

# **Digital Appendix Systematic Cochrane Review and Meta-Analysis on Psychological Interventions to Foster Resilience in Healthcare Professionals**

## **Appendix D1 Stressor Exposure in HCP, Definition of Resilience, Theories of Change, and Resilience Intervention Research**

### **Appendix D1.1 Further Information on the Stressor Exposure in HCP and its Consequences**

Some of the stressors named in section 2.1.1 were shown to be associated with employees' mental health problems in general (Gray et al., 2019; Harvey et al., 2017; Marchand et al., 2014). For the healthcare sector in particular, for example, high workload (e.g., Adriaenssens et al., 2015; Anderson et al., 2017; Shanafelt et al., 2016; Shanafelt et al., 2009; Van Ham et al., 2006), demanding work situations (e.g., in emergency ward; Adriaenssens et al., 2015; Adriaenssens et al., 2011), workplace violence (Pekurinen et al., 2017; Shi et al., 2017), lack of recognition (Adriaenssens et al., 2015; Van Ham et al., 2006), and administrative burdens (Anderson et al., 2017; Van Ham et al., 2006) have been demonstrated to be associated with burnout symptoms and mental health problems.

In addition to potential negative effects on mental health, the (chronic) stressor exposure in HCP may also affect their work motivation and their tendency to further pursue their career in the healthcare sector. Based on an observational (cross-sectional) study in 10 European countries, Heinen et al. (2013) demonstrated that 5%–17% of nurses from participating medical and surgical hospital wards intended to leave the profession. For new nursing-school graduates, high first-year turnover rates (i.e., the percentage of employees leaving in the first year after training) have been reported (35%–61%; Pine & Tart, 2007).

## **Appendix D1.2 Further Information on Definition of Resilience (Especially Process-Oriented Approach)**

Since the introduction of Antonovsky's salutogenesis as a basis for health promotion (Antonovsky, 1979), and the Ottawa Charter for Health Promotion (WHO, 1986), the concept of resilience has stimulated extensive research. Resilience describes the phenomenon in which an individual does not, or only temporarily experience mental health problems despite being subjected to psychological or physical stressors of short (acute) or long (chronic) duration (Kalisch et al., 2017; Kalisch et al., 2015). By definition, resilience presupposes the exposure to substantial risk or adversity (Earvolino-Ramirez, 2007; Jackson et al., 2007; Luthar et al., 2000; Masten, 2001). In general, resilience is viewed as the outcome of an interaction between individuals and their environment (Cicchetti & Rogosch, 2012; Rutten et al., 2013), which may be influenced through personal (e.g., optimism) as well as environmental (e.g., social support) resources (Haglund et al., 2007; Iacoviello & Charney, 2014; Kalisch et al., 2015; Southwick et al., 2005; Wu et al., 2013). As such, resilience is modifiable and can be improved by interventions (Bengel & Lyssenko, 2012; Connor & Zhang, 2006; Southwick et al., 2011).

Despite the consensus of viewing resilience as dynamic process of adaptation (i.e., a trajectory of undisturbed mental health during or after adversities or temporary dysfunctions followed by successful recovery), different suggestions were made concerning those trajectories. For example, when investigating New Yorkers exposed to the September 11, 2001, terrorist attack, Bonanno and colleagues identified different longitudinal trajectories of postadversity adjustment including resilience, recovery, chronic dysfunction, and delayed reactions (for an overview, see Bonanno & Diminich, 2013; Bonanno et al., 2011). According to the author's definition, following a potentially traumatic event (PTE), resilience – as most common trajectory (35%–65%) – refers to a minimal impairment and a *stable trajectory of health functioning* before and after the event. Resilience is further distinguished into emergent resilience (i.e., resilience following a chronic adversity) and minimal-impact resilience (i.e., resilience after a single-incident stressor or trauma; Bonanno & Diminich, 2013; Bonanno et al.,

2015).

Regarding temporal aspects of resilience, Layne et al. (2009), however, suggested different trajectories of adjustment by delineating stress resistance, resilience, protracted recovery, and severe persisting distress. Here, stress resistance is characterized by maintaining homeostasis and a stable level of functioning during and after stressor exposure (compare resilience according to Bonanno et al., 2011). Resilience, on the other hand, refers to *restoring homeostasis* following temporary adjustment problems and functional impairments after a stressor (i.e., recovery according to Bonanno et al., 2011). Depending on if a system's adjustment efforts are adequate and the time required to restore healthy functioning, resilience can also be distinguished from protracted (i.e., slow) recovery.

With respect to the distinction between resilience and *stress-related or posttraumatic growth*, Layne et al. (2009) view posttraumatic growth as another trajectory, that can be differentiated from resilience. For posttraumatic growth after a stressor, the perception of benefits in several life domains (e.g., by seeing new possibilities in one's life) is perceived as the central element (Tedeschi & Calhoun, 1996). Whereas resilience refers to maintaining mental health or regaining the pre-adversity adaptive functioning in the face of stressors, posttraumatic growth includes not only restoring homeostasis, but also *increasing* the level of functioning compared to the baseline (Layne et al., 2009). Resilience also occurs after lower-level stressors; however, posttraumatic growth results from reflective ruminative thinking in the aftermath of life altering traumatic events (Angel, 2016; Chmitorz et al., 2018; Tedeschi, 2011). Therefore, compared to resilience, that is a common phenomenon after adversity (Bonanno et al., 2011), posttraumatic growth is partly considered as a rarer observation (Angel, 2016; Levine et al., 2009). Since resilient individuals naturally use positive coping, can adapt to stressors, and are less confronted with changing their core beliefs, they are assumed as being less likely to engage in the meaning-making processes of posttraumatic growth soon after a trauma (Levine et al., 2009; Tedeschi, 2011). However, in the long-term, posttraumatic growth may contribute to resilience (Tedeschi, 2011).

## **Appendix D1.3 Theories of Change Based on Theoretical Foundations of Resilience Interventions (Detailed)**

### **D1.3.1 Cognitive Behavioral Therapy (CBT)**

From a cognitive-behavioral perspective, stress-related mental disorders (e.g., depression) result from dysfunctional thinking (Beck, 2011; Benjamin et al., 2011). In the face of adversity, people show maladaptive behavioral responses and/or experience negative emotions due to irrational cognitions (Beck, 1976; Ellis & Harper, 1975), which is in line with other stress (resilience) theories assuming that not the stressor itself, but its cognitive appraisal is essential for stress reactions (compare Transactional model of stress and coping, Positive Appraisal Style Theory of Resilience). Thus, modifying cognitions into more adaptive patterns of thought might produce more adaptive emotional and behavioral responses to stress (Beck, 1964). Cognitive restructuring as a central element of CBT includes to recognize the association between cognitions, behaviors, and emotions, to challenge dysfunctional automatic thoughts (reality-testing), and to find more helpful interpretations (Beck et al., 1979; Beck, 2011; O'Donohue & Fisher, 2012). By challenging maladaptive thoughts, CBT-based resilience trainings might be beneficial in promoting the resilience factors of cognitive flexibility and active coping, for example.

### **D1.3.2 Stress Inoculation Therapy (SIT)**

SIT, as one form of CBT, also considers stress as result of perceived imbalance between situational demands and resources (Meichenbaum, 2007). Individuals are exposed to mild forms of stressors in order to strengthen their (intra-/interpersonal) coping strategies and the confidence in using their coping repertoire (Meichenbaum, 2007). In the “conceptual educational phase”, participants are educated about the nature and impact of stress, for instance. The “skills acquisition and consolidation” phase aims to support them in acquiring new or in consolidating existing coping skills (e.g., problem-solving). In the final “application and follow-through” phase, participants are given the opportunity to gradually use various coping skills for increasingly demanding stressors. Overall,

they learn to distinguish between controllable versus uncontrollable stressors, in order to choose adequate coping strategies, to break down complex stressors, and to be confident of having the required coping skills (Meichenbaum, 2007). Resilience-training programs grounded in SIT might foster resilience by enhancing factors such as active coping and self-efficacy.

#### **D1.3.3 Problem-Solving Therapy (PST)**

PST, closely related to CBT, is based on the diathesis-stress model (Nezu & Nezu, 2013). Two dimensions of problem-solving are differed (D'Zurilla et al., 2004). *Problem orientation* refers to an individual's relatively stable schemas about problems and the ability to deal with them. A positive problem orientation is characterized by an appraisal of problems as challenges and optimistic outcome expectations. *Problem-solving styles* describe the modifiable cognitive-behavioral activities that a person uses to cope with problems. Planful problem-solving, as adaptive problem-solving style (Nezu et al., 2016), includes four skills (problem definition, generate possible solutions, decision-making, solution implementation and review). According to the problem-solving model of stress and adaptation, effective problem-solving can attenuate the negative effects of adversity on emotional well-being by moderating and/or mediating the effects of stressors (Nezu et al., 2016; Nezu et al., 2013). PST aims at enhancing positive problem orientation and planful problem-solving (Nezu et al., 2013). Therefore, PST-based resilience interventions might foster the participants' adjustment to stressors by increasing the resilience factors self-efficacy, optimism, and active coping.

#### **D1.3.4 Acceptance and Commitment Therapy (ACT)**

According to ACT as third-wave CBT (Hayes et al., 2004; Hayes et al., 2006), psychological inflexibility is the primary reason for psychopathology (Hayes et al., 2006). Psychological flexibility is the ability to consciously contact the present moment, and to change or persist in behavior when doing so serves long-term values (Hayes et al., 2006). In order to enhance this flexibility, ACT includes six core processes (Hayes et al., 2006): acceptance, cognitive defusion, being present, self as context, values, and committed action. Instead of avoiding or changing stressors, individuals are encouraged to

accept those events. Cognitive defusion describes modifying the undesirable functions of cognitions. Being present refers to the non-judgmental experience of (psychological, environmental) events (e.g., thoughts). ACT supports participants in defining their values, which are continuously pursued. Finally, through committed action, ACT fosters the development or change of behaviors in line with personal values. In sum, by teaching acceptance skills and commitment and behavior-change skills, several resilience factors might be fostered in ACT-based trainings (e.g., cognitive flexibility, purpose in life). Especially the acceptance of a full range of emotions taught in ACT might result in a better adjustment to stressful conditions.

#### **D1.3.5 Mindfulness-Based Interventions**

Mindfulness is characterized by the non-judging awareness of the present moment and its accompanying mental phenomena (body sensations, thoughts, emotions; Grossman et al., 2004; Shapiro et al., 2005). In Mindfulness-based Stress Reduction (MBSR; Kabat-Zinn, 1996), including (in-) formal meditation practices (e.g., body scan, awareness of breathing; Kabat-Zinn, 1996), seven pillars of mindfulness practice are trained: non-judging (i.e., taking perspective of distanced observer), patience (i.e., accepting that things develop in their own time), a beginner's mind (i.e., being willing to see everything as if for the first time), trust (i.e., having basic trust, e.g., in yourself), non-striving (i.e., attitude that not all activities have to fulfil a certain purpose), acceptance (i.e., embracing moments as they are before trying to change them), and letting go (i.e., recognizing inner experiences, but not trying to pursue them; Kabat-Zinn, 2013). As being aware of the "here and now" possibly enhances the sensitivity for positive aspects, mindfulness-based resilience trainings might help participants to gain a brighter outlook for the future (i.e., optimism) or to experience positive emotions more regularly. Besides, the cognitive flexibility might be increased by learning to accept negative situations and emotions.

### **D1.3.6 Attention and Interpretation Therapy (AIT)**

According to AIT, each behavior is influenced by attention and interpretation (Sood, 2010), which are – for evolutionary reasons – automatically attracted by imperfections and threats in the environment and negatively biased (Sood et al., 2011). As nowadays people are confronted with less threats, the latter mainly exist in their mind (e.g., rumination about past, catastrophizing about future) leading to stress (Sood, 2010). Using attention training, AIT teaches subjects to delay negative judgements of their environment and to focus their attention on the world's novelty (Sood et al., 2011). In interpretation training, learners are supported to take a more flexible perspective to reduce stress and improve well-being by teaching them higher-order principles (e.g., gratitude, acceptance, and meaning; Sood, 2010; Sood et al., 2011). Resilience trainings using an AIT approach could especially enhance the participants' cognitive flexibility (e.g., reappraisal) by fostering non-judgmental and more positive (re-)interpretations of stressors. By increasing the attention for the "novelty of the world", including positive aspects (e.g., nature), and the instruction in higher-order principles, AIT-based resilience interventions might also contribute to enhanced positive emotions or meaning in life.

### **D1.3.7 Coaching Approaches**

Coaching interventions (e.g., life or executive coaching) usually include a helping relationship between clients (e.g., in executive coaching often with managerial responsibility; e.g., Grant et al., 2009) and a coach using different techniques (e.g., 360-degree feedback, problem-solving) to support the client(s) in identifying and meeting important goals in their personal and professional lives (APA, 2020a, 2020b). During this coaching process, an increase of (professional) skills, resources, and well-being of the clients and eventually their staff (e.g., Weir et al., 1997) is intended. Besides, leadership styles and job performance are often focused. As coaching relies on models of problem-solving or related frameworks (e.g., GROW; Grant et al., 2009), respective resilience trainings might increase active coping.

### **D1.3.8 Positive Psychology (PP)**

PP refers, for example, to the study of positive psychological states and emotions as well as character strengths that enhance subjective well-being, enable individuals to thrive, and lead to meaningful lives (APA, 2020c; Positive Psychology Center, 2020; Seligman & Csikszentmihalyi, 2000). In recent years, PP-based interventions have been used for prevention and therapy (e.g., Parks & Schueller, 2014; Sin et al., 2011), including resilience interventions (e.g., Wang et al., 2012). A number of constructs, such as happiness, meaning making, and optimism is subsumed under this umbrella term (Luthar et al., 2014) and focused in respective programs. Thus, resilience interventions using a PP approach might also foster various resilience factors, such as positive emotions and optimism.



#### D1.4 Previous Reviews/Meta-Analyses on Resilience Interventions in (Non-)Clinical Populations

Based on a dynamic resilience definition, there has been a growing interest in interventions to foster resilience in various clinical and non-clinical target groups (Southwick et al., 2011), with several systematic reviews and meta-analyses conducted so far (see Table D1.4.1 and D1.4.2).

**Table D1.4.1**

*Eligibility Criteria (PICOS) of Previous Reviews/Meta-Analyses*

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
Bauer 2018	Serving or former military personnel adjusting to civilian life (Reservists, veterans and soldiers in the postdeployment period)	Brief preventative interventions promoting well-being or for preclinical distress	Usual, other intervention, or none	Improved psychological/ emotional well-being	Observational/interventional (RCTs, cohort studies, cross-sectional studies)
Deady 2017 <sup>a</sup>	1) Subclinical or nonclinical sample (or studies that split into subclinical/ diagnosed); that is, diagnostic tool at baseline or use of subclinical cut-off on validated measure in order to exclude cases 2) Population aged between 18 and 64 years 3) Tertiary/workplace populations acceptable	eHealth-based psychological intervention aimed at prevention of anxiety and depression in the general population	Not specified	Primary outcome either incidence or symptom reduction of common mental disorder (depressive or anxiety disorder)	RCTs
Joyce 2018	Adults	1) Any program designed to develop, enhance or improve resilience	No restrictions based on type of comparator	Acceptable measure of resilience as one of the outcome measures (1. assess an individual's ability to adapt to change and	RCTs

Population (P)		Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
Leppin 2014	1) Adults (≥ 18 years) 2) Clinical and non-clinical	2) Studies have to describe a specific aim to improve resilience	used	cope effectively with significant life adversity; 2. some type of validity assessment; 3 prespecified measures: Connor-Davidson Resilience Scale, Brief Resilience Scale, Resilience Scale)	
		1) Any program designed to develop or enhance resilience (or a related construct, 'hardiness')			
		2) Intention to impact resilience or hardiness has to be described in study's rationale or design and intervention has to prospectively and systematically aim to impact resilience primarily (by describing theoretical or scientific rationale for why intervention would be expected to impact resilience)	No restrictions based on type comparator used	No restrictions based on type of outcomes; but according to protocol: primarily interested in 1) quality of life or well-being, 2) activation or self-efficacy, 3) resilience or ability to cope; Secondary outcomes: depression, stress, anxiety	RCTs
Macedo 2014	1) Adults 2) Non-clinical (mentally and physically healthy)	3) Programs may have additional elements (e.g., MBSR, meditation, yoga), but cannot be solely focused on stress-reduction or 'reactive' methods  Purpose of training program on strengthening resilience (and associated constructs, e.g., hardiness, stress inoculation) in	Not specified	Not specified	RCTs, non-randomised controlled trials, open-ended trials

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
		<p>order to prepare individual to cope with future adversities</p> <p>Intervention designed to promote well-being (rather than aiming to reduce a negative construct)</p> <p>Well-being interventions include:</p> <ol style="list-style-type: none"> <li>1) PP interventions: focus on increasing psychological well-being through deliberate completion of specific activities (e.g., counting blessings, identifying/using personal strengths)</li> <li>2) Mindfulness-based interventions: focus on cultivating mindfulness (i.e., mental state achieved by focusing one's awareness on present moment); range from mindfulness meditation practice to multifaceted interventions combining mindfulness meditation with cognitive therapy, goal setting and/or educational programs, or stress-reduction programs</li> <li>3) Acceptance and commitment therapy (ACT): combines mindfulness and</li> </ol>			
Massey 2019	Participants diagnosed with diabetes (Type 1 or Type 2)		Variation in comparators (including studies with no comparison group) allowed	Psychological and physical health outcomes	Use of prospective study design (RCTs and non-RCTs)

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
		<p>acceptance strategies with behavioral change and commitment techniques to promote awareness of emotional experience, emotion regulation, and decreased avoidance</p> <p>4) Resilience-based programs: focus on improving well-being through teaching new adaptive coping methods; rather than targeting ways to repair existing problems, they build resources and positive assets</p> <p>Variation in intervention duration allowed</p>			
Milne 2016	Indigenous, aboriginal, First Nation or Māori students in higher education	Educational strategies that promote academic success and resilience	Not specified	Not specified	Quantitative, qualitative and mixed-methods studies
Pallavacini 2016	Military personnel (e.g., soldiers, pilots, other aircrew professionals)	Virtual Reality (VR)-based stress management programs/VR applications for stress management	Not specified	Outcome type not specified; articles have to provide information about measures	Experimental studies (RCTs, non-randomised controlled and uncontrolled studies)
Pesantes 2015	<p>1) Vulnerable populations: Ethnic minorities (African Americans, Latinos, indigenous people); low socioeconomic status; underserved population; immigrants; people from low-income countries; veterans; uninsured</p>	<p>1) Any intervention used to introduce, train, teach or enhance resilience in vulnerable population to manage hypertension and/or type-2 diabetes or its complications</p> <p>2) Any mention of intention to affect or impact</p>	Search not limited to any type of comparator	Clinical outcomes, for example, changes in blood pressure or changes in HbA1c	RCTs; quasi-experimental studies

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
	population; people who live in poor areas (inner city)	resilience, capacity to face challenges, and hardiness of living with diabetes or hypertension in their design or aims			
	2) Patients diagnosed with or taking medications for hypertension and/or type-2 diabetes	3) Coping, stress, hardship, quality of life, self-efficacy, empowerment 4) Studies with resiliency training as only one part of the intervention also considered 5) Studies that did not use the term 'resiliency training' also considered			
Petriwskyj 2016 <sup>b</sup>	1) Family caregivers of people with dementia 2) Any cultural or geographical context	1) Interventions to build resilience in family caregivers 2) In any setting, for example, participants' homes in the community, residential aged care or hospital, medical or allied health practice	Not specified	Quantitative studies: 1) Either objective or subjective outcome measures (or a combination of both) 2) Proxy measures of resilience (only papers included that explicitly related aims of intervention and measurement of outcomes to resilience itself): for example, self-efficacy, locus of control, perceived burden, psychological well-being, strength, coping, positive adjustment, resourcefulness  Qualitative studies: have to explicitly relate the aims of intervention to resilience	Quantitative studies (experimental and descriptive study designs) and qualitative studies (e.g., phenomenology, grounded theory, ethnography, action research, feminist research)
Reyes 2018	1) Individuals exposed to traumatic events or at risk of developing PTSD,	Trauma-focused interventions/interventions for posttraumatic stress	Not specified	Resilience as outcome of intervention study, that is, studies explicitly report and use an instrument measuring resilience	Research study testing an intervention; later included: RCTs, single-

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
	including those with symptoms of PTSD 2) Subjects with posttraumatic stress symptoms, those diagnosed with PTSD, and those exposed to traumatic events and were at risk for developing PTSD symptoms based on SAMHSA's (Substance Abuse and Mental Health Services Administration) broad definition of trauma-informed services				arm studies, quasi-controlled studies
Robertson 2015	1) Adults (>18 years) 2) Any working (employee) samples	Any specifically resilience-based intervention	Not specified	Primary outcomes: resilience, mental health and well-being outcomes (e.g., stress, anxiety, depression); Secondary outcomes: physical health, biological outcomes, psychosocial functioning, job performance	RCTs, controlled trial, trial that provides quantitative values of all variables
Skeffington 2013	1) Populations in any country, in any year and of any age 2) who are subsequently exposed to a potentially traumatic event (PTE; i.e., event meeting Criterion A-1 for PTSD as outlined in DS-IV (APA, 1994): "the person has experienced, witnessed, or been confronted with an event or events that involve actual or threatened death	1) Resilience-building intervention delivered prior to a potentially traumatic event 2) Defined as: any kind of structured psychological skills training delivered to an individual or group of people with the aim of improving psychological functioning or well-being 3) Programs may have been reported as resilience	Not specified	Psychological well-being, that is, any objective measure of psychological health or ill health	Not specified; later found/included: single-group studies, non-randomised controlled studies (pre-post, post-only)

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
	or serious injury, or a threat to the physical integrity of oneself or others“	building, resilience training, stress inoculation training, stress management, coping skills training, hardiness training, or cognitive-behavioural interventions			
Tams 2016 <sup>a,b</sup>	Families affected by progressive neurological illness	Strengths-based, family focused interventions that target illness uncertainty	Not assessable based on publication abstract	Not assessable based on publication abstract	Not assessable based on publication abstract
Townshend 2016 <sup>b</sup>	<p>All children aged 0-18 years, whose parents have completed a Mindful Parenting program (participants are children/adolescents and their parents)</p> <ol style="list-style-type: none"> <li>1) Children and adolescents with or without a mental health diagnosis</li> <li>2) from culturally diverse backgrounds,</li> <li>3) from adopted or fostered backgrounds,</li> <li>4) or children living with their family of origin</li> </ol>	<ol style="list-style-type: none"> <li>1) Mindful Parenting interventions with a minimum duration of 2 hours per week for 8 weeks provided by a registered health practitioner including but not limited to a psychologist, social worker or nurse</li> <li>2) Parenting programs that draw upon MBSR, MBCT, MBCBT, ACT or DBT</li> <li>3) Focus on interventions that combine mindfulness and parenting</li> </ol>	Standard care as usual	<p>Studies reporting on outcomes for children, adolescents and parents, measured with validated instruments</p> <p>Primary outcomes:</p> <ol style="list-style-type: none"> <li>1) Well-being</li> <li>2) Intensity of symptoms associated with internalising disorders (depression, anxiety, stress)</li> <li>3) Intensity of symptoms associated with externalising disorders (conduct disorders)</li> </ol> <p>Of children, adolescents and parents</p> <p>Secondary outcomes:</p> <ol style="list-style-type: none"> <li>1) Emotional regulation</li> <li>2) Quality of the parent-child relationship</li> <li>3) Resilience</li> <li>4) Mindfulness</li> </ol> <p>of children, adolescents and parents (measured on validated tools with known psychometric properties, e.g., Depression Anxiety and Stress Scale (DASS), Resilience Scale (RS), Emotional Regulation of Self</p>	RCTs (see publication abstract)

Population (P)		Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
				and Others (EROS), Langer's Mindfulness Scale (LMS) and other relevant scales	
Vanhove 2016	1) Adults 2) Employees	1) Primary prevention techniques, whether exclusively or supplemented with secondary techniques 2) Interventions have to emphasise modifiable psychosocial factors identified as contributing to resilience	Not specified	Wellbeing, psychological deficits, performance	1) Studies using various quantitative methodologies (e.g., between- and within-participant designs; experimental and non-experimental designs) 2) Studies provide data from which effect sizes can be calculated and provide data unique from those reported in studies already
Van Kessel 2014	1) Adults (> 18 years) 2) In disaster setting: technological (e.g., transport accident), natural, including geophysical (e.g., earthquakes), hydrological (e.g., floods), meteorological (e.g., hurricanes), and climatological disasters (e.g., drought and fires)	Public health intervention in a disaster setting	Not specified	Not specified	Quantitative (RCTs, comparative studies, case studies) and qualitative studies



	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
Wainwright 2019	1) Aged 18+ 2) with chronic pain (diagnosed or labelled using any recognised criteria) 3) who are either in any kind of employment or attempting to (re)enter employment through any (RTW) scheme	1) Return-to-work pain interventions, that is, designed to assist RTW or staying at work for chronic pain sufferers, which have any element of resilience within it 2) Key elements of resilience (see outcome measures): self-efficacy, active coping, positive affect, positive growth, positive reinforcement, optimism, purpose in life and acceptance, all per se and in relation to pain	Placebo, no treatment, wait list, usual care/ treatment-as-usual (UC/TAU)	Primary outcome measures: 1) RTW or staying-at-work measures (via any quantifiable method capable of being validated) 2) Resilience (as measured by any validated resilience scale 3) plus any validated scales measuring the following aspects of resilience: self-efficacy, active coping, positive affect, positive growth, positive reinforcement, 4) optimism, purpose in life and acceptance, all per se and in relation to pain) Secondary outcome measures (measured using any validated scale): 1) Pain intensity 2) Pain interference 3) Pain disability Fear of work avoidance beliefs	RCTs reported in this paper, but all primary study types were searched (systematic reviews, RCTs, observational and qualitative); Observational and qualitative studies (sought to assess harms and consider why people may respond differently to the same objective experiences of interventions at work) reported in subsequent papers

*Note.* RCT = Randomized controlled trial.

<sup>a</sup> No primary focus or eligibility criteria with respect to resilience formulated in the review, but resilience or related constructs were included in the search strategy.

<sup>b</sup> Full text not available; data extracted based on publication abstract; for Townshend 2016, review protocol available.

**Table D1.4.2**

*Further Methodological Characteristics of Previous Reviews/Meta-Analyses*

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Bauer 2018	Peer-reviewed articles	<ol style="list-style-type: none"> <li>1) Evaluation of interventions for specific clinical conditions, and those purposively selecting individuals with clinical diagnoses, for example, posttraumatic stress disorder (PTSD)</li> <li>2) Only focus on spouses, parenting or children of military personnel</li> <li>3) Only evaluations of residential interventions including couples' reunification retreats</li> </ol>	<p>MEDLINE, PsycINFO, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), Health Management Information Consortium (HMIC), Web of Science, CINAHL, PubMed, PILOTS, PAIS International, Project Cork, Ministry of Defence (gov.uk), US Defence Technical Information Centre (dtic.mil)</p> <p><i>Additional sources:</i> Internet search via google.co.uk, citation searches of included articles, hand searches of Journal of the Royal Army Medical Corps and Military Medicine</p>	<p>3 key areas: military personnel of all branches and statuses + adjusting to civilian life + psychological and emotional well-being (e.g., resilience)</p> <p>Only English publications</p>	All years; no publication date restrictions	9132/12 (5 RCTs) (according to review 5 interventions on resilience; none of them RCT)	<p>PROSPERO registration (CRD42015026341); only review; risk of bias/methodological quality assessment of included studies using Quality Assessment Tool for Quantitative Studies; review according to PRISMA and Centre for Reviews and Dissemination guidance</p>
Deady 2017 <sup>a</sup>	Peer-reviewed articles	<ol style="list-style-type: none"> <li>1) Not peer-reviewed</li> <li>2) Uncontrolled</li> <li>3) Not published in English</li> </ol>	PubMed, PsycINFO, EMBASE, Cochrane library	Combination of keywords:	Studies published between	2925/10 (10 RCTs)	Review and meta-analyses; risk of bias/methodological

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Joyce 2018	No restrictions based on length of follow-up	4) Used a child/ adolescent or elderly population 5) Used a non-general population (e.g., postnatal, comorbid, chronic pain) 6) Non-published articles	<i>Additional sources:</i> Reference lists of all included studies; final search of PubMed for related articles of all included studies; Google Scholar search	Mental health related terms (e.g., depression, anxiety, mood disorder, panic, posttraumatic stress) + Prevention terms (e.g., prevent, resilience, at-risk, subclinical) + Study design terms (e.g., RCT, efficacy, random, clinical trial) + eHealth terms (e.g., internet, online, app, self-directed, web-based, mobile phone) + Title search (e.g., prevent, resilience, at-risk, common mental, subclinical)  Only English publications	2000 to January 2016		quality assessment of included studies using Downs and Black checklist with minor modifications; review according to PRISMA and Cochrane Collaboration's Handbook
		1) Studies that only evaluate the implementation or receptivity of a resilience program 2) Studies exclusively using well-being or mental health outcomes as the main measure of resilience 3) Non-English publications	Ovid Medline, Ovid EMBASE, PsycINFO, Ovid Cochrane Library  <i>Additional sources:</i> Reference lists, WHO Clinical Trials Registry (using term resilience)	Resilience + resilience training + resilience intervention + controlled trial (in some databases)  Only English publications	All years until June 2016	611/17 (15 RCTs) (11 studies included in meta-analyses)	Review and meta-analyses; risk of bias/methodological quality assessment of included trials using Downs and Black Checklist with minor modifications; review according to PRISMA

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Leppin 2014	No eligibility restrictions based on length of follow-up	<ol style="list-style-type: none"> <li>1) Studies only evaluating the dissemination and/or implementation of resiliency training programs</li> <li>2) Studies of children</li> <li>3) Historically controlled, quasi-experimental, and single-arm pre-post studies</li> </ol>	<p>PubMed, Scopus, EBSCO CINAHL, Ovid MEDLINE, Ovid EMBASE, Ovid Cochrane Library, Web of Science, and Ovid PsycINFO.</p> <p><i>Additional sources:</i> Clinical trial registries, contact with authors and experts, reference lists</p>	<p>MeSH terms (e.g., resilience, psychological, RCT) + resilience and hardiness (text searches) + training terms (e.g., train, teach, skills)</p> <p>Any publication language and format</p>	1990 to 14 January 2014	516/25 (25 RCTs)	Published protocol (Leppin et al., 2014); review and meta-analyses; risk of bias/methodological quality assessment of included studies using Cochrane tool; review according to PRISMA
Macedo 2014	/	<ol style="list-style-type: none"> <li>1) Studies not primarily designed to promote resilience (e.g., focus on increasing well-being)</li> <li>2) Theoretical articles, reviews, book chapters, theses/ dissertations</li> <li>3) Studies with focus on children or adolescents</li> <li>4) Research focused on strengthening resilience in physically and/or mentally ill individuals or with primary focus on assessing resilience in aftermath of trauma exposure (e.g., natural disaster)</li> <li>5) Case reports/series</li> <li>6) Studies without standardised efficacy measure at pre- and postintervention</li> </ol>	<p>ISI, PsycINFO and Pubmed</p> <p><i>Additional sources:</i> Reference lists of selected articles and times cited lists (ISI database)</p>	<p>Resilience and associated constructs (e.g., hardiness, post-traumatic growth, well-being) + resilience factors (e.g., cognitive flexibility) + training terms (e.g., cognitive therapy, positive psychology, health promotion, treatment)</p> <p>Any publication language, only articles and notes</p>	All years until 20 January 2013	2337/13 (7 RCTs)	Only review; risk of bias/methodological quality assessment of included studies using Cochrane Collaboration Tool for Assessing the Risk of Bias; not specified that according to PRISMA, but review seems to have been conducted/reported according to PRISMA

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
		7) Studies with baseline evaluation without intervention 8) Studies with resilience concept related to other field (e.g., physics, mathematics) 9) Studies evaluating effects of physical activity or yoga instead of psychological programs 10) Animal studies					
Massey 2019	1) Peer-reviewed manuscripts 2) Variation in follow-up periods allowed	1) Case studies, case reports, and abstracts	PubMed, PsycINFO, Scopus	Keyword-based queries Diabetes (keyword) + well-being intervention keywords (e.g., positive psychology, well-being therapy, life review, mindfulness, relaxation, personal strengths, gratitude, resilience, purpose, optimism, positive affect)  English, Spanish, and/or Persian publications (languages spoken by lab members)	Inception to October 2017	1070/30 (No. of RCTs not specified, 6 uncontrolled) (3 resilience studies according to authors)	Only review; risk of bias/methodological quality assessment of included studies using Effective Public Health Practice Project's Quality Assessment Tool for Quantitative Studies; review according to PRISMA

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Milne 2016	Peer reviewed research articles from scholarly journals	/	Scopus, ProQuest, Informit, Web of Science,  <i>Additional sources:</i> Google Scholar to locate any other material from conference reports, government reports and other significant documents; reference lists	Indigenous, aboriginal, First Nation or Māori students + resilience and associated constructs (e.g., strength, protective factor) + terms related to academic success (e.g., achievement, completion rate) + terms related to university (e.g., undergraduate, tertiary education, higher education) + training terms (e.g., educational approach/strategy/intervention) (Searched in title, abstract and body of all works)  Only English publications	Studies published between 1995 to 2015 (searches conducted between October 2014 to January 2015)	156/16 (No RCT)	Only review; review according to newly developed framework of analysis ("Reframed Standpoint Theory")
Pallavini 2016	/	/	PsycINFO, Web of Science (Web of Knowledge), PubMed, Medline, Scopus	("Virtual Reality") AND ("Military") AND ["Stress Training" OR ("Stress Management")]	Studies published between 2001 to 2016	127/14 (No. of RCTs not specified, 3 uncontrolled)	Only review; review according to PRISMA



Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
							Review Instrument (JBI-QARI)
Reyes 2018	/	<ol style="list-style-type: none"> <li>1) Non-intervention studies</li> <li>2) Conceptual, theoretical, and methodological articles</li> <li>3) Studies involving animals</li> <li>4) Studies that used pharmacological interventions or a combination of psychosocial and pharmacological interventions</li> <li>5) Book chapters, book reviews, commentaries, and editorials</li> <li>6) Published study protocols</li> <li>7) Research studies that did not use resilience as assessment tool but measured variables similar to resilience (e.g., hope, motivation, self-esteem, quality of life, and posttraumatic growth)</li> <li>8) Studies not including resilience as an outcome measure but instead measuring the severity of PTSD symptoms and explaining in their implications that improvement of PTSD</li> </ol>	<p>ProQuest, PubMed, Web of Science, Scopus, EBSCO, Cochrane Library, ScienceDirect, Sage Full Text</p> <p><i>Additional sources:</i> unpublished master's theses and doctoral dissertations</p>	<p>Resilience, resiliency + 5 terms: post-traumatic stress disorder or PTSD, trauma, intervention, treatment, therapy</p> <p>Only English publications</p>	<p>Studies published between 1990 to 2017</p>	<p>2027/17 (7 RCTs)</p>	<p>Only review; review according to PRISMA</p>



Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Roberts on 2015	/	<p>symptoms indicates resilient traits</p> <p>9) Intervention studies not explicitly using a resilience assessment tool</p> <p>10) Qualitative studies, single case studies, systematic review, literature review, methodological papers</p> <p>11) &lt;18 years and non-work samples</p> <p>12) Non-resilience interventions</p>	<p>Cochrane Central Register of Controlled Trials, MEDLINE, and PsycINFO</p> <p><i>Additional sources:</i> Google Scholar, Dissertation Abstracts International, and ETHOS online databases, reference lists, Science Citation Index, contact with experts</p>	<p>resilien* (for resilience, resiliency, and resilient)</p> <p>+ training, intervention + work</p> <p>Only English publications</p>	1989 to April 2014	155/14 (8 RCTs)	Only review; risk of bias/methodological quality assessment of included studies using Cochrane Collaboration's assessment tool
Skeffington 2013	<p>Exposure to simulated traumatic event or stressor also eligible</p> <p>(Criterion A2 of DSM-IV not used in assessing eligibility)</p>	<p>1) Research articles regarding treatment of PTSD</p> <p>2) Studies conducted on samples with current PTSD symptomatology</p> <p>(Non-meeting of Criterion A-1 by PTE no exclusion criterion)</p>	<p>ProQuest, PsycINFO; MEDLINE, Science Direct, Web of Knowledge</p> <p><i>Additional sources:</i> Reference lists of eligible articles</p>	<p>trauma* or PTSD or post-traumatic stress disorder or post-traumatic stress disorder or post traumatic stress disorder AND</p> <p>resilien* or prevent* or stress* or inoculation* or hardiness or protect* AND</p> <p>interven* or training</p>	Search conducted on 25 November 2011	15014/7 (No RCTs)	Only review

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
				(Search terms located in abstract or keywords)			
				Articles not excluded by language			
Tams 2016 <sup>a,b</sup>	Not assessable based on publication abstract	Not assessable based on publication abstract	National Library for Health abstract database	Not assessable based on publication abstract	Not assessable based on publication abstract	5 papers included	Only review
			3-step search strategy: 1) PubMed, PsycINFO, EMBASE, Scopus, Psychology and Behavioral Sciences Collection, CINAHL, Cochrane Library; analysis of text words contained in title, abstract and index terms used to describe the articles 2) Search using all identified keywords and index terms across all included databases 3) Reference lists of all identified reports and articles	Initial keywords: "mindful" and "parenting"  Keywords associated with "mindful" (mindfulness, Mindfulness Based Stress Reduction (MBSR), Mindfulness Based Cognitive Therapy, Mindfulness Based Cognitive Behavior Therapy (MCBT), Dialectical Behavior Therapy (DBT) or Acceptance Commitment Therapy (ACT)) + keywords associated with "parenting"			
Townshend 2016 <sup>b</sup>	/	/			Studies published between 1997 to November 2014	1232/7 (7 RCTs)	Protocol published (Townshend et al., 2014); only review (see publication abstract); risk of bias/methodology quality assessment of included studies using Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBIMASTARI)

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
			<i>Additional sources:</i> Reference lists (see above); grey literature (ProQuest Dissertations and Theses Database)	(parent, parent-child relationship, father, mother, parental, maternal, paternal, perinatal, antenatal) + keywords associated with well-being (resilience, emotional regulation, internalising disorders (depression, anxiety, stress) and externalising disorders (conduct disorders))  Search for studies with different subgroups of children: using keywords preschoolers, adolescents, Indigenous, migrant, African American children  Only English publications; published and unpublished studies			
Vanhove 2016	/	1) Secondary prevention techniques (i.e., stress management interventions)	PsycINFO, Google Scholar	Resilience, resiliency + intervention, program, training	All years until April 2014	129/37 (14 RCTs)	Review and meta-analyses; assessment of publication bias

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Van Kessel 2014	/	2) Tertiary prevention techniques (e.g., stress debriefing) that aim to treat existing problems associated with specific past traumas or exposures to stress 3) Studies employing program reaction criteria (e.g., satisfaction with training experience) 4) Health promotion interventions emphasising, for example, physical fitness, changes to the workplace environment, and meditation	<i>Additional sources:</i> Reference lists of included studies and reviews (on preventive interventions among military personnel, targeting posttraumatic stress disorder, workplace health promotion, stress management, or positive psychology and wellbeing interventions)	+ work, organization, employee  Any publication language; published and unpublished studies	Inception to December 2013	1880/8 (No RCT)	Only review; risk of bias/methodological quality assessment of included trials using mixed methods appraisal tool (MMAT); ranking of quantitative studies using National Health and Medical Research Council guidelines; ranking of qualitative studies using qualitative hierarchy of evidence for practice; review
		1) No empirical study 2) No disaster setting 3) Disaster setting is a biological disaster 4) Only children or adolescents 5) Not a public health intervention 6) Not related to an intervention targeting resilience 7) Commentary or theoretical discussion on resilience	PsychArticles, Psychbooks, PsychInfo, Psychological and Behavioural Sciences collection, CINAHL, Sociological abstracts, MEDLINE  <i>Additional sources:</i> Grey literature including ProQuest Dissertation & Thesis, DART—Europe, Global Health database, WHOLIS, Libraries Australia, Conference	Resilience and associated terms (e.g., adapt, cope) + intervention terms and resilience factor social support (e.g., public health, preventive medicine, health promotion, social support, disaster planning) + terms on types of disaster (e.g., natural disaster, flood)			

Study	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
			Papers Index, OpenGrey; hand-searching in key journals focused on disaster, emergency, and trauma	Only English publications			according to Guidance for Undertaking Reviews in Health Care;
				MeSH and key word terms			
			MEDLINE, Embase, PsycINFO (via Ovid), Cochrane Library, Web of Science	Pain-and disease related terms (e.g., fibromyalgia, chronic pain, headache, hyperostosis)			PROSPERO registration (CRD42015023504); risk of bias/methodological quality assessment using Cochrane risk of bias (RoB) tool and additional quality assessment; review according to PRISMA
Wainwright 2019	Completed, published RCTs/clinical trials		<i>Additional sources:</i> Searching of first 20 pages of Google Scholar; reference lists of all full-text articles; screening of relevant systematic reviews; contact with authors of any RCT protocols/abstracts to establish trial status	+ resilience and related terms (e.g., resilience, bounce back, hardiness, inner strength) + terms related to work and sickness absence (e.g., workplace, sick leave, sickness absence)	Inception to May 2017	3354/24 (24 RCTs)	
				No language restrictions			

*Note.* RCT = Randomized controlled trial.

<sup>a</sup> No primary focus or eligibility criteria with respect to resilience formulated in the review, but resilience or related constructs were included in the search strategy.

<sup>b</sup> Full text not available; data extracted based on publication abstract; for Townshend 2016, review protocol available.

## Appendix D1.5 Effect Sizes Found in Previous Reviews on Resilience Interventions in (Non-)Clinical

### Populations

**Table D1.5.1**

*Effect Sizes in Previous Reviews – (non-)Clinical Populations*

Outcome	SMD, Random-effects, 95% CI	<i>p</i>	<i>I</i> <sup>2</sup>
LEPPIN ET AL. (2014)			
1. Generalized stress-directed trainings (within 3 months postintervention)			
Resilience ( <i>k</i> = 13)	0.37 [0.18, 0.57]	< .001	41%
Depression ( <i>k</i> = 6)	−0.28 [−0.56, 0.01]	.06	33%
Stress ( <i>k</i> = 9)	−0.28 [−0.60, 0.04]	.09	57%
Anxiety ( <i>k</i> = 5)	−0.11 [−0.41, 0.20]	.48	17%
Quality of life ( <i>k</i> = 4)	0.34 [−0.03, 0.72]	.07	10%
Self-efficacy ( <i>k</i> = 3)	0.26 [−0.10, 0.63]	.16	66%
1.1 Subgroup analysis (control group): Resilience ( $\chi^2 = 2.19$ , <i>df</i> = 1, <i>p</i> = .14, <i>I</i> <sup>2</sup> = 54.3%)			
Attention control ( <i>k</i> = 4)	0.18 [−0.09, 0.45]	.20	0%
Usual care or nothing ( <i>k</i> = 9)	0.46 [0.20, 0.72]	< .001	53%
1.2 Subgroup analysis (chronic disease): Resilience ( $\chi^2 = 0.38$ , <i>df</i> = 1, <i>p</i> = .54, <i>I</i> <sup>2</sup> = 0%)			
Chronic disease ( <i>k</i> = 4)	0.54 [−0.06, 1.14]	.08	61%
No chronic disease ( <i>k</i> = 9)	0.34 [0.14, 0.55]	.001	28%
1.3 Subgroup analysis (control group): Depression; test for subgroup differences not applicable			
Attention control ( <i>k</i> = 0)	/	/	/
Usual care or nothing ( <i>k</i> = 6)	−0.28 [−0.56, 0.01]	.06	33%
1.4 Subgroup analysis (chronic disease): Depression ( $\chi^2 = 1.03$ , <i>df</i> = 1, <i>p</i> = .31, <i>I</i> <sup>2</sup> = 2.6%)			
Chronic disease ( <i>k</i> = 1)	−0.55 [−1.09, −0.00]	.05	/
No chronic disease ( <i>k</i> = 5)	−0.22 [−0.55, 0.10]	.18	37%
1.5 Subgroup analysis (control group): Stress ( $\chi^2 = 0.16$ , <i>df</i> = 1, <i>p</i> = .69, <i>I</i> <sup>2</sup> = 0%)			
Attention control ( <i>k</i> = 2)	−0.39 [−0.86, 0.07]	.10	8%
Usual care or nothing ( <i>k</i> = 7)	−0.27 [−0.67, 0.13]	.19	65%
1.6 Subgroup analysis (chronic disease): Stress ( $\chi^2 = 0.47$ , <i>df</i> = 1, <i>p</i> = .49, <i>I</i> <sup>2</sup> = 0%)			
Chronic disease ( <i>k</i> = 3)	−0.46 [−0.99, 0.08]	.09	22%
No chronic disease ( <i>k</i> = 6)	−0.22 [−0.63, 0.18]	.28	67%
1.7 Subgroup analysis (control group): Anxiety ( $\chi^2 = 0.55$ , <i>df</i> = 1, <i>p</i> = .46, <i>I</i> <sup>2</sup> = 0%)			
Attention control ( <i>k</i> = 1)	−0.41 [−1.24, 0.42]	.33	/
Usual care or nothing ( <i>k</i> = 4)	−0.07 [−0.42, 0.28]	.69	28%
1.8 Subgroup analysis (chronic disease): Anxiety ( $\chi^2 = 0$ , <i>df</i> = 1, <i>p</i> = 1.00, <i>I</i> <sup>2</sup> = 0%)			
Chronic disease ( <i>k</i> = 1)	−0.07 [−0.89, 0.75]	.86	/
No chronic disease ( <i>k</i> = 4)	−0.07 [−0.42, 0.28]	.69	28%
1.9 Subgroup analysis (control group): Quality of life ( $\chi^2 = 0.83$ , <i>df</i> = 1, <i>p</i> = .36, <i>I</i> <sup>2</sup> = 0%)			
Attention control ( <i>k</i> = 1)	0.71 [−0.14, 1.56]	.10	/
Usual care or nothing ( <i>k</i> = 3)	0.27 [−0.17, 0.70]	.23	16%
1.10 Subgroup analysis (chronic disease): Quality of life ( $\chi^2 = 3.21$ , <i>df</i> = 1, <i>p</i> = .07, <i>I</i> <sup>2</sup> = 68.9%)			
Chronic disease ( <i>k</i> = 3)	0.62 [0.14, 1.09]	.01	0%

Outcome	SMD, Random-effects, 95% CI	<i>p</i>	<i>I</i> <sup>2</sup>
No chronic disease ( <i>k</i> = 1)	−0.04 [−0.58, 0.50]	.88	/
1.11 Subgroup analysis (control group): Self-efficacy ( $\chi^2 = 0.10$ , <i>df</i> = 1, <i>p</i> = .76, <i>I</i> <sup>2</sup> = 0%)			
Attention control ( <i>k</i> = 1)	0.18 [−0.24, 0.60]	.39	/
Usual care or nothing ( <i>k</i> = 2)	0.30 [−0.28, 0.88]	.32	82%
1.12 Subgroup analysis (chronic disease): Self-efficacy ( $\chi^2 = 0.10$ , <i>df</i> = 1, <i>p</i> = .76, <i>I</i> <sup>2</sup> = 0%)			
Chronic disease ( <i>k</i> = 1)	0.18 [−0.24, 0.60]	.39	/
No chronic disease ( <i>k</i> = 2)	0.30 [−0.28, 0.88]	.32	82%
2. Trauma-focused resilience interventions (within 3 months postintervention)			
Depression ( <i>k</i> = 3)	−0.51 [−0.92, −0.10]	.02	61%
Stress ( <i>k</i> = 3)	−0.53 [−1.04, −0.03]	.04	73%
Anxiety ( <i>k</i> = 2)	−0.61 [−1.54, 0.31]	.19	81%
2.1 Subgroup analysis (control group AND chronic disease): Depression ( $\chi^2 = 5.00$ , <i>df</i> = 1, <i>p</i> = .03, <i>I</i> <sup>2</sup> = 80.0%)			
Attention control AND no chronic disease ( <i>k</i> = 2)	−0.32 [−0.56, −0.08]	.009	0%
Usual care or nothing AND chronic disease ( <i>k</i> = 1)	−1.14 [−1.83, −0.46]	.001	/
2.2 Subgroup analysis (control group AND chronic disease): Stress ( $\chi^2 = 6.74$ , <i>df</i> = 1, <i>p</i> = .009, <i>I</i> <sup>2</sup> = 85.2%)			
Attention control AND no chronic disease ( <i>k</i> = 2)	−0.26 [−0.50, −0.02]	.03	0%
Usual care or nothing AND chronic disease ( <i>k</i> = 1)	−1.23 [−1.92, −0.54]	< .001	/
2.3 Subgroup analysis (control group AND chronic disease): Anxiety ( $\chi^2 = 5.20$ , <i>df</i> = 1, <i>p</i> = .02, <i>I</i> <sup>2</sup> = 80.8%)			
Attention control AND no chronic disease ( <i>k</i> = 1)	−0.18 [−0.62, 0.27]	.43	/
Usual care or nothing AND chronic disease ( <i>k</i> = 1)	−1.12 [−1.80, −0.44]	.001	/
VANHOVE ET AL. (2015)			
1. Proximal effect (≤ 1 month postintervention)			
Well-being ( <i>k</i> = 23)	0.25 [0.15, 0.34]	NR	NR
Psychological deficits ( <i>k</i> = 19)	0.17 [0.03, 0.32]	NR	NR
Performance ( <i>k</i> = 12)	0.36 [0.21, 0.50]	NR	NR
1.1 Subgroup analysis (program sample)			
Universal ( <i>k</i> = 23)	0.29 [0.18, 0.40]	NR	NR
Targeted ( <i>k</i> = 6)	0.09 [−0.11, 0.28]	NR	NR
1.2 Subgroup analysis (occupational setting)			
Non-military ( <i>k</i> = 20)	0.26 [0.12, 0.41]	NR	NR
Military ( <i>k</i> = 9)	0.25 [0.09, 0.41]	NR	NR
1.3 Subgroup analysis (form of delivery)			
One-on-one ( <i>k</i> = 3)	0.59 [0.23, 0.95]	NR	NR
Group-based classroom ( <i>k</i> = 21)	0.25 [0.12, 0.37]	NR	NR
Computer-based ( <i>k</i> = 4)	0.16 [−0.08, 0.39]	NR	NR
Train-the-trainer ( <i>k</i> = 1)	0.16 [−0.07, 0.39]	NR	NR
1.4 Subgroup analysis (study design)			
Between-participants ( <i>k</i> = 22)	0.15 [0.07, 0.24]	NR	NR
Within-participants ( <i>k</i> = 7)	0.49 [0.35, 0.63]	NR	NR
1.5 Subgroup analysis (comparison group)			
Non-intervention ( <i>k</i> = 17)	0.18 [0.09, 0.26]	NR	NR
Active comparison ( <i>k</i> = 5)	0.09 [−0.16, 0.33]	NR	NR
1.6 Subgroup analysis (comparison group)			
Non-random ( <i>k</i> = 10)	0.18 [0.04, 0.31]	NR	NR

Outcome	SMD, Random-effects, 95% CI	<i>p</i>	<i>I</i> <sup>2</sup>
Random ( <i>k</i> = 12)	0.12 [0.00, 0.24]	NR	NR
2. Distal effect (> 1 month postintervention)			
Well-being ( <i>k</i> = 12)	0.06 [−0.05, 0.17]	NR	NR
Psychological deficits ( <i>k</i> = 19)	0.10 [0.03, 0.17]	NR	NR
Performance ( <i>k</i> = 8)	0.03 [−0.01, 0.07]	NR	NR
2.1 Subgroup analysis (program sample)			
Universal ( <i>k</i> = 14)	0.04, [0.00, 0.07]	NR	NR
Targeted ( <i>k</i> = 7)	0.26 [0.11, 0.40]	NR	NR
JOYCE ET AL. (2018)			
Resilience ( <i>k</i> = 11)	0.44 [0.23, 0.64]	.04	47.6%
1.1 Subgroup analysis (content)			
CBT-based intervention ( <i>k</i> = 4)	0.27 [0.05, 0.50]	.69	0%
Mindfulness-based intervention ( <i>k</i> = 2)	0.46 [0.10, 0.82]	.34	0%
Mixed intervention (incorporating CBT and mindfulness) ( <i>k</i> = 5)	0.51 [0.12, 0.91]	.02	65.9%
1.2 Subgroup analysis (follow-up and content)			
6-month follow-up AND CBT-based intervention ( <i>k</i> = 2)	0.76 [−0.04, 1.55]	NR	NR
6-month follow-up AND mindfulness-based intervention ( <i>k</i> = 3)	0.58 [0.27, 0.89]	NR	NR

*Note.* For Pesantes et al. (2015), pairwise meta-analyses were only calculated for HbA1c value, but not on psychological outcomes (HbA1c: pooled SMD −0.18, 95% CI [−0.31, −0.06], *I*<sup>2</sup> = 0.8%). *k* = number of studies; SMD = standardized mean difference; CI = confidence interval; *p* = *p* value; *I*<sup>2</sup> = heterogeneity; NR = Not reported.



## **Appendix D1.6 Previous Reviews/Meta-Analyses on Resilience Interventions in Healthcare Workers**

To date, there are many systematic reviews and meta-analyses that have investigated various forms of intervention to foster healthcare professionals' mental health, such as stress management, mentoring programs, emotional intelligence interventions, mindfulness-based trainings, interventions to reduce or prevent burnout, or crisis-focused programs (Boellinghaus et al., 2014; Buddeberg-Fischer & Herta, 2006; Burton et al., 2017; Canadian Institute for Public Safety Research and Treatment, 2020; Car et al., 2018; Carrieri et al., 2018; Chesak et al., 2019; Cochran, 2017; De Oliveira et al., 2019; Edwards & Burnard, 2003; Guillaumie et al., 2017; Hannigan et al., 2004; Harris et al., 2018; Jones & Johnston, 2000; Lamothe et al., 2016; Maben et al., 2018; McVicar, 2003; Mimura & Griffiths, 2003; Panagioti et al., 2017; Paris & Hoge, 2010; Petrie et al., 2019; Raj, 2016; Regehr et al., 2014; Romppanen & Häggman-Laitila, 2017; Ruotsalainen et al., 2015; Smith & Roberts, 2003; Trowbridge & Mische Lawson, 2016; West et al., 2016). Although some of these reviews also identified interventions to foster resilience (e.g., Lamothe et al., 2016; Ruotsalainen et al., 2015), the primary review question did not specifically refer to identifying such programs, respectively.

In addition, there are several systematic reviews and meta-analyses that synthesized the evidence on the efficacy of resilience-training programs in this target group. Table D1.6.1 and Table C.1.6.2 in this Appendix provide an overview concerning the methodological characteristics of these reviews.

**Table D1.6.1**

*Eligibility Criteria (PICOS) of Previous Reviews/Meta-Analyses in Healthcare Professionals*

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
Cleary 2018	All types of staff working in health settings or teaching hospitals	1) Any psychological intervention prospectively designed to develop or enhance resilience among health professionals 2) Irrespective of content, method of delivery or duration 3) Study title or aim(s) have to explicitly identify resilience as the primary focus of the intervention	Not specified	1) Primary outcome measure: effectiveness of interventions in improving resilience outcomes 2) Any type of direct resilience outcomes also included	Peer reviewed primary research evaluating resilience interventions either qualitatively or quantitatively (RCTs and non-RCTs, e.g., single-arm trials)
Concilio 2019	Newly licensed nurses (NLNs) within first year of practice	Focus of review not only on resilience interventions; intervention to promote NLN (Newly Licensed Nurses) resiliency/protective factors of resilience within the first year of hire that lead to NLN's intention to stay at their current job	Not specified	Not specified	Any research design (later included: qualitative studies: case study, phenomenological, grounded theory analyses; quantitative studies were non-experimental: causal-comparative, descriptive analyses; mixed-methods studies: sequential, exploratory designs)
Delgado 2017	Registered nurses	Focus of review not only on resilience interventions; with respect to interventions: resilience-building interventions for nurses (eligibility criteria not further specified)	Not specified	Not specified	Quantitative and qualitative studies (any study design included; for intervention studies later included; RCTs and non-RCTs)
Elliott 2012	1) Paid health workers who provide support or care to people with dementia or their informal caregivers	Intervention aim to enhance some aspect of dementia care worker or workforce capacity and organisational factors	Not specified	Only interventions involving dual outcome domains: that is, 1) Some aspect of worker capacity or well-being (e.g., job stress, knowledge, mood,	RCT and effects of intervention are evaluated using empirical data

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
	2) Workers employed in residential facilities or community-based services			job satisfaction, well-being) AND 2) Organisational factors (e.g., service delivery or retention)	
Foster 2019	Mental health nurses (need to comprise majority of sample population)	Focus of review not only on resilience interventions; eligibility criteria for resilience interventions not further specified	Not specified	Not specified; resilience in relation to mental health nursing has to be examined	Peer reviewed empirical research, theoretical or discussion papers (later included: one intervention study: non-RCT)
Fox 2018	1) Physicians 2) who had completed undergraduate or postgraduate training 3) were practising medicine in any setting	Any intervention that was implemented with the stated intention of promoting resilience among physicians	Not specified	Not specified	Original research: qualitative, quantitative and mixed-method research studies
Gillman 2015 <sup>a</sup>	Oncology and palliative care nurses caring for adult patients with malignancy in a hospital or community setting	1) Quantitative: Personal and organizational strategies to promote coping and resilience in nurses working in an oncology or palliative care context, such as appraisal-focused techniques changing the way individuals think (e.g., mindfulness-based stress reduction) and emotion-focused techniques that involve releasing or managing emotions that accompany the perception of stress (e.g., distraction, exercise, music, meditation, use of humour) 2) Qualitative: experience of different extrinsic and intrinsic factors that influence coping and resilience in nurses working in an oncology or palliative care context, such as: story-	None (according to review registration)	1) Experience of factors that influence an individual's coping and resilience 2) Outcomes of validated measures of coping or resilience  See review registration: 1) Primary outcomes: Outcome measures reflecting the effectiveness of personal and organisational strategies to promote resilience and effective coping, such as: resilience, coping, stress, burnout, staff retention, job satisfaction, intention to leave, sick leave/stress leave,	Qualitative, quantitative and mixed methods studies 1) Quantitative: RCTs, non-RCTs, quasi-experimental, before and after studies, prospective and retrospective cohort studies, case control studies, analytical cross-sectional studies 2) Qualitative: Phenomenology, grounded theory, action research

Population (P)		Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
Gilmartin 2017	1. Practicing nurses, physicians, student nurses, or medical trainees 2. 18 years or older 3. employed in hospital setting (e.g., emergency department, inpatient wards, intensive care)	telling, talking to friends/family, debriefing, mentoring or buddy systems, reflective practice, problem-focused coping, use of serenity or quiet rooms  Interventions considered (see abstract): clinical supervision, staff retreats, psycho-educational programs, compassion fatigue resilience programs, stress inoculation therapy and individual approaches that reduced the emotional impact of cancer care work	Not specified	staff belief that they have “value added” to the patient’s experience, quality of patient care 2) Secondary outcomes: None	All study designs (e.g., RCTs, pre-post, qualitative)
		1) Brief mindfulness interventions using dedicated content (e.g., mindfulness-based stress reduction-based programs) 2) ≤ 4 hours as cut-off 3) Exercises focusing on paying attention on purpose, being in the present moment, being non-judgmental (e.g., sitting meditation, breathing exercises, guided imagery, relaxation methods, yoga, desensitization-relaxation in person or through virtual modalities, e.g., online module, CDs, smartphone application) 4) Brief mindfulness-based interventions embedded within multifaceted programs		Quantitative or qualitative outcomes (not further specified) Main outcomes of interest: 1) Provider well-being: self-reported levels of stress, anxiety, depression, resilience, mindfulness, relaxation or burnout symptoms (e.g., emotional exhaustion, depersonalization, personal accomplishment), satisfaction with life or quality of life 2) Provider behaviour: reports of changes in academic performance (e.g., improvements on school examinations), performance on tasks of attention (e.g., attentional awareness and cognition measured by tests of memory or intelligence),	

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
				changes in clinical practice (e.g., increased adherence to evidence-based practices) or incidence of diagnostic errors related to mindfulness intervention	
Hunter 2016 <sup>b</sup>	Qualified nurses and midwives (studies with nurses or midwives as majority of participants)	Mindfulness training	Not specified	Qualitative outcomes (no eligibility criteria specified)	Qualitative research (mixed-methods studies with qualitative element also included)
Pezaro 2017 <sup>b</sup>	1) Midwives 2) Student midwives experiencing work-related psychological distress	1) Intervention designed to support midwives and/or student midwives experiencing work-related psychological distress 2) All types of interventions	Studies not required to include either a comparator or control group	<ul style="list-style-type: none"> <li>Studies have to report at least one outcome measure</li> </ul> 1) Primary outcome: work-related psychological distress 2) Secondary outcomes: Any quantitative and/or qualitative outcomes and/or experiences relating to intervention use	Quantitative and qualitative studies (later included: RCTs, mixed-methods, cohort studies, qualitative case study)
Robertson 2016	Healthcare professionals in primary care (where both primary and secondary care professionals, data extracted for primary care professionals where possible)	Focus of review not only on resilience interventions; eligibility criteria for resilience interventions not further specified	Not specified	Not specified	No eligibility criteria specified; later included: quantitative and qualitative research; one intervention study (non-RCT)
Rogers 2016	Healthcare students and professionals	1) Interventions whose primary purpose was education 2) Qualitative research covering educational interventions and resilience was included	No comparison criteria; allows inclusion of qualitative studies	Only validated resilience scores	Only primary research studies (later included: RCTs, before and after studies, qualitative studies, mixed-methods studies)

	Population (P)	Intervention (I)	Comparator (C)	Outcomes (O)	Study design (S)
Venegas 2019	1) Physicians who have completed training working in any setting 2) Studies including physicians in addition to residents, medical students or other healthcare providers also eligible	Intervention with aim of improving resilience (and not just intention of reducing stress)	Not specified	1) Primary outcome: Primarily interested in studies presenting outcome data related to resilience (outcome measures based on definition of resilience as continuous, effective and positive adaptation process to adversity) 2) Secondary outcomes: Studies with aim of enhancing resilience but without specifically measuring resilience (i.e., “proxy” measure for resilience, such as burnout, depression, anxiety, empathy) also eligible as secondary outcome measures as they target these states with the aim of enhancing resilience but without specifically measuring resilience	RCTs and observational studies
Wright 2017	Midwives (sample that includes a stratification of participants, with 50% or greater being midwives)	Methods for alleviating stress and increasing resilience (eligibility criteria not further specified)	Not specified	Qualitative or quantitative measurements of coping in the context of the midwifery practice	Original research (quantitative, qualitative and mixed-methods studies)

*Note.* RCT = Randomised controlled trial.

<sup>a</sup>Gillmartin 2015: Full-text not available; data extracted from publication abstract and review registration (Prospero).

<sup>b</sup>No primary focus or eligibility criteria with respect to resilience formulated in the review, but resilience or related constructs were included in the search strategy.

**Table D1.6.2**

*Further Methodological Characteristics of Previous Reviews/Meta-Analyses in Healthcare Professionals*

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Cleary 2018	/	<ol style="list-style-type: none"> <li>1) Non-interventional studies</li> <li>2) Studies were subjects were primarily non-health professionals or students</li> <li>3) Theoretical articles, commentaries, editorials, review articles</li> <li>4) Articles published in non-English language</li> </ol>	<p>PubMed, PsychINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus</p> <p><i>Additional sources:</i> reference lists of retrieved articles, manual searching of journals</p>	<p>Boolean connectors AND, OR and NOT utilized to combine the following MeSH and search terms:</p> <p>resilien*, hardiness, training, health personnel, health facility, staff development</p> <p>Only English publications</p>	Searched in February 2018 (probably all years until February 2018)	1451/33 (9 RCTs)	<p>Only review; risk of bias/methodological quality assessed using Joanna Briggs Critical appraisal tools: JBI Critical Appraisal Checklist for Randomised Experimental Studies and JBI Critical Appraisal Checklist for Non-randomised Experimental Studies; quality assessment for qualitative data using CASP tool (Critical Appraisal Skills Programme checklists); review according to PRISMA</p>
Concilio 2019	Only studies conducted in the United States	Non-research publications, grey literature	CINAHL, PubMed	<p>Subject heading used: newly licensed nurses, resiliency, intention to leave combined via Boolean operators (AND, OR) with terms newly licensed nurse*, nurs*</p>	Studies published between January 2008 to May 2018	789/16 (No RCT)	<p>Only review; risk of bias/methodological quality assessment of included studies using GRADE (Grading of Recommendations, Assessment, Development and Evaluations) Guideline</p>

Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Delgado 2017	Peer-reviewed empirical articles	CINAHL, Medline, Scopus, PsycInfo  <i>Additional sources:</i> reference lists of included studies	(Searches with assistance of health science librarian)  Only English publications	Studies published between January 2005 to December 2015	758/27 (1 RCT)	Criteria for Appraising Quality of Evidence for quantitative studies and using GRADE-CERQual Confidence in the Evidence from Review of Qualitative Research for qualitative studies (also publication bias assessed); review according to integrative approach by Whitemore & Knafl (2005)
			Search terms in combined searches using Boolean operators: resilien* (resilience, resilient, resiliency) OR emotional labour (or emotional labor) AND nurs* (nurse, nurses and nursing) AND nursing care  Search terms derived from existing literature on the topic and in consultation with a librarian  Only English publications			Only review; risk of bias/methodological quality of included studies assessed using Mixed Methods Appraisal Tool (MMAT) (established validity and reliability for summarising overall quality across range of study designs, including quantitative, qualitative or mixed methods studies); review process guided by Whitemore and Knafl's methodology for integrative reviews



	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Elliott 2012	/	1) Studies without worker or organisational assessment 2) Studies predominantly focused on outcomes for the person with dementia or their informal carer 3) Studies primarily focusing on behavior change in people with dementia via staff training in skills aimed at changing specific behaviors excluded if they did not include worker-related outcomes 4) Non-dementia specific papers (i.e., studies testing training intervention of generalised educational resource for nurses in elderly care) 5) Studies only assessing change in one domain	Web of Science, PsycINFO, Scopus, ProQuest, PubMed  <i>Additional sources:</i> References from papers located through database searches	Terms such as "dementia training," "dementia care training," "dementia training intervention," "dementia staff training," and "dementia education"  Only English publications	Studies published between 1990 to 2011	74/6 (6 RCTs)	Only review; risk of bias/methodological quality calculated based on rating scale developed from criteria based on Consolidated Standards of Reporting Trials (CONSORT; Moher et al., 2001) and by Brodaty et al. (2003); included studies ranked in order of highest to lowest quality rating
Foster 2019	/	1) Articles on undergraduate education and student nurses	MEDLINE Complete, CINAHL Complete, PsycINFO (searched for titles and abstracts)	<i>Content area:</i> Nursing, Resilience  <i>Subject heading:</i> Psychiatric nursing;	Studies published between January 2000 to June 2018	1773/12 (no RCT)	Only review; risk of bias/methodological quality of included studies assessed using Mixed Methods

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Fox 2018	Published in peer-reviewed journal (original research)	2) Editorials, non-peer-reviewed articles, literature reviews, dissertations, book chapters, conference proceedings, and other grey literature	<i>Additional sources:</i> Reference lists of key articles	Mental health nurse; Adaptation, psychological; Coping; Psychological well-being; Resilience, psychological; Emotional adjustment; Hardiness  <i>Search terms:</i> Psychiatric nurs*; Mental health nurs*; resilien*; adapt*; coping; withstand*; adjust*; resist*; wellbeing; well-being; overcome*; psycholog*; behav*; respon*; emotion*  Use of Boolean methods AND with OR  Only English publications			Appraisal Tool (MMAT); review according to Whitemore and Knaf's methodology
		1) Studies not reporting the participation of physicians 2) Intervention described delivered to individuals from multiple health professions and was	MedLine, PsycINFO, CINAHL, Web of Science, Psychology and Behavioural Sciences  <i>Additional sources:</i>	MeSH terms for healthcare professionals (e.g., "Personnel, hospital/"; "Health personnel/"; "Medical staff/"; "Patient care team/") and resilience	Searches conducted in April 2017 (probably all years until April 2017)	3665/22 (7 RCTs)	Only review; risk of bias/methodological quality of included studies assessed using Downs and Black checklist (suitable for use with both randomised and non-

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Gillman 2015 <sup>a</sup>	/	not possible to extract data concerning physician outcomes specifically	Reference lists of included studies; reference lists of recent reviews focusing on resilience among healthcare professionals (2 reviews)	("Resilience, psychological/" + keywords including "resilienc*" and "hardiness"	1980 to 2012	20 included (6 intervention trials, but unclear how many RCTs)	randomised studies of healthcare interventions); review according to PRISMA
		3) Studies focused on developing organisational or system resilience 4) Studies with focus on developing resilience in emergency situations or in order to mitigate trauma-induced stress or the consideration and/or measurement of resilience in the absence of intervention		Only English publications			
		1) Studies exclusively involving children and adolescents, i.e., < 18 years of age 2) Studies which do not examine outcomes or phenomena of interest within the context of oncology and palliative care nursing	AustHealth, Cochrane Library, EMBASE, MEDLINE, Proquest Health and Medical Complete, PsycINFO, Qualitative Inquiry ( <a href="http://qix.sagepub.com/">http://qix.sagepub.com/</a> ), TRIP (Turning Research into Practice), EBSCOhost CINAHL PLUS with full text, Joanna Briggs Institute Library of Systematic Reviews, AMED (Allied Complementary Medicine)	Initial keywords used (alone and as combined terms): malignancy, neoplasm, cancer patients, oncology nursing, oncologic care, hospice and palliative nursing, palliative care, resilience, hardiness, stress, burnout, symptom distress, coping, role stress, stress management			PROSPERO registration (CRD42012002972); only review; risk of bias/methodological quality assessment (see PROSPERO registration) for quantitative papers using standardised critical appraisal instruments from JBI-MASARI and for qualitative papers using standardised critical appraisal instruments from JBI-QUARI

Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
		<p>(Cochrane and JBI library searched for systematic reviews on similar topics)</p> <p>+ ProQuest Dissertations and Theses for unpublished studies</p> <p>3-step search strategy (including reference lists as 3. step):</p> <ol style="list-style-type: none"> <li>1) MEDLINE, CINAHL, followed by analysis of text words contained in title and abstract and of index terms used to describe the article</li> <li>2) Search using all identified keywords and index terms across all included databases</li> </ol> <p><i>Additional sources:</i></p> <ol style="list-style-type: none"> <li>1) Reference lists of all identified articles</li> <li>2) Cross-checking of key articles in citation indexes</li> <li>3) Hand-searching of journals relevant to topic accessible in local educational and</li> </ol>	<p>English abstract required for article to be assessed;</p> <p>translation of non-English articles for eligible studies for which translation resources available: Italian, German, French</p>			

Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
		<p>health libraries or on-line for period 2007-2012</p> <p>4) Grey literature and unpublished material (e.g., conference papers, research reports, dissertations); sources of unpublished studies: ProQuest Dissertations and Theses, Index to Theses, Grey Literature Report, conference papers, Research registers, WWW sites of relevant associations, Internet search engines, direct communication with researchers and relevant professional organisations</p> <p>Quality web search tools (e.g., AllTheWeb, GoogleScholar, Scirus.com, NurseScribe, Agency of Healthcare Research</p>				

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Gilmartin 2017	Peer-reviewed literature	<ol style="list-style-type: none"> <li>1) Psychologists, psychiatrists, social workers, and others in counselling roles</li> <li>2) Studies performed in primary care, outpatient, long-term care, or office-based settings</li> <li>3) Dissertations, conference abstracts, and literature published in non-peer-reviewed journals</li> </ol>	<p>and Quality, NLM Gateway, Netting the Evidence, Medscape)</p> <p>MEDLINE, CINAHL, PsychINFO, Cochrane/EBM Reviews, EMBASE, PubMed Journals and Medical Subject Heading databases (Mesh), ISI knowledge databases (by research librarian)</p> <p><i>Additional sources:</i> reference lists (manual searching) of included articles; searching for published protocols on ClinicalTrials.gov; searching for systematic reviews registered in PROSPERO</p>	<p><i>Mindfulness block</i> (e.g., relaxation therapy, mindfulness, stress management) + <i>Population block</i> (e.g., physicians, nurses, residency, hospitalist, health personnel, health care provider) + <i>Intervention block</i> (e.g., intervention, training support, training)</p> <p>Only English publications</p>	Searches conducted on 9 February 2016 and updated on 24 January 2017 (probably all years until January 2017)	4181/14 (7 RCTs)	PROSPERO registration (CRD42016048388); only review; risk of bias/methodological quality assessment of quantitative studies using Downs and Black (D&B) tool (as recommended by Cochrane collaboration); risk of bias assessment of qualitative studies using Critical Appraisal Skills Programme (CASP) tool; review according to PRISMA
Hunter 2016 <sup>b</sup>	Studies contain qualitative findings relevant to focus of the review	/	<ol style="list-style-type: none"> <li>1) CINAHL and Medline to scope extent of literature on the subject</li> <li>2) More focused search in CINAHL, Medline, Psychinfo</li> </ol> <p><i>Additional sources:</i> Reference chaining</p>	<ol style="list-style-type: none"> <li>1) Scoping search (title/abstract): "mindfulness" + "nurse or midwife or doctor or healthcare professional"</li> <li>2) Focused search terms (title/abstract)</li> </ol> <p>Mindfulness</p>	No data limits	88/5 (1 RCT)	Only review

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
				+ terms related to nurses/midwives (healthcare professional*, nurse*, midwi*) + terms related to experience, patients, coping and resilience (e.g., perception*, behaviour?, patient care, relationships, resilience) + Qualitative  Only English publications  Terms related to identification of midwifery profession (e.g., midwives) + terms related to any of the outcomes considered to be generally associated with “work-related psychological distress” (e.g., occupational stress, job satisfaction, psychological stress, professional burnout) + terms related to work, employment, occupation and professional health			
Pezaro 2017 <sup>b</sup>	1) Peer reviewed studies 2) All types of length of follow up considered	/	PsycINFO, PsycARTICLES, MEDLINE, Academic Search Complete, Scopus, CINAHL  <i>Additional sources:</i> reference lists of identified studies, contact with authors of included studies		January 2000 – December 2016 (searches conducted between 31 March and 24 May 2016)	524/5 (1 RCT)	PROSPERO registration (CRD42016036978); only review; risk of bias/methodological quality assessment of included studies using scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in mixed studies reviews (Pluye et al., 2009); review according to PRISMA

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Robertson 2016	Empirical studies			(e.g., work, job, occupation, well-being, psychosomatic health, professional well-being) + terms associated with management of general well-being, interventions, treatments, therapies and coping behaviours (e.g., employee assistance programs, workplace intervention, anxiety management, resilience, coping behaviour)			
		1) Studies in educational settings 2) Studies solely in secondary care 3) Students, dentists and dieticians 4) Leadership/organizational focus 5) Conceptual view/summary 6) Systematic review	Ovid, Embase, CINAHL, PsycINFO, Scopus  <i>Additional sources:</i> Reference lists	Only English publications  Terms relating to primary care (e.g., primary care, health professional, physician, community health nurse) + resilience Search in keywords, title, or abstract  Only English publications	Studies published during the last 20 years; search performed on 17 December 2014	1557/13 (no RCT)	Only review; no formal quality assessment of studies



	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
Rogers 2016	/	Related outcomes such as burnout or depression were excluded as there is not a clear correlation between these and resilience	Medline, Embase, BNI, CINAHL, HMIC, PsycInfo, and PubMed  <i>Additional sources:</i> Editorials, letters and reviews	"Education" or "Training" or "Medical Students" + "Resilience"	Not specified	1402/16 (4 RCTs)	Only review; methodological quality risk of bias/assessment of quantitative studies according to Medical Education Research Study Quality Instrument (MERSQI)
Venegas 2019	/	<p>1) Studies focusing on stress reduction alone (unrelated to resilience); that is, more short-term or specific interventions which do not apply to resilience (e.g., interventions to reduce anxiety/stress for breaking bad news or for distress following patient adverse events, or when states such as phobic anxiety were measured)</p> <p>2) Studies only including interventions to improve resilience in residents and medical students</p> <p>3) Commentaries, perspectives, expert opinions, conference proceedings,</p>	<p>Medline, EMBASE, PsychInfo, CINAHL, Cochrane Library (searched with help of trained information specialist)</p> <p><i>Additional sources:</i> Google Scholar; BMJ Careers; grey literature; clinical trial registries to identify completed and in-progress studies; contact with study authors; relevant study references</p>	<p>Resilience and associated constructs (MeSH terms and search terms (tw); e.g., psychological adaptation, hardiness, social adjustment, coping behaviour) + terms related to physicians (MeSH and search term; e.g., physician, doctor general practitioner, neurologist, internist, surgeon)</p> <p>English, French and Spanish publications</p>	All years until 29 March 2017	7579/17 (9 of them with extractable data for physicians) (4 RCTs)	PROSPERO registration (CRD42017060197); review and meta-analysis (only for burnout); risk of bias/methodological quality assessment using Cochrane Collaboration risk of bias tool for RCTs and Cochrane Risk of Bias Assessment Tool for Non-Randomized Studies of Interventions (ACROBAT-NRSI) for non-RCTs; review according to PRISMA

	Further inclusion criteria	Further exclusion criteria	Databases searched	Search terms	Search period	Number of studies found/included	Further methodological aspects
		editorials, book chapters, theses					
Wright 2017	1) Original research published in a peer-reviewed journal 2) Discussion in publication specific to midwives and the midwifery profession	1) Publications that are not original research 2) Studies including some midwives in the sample but were not stratified for results, and/or 3) Studies did not include midwives in the discussion 4) Studies addressing stress coping specific to student midwives	PubMed, CINAHL, Embase, PsycINFO, Cochrane databases  <i>Additional sources:</i> Reference lists of included studies	Terms for midwifery concept (midwifery, nurse midwife, nurse midwives, midwife, midwives, labor and delivery nurse, labor and delivery nursing, delivery room nurse) + coping concept (psychological adaptation, psychological resilience, resilience, hardiness, coping behavior, cope, coped, coping)  Only English publications	Studies published between 2011 to 2016; searched in September 2016	1020/6 (no RCT)	Only review (scoping review); risk of bias/methodological quality and strength assessment of included studies using Johns Hopkins Nursing Evidence-Based Practice Model tools for research evidence appraisal

*Note.* RCT = Randomised controlled trial.

<sup>a</sup>Gillmartin 2015: Full-text not available; data extracted from publication abstract and review registration (Prospero).

<sup>b</sup>No primary focus or eligibility criteria with respect to resilience formulated in the review, but resilience or related constructs were included in the search strategy.

## Appendix D1.7 Summary of Methodological Characteristics of Previous Reviews and Meta-Analyses

**Table D1.7.1**

*Systematic Reviews and Meta-analyses on Resilience Interventions in Clinical and Non-Clinical Adult*

*Populations*

Category	Details of previous reviews/meta-analyses
Number of reviews and meta-analyses	<ul style="list-style-type: none"> <li>13 systematic reviews (Bauer et al., 2018; Macedo et al., 2014; Massey et al., 2018; Milne et al., 2016; Pallavicini et al., 2016; Petriwskyj et al., 2016; Reyes et al., 2018; Robertson et al., 2015; Skeffington et al., 2013; Tams et al., 2016; Townshend et al., 2016; Van Kessel et al., 2014; Wainwright et al., 2019)<sup>a</sup></li> <li>five meta-analyses, with only three being relevant due to meta-analyses for psychological outcomes (Joyce et al., 2018; Leppin et al., 2014; Vanhove et al., 2016). Deady et al. (2017)<sup>a</sup> conducted a meta-analysis on psychological symptoms but included primary studies that did not explicitly mention resilience, while Pesantes et al. (2015) conducted no pooled analysis for psychological outcomes.</li> </ul>
Methodological characteristics	<p><i>Eligibility criteria:</i> heterogeneous eligibility criteria (e.g., concerning study design) and definitions of resilience training (e.g., the aim of fostering resilience was not always stated in the included primary studies)</p> <p><i>Search strategy:</i> Some reviews used rather simple, limited search strategies to identify relevant studies (e.g., only resilience/hardiness combined with training terms in, for example, Joyce et al. (2018); Robertson et al. (2015); restriction to English language), which may bias the search results.</p> <p><i>Review protocol/registration:</i> A review protocol or PROSPERO registration was available for four publications only (Bauer et al., 2018; Leppin et al., 2014; Townshend et al., 2016; Wainwright et al., 2019).</p> <p><i>Review according to guidelines:</i> The majority of reviews report having been conducted according to the PRISMA or alternative guidelines, such as the guidance for undertaking reviews in healthcare (Centre for Reviews and Dissemination (CRD), 2009; e.g., Milne et al., 2016; Van Kessel et al., 2014).</p> <p><i>Quality assessment of included studies:</i> Most reviews performed a quality assessment of the primary studies (the exceptions being Milne et al., 2016; Pallavicini et al., 2016; Reyes et al., 2018; Skeffington et al., 2013; Vanhove et al., 2016 who only judged publication bias)<sup>b</sup>. For studies included in several reviews, the reported risk of bias also differed between publications (e.g., detection bias for Abbott et al. (2009) differed between Leppin et al. (2014) and Robertson et al. (2015)).</p>

*Note.* <sup>a</sup> Deady et al. (2017) and Tams et al. (2016) searched for “resilience” and related constructs, but did not formulate specific eligibility criteria concerning resilience-training programs.

<sup>b</sup> Additionally, not possible to verify if Tams et al. (2016) conducted a quality assessment as full text could not be retrieved.

**Table D1.7.2**

*Systematic Reviews and Meta-Analyses on Resilience Interventions in Healthcare Professionals*

Category	Details of previous reviews/meta-analyses
Number of reviews and meta-analyses	<ul style="list-style-type: none"> <li>11 systematic reviews<sup>a</sup> (Cleary et al., 2018; Concilio et al., 2019; Delgado et al., 2017; Elliott et al., 2012; Foster et al., 2019; Fox et al., 2018; Gillman et al., 2015; Gilmartin et al., 2017; Robertson et al., 2016; Rogers, 2016; Wright et al., 2017); two other reviews (Hunter, 2016; Pezaro et al., 2017) searched for “resilience” and identified resilience intervention studies but did not initially focus on identifying such programs (e.g., no respective eligibility criteria)</li> <li>one meta-analysis (Lavin Venegas et al., 2019), but it was restricted to burnout outcomes, with a majority of observational studies in the pooled analyses</li> <li>Three of these publications (Delgado et al., 2017; Foster et al., 2019; Robertson et al., 2016) did not merely aim to identify resilience interventions but also had other review questions (e.g., concerning concepts or measures of resilience). Thus, the number of resilience intervention studies was limited (e.g., only one study in Foster et al. (2019) or Robertson et al. (2016)).</li> </ul>
Methodological characteristics	<p><i>Eligibility criteria:</i></p> <ul style="list-style-type: none"> <li>Each publication focused on different aspects of resilience training, using different definitions of resilience, and different inclusion and exclusion criteria for studies.</li> <li>While some reviews only included training programs with the stated intention to enhance resilience or provided concrete examples of resilience training (e.g., Cleary et al., 2018; Fox et al., 2018; Gillman et al., 2015), the eligibility criteria concerning the types of intervention were not described in detail in a number of publications (e.g., Wright et al., 2017) and reviews not focusing solely on interventions, e.g., Foster et al., 2019).</li> <li>The 14 publications either investigated healthcare staff in general, in primary, or in dementia care (Cleary et al., 2018; Elliott et al., 2012; Robertson et al., 2016); specific groups of healthcare workers such as physicians (Fox et al., 2018; Lavin Venegas et al., 2019), nurses (Concilio et al., 2019; Delgado et al., 2017; Foster et al., 2019; Gillman et al., 2015), or midwives (Wright et al., 2017); combinations of these groups (Hunter, 2016); or combinations of healthcare professionals and healthcare students (e.g., Gilmartin et al., 2017; Pezaro et al., 2017; Rogers, 2016).</li> </ul> <p><i>Search strategy:</i></p> <ul style="list-style-type: none"> <li>Each review varied in the breadth of the search strategy and the extent of reporting of the strategy used. For example, while some reviews searched for resilience and associated terms (e.g., hardiness; e.g., Foster et al., 2019; Pezaro et al., 2017), used specific intervention terms (e.g., stress management; e.g., Gilmartin et al., 2017), and involved several terms for healthcare staff or the respective subgroup (e.g., Lavin Venegas et al., 2019), others used a narrow search (e.g., resilience combined with one term for healthcare professionals; e.g., Delgado et al., 2017).</li> <li>Most previous reviews were restricted to English-language publications and grey literature was not always considered.</li> </ul> <p><i>Review protocol/registration:</i> The absence of a published protocol or protocol registration for most of these reviews (the exceptions being Gillman et al., 2015; Gilmartin et al., 2017; Lavin Venegas et al., 2019; Pezaro et al., 2017) also reduces transparency and comparability in the reviews' procedures and potentially restricts the evidence found.</p> <p><i>Review according to guidelines:</i> Several reviews did not specify whether they had been conducted according to guidelines, such as PRISMA or Cochrane guidelines, or other</p>

Category	Details of previous reviews/meta-analyses
	<p>validated frameworks (e.g., Elliott et al., 2012; Gillman et al., 2015; Hunter, 2016; Robertson et al., 2016; Rogers, 2016; Wright et al., 2017).</p> <p><i>Quality assessment of included studies:</i></p> <ul style="list-style-type: none"> <li>• The assessment and reporting of the risk of bias and quality of the included studies also differed between the reviews, as they often relied on different guidelines depending on the study design considered (e.g., Methods Appraisal Tool (Pace et al., 2012), Downs and Black checklist (Downs &amp; Black, 1998), Cochrane Collaboration Risk of bias tool (Higgins et al., 2011)).</li> <li>• Two reviews reported no Risk of bias assessment (Hunter, 2016; Robertson et al., 2016).</li> </ul>

*Note.* <sup>a</sup> Taylor et al. (2018) identified resilience training as alternative intervention to assess the impact of Schwartz Center Rounds on healthcare staff. However, as the review aimed to synthesize the evidence base on Schwartz Center Rounds, it was not considered to be a “resilience review” for the current review.

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