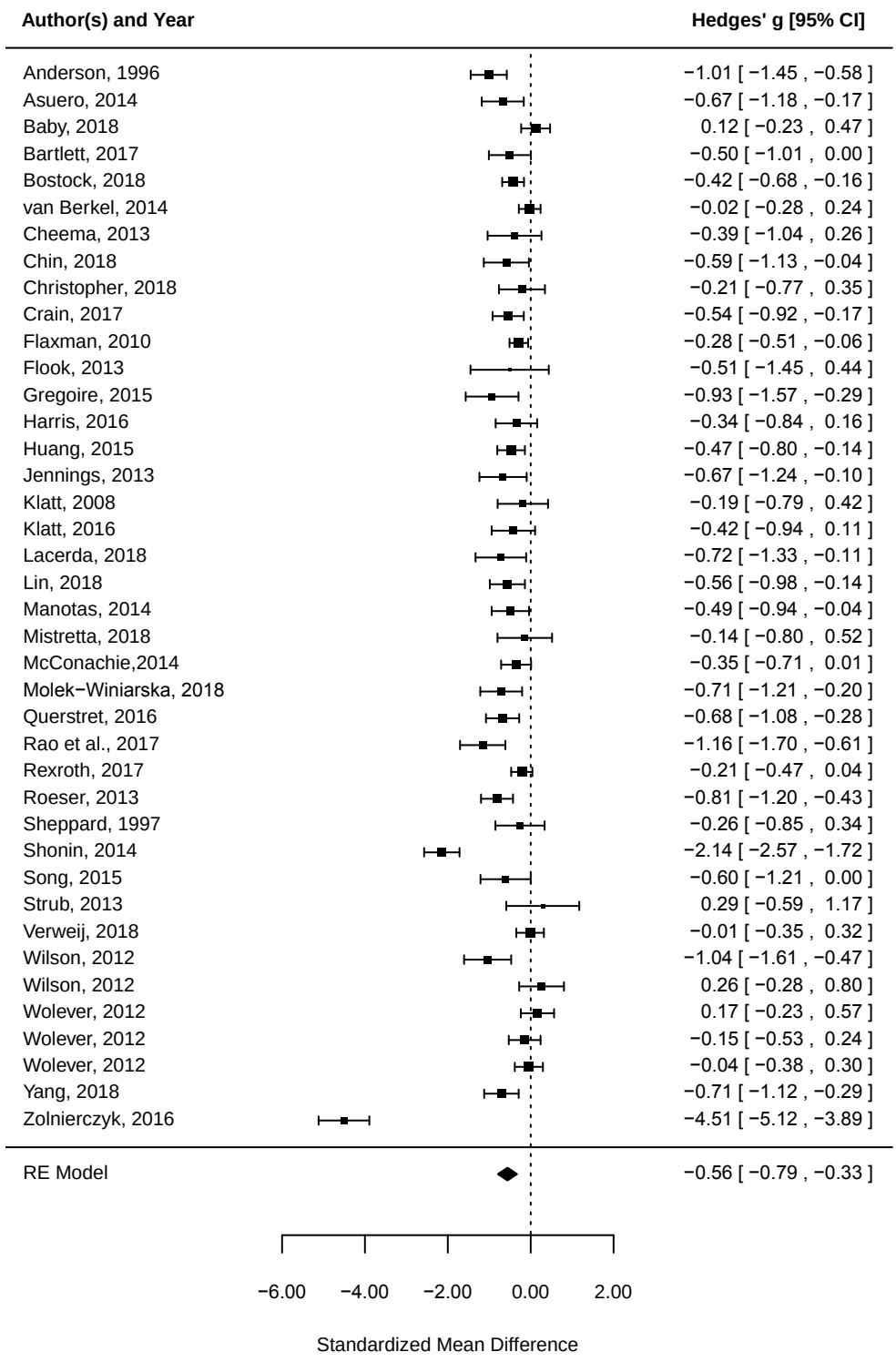
B4.2.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

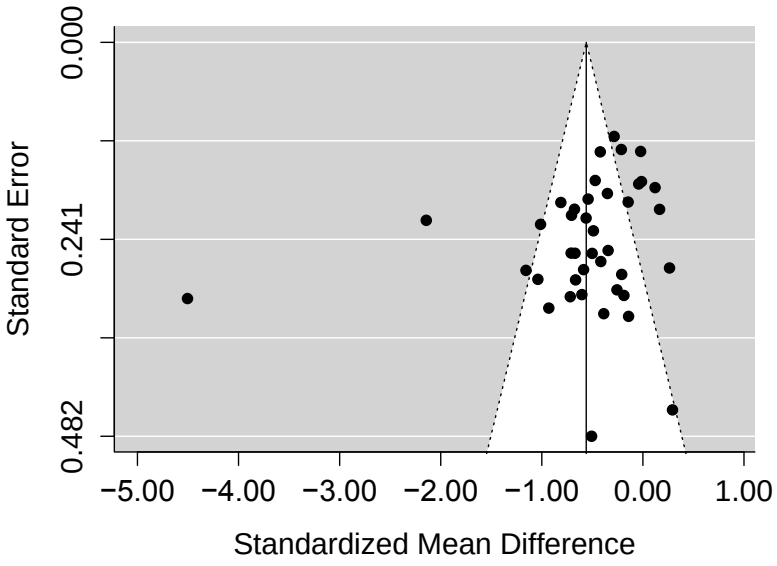
$t(13) = -1.27$, $p = .220$

B5.1: Subsynd. Symptoms Post-Intervention

B5.1.1: Forest Plot



B5.1.2: Funnel Plot



B5.1.3: Outlier Analysis (Cook's distance)

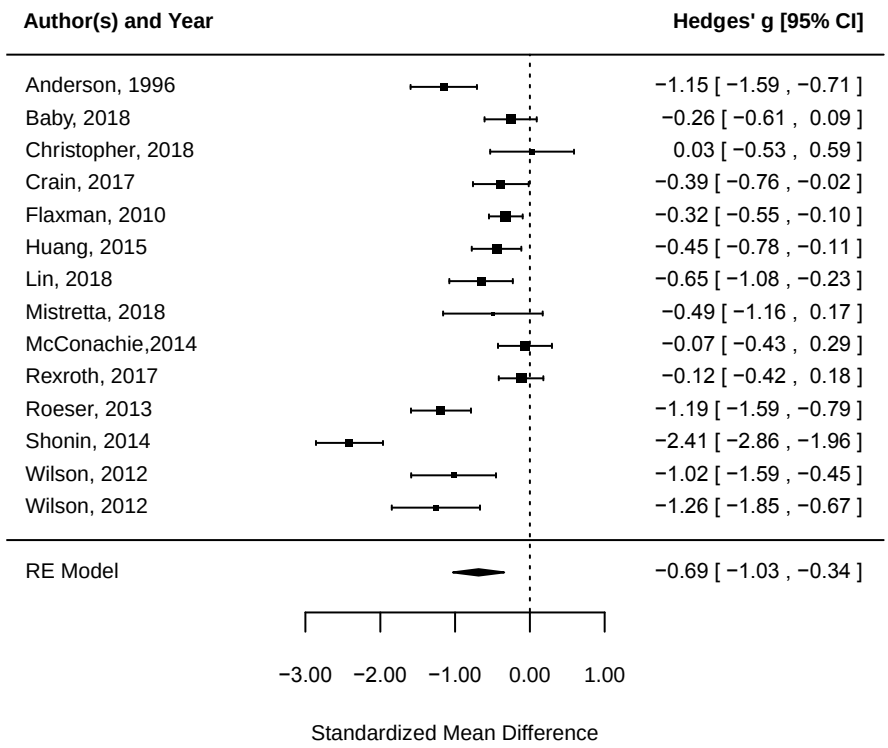
B5.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

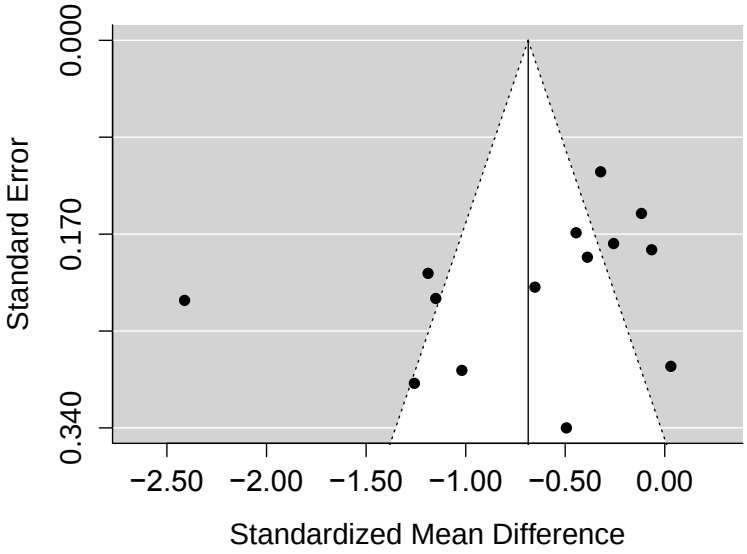
$t(38) = -1.98$, $p = .055$

B5.2: Subsynd. Symptoms Follow-Up

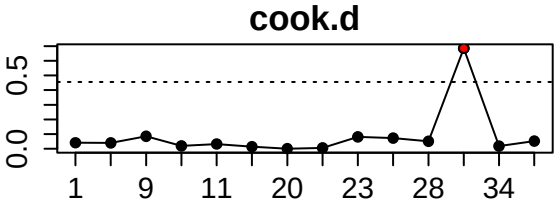
B5.2.1: Forest Plot



B5.2.2: Funnel Plot



B5.2.3: Outlier Analysis (Cook's distance)



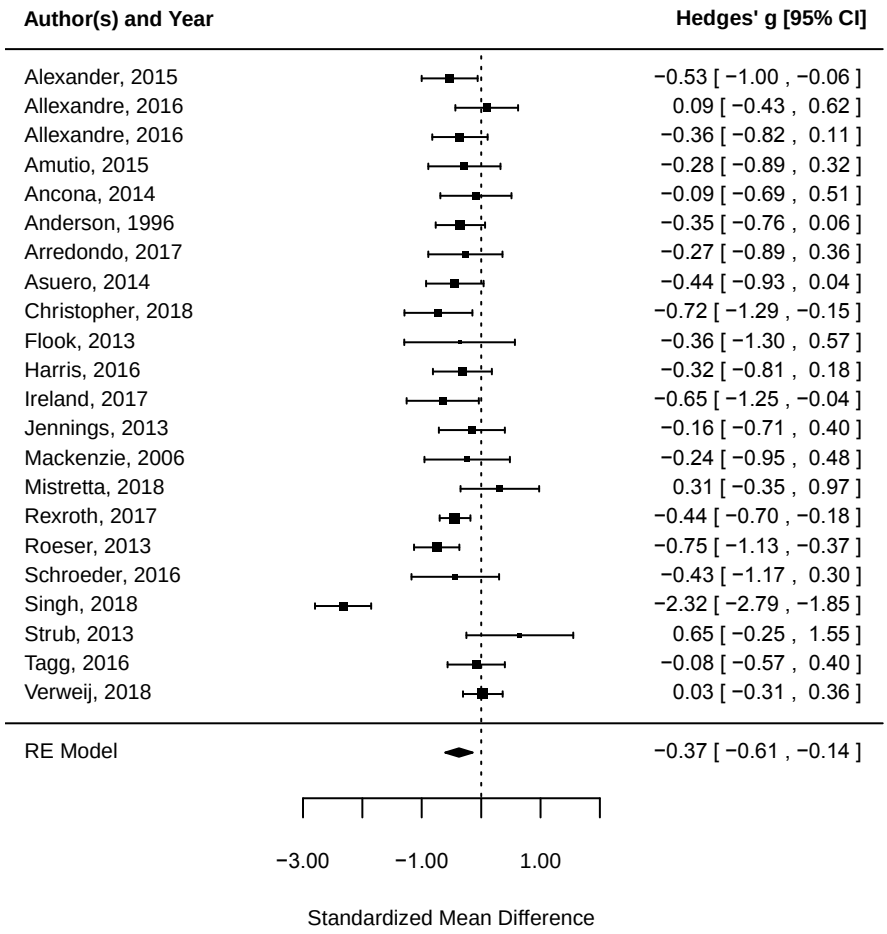
B5.2.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

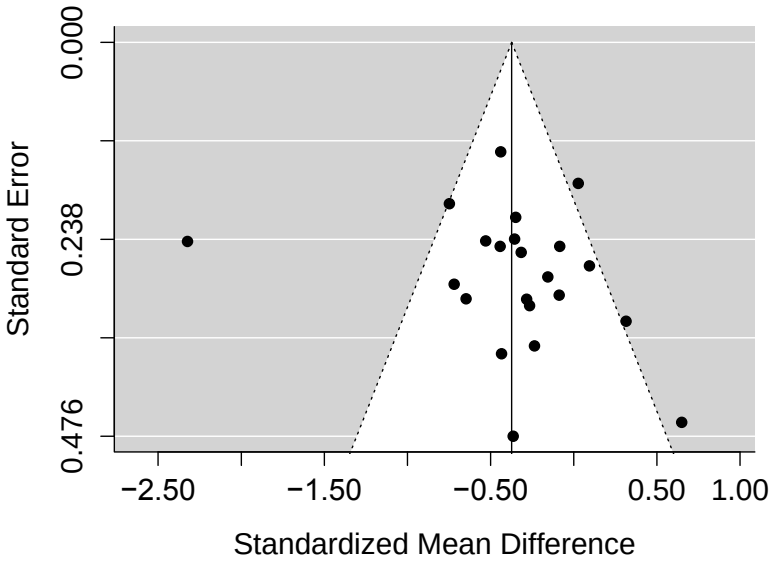
$t(12) = -1.66$, $p = .120$

B6.1: Burnout Post-Intervention

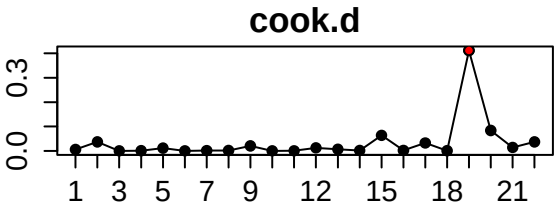
B6.1.1: Forest Plot



B6.1.2: Funnel Plot



B6.1.3: Outlier Analysis (Cook's distance)



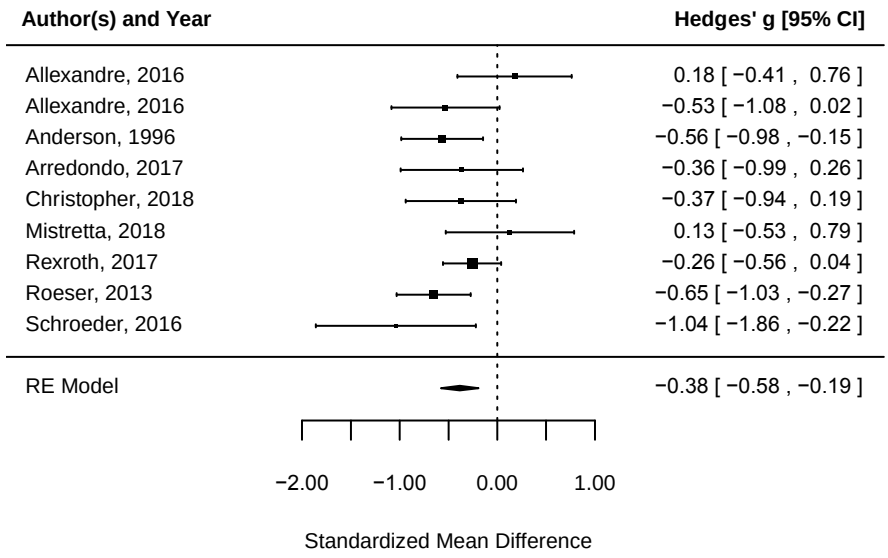
B6.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

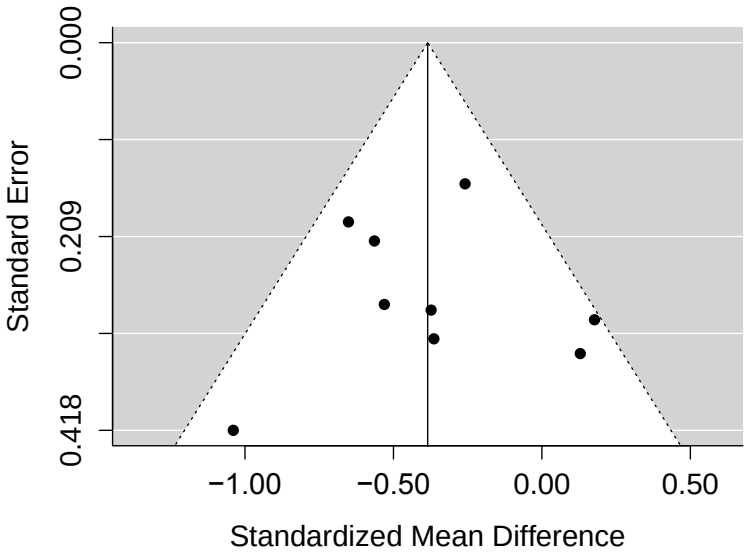
$t(20) = 0.61$, $p = .546$

B6.2: Burnout Follow-Up

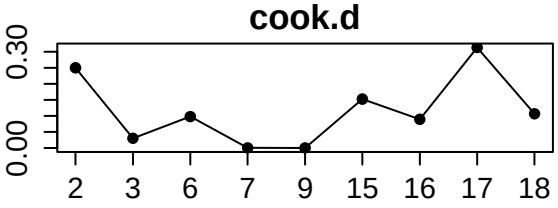
B6.2.1: Forest Plot



B6.2.2: Funnel Plot



B6.2.3: Outlier Analysis (Cook's distance)



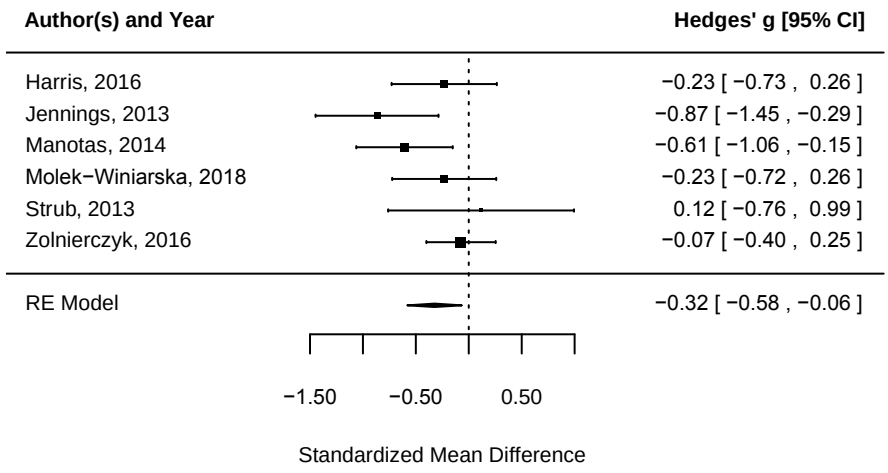
B6.2.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

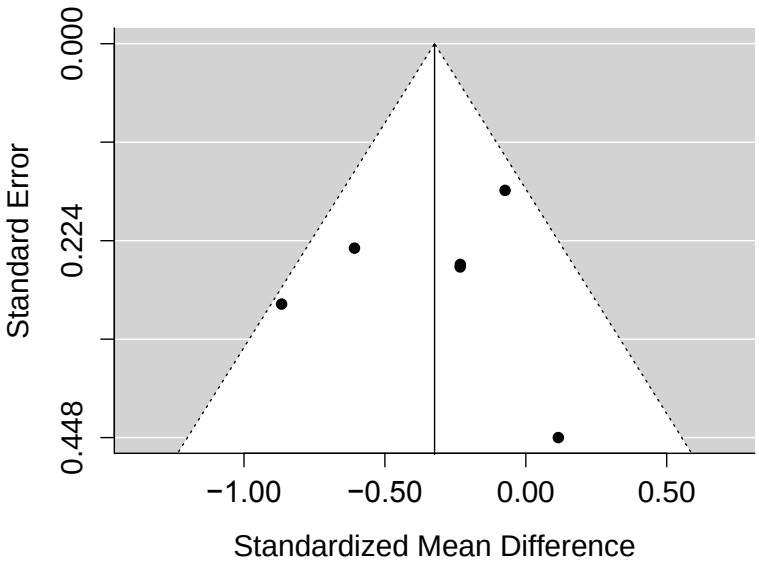
$t(7) = 0.04$, $p = .971$

B7.1: Somatization & Physical Illness Post-Intervention

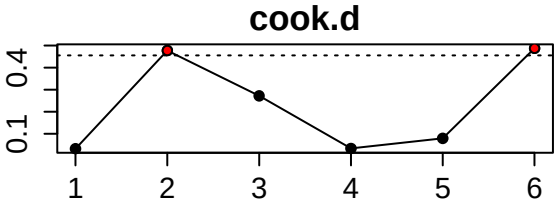
B7.1.1: Forest Plot



B7.1.2: Funnel Plot



B7.1.3: Outlier Analysis (Cook's distance)



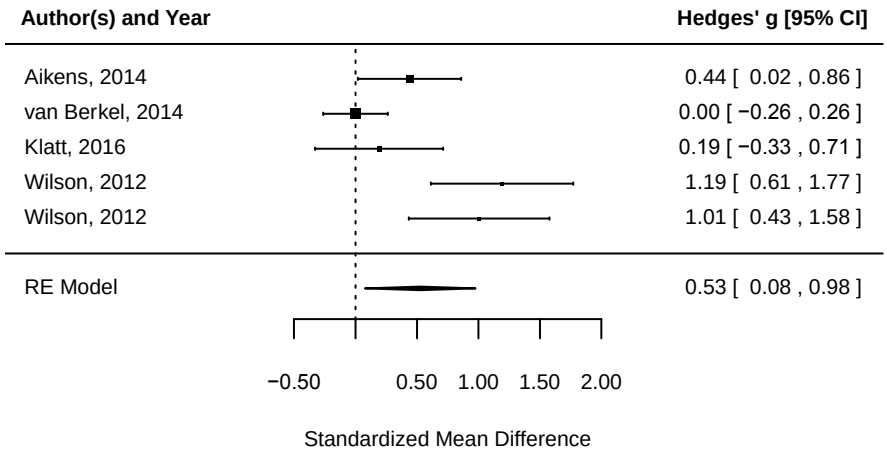
B7.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

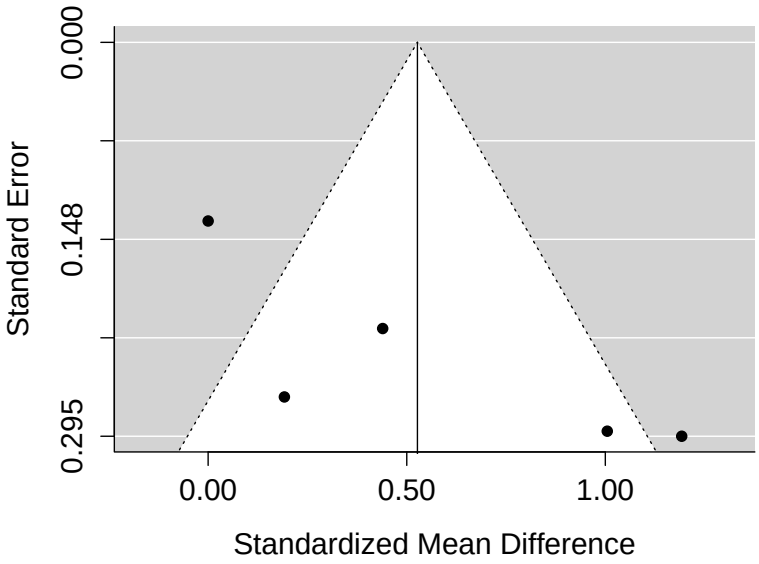
$t(4) = -0.49$, $p = .650$

B8.1: Work Engagement Post-Intervention

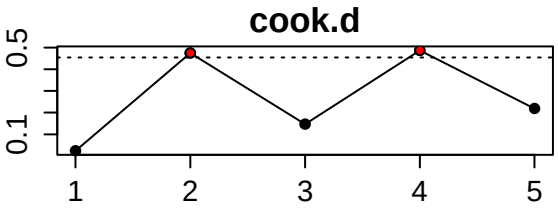
B8.1.1: Forest Plot



B8.1.2: Funnel Plot



B8.1.3: Outlier Analysis (Cook's distance)



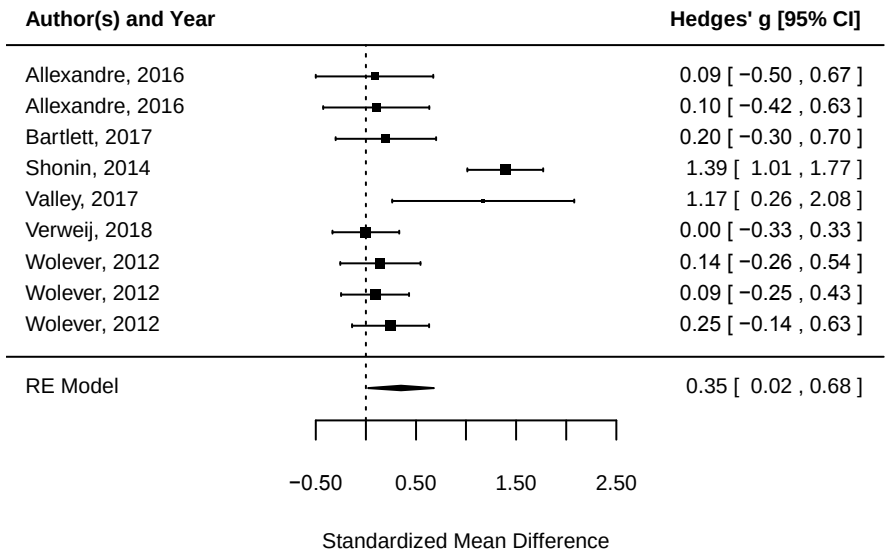
B8.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

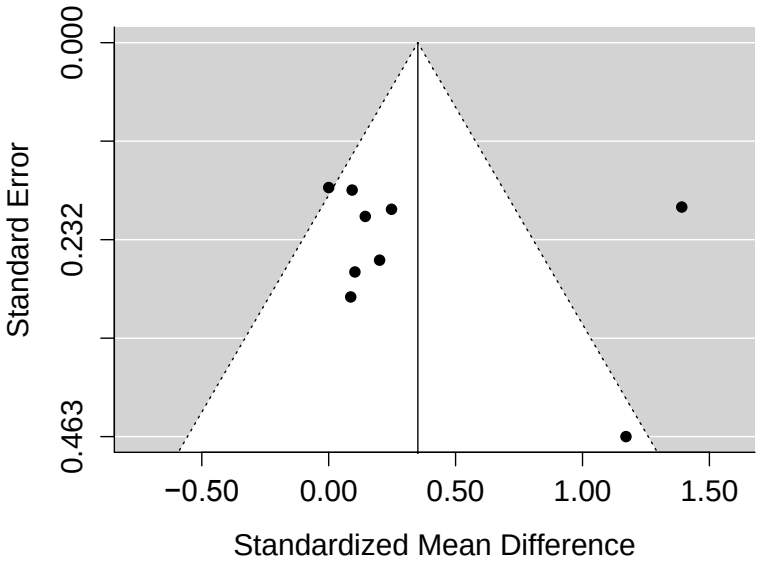
$t(3) = 2.95$, $p = .060$

B9.1: Productivity Post-Intervention

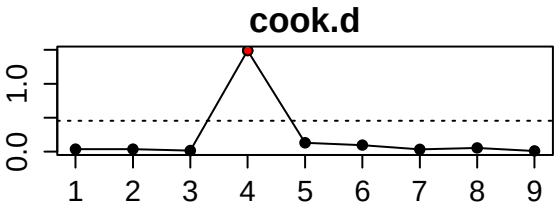
B9.1.1: Forest Plot



B9.1.2: Funnel Plot



B9.1.3: Outlier Analysis (Cook's distance)



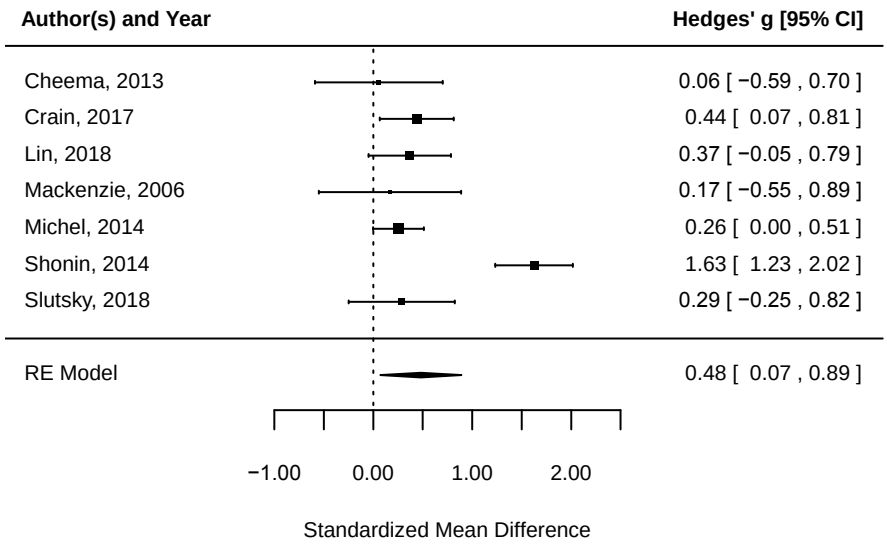
B9.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

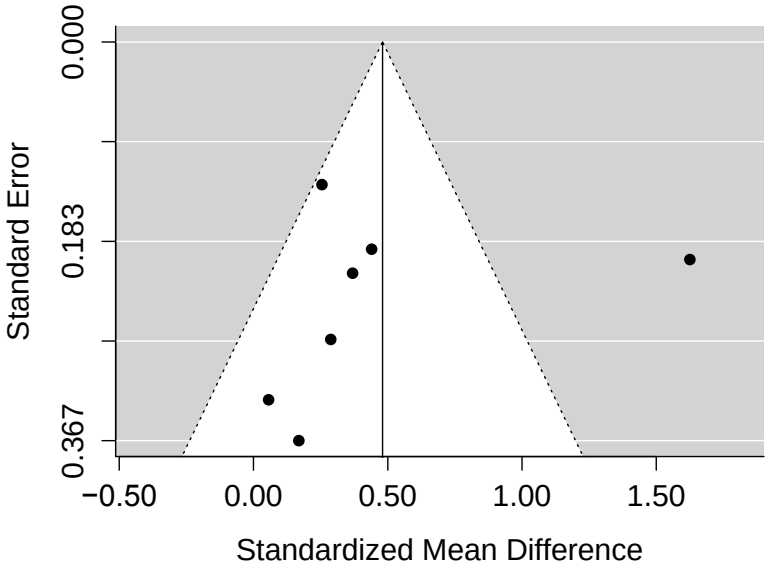
$t(7) = 0.44$, $p = .676$

B10.1: Job Satisfaction Post-Intervention

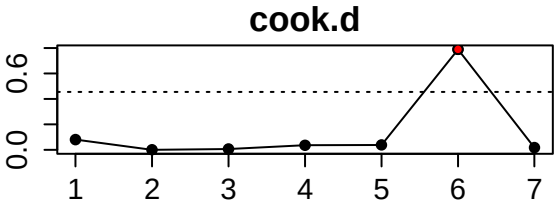
B10.1.1: Forest Plot



B10.1.2: Funnel Plot



B10.1.3: Outlier Analysis (Cook's distance)



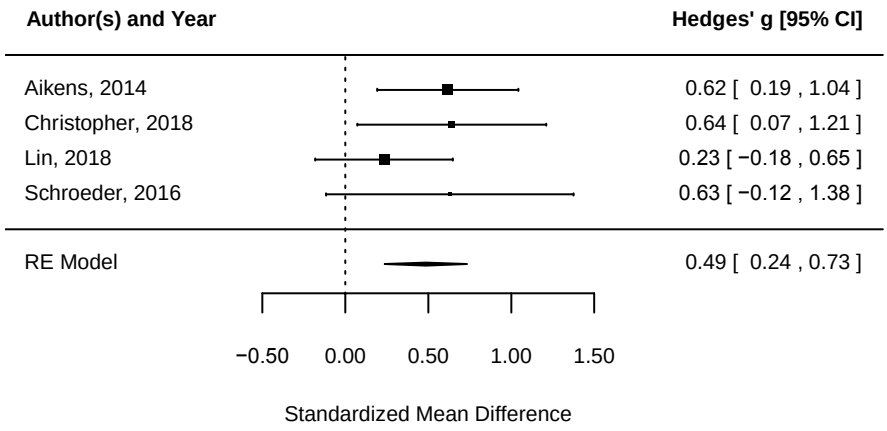
B10.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

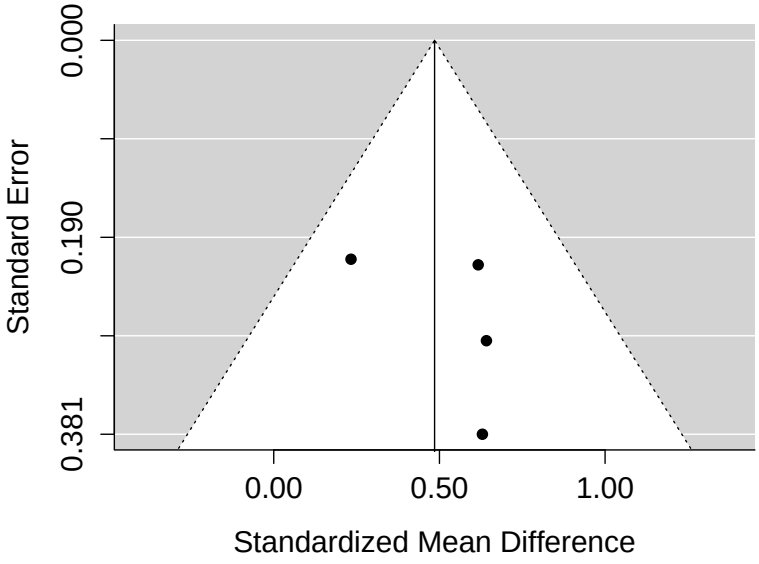
$t(5) = -0.08$, $p = .939$

B11.1: Resilience Post-Intervention

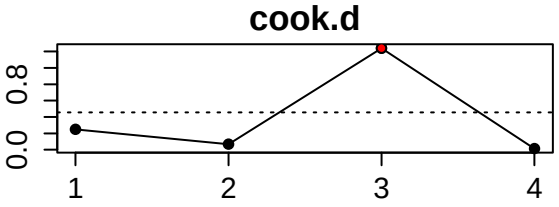
B11.1.1: Forest Plot



B11.1.2: Funnel Plot



B11.1.3: Outlier Analysis (Cook's distance)



B11.1.4: Egger's Regression Test for Funnel Plot Asymmetry

Predictor: Standard Error

$t(2) = 0.82$, $p = .497$

11.3 Anhang C: Tabelle der Moderatoranalysen in der Metaanalyse

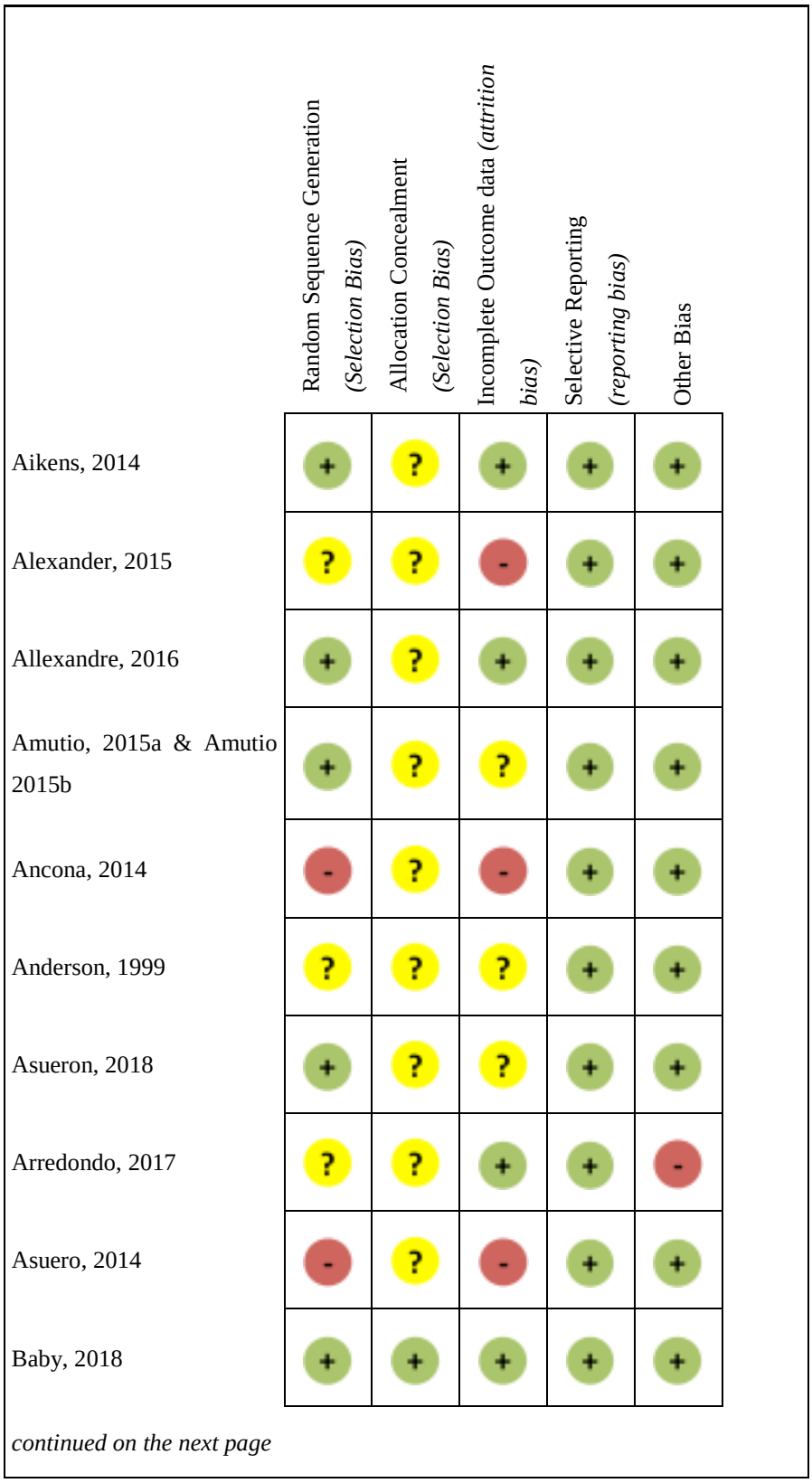
Table C.1.

Moderator analyses for participant, program and study-design characteristics

	Mindfulness				Well-being				Stress				Subsyn. Symptoms				Burnout			
	k	*Q*	*df*	*p*	*k*	*Q*	*df*	*p*	*k*	*Q*	*df*	*p*	*k*	*Q*	*df*	*p*	*k*	*Q*	*df*	*p*
Participant																				
age	28	2.97	1	.085	19	0.00	1	.995	36	0.13	1	.720	35	0.59	1	.442	19	0.70	1	.404
gender	31	1.55	1	.214	22	6.76	1	.009	41	2.84	1	.092	39	0.25	1	.620	40	0.49	1	.486
education	8	1.26	1	.261	5	6.12	1	.013	12	3.33	1	.068	14	10.02	1	.002	6	0.04	1	.846
work experience	12	6.13	1	.013	6	0.74	1	.390	13	0.32	1	.569	12	0.74	1	.390	10	8.67	1	.003
profession[1]	32	7.59	7	.370	22	21.39	7	.003	43	5.93	9	.747	40	2.91	9	.968	22	3.22	5	.666
Program																				
MBI-type[2]	32	6.88	6	.332	22	6.82	7	.448	43	11.14	8	.194	40	9.77	7	.202	22	10.48	7	.163
hours of attendance	30	5.11	1	.024	21	7.75	1	.005	40	0.33	1	.568	36	1.74	1	.187	21	12.85	1	.000
class weeks	32	0.18	1	.671	22	0.67	1	.414	43	0.02	1	.900	40	0.27	1	.602	22	0.58	1	.445
delivery[3]	32	3.28	3	.350	22	0.54	2	.765	43	0.35	3	.951	40	1.57	3	.666	22	0.23	2	.891
location[4]	32	4.74	3	.192	22	3.66	2	.161	43	2.28	3	.516	40	6.41	3	.093	22	0.04	3	.998
homework	19	1.49	1	.223	12	0.40	1	.526	24	1.43	1	.232	40	0.19	1	.911	10	1.94	1	.164
Study-design																				
ITT[5]	32	1.64	1	.200	22	1.78	1	.182	43	0.51	1	.475	40	1.97	1	.160	22	0.75	1	.386
control[6]	32	0.13	1	.718	22	0.83	2	.659	43	1.60	1	.207	40	0.22	2	.894	22	2.21	1	.137

Note. *k* = number of studies. *Q* = Cochran's Q heterogeneity statistic to test moderator effects. *df* = degrees of freedom of Cochran's Q. [1]profession categories: health care, public administration, law enforcement, industry, science, teaching, finance, marketing, phone service (call center), mixed profession. [2]MBI-type categories: yoga, relaxation, psychoeducation and personal reflection, MBSR, meditation, ACT, MBCT, mixed, others. [3]delivery categories: inclass, online, blended, audio. [4]location categories: at work, after work, centralized, not specified. [5]ITT categories: yes, no. [6]control-group categories: wait-list, passive, active

11.4 Anhang D: Risk of bias ratings der Primärstudien in der Metaanalyse



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Bartlett, 2017	+	+	+	+	+
Bostock, 2018	+	?	+	-	+
Cheema, 2013	+	+	+	+	+
Chin, 2019 & Slutsky, 2018	?	?	+	+	+
Christopher, 2018	+	?	+	+	+
Crain, 2017	?	?	-	+	+
Dwivedi, 2015	+	+	?	-	+
Flaxman, 2010	?	?	+	+	+
Flook, 2013	?	?	+	+	+
Gregoire, 2015	-	+	-	+	-
Harris, 2016	?	?	+	+	-
Huang, 2015	+	?	+	+	-
Ireland, 2017	?	?	+	+	+
Jennings, 2013	?	?	+	+	+
Klatt, 2009	?	?	+	+	+

continued on the next page

Klatt, 2017	+	?	?	+	+
Lacerda, 2018	+	?	+	+	-
Lin, 2019	+	?	-	+	+
Mackenzie, 2006	-	?	+	+	-
Manotas, 2014	?	?	-	+	+
McConachie, 2014	+	?	+	+	-
Mistretta, 2018	?	?	+	+	+
Molek-Winiarska, 2018	-	?	+	+	+
Querstret, 2017	+	?	+	+	+
Rao, 2017	+	?	?	+	+
Rexroth, 2017 & Michel, 2014	?	?	-	+	+
Roeser, 2013	?	?	+	+	-
Schroeder, 2016	?	?	+	+	+
Sheppard, 1997	?	?	+	+	+
Shonin, 2014	+	+	+	+	+

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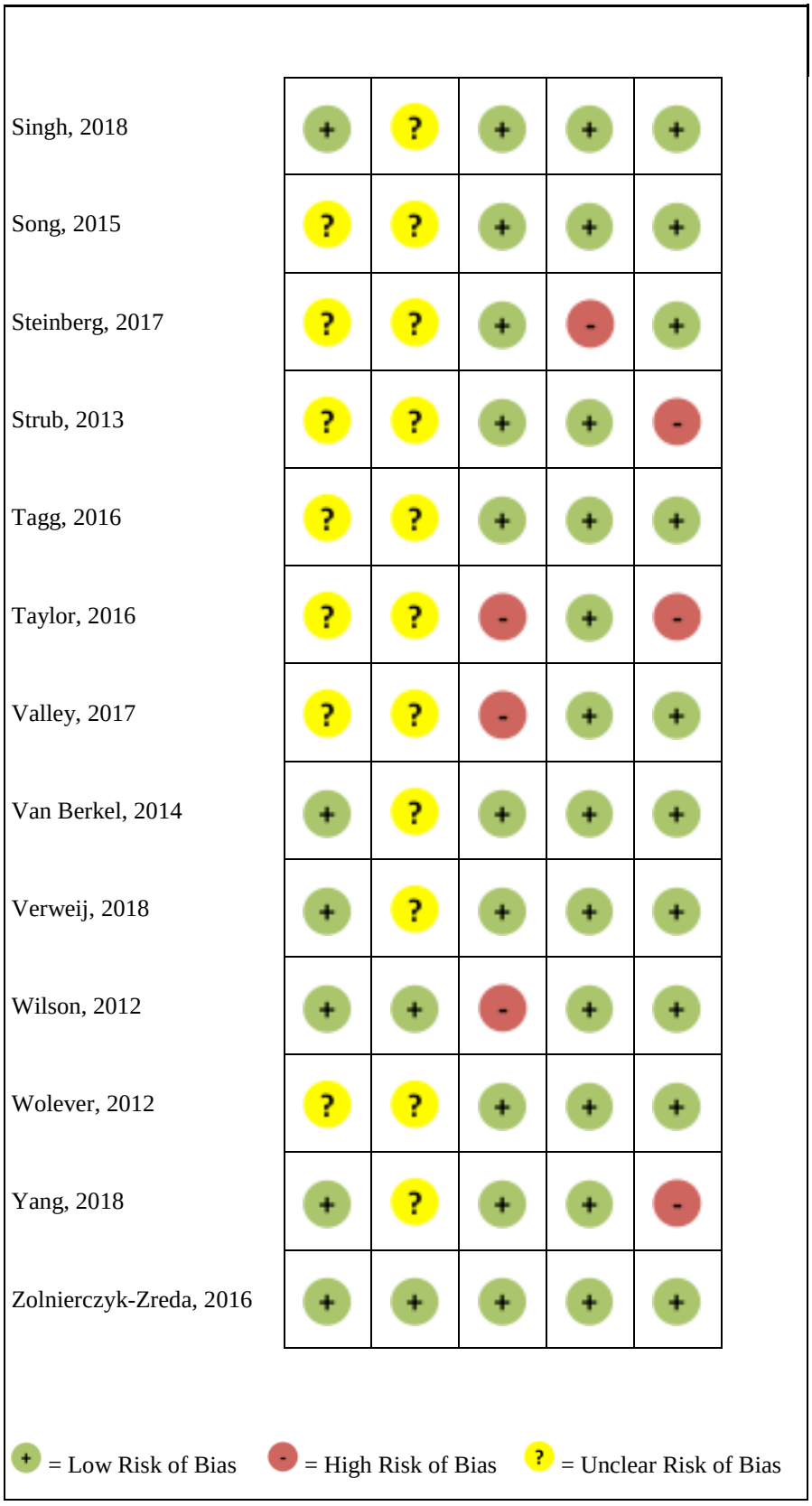


Figure D.1. Risk of Bias Assessment for included studies. Risk of Bias was assessed by two reviewers independently. Conflicts were resolved in discussion with all authors. Blinding of participants and personnel (performance bias) and blinding of outcome assessment (detection bias) was not rated because blinding in randomized controlled trials is normally not possible.

11.5 Anhang E: PRIMSA Checkliste

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	p. 37
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	p. 37
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	pp. 38-41
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	pp. 38-41
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	p. 41
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	p. 42
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	p. 42
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	p. 42
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	Fig. 3
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	pp. 42-43

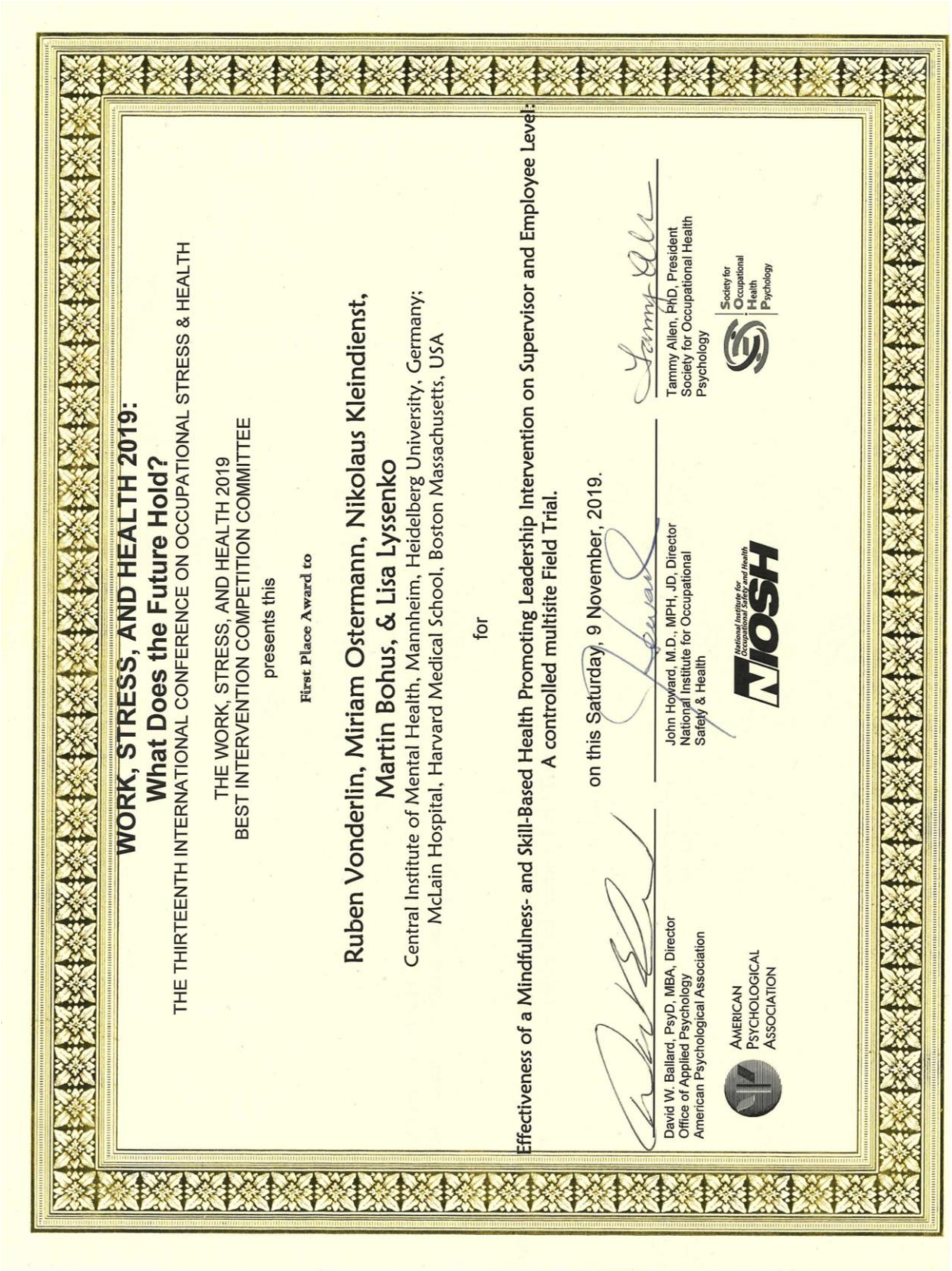
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	pp. 42-43 & Table 6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	p. 45
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	p. 45
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	p. 45
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	p. 12
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	p. 12
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	p.46 & Figure 3
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Table 7, App. A
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	p. 56 & Fig. 4 & App. D
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	App. B
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Table 3
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	p. 56 & App. B
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	pp. 54-56
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	pp. 57-59
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	pp. 61-62

Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	p. 64
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Title page

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

11.6 Anhang F: Forschungspreis Best-Intervention Award



12 CURRICULUM VITAE

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AUSBILDUNG

seit 03/2017	**Zentralinstitut für Seelische Gesundheit, Mannheim** Promotion am Institut für Psychiatrische und Psychosomatische Psychotherapie
08/2014 – 02/2017	**Universität Mannheim** Master of Science kognitive und klinische Psychologie (Note: 1,1) Abschlussarbeit: Dissoziation nach Missbrauch und Vernachlässigung in der Kindheit
09/2011 – 07/2014	**Universität Mannheim** Bachelor of Science Psychologie (Note: 1,5) Abschlussarbeit: Kontextabhängige Kreativität: Die Auswirkung von Regulatorischen Fit auf die intrinsische Motivation und Kreativitätsleistung
09/2002 – 07/2011	**St. Raphael Gymnasium Heidelberg** Abitur (Abiturnote 1,6)

AUSZEICHNUNGEN

09/2019	**Best Intervention Award** der American Psychological Association (APA), des National Institute for Occupational Safety and Health (NIOSH) und der Society for Occupational Health Psychology (SOHP) für das Manuskript *Effectiveness of a Mindfulness- and Skill-Based Health Promoting Leadership Intervention on Supervisor and Employee Level: A controlled multisite Field Trial.*

KLINISCHE ERFAHRUNG

Seit 10/2017	**Zentrum für Psychologische Psychotherapie (ZPP), Mannheim** Postgraduale Ausbildung in Psychologischer Psychotherapie (VT)
Seit 03/2020	**ZPP Lehrambulanz an der Universität Mannheim** Ambulante Behandlungsfälle im Rahmen der Psychotherapieausbildung
Seit 01/2019	**Dachverband Dialektisch Behaviorale Therapie e.V.** Theoretische Ausbildung in Dialektisch Behavioraler Therapie (DBT) am Zentralinstitut für Seelische Gesundheit
01/2019 – 12/2019	**Zentralinstitut für Seelische Gesundheit, Mannheim** Praktische Tätigkeit I Klinik für Psychosomatik und Psychotherapeutische Medizin
07/2018 – 12/2018	**Zentralinstitut für Seelische Gesundheit, Mannheim** Praktische Tätigkeit II Institut für Psychiatrische und Psychosomatische Psychotherapie
07/2013 – 08/2013	**Kliniken Schmieder Heidelberg** Neuropsychologische Assistenz zur Elternzeitvertretung Abteilung Psychologie
01/2013 – 02/2013	**Kliniken Schmieder Heidelberg** Klinisches Praktikum Abteilung Psychologie

LEHRTÄTIGKEIT

Seit 2019	**Universität Heidelberg, Medizinische Fakultät Mannheim** Seminar „Unterricht am Krankenbett“ im Modul Psychosomatik Seminar „Ärztliche Kommunikation“ im Modul Psychosomatik Vorlesung Resilienz im Modul Psychosomatik

PUBLIKATIONEN

Biermann, M., **Vonderlin, R.**, Mier, D., Witthöft, M. & Bailer, J. (under review). Predictors of psychological distress and coronavirus fears in the first recovery phase of the COVID-19 pandemic in Germany. *Frontiers in Psychology*

Vonderlin, R., Müller, G., Biermann, M., Schmidt, B., Kleindienst, N., Bohus, M., Lyssenko, L. (in revision). Effectiveness of a Mindfulness- and Skill-Based Health Promoting Leadership Intervention on Supervisor and Employee Level: A controlled multisite Field Trial. *Journal of Occupational Health Psychology*

Müller, G., Bombana, M., Heinzel-Gutenbrenner, M., Kleindienst, N., Bohus, M., Lyssenko, L., & **Vonderlin, R.** (2021). Socio-economic consequences of mental distress: quantifying the impact of self-reported mental distress on the days of incapacity to work and medical costs in a two-year period: a longitudinal study in Germany. *BMC Public Health, 21:625,* 1-14.

Vonderlin, R., Biermann, M., Konrad, M., Klett, M., Kleindienst, N., Bailer, J., ... & Bohus, M. (2021). Implementierung und Evaluation einer Telefonhotline zur professionellen Ersthilfe bei psychischen Belastungen durch die COVID-19-Pandemie in Baden-Württemberg. *Der Nervenarzt*, 1-9.

Vonderlin, R., Schmidt, B., Müller, G., Biermann, M., Kleindienst, N., Bohus, M., & Lyssenko, L. (2021). Health-oriented leadership and mental health from supervisor and employee perspectives: a multilevel and multisource approach. *Frontiers in Psychology*, *11*.

Biermann, M., Bohus, M., Gilbert, P., **Vonderlin, R.**, Cornelisse, S., Osen, B., ... & Lyssenko, L. (2020). Psychometric properties of the German version of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS). *Psychological Assessment*, *33*(1), 97.

Biermann, M., Bohus, M., Gilbert, P., **Vonderlin, R.**, Cornelisse, S., Osen, B., ... & Kleindienst, N. (2020). Psychometric properties of the German version of the fears of compassion scales. *Clinical Psychology & Psychotherapy*, *28*(1), 137-149.

Bohus, M., Biermann, M., **Vonderlin, R.**, Priebe, K., & Kleindienst, N. (2020). Traumaspezifische Ausrichtung in der Behandlung von Borderline-Störungen mit komorbider Posttraumatischer Belastungsstörung. *Psychotherapeut*, 1-7.

Kleindienst, N., **Vonderlin, R.**, Bohus, M., & Lis, S. (2020). Childhood adversity and borderline personality disorder. Analyses complementing the meta-analysis by Porter et al.(2020). *Acta Psychiatrica Scandinavica*.

Vonderlin, R., Biermann, M., Bohus, M., & Lyssenko, L. (2020). Mindfulness-based programs in the workplace: a meta-analysis of randomized controlled trials. *Mindfulness, 11*(7), 1579-1598.

Bohus, M., Gimbel, S., Goerg, N., Humm, B., Schüller, M., Steffens, M., & **Vonderlin, R.** (2018). *Improving Machine Learning Prediction Performance for Premature Termination of Psychotherapy*. In International Conference on Artificial Intelligence: Methodology, Systems, and Applications (pp. 141-151). Springer, Cham.

Lyssenko, L., Schmahl, C., Bockhacker, L., **Vonderlin, R.**, Bohus, M., & Kleindienst, N. (2018). Dissociation in psychiatric disorders: a meta-analysis of studies using the dissociative experiences scale. *American Journal of Psychiatry, 175*, 37-46.

Vonderlin, R., Kleindienst, N., Alpers, G. W., Bohus, M., Lyssenko, L., & Schmahl, C. (2018). Dissociation in victims of childhood abuse or neglect: a meta-analytic review. *Psychological Medicine, 48*, 2467-2476.

13 DANKSAGUNG

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