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# Burnout

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Definition, Prevalence, Risk Factors, Prevention, and  
Interventions Literature Reviews

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## About This Report

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The Department of Defense, Department of Veterans Affairs, and the Department of Health and Human Services have implemented campaigns to reduce negative perceptions of mental health conditions and treatment and to increase awareness of resources available to service members, veterans, and their families. Barriers to mental health care exist at an individual level (e.g., perceptions of mental health problems and treatment, perceived access), a provider level (e.g., knowledge, attitude, behaviors), and a systems level (e.g., appointment availability, facilities, medical record access).

The provision of mental health treatment is also affected by the strength, health, and well-being of the health care workforce. Health care provider *burnout*—defined as chronic occupational-related stress, emotional exhaustion, disengagement, depersonalization, anhedonia, and hopelessness—poses a critical threat to mental and behavioral health care for service members, veterans, and their families.

This report presents a series of literature reviews related to burnout. The objectives are to synthesize key concepts, models, and applications of burnout; assess the magnitude of burnout among U.S.-based providers, including among U.S. military health care providers; understand risk factors for burnout among health care providers; and assess interventions to mitigate and/or prevent burnout across professions, including those directed toward military health care providers. Evidence syntheses are a key component in the knowledge translation process and they function to translate the available research into evidence-based health care guidelines that promote optimal clinical care.

The research reported here was completed in February 2021 and underwent security review with the sponsor and the Defense Office of Prepublication and Security Review before public release.

The literature review was conducted by the Southern California Evidence-Based Practice Center staff. None of the authors have any conflicts of interest to declare. This report will be of interest to health policymakers and practitioners.

## RAND National Security Research Division

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# Summary

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One potential barrier to optimizing mental and behavioral health care for service members, veterans, and their families might be *burnout* (chronic occupational-related stress, emotional exhaustion, disengagement, depersonalization, anhedonia, and hopelessness) in the workplace.

This report outlines five systematic literature reviews to synthesize the evidence base on burnout. The reviews cover the following topics:

- **Review A:** This scoping review documents the most-cited and influential publications on burnout.
- **Review B:** This rapid review presents recent estimates on the incidence and prevalence of burnout among U.S. health care providers.
- **Review C:** This systematic review depicts risk factors for burnout among U.S. health care providers.
- **Review D:** This rapid review shows the implementation, sustainability, and outcomes of interventions to prevent and/or reduce burnout among military health care professionals.
- **Review E:** This evidence map documents interventions to prevent and/or reduce burnout among work settings.

We searched the following databases through June 2020: PubMed, PsycINFO, Business Source Complete, Web of Science, CINAHL, Allied and Complementary Medicine, Defense Technical Information Center, Education Resources Information Center, Scopus, CENTRAL, ClinicalTrials.gov, and International Clinical Trials Registry Platform. We searched the gray literature for burnout interventions within military settings and contacted additional experts to identify any additional relevant studies. Two reviewers independently screened citations identified by the searches using predetermined eligibility criteria and abstract data from eligible studies. We pilot-tested standardized forms in an online database designed for systematic reviews. For the systematic review, we performed an in-depth critical appraisal to assess key sources of bias in prognostic studies and the quality of evidence using an adaptation of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach. The systematic review is registered in PROSPERO (an international database of prospectively registered systematic reviews in health and social care) and the evidence map is in the Open Science Framework.

This report presents our methodology, literature search results, findings, quality of evidence, and synthesis of the individual reviews and the conclusions across all five reviews. We document the results in detailed tables (including evidence tables for all five literature reviews) and informative figures, including an online visualization of the available research in burnout prevention and reduction in Chapter Three (also see [https://www.rand.org/pubs/research\\_reports/RRA428-1/visualization.html](https://www.rand.org/pubs/research_reports/RRA428-1/visualization.html)).

Overall, the five literature reviews depict widespread use of the burnout concept across various work contexts. Around the world, burnout has become particularly salient to those within the health care field. Despite the widespread application of the term burnout, the field has been limited by a lack of consensus surrounding the definition of burnout, how to measure burnout, and how to address burnout—all of which complicate the assessment of the magnitude of the issue. Several theoretical developments have occurred within the burnout literature, but most applications of burnout do not directly engage with the complicated conceptual and etiologic models of burnout, nor is there standardization of scales among the conceptual models that are employed.

Our first review demonstrates that, although there have been significant developments and expansions of initial conceptual models of burnout, the preeminent model has remained fairly consistent, particularly when being operationalized within the applied literature in health care provider burnout. This potentially has implications for the wide variation in prevalence estimates observed among U.S. health care professionals.

Our review also revealed wide variation in prevalence estimates of burnout among U.S.-based health care providers. This variation might reflect reality, or it might be the byproduct of using a variety of different measures to assess burnout.

A variety of risk factors for burnout have also been assessed, including several demographic, professional and clinical practices, and mental and behavioral risk factors. The data either conflict or show no association for demographic factors. Workplace factors—such as workload, work/life balance, job autonomy, and perceived support from leadership—had stronger associations with risk for burnout. Mental health disorders (such as anxiety) and health risks (such as physical health problems and lack of sleep) might also be associated with risk of burnout, although it is unclear whether burnout exacerbates health issues or vice versa; few prospective studies exist to address this question. Such factors as exercise, perceptions of control, and social support appear to have a protective effect.

The effects of interventions to engender these protective factors and mitigate or prevent burnout also varied widely. The evidence base on interventions to prevent or mitigate burnout is vast, although it is significantly more limited within military contexts. Nevertheless, this review identified effective strategies to manage burnout that can be implemented at the individual level or organizational level.

This series of literature reviews documents what is known about the concept of burnout, shows burnout prevalence in health care facilities, evaluates the presence and absence of evidence for suggested risk factors of burnout, outlines approaches for burnout among military health care providers, and provides an overview of organizational interventions that have been suggested to prevent and mitigate burnout.

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# 1. Introduction

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The health and well-being of the health care workforce is critical for providing quality mental and behavioral health treatment. One challenge to optimizing mental and behavioral health care for service members, veterans, and their families might be burnout among health care providers treating military and veteran populations. Burnout is considered to be an important issue among health care providers in a variety of health care delivery contexts, but a complete understanding of the burden of burnout among health care providers has been difficult to obtain.

Through a series of literature reviews, this report explores several facets of burnout, including its theoretical development, the magnitude of burnout among U.S.-based health care providers, risk factors for burnout, strategies to curb burnout among military and veteran populations, and interventions to prevent and mitigate burnout across a variety of workplace settings. Although none of the reviews provide straightforward solutions to this complex problem, when taken together, they shed light on limitations in the field and provide directions to better assess and address burnout. This introduction provides a broad overview to some of the central debates with respect to burnout and sets the stage for why burnout is an important area of inquiry for health care providers, including those in military and veteran health care settings.

*Burnout*, in its broadest definition, relates to chronic emotional and interpersonal stress stemming from one's work environment. Just a few decades ago, burnout was considered as an output of pop psychology (Maslach, Schaufeli, and Leiter, 2001), but it now has been explored in thousands of scholarly articles, covering professional settings from human resources to information technology. Although burnout lacks an actual universal codified medical diagnosis, it is most readily associated with the *helping professions*—those that pertain to serving others and to health, safety, and well-being issues; burnout is particularly common among health care providers (Schaufeli, Leiter, and Maslach, 2009).

Psychologist Herbert Freudenberger popularized the use of the term burnout for the predictable exhaustion, cynicism, and reduced professional efficacy that he and fellow psychological clinicians experienced approximately one year after beginning work at an institution (Freudenberger, 1974). Since then, core symptoms of burnout have been depicted as intense emotional and physical exhaustion, general fatigue, disengagement, depersonalization, anhedonia, dysphoria, lower job performance, hopelessness, cynicism, and a state of being withdrawn (Kahill, 1988; Maslach, 2001). Existing research has identified a variety of potential professional, environmental, and personal factors that are believed to be associated with developing burnout (Paris and Hoge, 2010). As expected, burnout has also been linked to indicators of low professional satisfaction, such as turnover, attrition, job loss, absenteeism, and early retirement (Han et al., 2019; Meredith et al., 2015; Paris and Hoge, 2010).

Given these potential downstream effects of burnout on individuals and their work (Azam, Khan, and Alam, 2017; Patel et al., 2018; Rathert, Williams, and Linhart, 2018; Robbins, Butler, and Schoenthaler, 2019; Salvagioni et al., 2017), it is critical to understand how burnout intersects with other health issues (e.g., depression) and occupational outcomes (e.g., absenteeism) to assess the magnitude of the issue through prevalence estimates, identify risk factors, and map out an overview of efforts taken to mitigate or prevent burnout.

The Maslach Burnout Inventory (MBI) has been the foremost measure of burnout for over three decades (Schaufeli, Enzmann, and Girault, 1993). It has been validated in short forms and tailored to specific populations, including educators (Maslach and Jackson, 2018), students (Schaufeli et al., 2002), medical personnel, and human service professions (Maslach and Jackson, 2018). Despite the utility of having a standardized, validated instrument to assess burnout, the MBI has also been noted to be imprecise and overinclusive (Schaufeli, Enzmann, and Girault, 1993). In addition, a recent study among physicians found an overlap among symptoms of burnout and depression; it might be useful to use multidimensional burnout inventories with valid depression scales, such as the Patient Health Questionnaire-9 (Kroenke, Spitzer, and Williams, 2001), instead of relying only on the MBI to assess burnout (Wurm et al., 2016). Several additional scales have been developed, such as the Oldenburg Burnout Inventory (OLBI) (Demerouti and Bakker, 2008), the Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005), and the Utrecht Work Engagement Scale (UWES) (Schaufeli, 1995); these have been used worldwide to track employee burnout.

The co-occurrence of burnout and mental health conditions like depression raises the question as to what burnout actually *is* vis-à-vis mental health disorders, how it is differentiated from mental health disorders, and how it could manifest differently across workplace contexts (Paris and Hoge, 2010). The term burnout has been used interchangeably with similar phenomena, such as secondary (or vicarious) traumatization and compassion fatigue; researchers recently have argued that although these conditions have similar presentations, they remain distinct (Canfield, 2005; Newell and MacNeil, 2010).

Even after thousands of published articles, a concrete definition and classification of burnout remains elusive, which has hindered an accurate depiction of the magnitude of the issue and the identification of possible strategies to prevent or mitigate burnout. Although burnout seemingly shares symptoms with recognized disorders—including depression, neurasthenia, and chronic fatigue syndrome (Bianchi, Schonfeld, and Laurent, 2014)—burnout is not classified as a medical diagnosis.

In fact, burnout is included in the International Classification of Diseases 11th Revision (ICD-11), but only as an “occupational phenomenon” and “*not* as a medical condition” (emphasis in original) (World Health Organization, 2019; World Health Organization, 2020). “Burn-out” is coded in the ICD-11 as QD85, with a parent code of “Problems associated with employment or unemployment,” and given the description as a syndrome conceptualized as resulting from

chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: 1) feelings of energy depletion or exhaustion; 2) increased mental distance from one's job, or feelings of negativism or cynicism related to one's job; and 3) reduced professional efficacy. Burn-out refers specifically to phenomena in the occupational context and should not be applied to describe experiences in other areas of life (World Health Organization, 2021).

Burnout is not included in the fifth and latest edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) (American Psychiatric Association, 2013). Despite the fact that burnout lacks the legitimacy of a diagnosis, the World Health Organization, which maintains the International Classification of Diseases, has noted plans to “embark on the development of evidence-based guidelines on mental well-being in the workplace” (World Health Organization, 2019). The lack of an official, universal diagnosis for burnout is important because research is limited to self-reported outcomes with no possibility of external validation. This can introduce subjectivity and bias into assessments of burnout, such as those described in this series of reviews.

Nevertheless, burnout has become an acceptable justification for sick leave (Bianchi, Schonfeld, and Laurent, 2015), and it remains an important point of discussion among public health practitioners, in discussions of workplace well-being, and in common parlance. In addition, burnout has been identified as a critical issue among health care providers, as noted earlier. The American Medical Association offers a variety of resources, from weekly emails to podcasts, to help clinicians manage burnout and improve workplace satisfaction (American Medical Association, undated). The high suicide rate observed in U.S.-based clinicians has even been attributed to burnout (Dzau, Kirch, and Nasca, 2018).

Despite the push for collective action to address provider burnout (Dzau, Kirch, and Nasca, 2018), exactly how to best prevent or mitigate provider burnout remains to be answered. The literature on provider burnout is vast but varied in terms of its methodological quality and scope. This variance warrants an assessment of available evidence and its limitations. A recent meta-analysis identified a series of successful individual-focused and organizational-focused interventions to reduce burnout among physicians (West et al., 2016), highlighting the value of reviewing the literature for additional strategies to prevent or minimize burnout.

Military mental health care providers face stressors that likely differ from those of their civilian counterparts, such as having patients who have faced combat-related posttraumatic stress disorder (PTSD) or having combat-related PTSD themselves (Ballenger-Browning et al., 2011). It is worth questioning whether the scales and conceptual models of burnout used in civilian settings align with military contexts. An early study of a small sample of mental health providers in the U.S. military found *lower* levels of burnout than among civilian mental health providers (Ballenger-Browning et al., 2011). The authors conclude that a better understanding of the drivers of burnout among military provider populations (e.g., time spent on administrative tasks,

military rank, nonwork-related social support, lack of control) is needed, as well as a better understanding of interventions to target institutional-level factors.

It also is worth exploring burnout among providers at the Veterans Health Administration (VHA), although their experiences are not interchangeable with those of active-duty military providers. Research performed on burnout at the VHA identified high levels of exhaustion (related to having too much clinical work) and cynicism (related to patient malingering) as well as reduced professional efficacy (Garcia et al., 2014; Garcia et al., 2016). Large bureaucracies, such as the VHA, set standards for providers as a means of upholding quality of care and productivity, but this might be occurring at the expense of provider cynicism and burnout (Garcia et al., 2014). Workplace stress among active-duty health care providers has also been identified as an issue and a reason for leaving active duty (Morrison, 2013). Furthermore, qualitative studies have shown that VHA providers treating PTSD, a mounting health problem among VHA patients, often feel as though their clinical judgment goes against VHA organizational policy; this might relate to burnout-related cynicism (Finley, 2011; Garcia et al., 2014). This situation highlights the need to understand particular contextual and system-specific factors when evaluating provider burnout, especially among health care providers who treat military and veteran populations.

In short, the evidence base on burnout would benefit from the following:

- a clearer overview of the leading concepts of burnout and how it is differentiated from other existing syndromes and conditions
- reliable estimates of prevalence and incidence of burnout among U.S.-based health care providers
- a systematic overview of risk factors for burnout
- an understanding of initiatives that have been undertaken in military settings to prevent and mitigate burnout
- a global perspective on interventions to manage the rising tide of burnout among various occupational settings.

In this report, we contribute to the evidence base on the complex topic of burnout through the following research focuses:

1. the most cited and influential publications on burnout (*scoping review*)
2. recent estimates on the incidence and prevalence of burnout among U.S. health care providers (*rapid review*)
3. risk factors for burnout among U.S. health care providers (*systematic review*)
4. implementation, sustainability, and outcomes of interventions to prevent and/or reduce burnout among military health care professionals (*rapid review*)
5. interventions to prevent and/or reduce burnout among work settings (*evidence map*)

The following chapter depicts each of the reviews in this series in detail.

## 2. Methodology

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In this chapter, we describe the methodology for each of the literature reviews, which vary in their aims, methods, and scopes. We begin by describing methods and approaches common to each of the reviews; we then provide specific descriptions for each of the reviews. The systematic review on risk factors for burnout (Review C) has been registered in PROSPERO, an international registry for systematic reviews. The evidence map on burnout interventions (Review E) has been registered in the Open Science Framework (Grant, Bouskill, and Hempel, 2019).

Throughout the series of reviews, a description of burnout as an outcome refers to self-reports of burnout or burnout based on accepted burnout measures and scales. As previously noted, confirmed diagnoses of burnout were not always available because burnout has only recently been included as an occupational condition in the ICD-11 and is not in the latest edition of the DSM-5.

### Overview of Burnout Reviews

The following sections will describe each of the literature reviews in detail. Table 2.1 provides a broad overview of the methods, focus, and population of interest for each review.

**Table 2.1. Overview of Burnout Reviews**

<b>Review</b>	<b>Review Type</b>	<b>Focus</b>	<b>Population</b>
A	Scoping review	Prominent concepts and themes in the burnout literature	No restriction
B	Rapid reviews	Incidence and prevalence of burnout	U.S. health care providers (physician, physician assistant, nurse practitioner), psychologists, mental health care providers, social workers
C	Systematic review	Risk factors of burnout	U.S. health care providers (physician, physician assistant, nurse practitioner)
D	Rapid review	Success, implementation, and sustainability of burnout interventions	Health care professionals in active military or in the VHA
E	Evidence map	Formally evaluated burnout intervention overview	Working professionals

### Search Strategy Across Reviews

The Southern California Evidence-Based Practice Center librarian and content experts developed and tailored the search strategies to each review. However, we used a central database

for all reviews because we anticipated considerable overlap in search results across reviews. The search strategy is documented in the appendix.

## Inclusion Screening Across Reviews

Citations were screened for relevance to the individual literature reviews. Details on these criteria can be found in the descriptions of the individual reviews. Two reviewers independently screened each title and abstract of retrieved citations. For the citation screening, reviewers determined whether the citation met inclusion criteria and should be obtained as full text for further review. Full-text publications were retrieved for citations deemed potentially eligible by one or both reviewers. Two independent reviewers applied explicit eligibility criteria for each review; discrepancies were resolved through a discussion that included a subject-matter expert. Reasons for exclusion were recorded in an electronic database for systematic reviews.

## Data Abstraction Procedure Across Reviews

The project team created detailed extraction forms for each review to standardize data collection processes. To ensure consistency of interpretation of all fields on the form, reviewers pilot tested the form on a few studies for which results had been clearly reported. The team discussed any issues and incorporated revisions into the form. One reviewer abstracted data; these data were checked by a second experienced reviewer. Any discrepancies were resolved through discussion.

## Review A: Scoping Review of Prominent Concepts and Themes in the Burnout Literature

Review A broadly provides a contextual description of burnout as a theoretical construct. Given the considerable size of the existing literature on theoretical constructs of burnout, the review centered on articles that have been demonstrated to be highly relevant within the evidence base and have been widely cited.

### *Review Questions*

The scoping review was guided by the following questions:

- How is burnout defined and conceptualized in relation to other related concepts?
- What are key components of influential conceptual models of burnout?
- How is burnout differentiated from other syndromes?
- What are influential conceptual models of precursors and consequences of burnout?
- In what professional settings have influential studies of burnout been evaluated?



## *Sources and Search Strategy*

We identified the top 50 most influential scholarly works on the topic of burnout via citation report within the Web of Science. (We omitted physical science works to avoid capturing works on burnout among thermodynamics.) The search terms are shown in the appendix.

## *Synthesis*

A content expert reviewed the articles and established an annotated bibliography in which the purpose/objective of the article, key concepts and constructs (e.g., how burnout is defined), conceptual frameworks and hypotheses of risk factors and consequences associated with burnout, study approach (e.g., cross-sectional study, systematic review), key findings, and broader implications were recorded. The results are presented in a narrative synthesis in Chapter Three.

In addition, a bibliometric analysis in Chapter Three depicts visually how the 50 most widely cited publications are interrelated, as well as how the publications are thematically clustered. Using the software program HistCite (Garfield, Paris, and Stock, 2006), which tracked the citations of the publication, we conducted a bibliometric analysis. We used the software Kumu (undated) to perform a bibliographic cartography.

## **Review B: Rapid Review to Determine Burnout Incidence and Prevalence Among U.S. Health Care Providers**

The rapid review aimed to provide up-to-date incidence and prevalence rates of burnout among U.S. health care providers, including mental and behavioral health care providers and among U.S. military health care providers. The review was based on best evidence, using only the largest and most relevant publications, instead of an exhaustive list of all published incidence and prevalence rates.

## *Review Questions*

The rapid review was guided by the following questions:

- What is the prevalence and incidence of burnout among U.S. health care providers?
  - What is the prevalence and incidence of burnout among mental and behavioral health professionals?
  - What is the prevalence and incidence of burnout among U.S. military health care providers?

## *Sources and Search Strategy*

The following databases were searched for published studies: PubMed, PsycINFO, Web of Science, and Business Source Complete. Relevant systematic reviews and meta-analyses were retained for reference-mining. The search strategy for all sources is documented in the appendix.

## *Eligibility Criteria*

A study had to meet the following criteria to be eligible for inclusion:

- **Participants:** U.S. health care providers (physicians, physician assistants, nurse practitioners), psychologists, mental health professionals, and social workers
- **Source:** federal and state estimates and studies directly aiming to estimate prevalence or incidence of burnout among U.S. health care providers
- **Outcomes:** incidence and prevalence might be determined using different denominators and reference frames, including lifetime prevalence, rate of providers affected by burnout among a given time frame, or the proportion of providers affected within a given organization
- **Timing:** estimates from 2015 or more recent (i.e., not older than five years) to ensure current and relevant estimates
- **Setting:** U.S. health care professional settings, including inpatient and outpatient; primary and secondary care settings; and military, VHA, and civilian settings
- **Study design:** prospective or retrospective studies reporting incidence or prevalence rates (or providing sufficient data to enable the calculation of rates). Estimates in journal manuscripts as well as government reports were eligible. Only best evidence estimates (minimum of 200 participants and no other flaws, such as estimates confounded with staff members not of interest or lack of precise numbers or definitions) of all identified evidence for the provider group was included. Studies with small samples (200 participants or fewer) were retained if they used a valid burnout scale (such as the MBI) to report on a group of providers for whom few estimates were available.

## *Data Extraction*

We abstracted the study identification year of the incidence or prevalence data estimate, the sample characteristics and provider type, the data source, the definition of burnout, and the estimate type (incidence or prevalence). We then converted the results to a common denominator where possible.

## *Synthesis*

The results of the rapid review were visually depicted in figures displaying the estimates and summarized in a narrative synthesis (see Chapter Three). We computed the 95-percent confidence interval around the effect estimate and provide a graphic display of the data that shows variation and consistency across estimates, highlights outliers, and communicates the uncertainty around the estimate (width of the confidence interval).

## **Review C: Systematic Review of Risk Factors of Burnout**

This systematic review builds on existing systematic reviews that have addressed specific areas of such potential predictors as adverse childhood experiences of providers or futile or potentially inappropriate care (Azam, Khan, and Alam, 2017; Chamberlin et al., 2019; De

Marchis et al., 2019; Jesse et al., 2018; La Mott and Martin, 2019; O'Connor, Muller Neff, and Pitman, 2018; Simionato and Simpson, 2018) but incorporated a broader variety of predictors and determinants of burnout. We included both individual-level variables (e.g., marital status, work experience) and work context aspects (e.g., policies in place, electronic health record [EHR] use requirement). The review included health care provider characteristics potentially associated with increased risk for burnout (e.g., length of time in the military), interpersonal aspects in the workplace (e.g., perceived support from colleagues), job characteristics (e.g., type of organization, type of provider), organizational characteristics (e.g., panel size), and the potential influence of patient characteristics on provider burnout (e.g., trauma-related conditions). Since risk factors might be health care system-specific, the review was restricted to health care providers in the United States. The review employed rigorous systematic review methods to address this complex topic, including documentation of individual study characteristics as well as the quality of evidence evaluation across studies.

### *Review Questions*

The systematic review was guided by the following questions:

- Which risk factors can reliably predict burnout among U.S. health care providers?
  - Do the predictors vary across military and civilian health care settings?

The subquestion evaluated whether estimates vary by setting to determine whether predictors of burnout among military health care providers differed from predictors for providers working among civilian populations (e.g., templated time, productivity demands, changes in workload without compensatory administrative time, nonclinical duties, family life stressors unique to military providers).

### *Sources and Search Strategy*

We searched PubMed, PsycINFO, Web of Science, and Business Source Complete. We also screened bibliographies of existing systematic reviews (identified through PubMed and PsycINFO searches) to identify any additional pertinent studies. The search strategy for the databases are shown in the appendix.

### *Eligibility Criteria*

Study inclusion and exclusion criteria can be summarized in the following framework (participants, exposure, outcomes, settings, and study design):

- **Participants:** U.S. health care providers (physicians, physician assistants, nurse practitioners) were included; we included mixed samples as long as more than 50 percent of the sample were eligible participants.

- **Exposure:** Eligible studies reported on potentially associated participant risk and predictor factors (e.g., resiliency, perceived stress, coping mechanism), interpersonal risk and predictor (e.g., perceived support from colleagues), workplace risk and predictor (e.g., organization type, setting, provider type), organizational risk and predictor (e.g., panel size, lack of control over workload, value conflicts, insufficient reward, work overload, work inefficiency, inadequate staffing, breakdown of community, loss of meaning from work, work-life balance issues, perception of unfairness, call/watch duty, rotation schedule, postcall day off, access to care expectations), or patient risk and predictor (e.g., complex or high-risk patients).
- **Outcomes:** Studies had to predict burnout to be eligible; studies exclusively predicting resilience and other related constructs were excluded.
- **Timing:** There were no restrictions regarding the timing of the exposure relative to the burnout outcome.
- **Setting:** Both military and civilian inpatient and outpatient professional health care settings; U.S. military providers were included regardless of where the care took place (e.g., overseas).
- **Study design:** Eligible studies were restricted to multivariate analyses simultaneously evaluating multiple competing variables and case-control studies.

This review was most restricted compared with the other literature reviews because the assessment of risk factors is complex and because we determined the presence and absence of predictors across all samples without introducing a further confounder, such as a wide variety of health care professionals.

### *Data Extraction*

All included studies were abstracted and checked by two trained literature reviewers, including an expert on military provider mental health. We abstracted the study ID and setting, the sample characteristics (e.g., civilian, military), the study design and analytic method, the predictor variables, the controlled variables, the outcome definitions and operationalization, and the results.

### *Risk of Bias*

Studies were assessed with Quality In Prognosis Studies, a critical appraisal tool for prognostic studies (Hayden et al., 2013). This critical appraisal took the methodological approach (e.g., prospective studies) and analytic methods (e.g., multivariate analyses) into account.

### *Synthesis*

The evidence was summarized by predictor type, which enabled us to document the variety of predictors that have been assessed in the literature and the research evidence supporting them.

We rated the quality of the evidence for risk factors for burnout across all identified pertinent studies. Based on GRADE guidelines (Huguet et al., 2013), we categorized the quality of the evidence as follows:

- **High:** We are very confident that the true effect lies close to that of the estimate of the effect.
- **Moderate:** We are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
- **Low:** Our confidence in the effect estimate is limited; the true effect might be substantially different from the estimate of the effect.
- **Very low:** We have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

We took eight criteria into account to determine the level of evidence quality following an adaptation of the GRADE framework for prognostic factor research (Huguet et al., 2013). The *phase of investigation* criterion was used as a starting point (high or moderate quality of evidence). The criteria *study limitations*, *inconsistency*, *indirectness*, *imprecision*, and *publication bias* can decrease the quality of evidence. The criteria *moderate/large effect size* and *exposure-response gradient* could increase the quality of the evidence.

The *phase of investigation* differentiates whether the risk factor evidence is primarily based on a study that aimed to identify potential prognostic factors (moderate quality) or based on studies aiming to confirm identified associations or on explanatory research aiming to understand prognostic pathways (high quality). *Study limitations* assess the quality and risk of bias of the identified pertinent studies. Inconsistency assesses whether the identified association was consistently present across independent studies. *Indirectness* takes into account whether the available research studies do not accurately reflect the review question (e.g., reporting only on a selected subgroup). Evidence was downgraded for *imprecision* if the sample size of included studies was insufficient, the confidence interval for effect estimates was wide, or there were few outcome events for each prognostic variable or cases included in the study. *Publication bias* was addressed by critically reviewing results based on only positive associations. Evidence for individual risk factors could be upgraded for *moderate/large effects*, or an *exposure-gradient response* was identified. The quality of evidence was documented in a quality of evidence table organized by predictor variable.

## Review D: Rapid Review on Burnout Interventions in Military Health Care Professionals

This rapid review explored interventions to prevent and reduce burnout among military health care professionals with the goal of identifying promising approaches to support military health care providers. Rather than applying a rigorous systematic review framework, this rapid review collected information on available interventions and their specific context. The review

included a variety of worldwide military health care professionals engaged in the care of patients. The review was not limited by study design or geographical region and captured relevant information for translation into practice. The rapid review was intended to serve as a resource that could inspire the development of new approaches.

### *Review Question*

The rapid review was guided by the following question:

- What are the characteristics and contexts of successful burnout interventions applied to military health care professionals?

### *Sources and Search Strategy*

We searched the databases PubMed, PsycINFO, CINAHL, Web of Science, Allied and Complementary Medicine, and Defense Technical Information Center. In addition, we searched the gray literature targeting relevant websites (e.g., the Department of Defense [DoD] website, the VHA website) and executed targeted searches in a general search engine for programs for military health care providers (e.g., Google search). Furthermore, we identified review articles on military provider burnout and systematic reviews summarizing the effects of interventions for burnout; both sources were reference-mined (screening the list of included studies for relevance to this review) to identify research studies or other relevant resources. The search strategy is documented in the appendix.

### *Eligibility Criteria*

Studies were not limited by study design or type of intervention. Studies may be descriptive or confirmatory and may include randomized or nonrandomized study designs. Outcomes of interest for the latter included burnout rates pre- and postintervention (as defined by self-report, standardized scale, clinical judgement) and other relevant workplace satisfaction and productivity outcomes (e.g., absenteeism). Individual case studies of burnout therapy were excluded. Study inclusion and exclusion criteria are summarized in the following framework (participants, intervention, comparator, outcomes, timing, setting, and study design):

- **Participants:** Any health care professionals in the active military or the VHA were eligible. Health care professionals include physicians, doctors of osteopathic medicine, nurse practitioners, physician's assistants, medical residents; psychologists, other mental health professionals (e.g., marriage and family therapists); registered nurses, licensed practical nurses, licensed vocational nurses, medical assistants; pharmacists, dentists, midwives; allied health professionals (e.g., occupational therapists, physical therapists, or speech language pathologists). Professionals in training and not yet practicing in their profession, including medical students, were excluded.
- **Intervention:** Interventions to prevent and/or reduce burnout or its components (compassion fatigue/depersonalization [DP], emotional exhaustion [EE], lack of feeling of competence) in military or veteran health care providers were eligible.

- **Comparators:** Studies were not restricted by comparator.
- **Outcomes:** Outcomes of interest included rates of provider burnout or its components (as defined by self-report, standardized scale, or clinical evaluation). For studies evaluating interventions specifically aimed at burnout, other relevant provider workplace satisfaction and productivity outcomes (e.g., absenteeism), mental health measures (e.g., stress, depression, quality of life) were eligible. In addition, information on the uptake, acceptability, or other organizational success measures were also eligible.
- **Timing:** We did not restrict by publication year, the length of the intervention, or the length of the follow-up period.
- **Setting:** Health care providers working in the active military, deployed in or outside the United States, or working in the VHA were eligible. Health care providers working with the military (regardless of active service or deployment status) of other countries were also eligible.
- **Study design:** Evaluations of a burnout intervention in a military or veteran setting were eligible. We retained systematic reviews summarizing the effects of burnout intervention and review articles on burnout among military providers for reference-mining.

### *Data Extraction*

Information extracted from individual studies included a description of participants and type (active military, VHA staff, behavioral health professionals, or other health care providers). We captured the organizational penetration and spread information (e.g., rollout for entire organization) in addition to the study design, analytic or evaluation method, and duration of intervention and follow-up. The data abstraction captured the intervention description and categorization (prevention or reduction) and intervention components. We also recorded the implementation approach to introduce the intervention (e.g., raising awareness within the organization), and any information on the sustainability of the intervention (e.g., ongoing institutional support). Where available, we documented a source (e.g., website, document, or contact details) for additional information. Finally, we documented the outcomes and results according to the authors' summary.

### *Synthesis*

We structured the narrative synthesis to group the interventions by type and describe the existing evidence for successful approaches.

## **Review E: Evidence Map of Research on Interventions to Prevent and/or Reduce Burnout in Working Adults**

The aim of this review was to potentially identify interventions in other professional fields that could be translated into health care. We provided an evidence map of interventions to prevent or reduce burnout among working adults within a clearly defined work setting. The map provides an overview of the existing research base on interventions that aim to prevent or reduce

burnout and chronic occupational-related stress. This review of intervention studies is the first step toward understanding how to engage the health care workforce in strategies to boost morale and prevent or minimize burnout. It was not limited by intervention design or approaches that have been evaluated in health care providers but instead explored a broader field of burnout prevention and/or reduction interventions in the workplace. The evidence map documents the available evidence in a central, user-friendly figure (see Chapter Three) and is registered in the Open Science Framework (Grant, Bouskill, and Hempel, 2019). Reporting followed the PRISMA Extension for Scoping Reviews (Tricco et al., 2018).

### *Review Question*

The evidence map was guided by the following review question:

- Which burnout interventions have been evaluated in research studies?

### *Sources and Search Strategy*

We searched the following databases: PubMed, PsycINFO, CINAHL, Business Source Complete, Scopus, and Education Resources Information Center. In addition, we searched the following clinical trial databases: CENTRAL, ClinicalTrials.gov, and WHO International Clinical Trials Registry Platform. The Southern California Evidence-Based Practice librarian and content experts developed the search strategy based on existing reviews on similar topics (Mann et al., 2005; Zalsman et al., 2016). To determine whether the search strategies captured the right types of articles, we checked the search results to determine whether key exemplar articles were retrieved. The full search strategies can be found in the appendix. We also retained relevant systematic reviews for reference-mining.

### *Eligibility Criteria*

To operationalize the review question, study eligibility criteria were summarized in the following framework (participants, interventions, comparators, outcomes, timing, settings, and study design):

- **Participants:** We included studies involving working-age, employed adults within a clearly defined work setting. Studies addressing students and studies not recruiting through a defined work setting were excluded.
- **Interventions:** We included studies that described a type of intervention to prevent or reduce burnout, including peer-to-peer interventions, workplace-organized interventions, and adjuvant wellness interventions, among others, offered in a work setting. We excluded interventions for individual patients outside the work setting, such as those provided for hospitalized patients or workshops advertised to individuals.
- **Comparators:** Studies were not restricted by comparator.
- **Outcomes:** We included studies that assessed burnout or related workplace satisfaction, workplace productivity, absenteeism, retention, or related outcomes.



- **Timing:** We did not place any restrictions related to publication year, the length of the intervention, or the length of the follow up period.
- **Setting:** We included studies in any profession and working environment.
- **Study design:** We included randomized controlled trials (RCTs), clinical trials, cohort studies, and organizational pre-post studies.
- **Other limiters:** We restricted to English-language publications to provide a transparent and readily available resource catalogue of interventions. We excluded all studies reported in abbreviated formats (e.g., conference abstracts, letters to the editor).

### *Data Extraction*

We created a data extraction form that included detailed instructions and decision rules for reviewers to maintain a standardized data collection process (see the appendix). To ensure consistency of interpretation of all fields on the form, reviewers pilot tested a draft version of the form on a few studies for which results were clearly reported. We iteratively modified and tested the form with randomly selected samples of eligible studies until the final version was agreed. One reviewer extracted data from included studies, and a second reviewer checked these data for accuracy. We resolved any discrepancies through discussion in the review team.

The data extraction form focused on key information needed to display the evidence in an evidence map and provide a brief evidence table. First, we categorized the type of participants (e.g., health care providers) and the setting type (military or civilian). Second, we documented the study design category (e.g., RCT). We also characterized the type of intervention (e.g., peer-to-peer, workplace-organized, adjuvant wellness), whether the intervention aimed to prevent or reduce burnout (or both), and the duration of the intervention (to capture sustainable interventions). We did not collect data to critically appraise individual sources of evidence.

### *Synthesis*

To summarize evidence within each study, we broadly categorized the measures and results of the intervention in terms of effectiveness according to the author's summary. To synthesize evidence across studies, we created a burnout intervention evidence map that incorporated the following four dimensions of information:

1. the study design (RCT, non-RCT, cohort comparing two cohorts, pre-post/case series, time series)
2. the type of intervention, using a broad categorization system, (e.g., peer-to-peer intervention, workplace-organized initiatives, adjuvant wellness approaches, interventions with clinical focus, individual versus group approaches)
3. the purpose of the intervention (i.e., prevention, reduction, both, other)
4. the study size (i.e., number of participants).

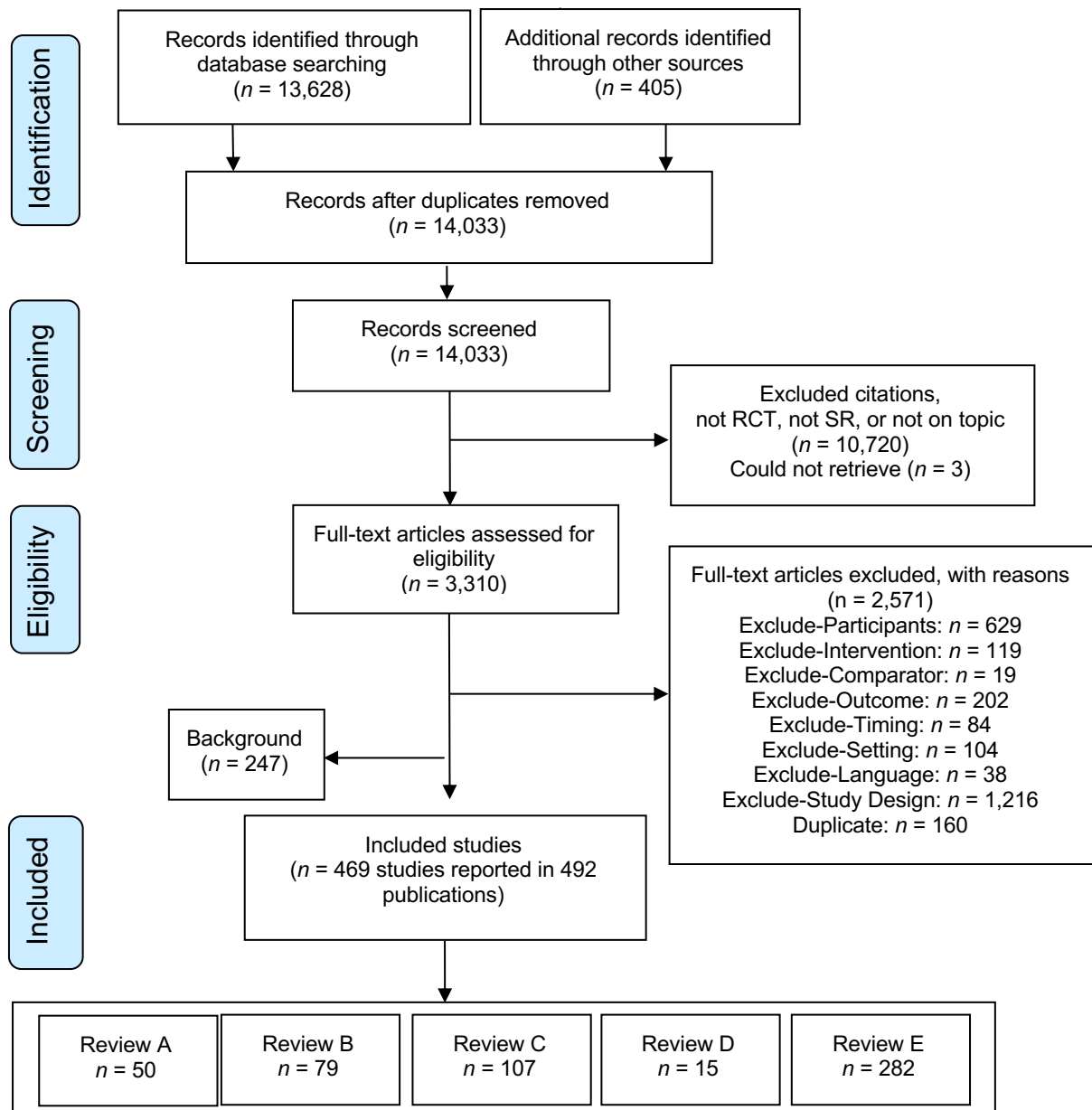
In addition to a visualization of the evidence map in the report, we created an online version of the map to capture and present a larger amount of information in a user-friendly and interactive way (see [https://www.rand.org/pubs/research\\_reports/RRA428-1/visualization.html](https://www.rand.org/pubs/research_reports/RRA428-1/visualization.html)).

The online evidence maps allow the reader to instantly access study information included in the evidence map, serving as a portal to a database of research information. The objects depicted in the map include links to the publications in PubMed (publicly available research database). In many cases, the PubMed entry not only provides summary information on the study but also links to the open-access, full-text version of the publication.

### 3. Results

In this chapter, we summarize all five reviews, thereby answering the key review questions. Figure 3.1 describes the literature flow across reviews.

**Figure 3.1. Literature Flow Diagram**



NOTE: SR = systemic review.

The searches identified 14,033 citations. We obtained 3,310 full-text publications and addressed these for relevance. In total, 470 studies reported in 493 publications contributed to at least one the five literature reviews.

## Review A: What Are the Prominent Concepts and Themes in the Burnout Literature?

The literature on burnout is vast. Although the majority of the scholarship on burnout stems from psychology, the concept has been taken up by several other disciplines, from sociology to sports medicine. Several scholars have traced the development of burnout since its initial legitimization within psychology (Cordes and Dougherty, 1993; Jackson, Schwab, and Schuler, 1986; Maslach, 2003; Maslach, Schaufeli, and Leiter, 2001). These literature reviews are entrenched in the theoretical orientations of certain thought leaders in the field, specifically Maslach and those following in her school of thought.

The overarching goal of this scoping review was to identify and orient the 50 most influential scholarly works related to burnout as indexed in the Web of Science (Aiken et al., 2002; Aiken and Patrician, 2000; Bakker et al., 2003; Bakker, Demerouti, and Euwema, 2005; Bakker, Demerouti, and Verbeke, 2004; Bodenheimer and Sinsky, 2014; Brotheridge and Grandey, 2002; Chida and Steptoe, 2009; Cordes and Dougherty, 1993; Crawford, LePine, and Rich, 2010; Demerouti et al., 2001; Dyrbye et al., 2008; Dyrbye, Thomas, and Shanafelt, 2006; Dyrbye, West, et al., 2014; Fahrenkopf et al., 2008; Faragher, Cass, and Cooper, 2005; Grandey, Dickter, and Sin, 2004; Hakanen, Bakker, and Schaufeli, 2006; Hakanen, Schaufeli, and Ahola, 2008; Halbesleben, 2006; Halbesleben and Buckley, 2004; Jackson, Schwab, and Schuler, 1986; Jennings and Greenberg, 2009; Krasner et al., 2009; Kristensen et al., 2005; Lee and Ashforth, 1996; Leiter and Maslach, 1988; Maslach, 2003; Maslach and Jackson, 1981; Maslach and Leiter, 2008; Maslach, Schaufeli, and Leiter, 2001; Nahrgang, Morgeson, and Hofmann, 2011; Pejtersen et al., 2010; Pruessner, Hellhammer, and Kirschbaum, 1999; Ramirez et al., 1996; Schaufeli and Bakker, 2004; Schaufeli, Bakker, and Salanova, 2006; Schaufeli, Bakker, and van Rhenen, 2009; Schaufeli, Leiter, and Maslach, 2009; Schaufeli et al., 2002; Schaufeli, Taris, and van Rhenen, 2008; Shanafelt et al., 2010; Shanafelt, Balch, et al., 2009; Shanafelt, Boone, et al., 2012; Shanafelt et al., 2002; Shanafelt, Hasan, et al., 2015; Thoresen et al., 2003; Vahey et al., 2004; van den Broeck et al., 2008; West et al., 2006).

In the review, we used these most widely cited published articles as a proxy for impact and influence within the field of burnout. We based citations on instances in which a publication was cited in a subsequent peer-reviewed publication. The search was not limited by objective (i.e., theoretical development or applied research), population, or setting. After identifying the most influential scholarly works on burnout, we sought to characterize the following concepts:

1. key conceptual models and theories used to define and operationalize burnout

2. how scholars have aligned with, deviated from, or amended prevailing concepts of burnout
3. populations for which burnout has been assessed and the degree to which these assessments engage with theoretical models of burnout
4. the degree of intersection and exchange across the publications (e.g., whether the applied literature cites the theoretical literature, how central concepts or findings of burnout have spread across the literature).

The list of studies is shown in the appendix. All of the included publications were cited at least 408 times. The highest number of citations was 5,242 (Maslach, Schaufeli, and Leiter, 2001). All publications were published between 1981 and 2015, and all were journal manuscripts. We grouped these publications into three categories:

1. **Early developments and explorations**, which focuses on how burnout was initially identified as an issue and the emergence of the MBI
2. **Expansion of burnout models and scales**, which depicts how conceptual models of burnout built on and deviated from the MBI
3. **Burnout among health care professionals**, which presents how burnout has been assessed among those in health care professions, including the underlying concepts of burnout that are used and key issues and concerns of burnout among these populations (e.g., risk of medical errors).

Although we searched for publications related to burnout irrespective of objective and population, it is worth noting that several articles focus on burnout among health care providers.

Additional citations were added if necessary to provide additional details on a particular concept of burnout; all of these citations are within the top 50 publications included in this review.

This review is intended to provide readers with a broad overview of the most central burnout concepts and the practical applications of these concepts. Specifically, we focus on the initial development of such core burnout concepts as the MBI, critiques and amendment of the MBI and related concepts, and how burnout has been operationalized and assessed among health care professionals.

### *Early Developments and Explorations*

Burnout emerged in the psychological literature in the 1970s, after psychologist Herbert Freudenberger coined the term to describe the exhaustion, cynicism, and reduced work productivity that he and his colleagues experienced (Freudenberger, 1974; see also Schaufeli, Leiter, and Maslach, 2009). Social psychologist Christina Maslach claimed to have observed a similar phenomenon independently and simultaneously among human service workers—i.e., workers experiencing ambiguity and frustration by not being able to help clients (Schaufeli, Leiter, and Maslach, 2009). The combination of performing emotionally draining work that does not readily lend itself to solutions was thought to put the worker at risk for developing burnout (Maslach and Jackson, 1981).

## Initial Emergence of Burnout

Schaufeli, Leiter, and Maslach (2009) posited that the rise in public consciousness of burnout among the early 1970s stemmed from a constellation of sociocultural factors. President Lyndon Johnson's 1964 creation of the War on Poverty had led to an increase in human service professionals tasked to provide services to combat rising poverty and its negative impacts on Americans. After years of working in human service fields, many professionals became disillusioned with the work and the inability to overcome widening socioeconomic gaps. The authors also note a possible reduction in societal respect and prestige for medical doctors, police officers, and teachers, in addition to a rise in individualism and narcissism. Finally, the authors noted how the increasingly bureaucratic, globalized, privatized, and neoliberal economy contributed to a discordance of personal values and work values (Schaufeli, Leiter, and Maslach, 2009).

## Development of the Maslach Burnout Inventory

In the pioneering phase of burnout development, Maslach and colleagues aimed to dispel the notion that burnout was a product of popular psychology by professionalizing the term and creating a standardized, validated scale with which to measure burnout through self-report (Maslach, Schaufeli, and Leiter, 2001). Before the scale was created, researchers had performed a series of qualitative interviews, observations, and preliminary surveys on the topic, which then coalesced into a set of attitudes and feelings embodied by those experiencing burnout (Maslach and Jackson, 1981). This research contributed to the development of an initial self-report survey, consisting of four subscales—EE, DP, personal accomplishment (PA), and involvement—that were tested for convergent validity in several ways (Maslach and Jackson, 1981). The authors enlisted outside observations from people close to the workers, including spouses and coworkers, to confirm these self-ratings. Patterns and dose-response relationships (e.g., frequency of stressful encounters in the workplace) were tested using nationwide surveys of job experiences and outcomes. Discriminant validity was assessed using standardized scores to differentiate burnout from job (dis)satisfaction and social desirability scores. Later on, burnout was suggested to differ from depression on account of the fact that depression is pervasive across all aspects of one's life whereas burnout is directly tied to one's work (Maslach, Schaufeli, and Leiter, 2001). Factor analysis suggested that involvement was not distinct from EE and DP, and that subscale was dropped from the final scale. EE, DP, and PA became the three subscales that made up the MBI. By giving an organized framework of burnout, the MBI enhanced the empirical inquiry of the condition.

The core model of burnout remains composed of these three subscales, in which EE describes the sense of being emotionally overextended and fatigued by excessive demands of helping others; DP is described as having an impersonal, negative response toward one's work; and PA is described as evaluating one's work negatively, as well as perceptions of competence and achievement (Jackson, Schwab and Schuler, 1986; Maslach and Jackson, 1981). Although

EE is seen “a key aspect of the burnout syndrome,” Maslach and Jackson (1981) emphasized that it is not sufficient to diagnose burnout alone. In addition to the MBI, the following five common elements of burnout were posited:

1. presence of dysphoric symptoms, including mental exhaustion and EE, fatigue and depression
2. symptoms that are more mental and emotional than physical
3. symptoms that are directly tied to work
4. symptoms that occur among those who did not previously have a pathopsychological condition
5. decreased job performance follows symptomology.

The authors note that this overlaps with what was previously referred to as job-related neurasthenia, loosely defined as long-term fatigue (Maslach, Schaufeli and Leiter, 2001). Interestingly, no articles included in this scoping review elaborated on exactly *how* burnout is differentiated from neurasthenia, despite noting “striking parallels” among neurasthenia and burnout (Schaufeli, Leiter, and Maslach, 2009).

#### Exploration of the Onset of Burnout

Maslach’s conceptualization was widely adopted in later studies, although variation continued in framing and the sequencing of the core components (e.g., EE, DP, and PA). In a literature review, Cordes and Dougherty (1993) trace how Maslach and colleagues wavered on the directions of how the core components of burnout are linked (e.g., whether DP followed EE). Initially, DP was conceptualized as a means of cognitively distancing of oneself from emotional demands (i.e., DP acted as a defense mechanism against EE). This then resulted in diminished feelings of PA, which then fed back into increased EE (Cordes and Dougherty, 1993). Leiter and Maslach (1988) found empirical support for this conceptual model of burnout among a cross-sectional study of hospital nurses: Nurses reported that unpleasant coworker contact increased EE. EE exacerbated their DP, which then reduced their organizational commitment and PA (Leiter and Maslach, 1988). However, other scholars critiqued these conclusions because of the cross-sectional design of that study and others (Cordes and Dougherty, 1993). Other studies showed support for a parallel development of the three components of burnout (Lee and Ashforth, 1996); other researchers posited that reduced PA might occur in parallel to the process of EE, leading to DP. In essence, the onset and development of the three core components of burnout remains in question (Lee and Ashforth, 1996).

Barring the debate over how the components of burnout are ordered, the field seemingly is unified around the three-component structure of burnout characterized within the MBI. The vast majority of studies included within this report use the MBI.

Despite the general agreement over the components of burnout, the causes and consequences of burnout had not yet been identified. An early longitudinal study sought to identify precursors and impacts of burnout among teachers. In the study, *role conflict*, or having multiple sources of

job demands that are incompatible with one's resources and ability, was a predictor of EE (Jackson, Schwab, and Schuler, 1986). Certain organizational-level factors were associated with dimensions of burnout. For example, perceived higher support from school leadership was associated with increased PA, while lack of a perceived support from leadership was associated with increased DP. Higher EE was associated with intending to leave one's job, receiving training for a new career, and ultimately leaving one's career as a teacher.

A subsequent literature review found that diminished PA was preceded by feeling overloaded in one's role, low skill utilization or challenge in one's work, lack of rewards contingent upon performance, role ambiguity, and unmet organizational and personal expectations (Cordes and Dougherty, 1993). Coping resources, such as organizational and personal support, mediated the degree of EE. Professional socialization and social support mediated the impact of EE. The impacts of job level on EE differed by gender—women in nonmanagerial roles experienced higher EE and DP, while men in managerial roles experienced higher EE and DP. This literature review also expanded upon the concept of EE, noting that it might be driven by the frequency and the intensity of emotionally exhausting encounters; i.e., both a receptionist and a paramedic might experience EE, but the EE experienced by receptionist could be the result of a high frequency of less intense emotionally exhausting encounters, while the paramedic's EE could stem from a lower frequency of more-intense emotionally exhausting encounters. This insight showed how EE can result from various types of work contexts (Cordes and Dougherty, 1993), an insight that fostered studies of burnout outside the helping professions.

### Considering Job Resources in the Onset of Burnout

As investigations of burnout expanded across a variety of work settings, frameworks to understand the correlates of burnout and how they relate to each aspect of burnout (EE, DP, and PA), began to formalize (Cordes and Dougherty, 1993; Lee and Ashforth, 1996). One framework that emerged after several years of initial inquiry was the Conservation of Resources model of burnout, which depicts burnout as the result of a chronic threat to one's job resources, in turn limiting the ability to meet one's job demands (Hobfoll and Freedy, 1993). A meta-analysis of 61 studies examined how the Conservation of Resources model relates to EE, DP, and PA, as well as behavioral and attitudinal outcomes (Lee and Ashforth, 1996). This meta-analysis largely corroborated the Conservation of Resources model of burnout. In addition, the findings suggested that EE might lead one to withdraw from their work through DP but that increased perceived PA might be protective against both EE and DP. These findings also called into question whether the concept of burnout should be expanded, as nearly any professional could be subjected to depleting resources and increasing job demands, irrespective of the type of profession.

Researchers noted that social support, although it was a critical tenet of the Conservation of Resources model, had yet to be rigorously assessed as a resource (Halbesleben, 2006). A meta-analysis to evaluate the relative effects of social support on the three components of burnout did



not find evidence for a differential impact of social support on these components, but the research came with a caveat—work-related social support was more strongly associated with reduced EE, and nonwork-related social support was more strongly related to DP and PA (Halbesleben, 2006). This review also revealed a gap in the evidence base, as only one study provided sufficient data on gender to be included in the meta-analysis. Another implication of the analysis was the need to better distinguish sources of social support (i.e., work-related and nonwork-related) when understanding its relationship to burnout.

Other studies continued to explore potential predictors and consequences of burnout. For example, burnout was hypothesized to be a contagion—burnout experiences spread among coworkers (Halbesleben and Buckley, 2004; Maslach, Schaufeli, and Leiter, 2001). Halbesleben and Buckley (2004) also reviewed several other potential predictors and outcomes of burnout. They found that neuroticism was the only “Big Five” personality trait dimension associated with EE. Improper job fit (discordant expectations of workload, values, control, etc.) was associated with increased burnout. Perceived inequity within social relationships and exchanges also contributed to and exacerbated burnout (Halbesleben and Buckley, 2004). Interestingly, there was not strong support for the hypothesis that burnout leads to reduced job performance; in fact, in some cases, burnout is positively associated with job performance (Halbesleben and Buckley, 2004). An additional analytic review found evidence that positive affect with respect to one’s job was negatively correlated with EE and DP and that negative affect was positively correlated with EE and DP. Positive affect was positively correlated with PA, while negative affect was negatively correlated with PA (Thoresen et al., 2003). Thus, the etiology of burnout became more complex as the evidence base grew, often raising more questions than providing answers.

Although it perhaps began as a trendy popular psychology term, burnout quickly became professionalized as an important topic of inquiry and recognized as a significant issue among the helping professions. Much of the field remained grounded in the Maslach school of thought, but Maslach and colleagues would soon build upon the mounting evidence to suggest that burnout was not limited by type of profession, opening up novel conceptual models and applications.

### *Expansion of Burnout Models and Scales*

The MBI conceptualization of burnout gave the research community a common framework with which to study the phenomenon (Halbesleben and Buckley, 2004). However, there were several additions and critiques of the model, including understanding how job resources and demands play into the onset and development of burnout, whether workplace engagement is the other side of the coin from burnout, and how generalizable the conceptual model of burnout is across professional contexts. As noted, after decades of conceptualizing burnout as a condition exclusive to those in the human service or “helping” professions, researchers drew on such theories as the Conservation of Resources model to cast doubt on the claim that burnout could not occur universally across professions. This section describes themes that emerged as conceptual models and scales with which to assess burnout expanded.

## Generalizing Burnout Across Professions

Maslach and colleagues had also recognized that the MBI warranted generalization outside the human service professions and created the MBI–General Survey (MBI-GS), which maps onto the MBI but labels the three components of burnout as *exhaustion*, *cynicism*, and *professional efficacy* (Schaufeli et al., 1996). In the MBI-GS, EE became *exhaustion*, which “measures fatigue without referring to other people as the source of one’s tiredness”; *cynicism* is “indifference or a distant attitude toward work in general, not necessarily with other people”; and *professional efficacy* denotes “both the social and nonsocial aspects of occupational accomplishments” (Schaufeli and Bakker, 2004). This reclassification made the three components of burnout more generic and did not refer to relationships among people (e.g., DP was reframed as cynicism). The MBI was also tailored to specific populations, such as university students (Schaufeli et al., 2002).

## Critique of the Maslach Burnout Inventory

Scholars noted the advantages of the expanded definition of burnout and the creation of the MBI-GS to include non–human service professions. Still, Demerouti et al. (2001) criticized the MBI-GS for its phrasing of the items, which is inferior to scales that include both positively and negatively phrased items. Phrasing bidirectional questions within a scale can reduce respondent bias (Bakker, Demerouti, and Verbeke, 2004).

Given this limitation and the tendency to associate the MBI exclusively with human service professions, the authors created the OLBI. The components of the OLBI include *exhaustion*, “a consequence of intensive physical, affective, and cognitive strain,” and *disengagement*, or “distancing oneself from one’s work and experiencing negative attitudes toward the work object, work content, or one’s work in general” (Demerouti et al., 2001). The OLBI furthermore assesses the cognitive and physical aspects of exhaustion. To compensate for the shortcomings of the MBI, the OLBI questions are phrased both positively and negatively. The OLBI was validated among three populations of employees (human service, industry, and transportation professions) (Demerouti et al., 2001), and later multitrait-multimethod analyses confirmed the factorial, convergent, and discriminant validity of the OLBI as compared with the MBI (Bakker, Demerouti, and Verbeke, 2004; Halbesleben and Buckley, 2004). The OLBI offers more-balanced wording of the items and provides a more universal assessment of exhaustion and workplace (dis)engagement.

Around the same time, Danish researchers echoed concerns about the utility of the MBI and noted that the MBI is potentially circuitous—i.e., the team that defined what burnout is also created the MBI (Kristensen et al., 2005). The Danish team also cast doubt that PA should be considered a core component of burnout, noting that PA could develop independently of EE and DP. Furthermore, by eliciting qualitative feedback, this team also determined that Danish respondents found aspects of the MBI culturally inappropriate and rooted in American cultural values (e.g., perceptions of PA, such as “I have accomplished many worthwhile things in this

job,” were seen as incongruent with Danish values). They created the CBI with the following three subscales: personal burnout, work-related burnout, and client-related burnout. The core of the CBI is evaluating fatigue and exhaustion by its source—either work conditions or client interactions. The CBI has high internal, convergent, and divergent validity. The scale results also predicted future sickness-related absence, sleep issues, use of pain killers, and intention to leave one’s job. Psychosocial factors, such as emotional demands, predicted all three subscales. Other demands, such as the perceived need to hide one’s emotions, predicted client-related burnout; a high work pace predicted work-related burnout; and poor role clarity of one’s position predicted personal- and client-related burnout. The CBI was also incorporated within the second version of the Copenhagen Psychosocial Questionnaire (Pejtersen et al., 2010). Although the CBI was developed under the auspices of a large-scale prospective study among Danish human service workers, the creators assert that the three scales can be used independently according to the populations and types of workers enrolled in a study. The CBI has also been translated in nine languages (Kristensen et al., 2005), although its universal utility remains in question (just as the MBI might be too grounded in American culture, the CBI might be too grounded in Danish culture).

### Consequences of Burnout

Growing evidence from cross-sectional studies suggests that burnout can carry sequelae of negative impacts. In *burnout cascades*, employees are caught in vicious cycles of negative actions and increased burnout. For example, one study explored the burnout cascade among teachers and found that poorer student-teacher relationships can lead to worsened student performance, further deterioration of the classroom climate, increased use of punitive and reactive measures, and greater risk for burnout (Jennings and Greenberg, 2009).

In addition, the presence of these negative consequences across multiple types of jobs and industries added further support for the need to understand burnout outside the helping professions (Maslach, Schaufeli, and Leiter, 2001). Health consequences included increased alcohol and substance use, exacerbation of such mental health issues as anxiety and depression (Maslach, Schaufeli, and Leiter, 2001), and dysregulation of physiological stress responses, which in turn can lead to a variety of negative health impacts (Chida and Steptoe, 2009; Pruessner, Hellhammer, and Kirschbaum, 1999).

In a systematic review and meta-analysis evaluating the relationship between job satisfaction and health outcomes, burnout was operationalized as a health outcome rather than as a predictor of job satisfaction. The researchers found that moderate decreases in perceived job satisfaction levels were associated with an increased risk of burnout “sufficiently large to be of considerable clinical importance” (Faragher, Cass, and Cooper, 2005). However, the analysis failed to explain what the clinical implications would be, nor did it adequately explain how burnout was assessed. In addition, Maslach, Schaufeli, and Leiter (2001) cautioned that the health consequences of

burnout should be interpreted with caution, as most of the health outcomes are assessed through self-report.

### Rethinking Job Demands and Resources in the Onset of Burnout

Building on the ample evidence to suggest that burnout can be found across professional settings, Demerouti et al. (2001) proposed and tested the Job Demands-Resources model, which understands burnout to be the result of high job demands coupled with reduced resources. This, in turn, leads to a depletion of energy and reduced motivation (Demerouti et al., 2001). The Job Demands-Resources model builds upon the Conservation of Resources model by examining how resources can also act as buffers against burnout and how demands can lead to both strain and a sense of achievement with one's career (Halbesleben and Buckley, 2004). Because the Job Demands-Resources is agnostic to the source of demands and resources (i.e., demands and resources do not have to be tied to working directly with people), it aligned well with expanding the definition of burnout outside the human service professions. In the Job Demands-Resources model, job demands are those

physical, psychological, social, or organizational aspects of the job that may do any of the following (a) be functional in achieving work goals, (b) reduce job demands at the associated psychological and psychological costs; (c) stimulate personal growth and development (Demerouti et al., 2001).

### The Relationship Between Burnout and Workplace Engagement

Another influence in burnout studies stemmed from the growing importance of positive psychology. Workplace *engagement* emerged as an important additional concept within the Job Demands-Resources model (Schaufeli and Bakker, 2004). Workplace engagement is characterized by vigor, dedication, absorption in one's work (i.e., being in a state of flow). In that sense, engagement is understood as the positive antipode of burnout, although evidence for this claim is mixed (Maslach, Schaufeli, and Leiter, 2001; Schaufeli et al., 2002; Schaufeli, Bakker, and Salanova, 2006; Schaufeli, Taris, and van Rhenen, 2008). A lack of resources, coupled with high demands, creates an energy-depleting process (burnout), whereas increased resources with manageable demands leads to a motivational process of personal development and attainment (engagement). Therefore, engagement and burnout can be considered as opposite ends of a spectrum (Schaufeli, Taris, and van Rhenen, 2008). Job resources occupy a dual role—low resources can exacerbate burnout and more resources can promote engagement, as was demonstrated in a large sample of Finnish teachers (Hakanen, Bakker, and Schaufeli, 2006).

A self-report questionnaire, the UWES, was created to assess engagement. In validation tests juxtaposing the UWES with the MBI, negative correlations among vigor and exhaustion as well as dedication and cynicism were observed. After collecting data from 27 studies in ten counties, a nine-item (as opposed to the original 17-item UWES scale) UWES was created and has become the standard scale for assessing engagement (Schaufeli, Bakker, and Salanova, 2006).

While work engagement and burnout stood at opposite ends of a spectrum, workaholism was noted to share features with both concepts but be distinct from them. *Workaholism*, the compulsion to work constantly and beyond normal expectations, overlaps with engagement with respect to organizational commitment and job satisfaction. Workaholism intersects with burnout with respect to job demands, poor quality of social relationships, and health issues (Schaufeli, Taris, and van Rhenen, 2008).

In a study of Dutch telecommunications managers, workaholism was related to excess working time, poor quality of social relations, health problems, excess job demands, and positive work outcomes, such as commitment to the organization (Schaufeli, Taris, and van Rhenen, 2008). Burnout and engagement followed predictable pathways and were conceptualized as opposites. Workaholism shared predictors of both engagement and burnout. The authors assert that burnout, engagement, and workaholism are three distinct but related facets of employee well-being and that all three should be considered when understanding the well-being of a workforce (Schaufeli, Taris, and van Rhenen, 2008).

Across study samples, the hypothesis that burnout and engagement are negatively correlated was confirmed; however, others began to argue that burnout and engagement should be measured as independent states (i.e., engagement cannot be understood as the opposite profile of the MBI scale) (Schaufeli and Bakker, 2004). High job demands are better predictors of burnout, while high job resources are better predictors of engagement. These insights contributed to an overall framing of job engagement as the ‘other side of the coin’ of burnout.

A subsequent study extended the Job Demands-Resources by providing strength for the directionality and further characterization of types of demands and their impacts on engagement and burnout. In a meta-analysis for 55 publications among 64 samples, Crawford, LePine, and Rich (2010) found that job resources, nearly irrespective of their type, are positively correlated with engagement. As expected, reduced job resources were associated with increased burnout. The study also found that job demands are linked to engagement, but this is dependent upon whether demands are seen as a *challenge* or a *hindrance*. Differentiating the type of demands increased the variance explained in engagement by close to half, in turn warranting an update to the Job Demands-Resources model.

The Job Demands-Resources was also employed to predict absenteeism (Bakker et al., 2003). Consistent with the Job Demands-Resources pathway of burnout, job demands predicted EE and DP and were indirectly associated with the duration of employee absence. Higher job resources were predictive of organizational commitment and reduced instances of absenteeism. Interestingly, older workers and those with more work experience reported more job demands and fewer resources. Questions remain as to whether absenteeism is a means of withdrawing from an adverse work environment to recover from workplace stress.

Job Demands-Resources also turned attention toward the negative consequences of burnout on work function and organizational-level outcomes (e.g., turnover, absenteeism), as opposed to individual-level outcomes (e.g., depression, anxiety). In a longitudinal study of

telecommunications managers, burnout was positively correlated with sickness-related absenteeism (as opposed to voluntary absenteeism) and longer absence duration (Schaufeli, Bakker, and van Rhenen, 2009). Work engagement was found to be negatively correlated with sickness-related absenteeism and fewer instances of absenteeism. In addition, higher work engagement at the start of the study was associated with more resources, and in turn more engagement, at the second time point. While it is difficult to rule out alternative hypotheses that underlying employee health influences absenteeism, these findings lend support for the claim that augmenting job resources can be an effective way of increasing engagement and reducing sickness-related absenteeism (Schaufeli, Bakker, and van Rhenen, 2009).

Using the OLBI, brief job demands and resources and in-role and extra-role performance questionnaires among several job sectors in the Netherlands, Bakker, Demerouti, and Verbeke (2004) found support for the following hypotheses:

1. More job demands predict the exhaustion component of burnout.
2. Job resources (specifically autonomy and social support) predicted extra-role performance (going above and beyond one's stated duties), which was mediated through the disengagement component of burnout.
3. Exhaustion was positively related to disengagement.

This work did not support the hypothesis that job resources could act as a buffer against job demands and exhaustion. However, a later study by the same group found that "several" job resources (social support, quality of the relationship with the supervisor, autonomy, performance feedback) in conjunction can buffer against the impact of job demands on two MBI subscales, EE and cynicism (Bakker, Demerouti, and Euwema, 2005). This is important for showing the variation in types of job resources and highlighting how the importance of each of these resources can vary for each individual. These findings also point to the fact that underpinning the complex concept of burnout are several other complex factors, such as job resources, that cannot necessarily be taken at face value.

Another group began to explore emotional labor of employee-customer interactions as a specific type of job demand (Brotheridge and Grandey, 2002; Grandey, Dickter, and Sin, 2004). The degree of autonomy an employee perceives in regard to how they can express their emotions at work was found to be correlated with burnout. As expected, frequency of customer aggression among call center employees was positively correlated with EE; there is a cost to the cultural mantra that "the customer is always right." (Grandey, Dickter, and Sin, 2004). There is also preliminary evidence to indicate that having to use surface-level acting or faking of one's emotions at work is predictive of DP, although perceiving the need to show positive emotions through a fake display of positivity was positively correlated with PA, which is indicative of the intricate complexity of emotional labor demands on one's work perceptions (Brotheridge and Grandey, 2002).

An additional extension of the Job Demands-Resources model emerged from testing the hypothesis that that basic psychological need for satisfaction mediates the relationship among job

demands and burnout, job resources and burnout, and job resources and engagement (van den Broeck et al., 2008). Among a sample of Belgian workers across various sectors, satisfaction of one's basic psychological needs was a partial mediator in the relationship between job demands and the EE component of burnout, and between job demands and vigor, but it fully mediated the relationship between job resources and the EE component of burnout.

Another meta-analysis among 203 independent samples examined the intersection of the Job Demands-Resources model and workplace safety and to test the hypothesis that work engagement can be a mechanism for preventing workplace safety incidents, which lead to immense economic losses (Nahrgang, Morgeson, and Hofmann, 2011). Burnout was negatively correlated with workplace safety, while engagement was associated with increased workplace safety. In accordance with the Job Demands-Resources model, resources were negatively correlated with burnout and positively correlated with engagement. Risks and hazards were positively correlated with burnout and negatively correlated with engagement. Burnout was significantly related to accidents, injuries, and adverse events, but not with committing unsafe behavior. Engagement was negatively correlated with adverse events and unsafe behavior, but not to accidents and injuries. A meta-analytic path model showed that burnout partially mediated the relationship between job demands and adverse events. Job resources across industries showed that autonomy, leadership, and safety climate explained the largest percentage of variance in burnout. Burnout and compliance explain most of the variance across all industries and might be the main mechanism through which job demands and resources influence safety outcomes.

Many theoretical models focus on burnout, engagement, job demands, job resources, emotional affect, and social support. As the nature of work continues to change through an increasingly globalized economy and novel work modalities (e.g., telework), these theoretical and conceptual models will also likely take new forms. The following section shifts away from theoretical concerns and centers on practical matters in the application of burnout among health care professionals.

### *Burnout Among Health Care Professionals*

Despite the presence of burnout across industries, its roots remain in the helping professions, particularly among health care professionals. This section describes our findings from the influential publications related to burnout among health care professionals, including the individual- and organizational-level factors related to burnout, consequences of burnout, and priorities with respect to mitigating burnout.

#### **Preventing Burnout as a Central Aim Within Health Care**

There is no doubt that the health care workforce is undergoing significant organizational shifts. Three-quarters of physicians now work in large health organizations (Shanafelt, Hasan, et al., 2015). Anecdotally, physicians report perceiving their jobs to be more like data managers

than doctors, feeling “defeated,” and feeling that “the joy of practicing medicine is gone” (Bodenheimer and Sinsky, 2014). Although preliminary evidence on individually based interventions to reduce burnout among physicians shows their effectiveness (Krasner et al., 2009), organizational redesign initiatives in improving health care professional health and well-being and care delivery might prove to be more important (Aiken and Patrician, 2000; Shanafelt, Hasan, et al., 2015). It is also important to consider that physicians with burnout might also be less likely to rate individual stress-reduction programs as important (Shanafelt et al., 2002).

Along these lines, Bodenheimer and Sinsky (2014) critiqued the Triple Aim, an initiative designed by the Institute for Healthcare Improvement to enhance patient experience, improve population health, and reduce health care costs as a framework to optimize health systems. They argue that society demands a high level of patient-centered care, but physicians are not necessarily given the resources to match the demand. They warn that adhering to the Triple Aim may increase clinician burnout, particularly within safety-net clinics. Considering that burnout leads to costly turnover issues, lower patient satisfaction, and poorer patient outcomes, addressing health care professional burnout ought to be added to the Triple Aim initiative, making it the Quadruple Aim (Bodenheimer and Sinsky, 2014).

### Psychiatric Morbidity and Burnout Among Physicians

The medical community has long been concerned with the mental health and well-being of its workforce. Estimates put the suicide rate among physicians in the United States at twice the national average (Ramirez et al., 1996). In the United States, the rate of suicide among male physicians is 40 percent higher than the general population; that number is an astronomical 130 percent higher among female physicians (Dyrbye et al., 2008). This brought attention to the relationship among workplace and demographic factors and adverse psychiatric outcomes.

An early study of psychiatric morbidity and burnout among physicians in British hospitals found that radiologists reported the highest levels of burnout (Ramirez et al., 1996). Other risk factors for burnout included younger age (under 55), being single, and feeling insufficiently trained in communication and management skills. Burnout was associated with reduced satisfaction in relationships with patients, relatives, and staff, professional status, and intellectual stimulation.

In the United States, rates of burnout among physicians vis-à-vis other working adults revealed that physicians were 10 percentage points more likely to experience burnout than nonphysicians (Shanafelt, Boone, et al., 2012). The highest levels of burnout were observed among those in frontline care delivery (family medicine, internal medicine, and emergency medicine). The same research group then examined the prevalence of burnout from 2011 to 2014 and found a 10-percent increase in the prevalence of burnout across all specialties of U.S. physicians (Shanafelt, Hasan, et al., 2015). Using the MBI, over half of the U.S. physicians in the sample were experiencing burnout. The physicians’ trend toward increased burnout from 2011 to 2014 was not mirrored in the general population.



A cross-sectional study of internal medicine residents rotating through university medical centers and VHA hospitals found that three-quarters met the criteria for burnout (Shanafelt, Balch, et al., 2009). Among those with burnout, half had depressive symptoms. Burnout was also a predictor of self-reported suboptimal patient care practices on at least a monthly basis, while high DP scores were associated with poorer patient care practices on a weekly basis.

U.S. surgeons were also at high risk for burnout and depression, particularly trauma surgeons, urologists, otolaryngologists, vascular surgeons, and general surgeons (Shanafelt, Balch, et al., 2009). Demographic risk factors for burnout included being younger, having a spouse employed as a nonphysician health care professional, and having younger children. Having a higher number of nights on call per week, total working hours per week, a greater number of years in practice (which contradicts younger age) and having billing-based compensation were also associated with greater burnout risk. Interestingly, having *more than half* of one's time dedicated to nonpatient tasks was associated with lower risk for burnout. Despite this, most surgeons reported being satisfied with their work and would choose to become surgeons again (Shanafelt, Balch, et al., 2009). More details on the specific risk factors for burnout among health care professionals can be found in Review C.

### Burnout and Medical Errors

The relationship among burnout and risk for committing medical errors has also gained importance. Health care professionals who make errors have been termed “second victims” because of the guilt and shame associated with making medical errors (West et al., 2006). A cross-sectional study among a large sample of U.S. surgeons found that higher EE and DP were associated with risk of committing a medical error, while higher PA was associated with reduced likelihood of committing an error, even after controlling for personal and professional factors (Shanafelt et al., 2010). In a small prospective cohort study among pediatric residents in the United States, three-quarters of the sample met the criteria for burnout (Fahrenkopf et al., 2008). A quarter of those with burnout also had depression. Residents with burnout were significantly more likely to report difficulty concentrating at work, and burnout was associated with medical errors. Another small prospective study among residents found that self-perceived medical errors were associated with a decrease in overall quality of life and worsened burnout (West et al., 2006). In a vicious cycle, those with increased burnout were more likely to commit medical errors in the following three months. Finally, a cross-sectional study of U.S. internal medicine residents identified burnout as a predictor for self-report of suboptimal patient care practices (Shanafelt et al., 2002). The issue of patient safety makes burnout among health care providers an all too important issue (West et al., 2006).

### Etiology of Burnout Among Physicians

Increased attention has also been given to the origins of physician-related burnout, with some positing that manifestations of burnout might begin in medical school (Dyrbye, Thomas, and

Shanafelt, 2006). In a large study of U.S. medical students across seven programs, half of the students met the criteria for burnout (Dyrbye et al., 2008). Students with burnout were two to three times more likely to report suicidal ideation, independent of whether students had depression. However, students who recovered from burnout were less likely to report suicidal ideation after one year than those with chronic burnout.

Recognizing this issue, many medical schools began offering wellness programs. However, the transition from medical training to practice (i.e., becoming a resident) is also seen as a particularly precarious time for new physicians (Dyrbye, West, et al., 2014). In a cross-sectional national survey, burnout was more prevalent among medical students, trainees, and early-career physicians than the general population (Dyrbye, West, et al., 2014). Residents and early-career physicians also reported higher levels of burnout.

### Health Systems Factors Implicated in Burnout

Another issue plaguing the health care workforce is nursing shortages and staffing challenges, especially in light of legislation in some states (e.g., California) that mandates a minimum hospital patient-to-nurse ratio (Aiken et al., 2002) and performance goals of patient-centered care set by the Institute of Medicine (Vahey et al., 2004). In a cross-sectional study of a large sample of nurses across 168 Pennsylvania hospitals, each additional patient in the patient-to-nurse ratio was associated with a significant increase in the odds of having burnout and poorer patient outcomes (Aiken et al., 2002). Nurses who reported high levels of burnout were also dissatisfied with their jobs and intended to leave their current jobs within the following year. Another cross-sectional study on nurse working environments found burnout levels that were on par with national averages of health care workers; however, nurses in more beneficial work environments were only one-third to one-half as likely as those working in poorer environments to have high EE, high DP, an intention to leave their job within the following year, and reduced patient satisfaction scores (Vahey et al., 2004).

### *Relationships Among the Publications*

The bibliometric analysis depicts how the top 50 most widely cited publications on burnout are interrelated, have drawn upon each other, and are connected through their citations. We tracked whether and how these publications cited one another as proxies for how their theoretical constructs of burnout and applications of burnout are in dialogue with one another. This builds an initial view of how conceptual models of burnout are linked, as well as how the applied studies of burnout (e.g., burnout among health care professionals) draw upon the theoretical and conceptual models of burnout. We first depicted all citations together, followed by three visuals of the three aforementioned sections, which are delineated through unique colors.

Figure 3.2 depicts the bibliometric analysis of the most cited articles, color coded by each of the three broad themes described in this review: early developments and explorations (orange), expansion of burnout models and scales (green), and burnout among health care professionals

(blue). The three clusters in Figure 3.2 depict the degree to which the most widely cited publications are linked through citing each other. The clustering effect of the three types of articles—early theoretical developments, expansion of the field, and burnout among health care providers—shows that there is little integration of applied studies of burnout among health care providers and theoretical and conceptual developments in the field.

Figure 3.3 centers on early developments and explorations. Figures 3.4. and 3.5 depict the expansion of burnout models and scales and burnout among health care professionals, respectively.

**Figure 3.2. Bibliometric Analysis of Most Widely Cited Publications on Burnout**

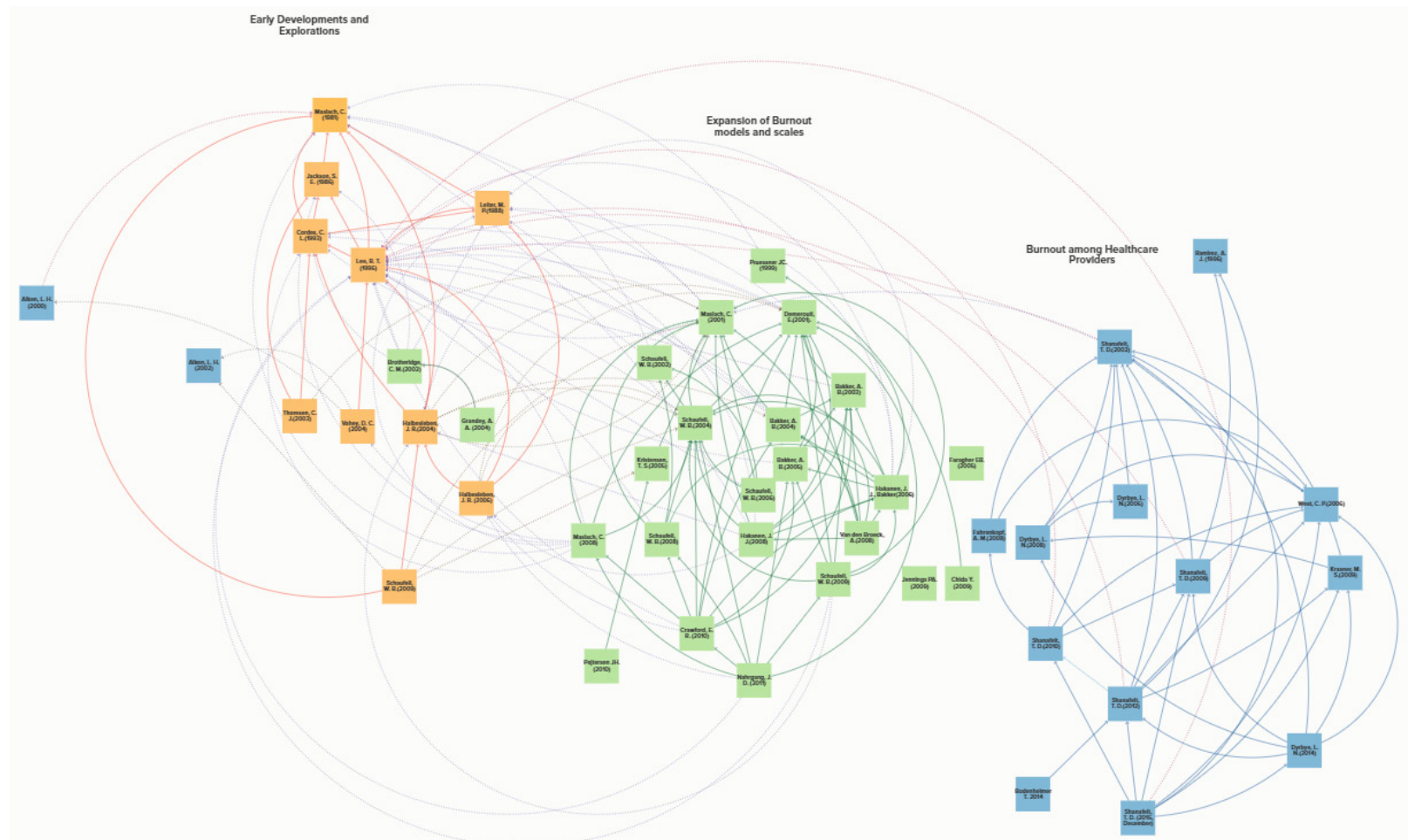


Figure 3.3. Bibliometric Analysis of Early Developments and Explorations of Burnout

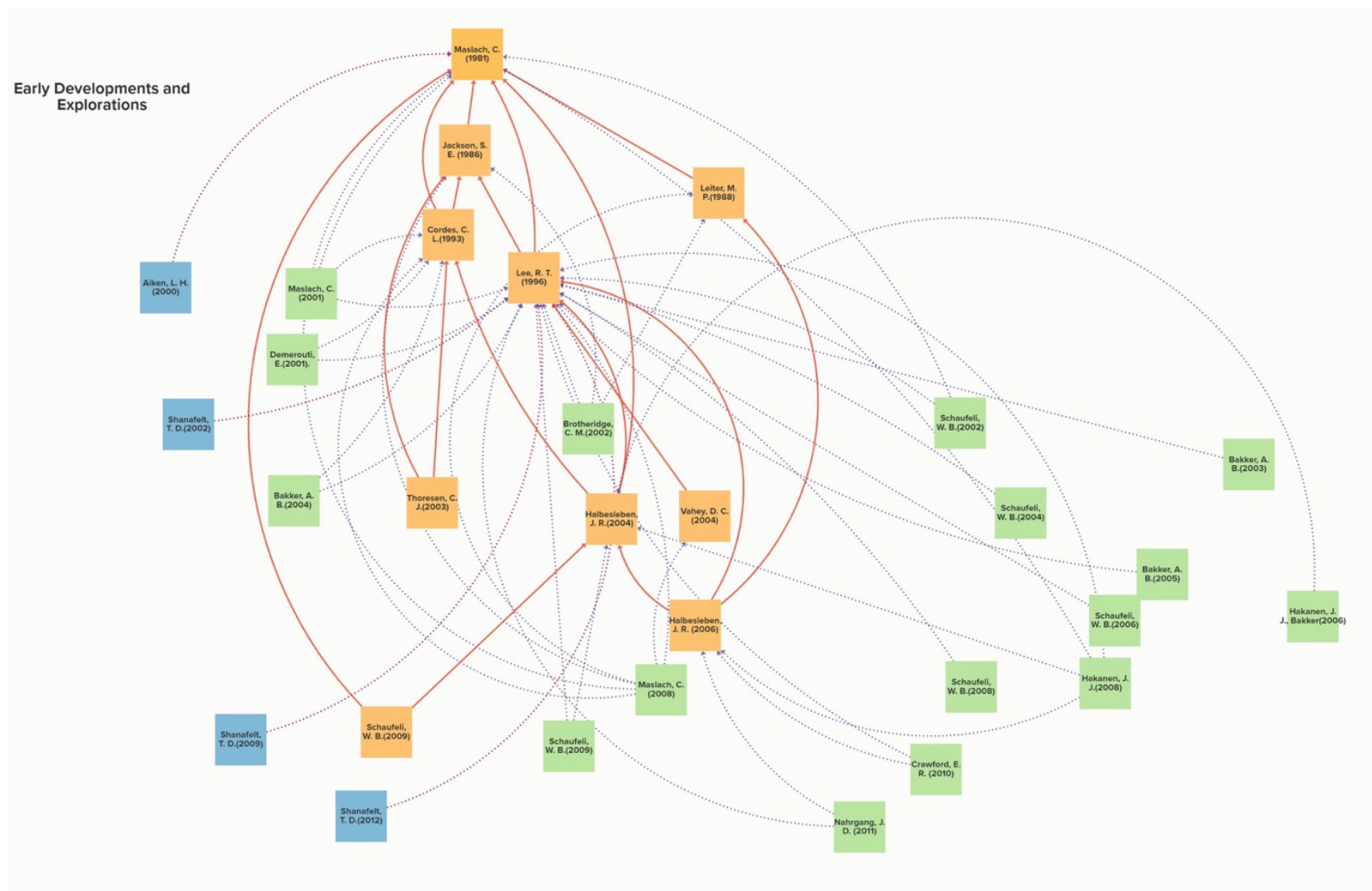
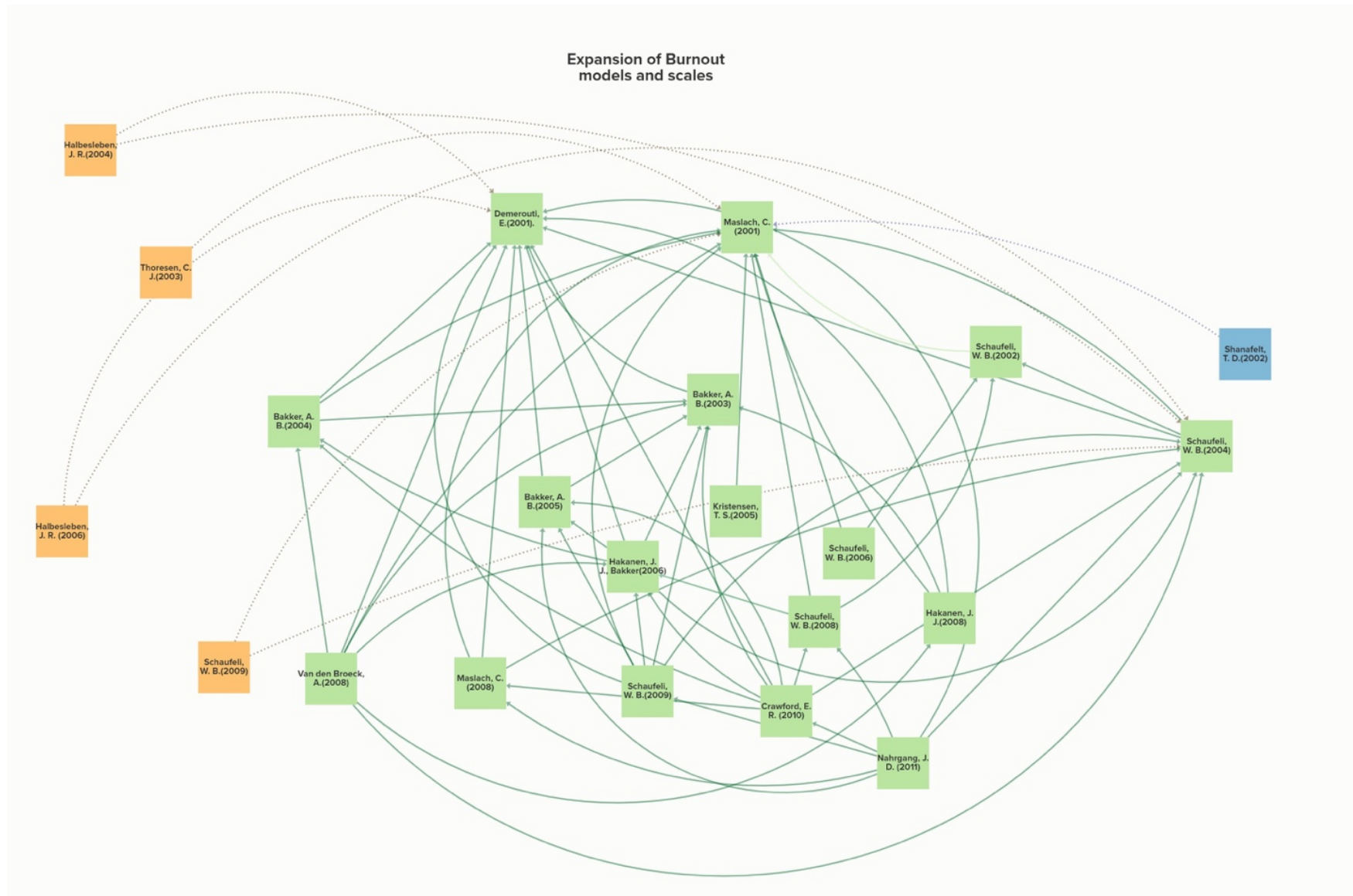


Figure 3.4. Bibliometric Analysis Expansion of Burnout Models and Scales





**Burnout among Healthcare Providers**

The diagram illustrates the relationships between various research papers on burnout among healthcare providers. The nodes are represented by colored squares, and the connections are shown by lines.

**Nodes (Papers):**

- Alken, L. H. (2000)
- Alken, L. H. (2002)
- Vahey, D. C. (2004)
- Schaufeli, W. B. (2009)
- Fahrenkopf, A. M. (2008)
- Dyrbye, L. N. (2008)
- Dyrbye, L. N. (2006)
- Shanafelt, T. D. (2002)
- Shanafelt, T. D. (2009)
- Shanafelt, T. D. (2010)
- Shanafelt, T. D. (2012)
- Shanafelt, T. D. (2015, December)
- Shanafelt, T. D. (2009)
- West, C. P. (2006)
- Krasner, M. S. (2009)
- Dyrbye, L. N. (2014)
- Ramirez, A. J. (1996)

**Connections:**

- Solid Blue Lines:** Represent direct relationships or citations between papers.
- Dotted Lines:** Represent indirect or conceptual relationships between papers.

The diagram shows a complex network of relationships, with many papers having multiple connections. For example, Shanafelt, T. D. (2002) is a central node with many incoming and outgoing connections. Similarly, West, C. P. (2006) and Krasner, M. S. (2009) are highly connected nodes.

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care professionals, Review B provides the latest reliable estimates of the prevalence of burnout among health care providers. Review C provides a systematic outlook on factors associated with risk for burnout among health care professionals. Review D focuses on specific approaches taken to ameliorate burnout among military health care providers. Lastly, Review E looks at the distribution and effectiveness of interventions to prevent and reduce burnout across professions, which were important vis-à-vis the call presented in the literature to instate organizational-level strategies to address burnout.

## Review B: What Is the Prevalence and Incidence of Burnout in U.S. Health Care Providers?

This rapid review identified 79 studies reporting on current prevalence estimates of burnout among U.S. health care providers (Adler et al., 2017; Agrawal et al., 2020; Ahmed et al., 2020; Anandarajah, Quill, and Privitera, 2018; Attenello et al., 2018; Ayyala et al., 2019a; Beck et al., 2020; Blechter et al., 2018; Britt, Koranne, and Rockwood, 2017; Bundy et al., 2020; Busis et al., 2017; Cheng et al., 2020; Chew et al., 2017; Creager, Coutinho, and Peterson, 2019; Cull et al., 2019; Del Carmen et al., 2019; Domaney, Torous, and Greenberg, 2018; Doolittle, 2020; Dyrbye et al., 2018; Dyrbye et al., 2020; Edwards, Helfrich, et al., 2018; Fargen et al., 2019; Gabbe et al., 2018; Garcia et al., 2018; Garcia et al., 2020; Gardner et al., 2019; Goldberg et al., 2020; Gribben, Kase, et al., 2019; Gribben, MacLean, et al., 2019; Guenette and Smith, 2017; Hansen et al., 2018; Harris et al., 2018; Hauer, Waukau, and Welch, 2018; Hu et al., 2019; Hughes, Francis, and Sciscione, 2019; Jackson et al., 2017; Kamal et al., 2016; Kemper et al., 2020; Knox et al., 2018; Kroll et al., 2020; Kroth et al., 2019; Lebares et al., 2018; LeClaire et al., 2019; Levin et al., 2017; Lin et al., 2019; Li-Sauerwine et al., 2020; Mandeville et al., 2020; Marchalik, Brems, et al., 2019; Melnick et al., 2020; Messias et al., 2019; Moore et al., 2019; Morrell et al., 2020; Ofei-Dodoo, Callaway, and Engels, 2019; Ofei-Dodoo et al., 2019; Olson et al., 2019; Porter et al., 2018; Puffer et al., 2017; Ramey et al., 2017; Rinne et al., 2020; Robertson, Robinson, and Reid, 2017; Schult, Mohr, and Osatuke, 2018; Shakir et al., 2020; Shakir et al., 2018; Shanafelt, West, et al., 2019; Sheno et al., 2018; Simons et al., 2016; Sliwa et al., 2019; Smeds et al., 2019; Somerson et al., 2020; Spinelli et al., 2016; Stearns, Shoji, and Benight, 2018; Summers et al., 2019; Tetzlaff et al., 2018; Waddimba et al., 2016; Wang et al., 2020; Weidner et al., 2018; Weintraub et al., 2016; Williford et al., 2018; Zhang et al., 2019). The most recent and reliable evidence is available for physicians. There is also substantial evidence of prevalence of burnout among physicians together with estimates among physician assistants, nurse practitioners, nurses, social workers, and other clinical staff. We identified two studies exclusively focused on physician assistants (Dyrbye et al., 2020; Tetzlaff et al., 2018), and one on advanced practice nurses (Harris et al., 2018). Provider specialties consisted of primary and secondary care, including internal and family medicine, emergency care, critical care, nephrology, neurology, pathology, radiology, oncology, urology, hospice and palliative

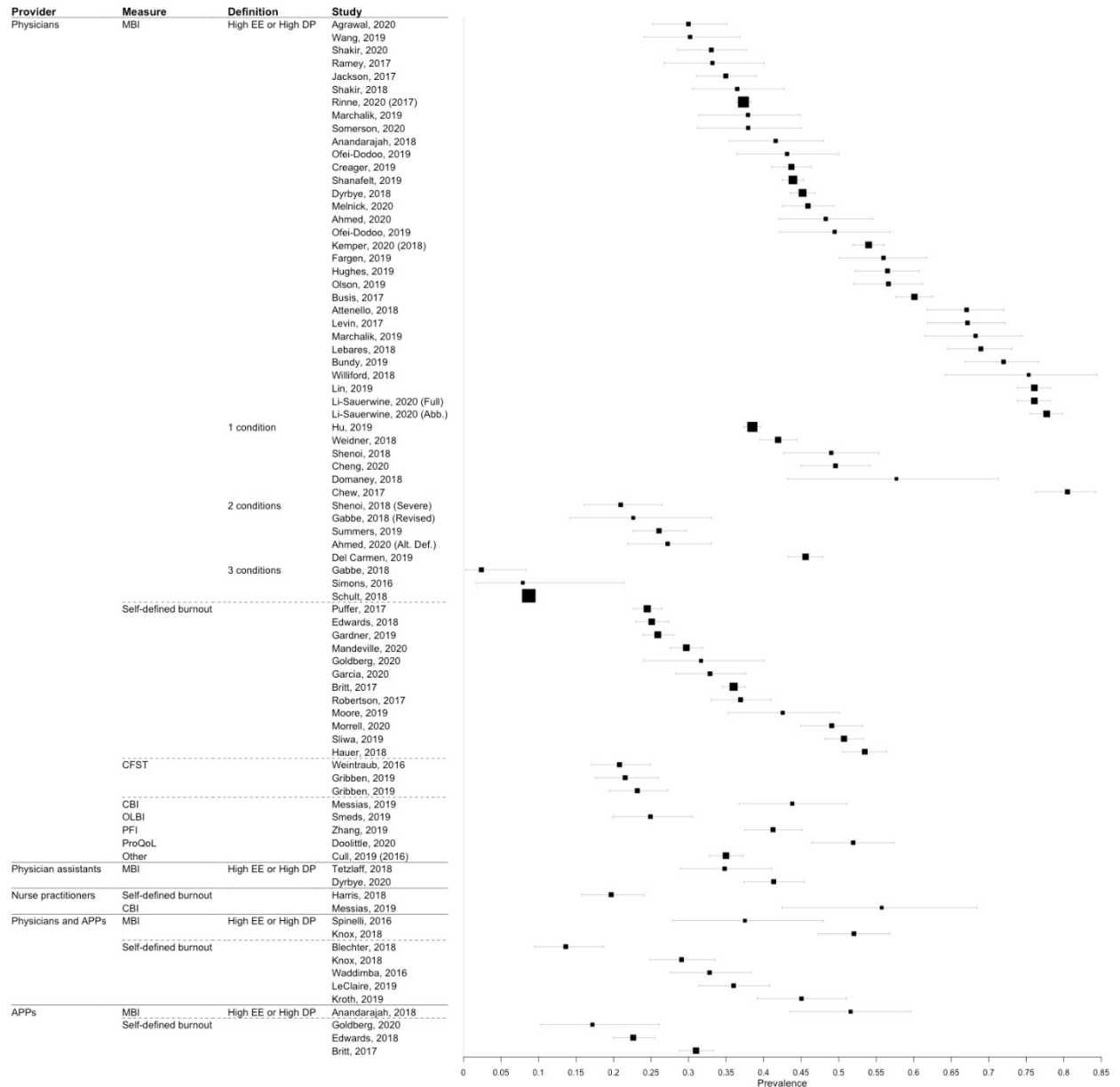


care, psychiatry, obstetrics and gynecology, pediatrics, orthopedics, physical medicine and rehabilitation, general surgery, neurosurgery, hand surgery, spinal surgery and vascular surgery. All of the estimates of burnout prevalence were self-reports obtained from cross-sectional surveys. None of the studies reported incidence rates of burnout (i.e., newly developed cases of burnout among the observation period).

The majority of the studies measured burnout using versions of or items from the MBI. Among health care professionals, the MBI–Human Services Survey (MBI-HSS) is the original and the most widely used version of the MBI, despite the fact that there is a specific version for medical personnel—the MBI–Human Services Survey for Medical Personnel (MBI-HSS [MP]). Some studies used the MBI-GS, which is intended for use in occupations other than in human service or education professions. None of the studies that employed the MBI-GS provided a rationale regarding the use of this version instead of the MBI-HSS or the MBI–HSS (MP) (Del Carmen et al., 2019; Garcia et al., 2018; Knox et al., 2018). Eighteen studies used a self-defined, single-item measure of burnout. The remaining studies measured burnout using the Compassion Fatigue and Satisfaction Self-Test for Helpers (CFST), the CBI, the Professional Fulfillment Index, the Professional Quality of Life Scale (ProQOL), and a single question assessing the presence of experienced burnout.

Figure 3.6 shows the prevalence results stratified by provider group and by burnout measure.

**Figure 3.6. Burnout Prevalence**



NOTES: Box size is proportional to sample size. *Condition met* refers to high EE scores, high DP scores, or low PA scores for these burnout components. APP = advanced practice provider; PFI = Professional Fulfillment Index.

## Physicians

The large majority of identified studies assessed burnout among physicians. As shown in the figure, the estimates of burnout prevalence are spread across a wide range, from 2 to 81 percent. In general, studies that adopted more-complex operationalizations of burnout (e.g., requiring all components [EE, DP, PA] to be present), reported lower prevalence. Studies that used some measures other than the MBI also tended to report lower burnout rates. Several studies that

adopted the MBI or used two of its subscales defined burnout as having either high EE or high DP and reported prevalence rates between 30 and 78 percent. More-lenient scenarios that required only one subscale criterion to be met to classify burnout reported rates from 42 to 81 percent. The studies that required at least two conditions to define burnout reported a prevalence ranging from 21 to 46 percent. In the most conservative scenarios, in which all three conditions must be met (especially low personal achievement), the reported prevalence of burnout fell below 10 percent.

There is also some evidence suggesting that fewer physicians in academia experienced burnout than did physicians without an academic position (Gabbe et al., 2018; Porter et al., 2018; Summers et al., 2019).

The largest group of studies used versions of the MBI to assess burnout. The studies employing the MBI used a score of 27 or higher to represent a high level of EE, a score of ten or higher to represent a high level of DP, and a score of 33 or lower to represent a low level of PA (Attenello et al., 2018; Bundy et al., 2020; Busis et al., 2017; Fargen et al., 2019; Guenette and Smith, 2017; Hughes, Francis, and Sciscione, 2019; Lin et al., 2019; Levin et al., 2017; Marchalik, Brems, et al., 2019; Olson et al., 2019; Ramey et al., 2017; Sheno et al., 2018; Summers et al., 2019). Of these, 32 studies defined burnout as having a high score on either the EE or the DP subscale of the MBI, including the full and the abbreviated versions.

While most studies used published multiitem scales, 12 studies used a single-item, self-defined burnout measure in which responses were scored on a five-point ordinal scale. Up to 54 percent of the respondents reported symptoms of burnout (Hauer, Waukau, and Welch, 2018) using this approach, but these studies should be interpreted with caution, as the measure was only validated against the EE subscale of the MBI.

### *Physician Assistants*

Defining burnout as having either high EE or high DP measured with the MBI, one study reported that 35 to 41 percent of the physician assistants were burned out; in the other study, 24 percent of the physician assistants had high scores for EE and 10 percent had high scores for DP (Kroll et al., 2020; Tetzlaff et al., 2018).

### *Nurse Practitioners*

Of the two studies that examined burnout among advanced practice nurses, one study found that 53 percent reported personal burnout, 55 percent reported work-related burnout, and 12 percent reported patient-related burnout, assessed with the CBI (Messias et al., 2019); the other study found that 20 percent of the respondents reported self-defined burnout (Harris et al., 2018).

### *Mixed Provider Groups*

The figures also depict a variety of studies that assessed burnout among a mixed group of providers. Six studies assessed burnout among clinicians, including physicians, physician

assistants and nurse practitioners (Blechter et al., 2018; Knox et al., 2018; Kroth et al., 2019; LeClaire et al., 2019; Spinelli et al., 2016; Waddimba et al., 2016). Of these, four studies reported a 14 to 45 percent prevalence of self-defined burnout (Blechter et al., 2018; Knox et al., 2018; Kroth et al., 2019; Waddimba et al., 2016). One study reported that the self-defined measure identified significantly fewer cases of burnout compared with the MBI–General Scale (Knox et al., 2018).

Four studies assessed burnout among APPs. Three reported a prevalence between 17 and 31 percent using the single-item self-defined burnout measure (Britt, Koranne, and Rockwood, 2017; Edwards, Marino, et al., 2018; Goldberg, 2018), and the other reported 52 percent using the single-item measures of EE or DP from the MBI (Anandarajah, Quill, and Privitera, 2018).

### *Mental and Behavioral Health Professionals*

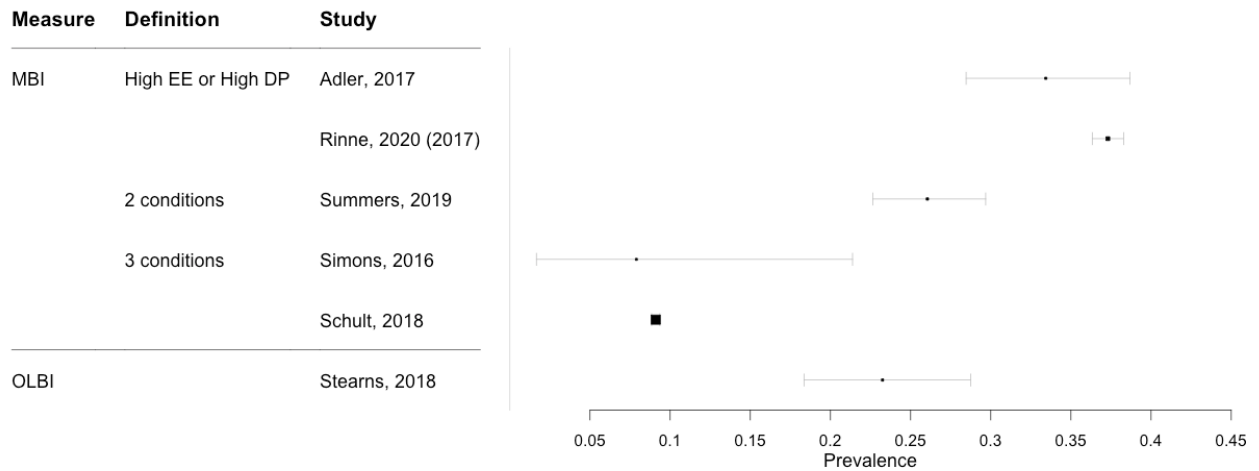
We identified few studies that estimated burnout prevalence in mental or behavioral health professionals in sufficiently large samples and also reported on the multicomponent construct burnout.

One study examining burnout among VHA mental health care providers (including physicians, nurse practitioners, psychologists, mental health professionals, and social workers) found that 55 percent of the staff had high levels of EE; 55 percent had high levels of cynicism; and 19 percent had low levels of professional efficacy, as measured with the MBI-GS (Garcia et al., 2018). One examined prevalence of burnout among psychiatrists using the MBI-HSS (MP) and found that 40 to 87 percent of the residents and 67 percent of the faculty experienced at least one dimension of burnout (Domaney, Torous, and Greenberg, 2018). However, because the study had a small sample size ( $n = 52$ ), the estimates might not be representative of the psychiatry specialty. The other study assessed burnout among military behavioral health providers and reported an overall burnout rate of 23 percent measured with the OLBI (Stearns, Shoji, and Benight, 2018).

### *What Is the Prevalence and Incidence of Burnout in U.S. Military Health Care Providers?*

We identified six studies (see Figure 3.7) that investigated prevalence of burnout among military and veteran health care providers. Five studies defined burnout using different definitions or measures, while one study reported prevalence of burnout components (Garcia et al., 2018).

**Figure 3.7. Military Providers**



The studies included VHA as well as health care providers working with active military personnel. Two studies assessed burnout among VHA employees (Garcia et al., 2018; Rinne et al., 2020). One study found that 37 percent of the employees had either high EE or high DP (Rinne et al., 2020). The other study focused on mental health care providers and found that 55 percent of the staff scored high on EE, 55 percent scored high on cynicism (used synonymously with DP among health care providers), and 19 percent scored low on professional efficacy (used synonymously with PA among health care providers) subscales of the MBI-GS (Garcia et al., 2018).

One study measured burnout among behavioral health providers working in both military and community settings using the OLBI and reported an overall burnout rate of 23 percent (Stearns, Shoji, and Benight, 2018). One study examining burnout among faculty physicians in military graduate medical education programs reported a prevalence of 26 percent, defined by high EE and high DP on the MBI (Summers et al., 2019). Lastly, one study assessed burnout among medical staff deployed across Afghanistan and found that 33 percent of the staff experienced either high EE or high DP, measured with an abbreviated version of MBI (Adler et al., 2017).

## Review C: Which Risk Factors Can Reliably Predict Burnout in U.S. Health Care Providers? Do the Predictors Vary Across Military and Civilian Health Care Settings?

A total of 107 studies met inclusion criteria for this systematic review of predictors of burnout (Aggarwal et al., 2015; Ahmed et al., 2020; Allegra, Hall, and Yothers, 2005; Anandarajah, Quill, and Privitera, 2018; Attenello et al., 2018; Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Kuerer, 2011; Blechter et al., 2018; Block et al., 2013; Braun et al., 2017; Busis et al., 2017; Campbell et al., 2010; Creager, Coutinho, and Peterson, 2019; Cull et

al., 2019; Cydulka and Korte, 2008; De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; De Oliveira et al., 2013; Del Carmen et al., 2019; Doolittle, 2020; Dyrbye et al., 2018; Dyrbye et al., 2013; Dyrbye et al., 2020; Dyrbye, West, et al., 2011; Edwards, Helfrich, et al., 2018; Elmariah et al., 2017; Elmore et al., 2016; Fargen et al., 2019; Firulescu et al., 2019; Gabbe et al., 2002; Gardner et al., 2019; Gleason et al., 2020; Glover-Stief, Jannen, and Cohn, 2020; Goldberg et al., 1996; Green-McKenzie et al., 2020; Gribben, Kase, et al., 2019; Gribben, MacLean, et al., 2019; Hamm et al., 2020; Harris et al., 2018; Hillhouse, Adler, and Walters, 2000; Hughes, Francis, and Sciscione, 2019; Hyman et al., 2017; Jackson et al., 2017; Janko and Smeds, 2019; Kamal et al., 2016; Kashani et al., 2015; Kemper et al., 2020; Kimo Takayesu et al., 2014; Kroth et al., 2019; Kuerer et al., 2007; Kuhn, Goldberg, and Compton, 2009; Lapinski and Hassan, 2016; Levin et al., 2017; Lindeman et al., 2017; Lu et al., 2015; Marchalik, Brems, et al., 2019; Martini et al., 2004; McAbee et al., 2015; McPhillips et al., 2007; Melnick et al., 2020; Mirvis, Graney, and Kilpatrick, 1999; Moore et al., 2019; O'Hara et al., 2020; Ofei-Dodoo, Callaway, and Engels, 2019; Ofei-Dodoo et al., 2019; Olson, Kemper, and Mahan, 2015; Olson et al., 2019; Porter et al., 2018; Primack et al., 2010; Qureshi et al., 2015; Rabatin et al., 2016; Ramey et al., 2017; Ratanawongsa et al., 2008; Rath et al., 2015; Rinne et al., 2020; Robertson, Robinson, and Reid, 2017; Roth et al., 2011; Shakir et al., 2020; Shakir et al., 2018; Shanafelt, Balch, et al., 2009; Shanafelt, Boone, et al., 2012; Shanafelt et al., 2002; Shanafelt et al., 2016; Shanafelt, Gorringer, et al., 2015; Shanafelt et al., 2014; Shanafelt, Oreskovich, et al., 2012; Shanafelt, West, et al., 2019; Shanafelt, West, et al., 2009; Shenoi et al., 2018; Sliwa et al., 2019; Smeds et al., 2019; Somerson et al., 2020; Starmer, Frintner, and Freed, 2016; Summers et al., 2019; Tetzlaff et al., 2018; Thrush et al., 2019; Tran et al., 2019; Wang et al., 2019; Weintraub et al., 2016; Weintraub et al., 2019; Windover et al., 2018; Wright, 2011; Yank et al., 2019; Yasko, 1983; Yoon, Hunt, et al., 2017; Zhang et al., 2019). The included studies were published as early as 1987 and as recently as 2020. We restricted this review to studies that included participants that were U.S. care providers (physicians, physician assistants, or nurse practitioners) and that reported on predictions for the complex construct burnout, rather than predicting only individual components of burnout.

Most of the documents employed concurrent (or cross-sectional) designs, although some used prospective designs and a few used retrospective designs. All analyses included some form of multivariate analysis (e.g., multivariate regression, multivariate intercorrelations, multivariate chi-square tests) because the goal was to identify associations between one or more risk factors and burnout.

A variety of settings were covered in this set of included studies, from health care professional organizations, hospitals and units within hospitals, university medical centers, health departments, the military, and VHA. The number of participants ranged from as few as 21 to as many as 184,357 providers.

## Outcome Definitions and Operationalization

We accepted the definition of burnout as a complex and multidimensional construct and included studies that aimed to predict this complex construct, rather than individual components or correlates of burnout. Burnout was operationalized differently across studies. Most studies used the full 22-item MBI to measure burnout and operationalized burnout using a dichotomous measure—high scores on the EE and DP subscales and a low score on the PA subscale. Some studies used only two components and operationalized burnout as high EE and DP (Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Balch, Shanafelt, Sloan, Satele, and Kuerer, 2011). A few studies combined the scales into phases of low, medium, and high burnout (Goldberg et al., 1996; Mirvis, Graney, and Kilpatrick, 1999). Some studies used abbreviated versions of the MBI, including a 12-item version (De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; De Oliveira et al., 2013), a six-item modified version (Block et al., 2013), a five-item version (Elmariah et al., 2017), and a two-item version (Anandarajah, Quill, and Privitera, 2018; Wang et al., 2019). Two studies used a single-item dichotomous measure (Primack et al., 2010; Rabatin et al., 2016).

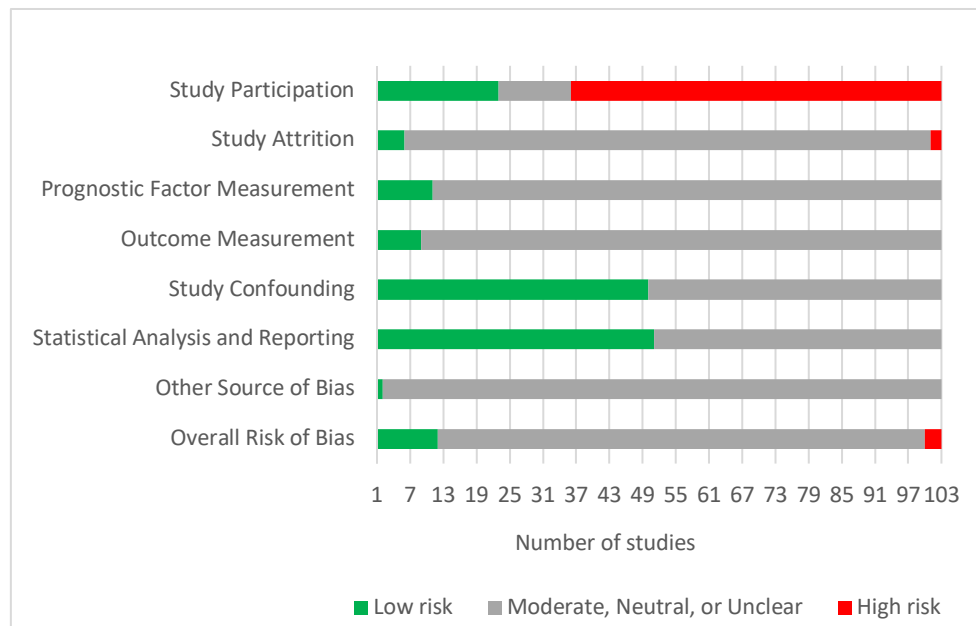
Other instruments used to measure burnout included the ProQOL V Scale (Doolittle, 2020; Glover-Stief, Jannen, and Cohn, 2020; O'Hara et al., 2020), the Mini Z (Gardner et al., 2019; Tran et al., 2019; Yank et al., 2019), the burnout subscale from the CFST (Gribben, MacLean, et al., 2019), the Staff Burnout Scale for Health Professionals (Hillhouse, Adler, and Walters, 2000), the 16-item OLBI (Janko and Smeds, 2019), and a four-item measure from the Physician Worklife Study (Kroth et al., 2019). One study used the 19-item CBI (Thrush et al., 2019), and one study used the 30-item Jones Staff Burnout Scale for Health Professionals (Yasko, 1983).

Studies assessed variables predicting higher levels of burnout and protective variables that were associated with lower levels of burnout. Most operationalized burnout as a binary measure as opposed to using the full range of scores with a continuous measure. For example, many studies defined burnout with the MBI if high on the EE subscale (score of 27 or higher) or high on the DP subscale (score of ten or higher) (Campbell et al., 2010). This tendency for using cut scores was partly a reflection of our exclusion criteria; we did not include studies that used just a single continuous subscale measure.

## Risk of Bias Assessment

Overall risk of bias across the included studies was primarily moderate (Figure 3.8).

**Figure 3.8. Summary of Risk of Bias Assessment by Source**



The largest source of bias was caused by study participation; most studies were at a high risk of bias from this source because of low or unknown response rates. Most studies were at moderate risk for study attrition bias. Most studies were at moderate risk of bias from prognostic factor measurement and outcome measurement. More than half the included studies were at low risk of bias from study confounding and statistical analysis. The types of other sources included having small sample sizes as well as simplistic analyses (e.g., use of only a two-sample Wilcoxon rank sum test).

### Risk Factors of Burnout

A variety of different types of risk factors were explored in the existing studies aiming to predict burnout in health care providers. These included demographic characteristics, professional and clinical practice characteristics, psychological health factors, health risks and health behaviors, and psychosocial variables.

#### *Demographic Characteristics*

Almost all studies examined the effect of one or more demographic characteristics (also referred to as personal characteristics) as risk factors for burnout.

The effect of gender on burnout was examined in 52 studies. Some studies found that women had a greater risk than men (Anandarajah, Quill and Privitera, 2018; De Oliveira et al., 2013; Dyrbye et al., 2018; Dyrbye et al., 2020; Elmore et al., 2016; Green-McKenzie et al., 2020; Hughes, Francis, and Sciscione, 2019; Kuerer et al., 2007; Lapinski and Hassan, 2016; Lindeman et al., 2017; Olson et al., 2019; Primack et al., 2010; Rabatin et al., 2016; Rath et al., 2015;



Shanafelt et al., 2014; Shenoi et al., 2018; Thrush et al., 2019), and four studies found that men were at greater risk for burnout, including two prospective studies (Campbell et al., 2010; Hillhouse, Adler, and Walters, 2000). Many studies did not find gender to be a significant predictor of burnout.

Thirty-nine studies assessed age as a predictor. A total of 19 studies found some association with burnout while 20 found none. Fifteen studies found that younger age was a significant risk factor for burnout; four found that older age was a significant predictor. Five studies used prospective designs, but those studies produced mixed results. Some found a negative association of age with burnout—i.e., younger providers had higher burnout levels (Mirvis, Graney, and Kilpatrick, 1999; Sliwa et al., 2019); others found a positive relationship (Lindeman et al., 2017) or no relationship (Campbell et al., 2010; Kemper et al., 2020).

Race or ethnicity as a predictor was evaluated in ten studies (including two prospective studies) but was a statistically significant predictor in only two studies, and the prospective studies found no effect (Del Carmen et al., 2019; Dyrbye et al., 2018). One study (Kashani et al., 2015) found that burnout was significantly lower in fellows who had immigrated to the United States from Asian countries ( $p < 0.04$ ). Another found that burnout was highest among underrepresented minorities (30 percent), followed by Caucasians (18 percent) and Asians (3 percent) (Primack et al., 2010).

Another variable studied was having children, which was examined in 25 studies (one of which used a prospective design). Only five studies, including a prospective study (Cull et al., 2019), that addressed having children found that this demographic characteristic statistically significantly predicted burnout, and the direction of effects varied (some indicated that having children is associated with lower burnout whereas others found having children was associated with greater burnout). In addition, another study found that having additional caregiving responsibilities (e.g., caring for very ill children, spouses, parents, or others) was associated with higher burnout rates (Yank et al., 2019).

A total of 17 studies examined marital status as a predictor of burnout. Of those, only two found a significant effect (being unmarried was significantly associated with burnout), but no prospective study addressed this variable.

### Professional and Clinical Practice Characteristics

Most of the included studies examined the effect of professional and clinical practice characteristics on burnout. These characteristics included specialty; years in practice; type and size of practice setting; management support (i.e., staffing, training resources); compensation or reimbursement; and several characteristics regarding direct patient care, such as job stress, autonomy, flexibility, work-life balance, workload/caseload (time spent on patient care, number of patients seen per week, hours worked, nights worked on call per week, charting or paperwork, EHR or computerization), and team functioning.

A total of 27 studies reviewed examined specialty or subspecialty as a risk factor for burnout.

One large study of all specialties observed wide variation in burnout across them (Shanafelt, Boone, et al., 2012). The highest rates were among frontline primary care physicians (i.e., family medicine, general internal medicine, and emergency medicine). Studies of surgeons have found trauma surgery to be associated with burnout (Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011); several subspecialties, including trauma surgery, urology, otolaryngology, vascular surgery, and general surgery, were associated with greater burnout compared with other surgical subspecialties (Shanafelt, Balch, et al., 2009). Another study found that advance practice providers had higher rates of burnout compared with physicians (Anandarajah, Quill, and Privitera, 2018). A study of 600 primary care providers found that providers with a specialty of emergency medicine were at higher risk of burnout compared with other types of primary care providers (Dyrbye et al., 2020). Three studies used prospective designs. One found that second-year residents in urology, neurology, emergency medicine, and general surgery were at higher risk of burnout compared with students in internal medicine or dermatology (Dyrbye et al., 2018). The other prospective studies (Del Carmen et al., 2019; Rabatin et al., 2016) found no effect.

A large number of studies assessed number of years in the profession, although many studies examined medical residents (comparing, for example, first-year residents with other residents). Of the 39 studies, some studies found that practice duration was a risk factor for burnout. One study identified the number of years in practice as a positive predictor of burnout (Shanafelt, Balch, et al., 2009) in a sample of surgeons and another found that neurosurgery residents and postgraduate neurosurgeons experienced significantly higher burnout (Shakir et al., 2020). However, other studies found that years in practice had a negative association with burnout. One of these was in a more specific surgeon sample (breast surgeons) (Zhang et al., 2019), one study found that higher postgraduate year level was significantly associated with lower burnout (Hamm et al., 2020), and one found that residents had more burnout than faculty (Ofei-Dodoo, Callaway, and Engels, 2019). Among a sample of residents, those with less experience (only one to two years postgraduation versus four or more years) had higher burnout (Thrush et al., 2019). Fewer years in role was also significantly associated with more burnout (Yasko, 1983), as was early career stage (Del Carmen et al., 2019). The study of early career stage used a prospective design and thus provides strong evidence for the risk factor on burnout.

Practice setting was also a commonly assessed factor. Most of the 26 studies found no effect. Among the five studies that found positive effects, one study of hospice and palliative care providers identified smaller organizations as a factor associated with greater burnout (Kamal et al., 2016). Working in profit-oriented clinical settings was also associated with more burnout (Yoon, Hunt, et al., 2017) in a study comparing physicians in end-of-life care compared with other general specialties. One (Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011) found that practicing in a university or academic medical setting (versus nonuniversity) was a significant predictor of higher burnout. A study of occupational and environmental physicians found that burnout was highest among physicians in government practice settings compared with physicians

in private medical center groups, occupational medicine employers, hospitals or medical center groups, or consulting groups (Green-McKenzie et al., 2020).

We identified 16 studies addressing support from management, organizational leadership, or mentors. One study found that feeling unsupported by leadership (Tetzlaff et al., 2018) was linked with higher burnout. In another study (Janko and Smeds, 2019), surgical trainees who did not have a self-identified mentor were significantly more likely to report burnout ( $p < 0.01$ ); residents that had a structured mentorship had lower burnout risk (Marchalik, Goldman, et al., 2019). High-quality supervisor leadership was also correlated with lower burnout among physicians and scientists in a large health care organization (Shanafelt, Gorringer, et al., 2015). Unfavorable physician evaluations of supervisors (Shanafelt, Gorringer, et al., 2015) and lower perceptions of meaningful feedback and professional development (Gleason et al., 2020) were associated with a greater degree of burnout, while feeling that faculty cared about the medical oncology fellows' educational success (Ahmed et al., 2020) was protective against burnout. Lastly, alignment with leadership values was also associated with lower burnout (Olson et al., 2019). In addition, taking on leadership roles (Cydulka and Korte, 2008), less time serving as department chair (Gabbe et al., 2002) (odds ratio [OR] 0.6, confidence interval [CI] 0.4, 0.9), and support from direct management and administration (Glover-Stief, Jannen, and Cohn, 2020) were associated with lower/less burnout.

Workload or job stress—as assessed by longer work hours, more shifts per month, on-call time, and overall higher *busyness* (e.g., higher patient volume or percent of time in direct patient care)—were consistent risk factors for burnout. This risk factor was examined in 43 of the studies we reviewed, and most found that workload was significantly associated with risk for burnout. One study (Busis et al., 2017) found that multiple workload factors—including more hours worked, more nights on call, higher outpatient volume, and higher percent of time in clinical practice—were associated with higher burnout risk. In terms of hours worked, one study found a greater likelihood of burnout was associated with working more than 60 hours per week (Zhang et al., 2019), another study reported this for more than 70 hours per week (De Oliveira et al., 2013), and two others reported that more than 80 hours a week (Marchalik, Brems, et al., 2019; Somerson et al., 2020). In addition, working more than one night shift per week was associated with an odds ratio of 5.9 (CI: 1.5–22.9) in a study of pediatric department chairs (McPhillips et al., 2007). Working longer than 24-hour shifts (Shanafelt et al., 2002), getting less time off (Kemper et al., 2020), and spending more hours devoted to direct patient care were also linked with burnout (Shanafelt et al., 2014; Tetzlaff et al., 2018; Green-McKenzie et al., 2020). In addition, one study found that administrative burden (Weintraub et al., 2019) was tied to burnout, and two recently published studies found that factors associated with EHR design (e.g., time spent charting, more EHR time) and use (Kroth et al., 2019; Tran et al., 2019) were linked to greater burnout. Prospective studies provide the strongest evidence for workload. One study of resident duty hours and shift type provides evidence that fatigue leads to increased burnout (Elmariah et al., 2017) and workload among a sample of psychiatrists was significantly associated

with higher rates of burnout (Sliwa et al., 2019). Satisfaction with workload (Del Carmen et al., 2019; Creager, Coutinho, and Peterson, 2019) and control over workload (Kroth et al., 2019) were protective factors against burnout.

Job autonomy, including increased flexibility in work schedule, has been evaluated in 23 studies. Reported autonomy served as a protective factor (Cull et al., 2019); perceived lack of control over work conditions (Cydulka and Korte, 2008; Moore et al., 2019) and dissatisfaction with clinical autonomy (Kuhn, Goldberg and Compton, 2009; Lindeman et al., 2017) were associated with greater burnout. One of the studies of military providers found that a desire to stay beyond the initial active duty service obligation was a protective factor for burnout (Summers et al., 2019). Findings from studies that are based on prospective designs suggested that flexibility and clinical autonomy might protect providers against future burnout.

Problems with work-life balance, including work-home conflicts and dissatisfaction with work-life integration, were identified as a common risk factor for burnout across the 25 studies that assessed the variable. The studies, including studies with a prospective design (Cydulka and Korte, 2008; Kemper et al., 2020; Rabatin et al., 2016), reported positive associations with burnout, adding strength to findings for this risk factor.

Eight studies looked at the effect of compensation and reimbursement as a burnout risk factor. In one study, additional compensation for consult calls was a significant protective factor for burnout (Fargen et al., 2019). Another study found that concern about reimbursement was a factor associated with higher burnout (Allegra, Hall, and Yothers, 2005). Having compensation based entirely on billing was associated with greater burnout (Shanafelt, Balch, et al., 2009). However, method of compensation was not a significant predictor of burnout among four identified studies (Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Qureshi et al., 2015; Rath et al., 2015; Shanafelt et al., 2014). The other two studies found no effect (Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Moore et al., 2019). Similarly, only one of six studies reported an association between salary and burnout, all other studies found no effect.

### Psychological Health Factors

Several studies examined provider psychological health factors associated with burnout, but studies varied in the analyzed predictors and operationalizations. These factors included overall distress, depression, anxiety, suicidal ideation, personality disorders, and personality traits.

Out of 14 studies that assessed depression as a risk factor, nine found that depression was significantly associated with higher burnout (Campbell et al., 2010; Janko and Smeds, 2019; Lu et al., 2015; Ofei-Dodoo et al., 2019; Qureshi et al., 2015; Rath et al., 2015; Shanafelt et al., 2002; Smeds et al., 2019; Starmer, Frintner, and Freed, 2016). In addition, two studies found that providers who had suicidal ideation had higher burnout scores (Ofei-Dodoo et al., 2019; Rath et al., 2015) which were associated with greater burnout risk.

Anxiety was examined in five studies and was identified as a statistically significant risk factor in three of these (Dyrbye et al., 2018; Firulescu et al., 2019; Kuhn, Goldberg, and

Compton, 2009) including one prospective study (Dyrbye et al., 2018). One study found that, among surgery residents, having PTSD and even screening positive for PTSD was associated with high risk for professional burnout (Jackson et al., 2017).

### Health Risks and Health Behavior Factors

Another commonly studied type of risk factor was health risks and health behaviors. This category included physical health problems, access to health services, sleep problems, heavy alcohol consumption, and healthful behaviors (including exercise and wellness strategies, such as mindfulness, self-compassion, and positive outlook). Among the ten studies that examined physical health problems as a risk factor, six identified low back pain, physical inactivity, and distress from the physical work environment (including from EHR use) as contributing to burnout (Hyman et al., 2017; Kroth et al., 2019; Weintraub et al., 2016). Two studies looked at the effect of physical quality of life but only one found it to be protective against burnout (Kuerer et al., 2007).

Ten studies included substance use as a potential risk factor. Of those that looked at alcohol use, consumption was identified as a risk factor; the studies reported that more than five drinks per week (De Oliveira et al., 2013), alcohol consumption more than once per week (Goldberg et al., 1996), and a high score on an alcohol abuse screener (Rath et al., 2015) were associated with higher odds of burnout. Two studies addressed tobacco use, one looked at cannabis use, and two at general substance use; none of these found effects on burnout. Several studies looked at additional individual problems that adversely affect burnout. Three studies identified poor access to mental health care services (Marchalik, Brems, et al., 2019; Marchalik, Goldman, et al., 2019) or reluctance to seek mental health care (Rath et al., 2015) as burnout risk factors.

Five studies (of eight studies assessing the variable) found that sleep deprivation was associated with greater burnout (Baer et al., 2017; Goldberg et al., 1996). Of the three prospective design studies, two found an association (Cull et al., 2019; Goldberg et al., 1996).

Some studies looked at health behaviors that have potential to protect against or minimize burnout. Among the nine studies of exercise and physical activity, four found it to be a protective factor (Cull et al., 2019; Doolittle, 2020; Goldberg et al., 1996; Shenoi et al., 2018) while the others found no effect. One study found that reporting good to excellent health (Starmer, Frintner, and Freed, 2016) was also protective.

Meditation and mindfulness specifically were assessed in five studies. Three studies that examined the effect of mindfulness on burnout found that it was a protective factor. One of these is based on prospective data (Braun et al., 2017) and therefore provides the strongest evidence.

### Psychosocial Variables

The last category of risk factors included such social and psychological mechanisms as perceived control, perceived disrespect or discrimination including sexism, empathy/self-compassion, perceived stigma, emotional intelligence, coping, self-efficacy, social support, and

social competence. Factors associated with higher burnout included perceived lack of control over work conditions and social stress outside work (Attenello et al., 2018). A study of bullying and sensitivity found no effect on burnout (Firulescu et al., 2019). In addition, one study found gender-based discrimination (Wang et al., 2019) was a predictor of greater burnout. The role of coping strategies was unclear as studies reported conflicting results.

On the other hand, several predictors had protective effects. Among all 14 studies that looked at perceived control, seven found significant effects, all but one indicating that more perceived control is a protective factor. Three studies used prospective designs (Cydulka and Korte, 2008; Del Carmen et al., 2019; Rabatin et al., 2016). Coping (Kroth et al., 2019; Shanafelt et al., 2002), self-compassion (Kemper et al., 2020; Olson, Kemper, and Mahan, 2015), empathy (Dyrbye et al., 2018), having a positive outlook (Shanafelt, Oreskovich, et al., 2012), and emotional intelligence (Gleason et al., 2020; Lindeman et al., 2017) were also protective. A study of grit and resilience did not find any effects on burnout (Shakir et al., 2020). Among the 20 studies (including one prospective study (Dyrbye et al., 2018) of social support, 11 reported an association.

Individual studies also assessed other factors; for example, one of four studies of social competence (Weintraub et al., 2019) found that this variable was significantly protective for burnout. A stronger sense of self-efficacy/self-assessed effectiveness was also found to be a protective factor (Gabbe et al., 2002; Lindeman et al., 2017; Smeds et al., 2019) in three of seven studies. The evidence is strongest for one of the studies of self-compassion (Kemper et al., 2020) that used a prospective design.

### Do Predictors Vary by Health Care Setting?

Studies varied in many aspects in addition to the setting. In addition, only a few studies included in this review were from VHA health care settings ( $n = 3$ ) and only one was from the military health care system, which makes it difficult to compare across predictors. The predictors that were examined in these settings included gender, perceived stigma, health behaviors, health conditions, and work environment. Across health care settings, findings were similar except for gender, and there were some similar patterns for health risks and health behaviors. With regard to the studies that addressed work environment, characteristics were consistent across civilian and military/VHA health care settings. Namely, greater flexibility of scheduling and job support (Mirvis, Graney, and Kilpatrick, 1999) were protective factors. Therefore, the evidence is far too limited to fully answer this question. One study looked at type of providers (including military personnel and veterans) but found no differences in burnout by provider type.

### Summary of Findings

Table 3.1 summarizes the results across studies. It is limited to risk factors that have been evaluated in more than one study.

**Table 3.1. Summary of Findings and Quality of Evidence**

<b>Risk Factors</b>	<b>Number of Studies and Citations</b>	<b>Reasons for Downgrading or Upgrading Quality</b>	<b>Findings</b>	<b>GRADE</b>
<b>Demographic characteristics</b>				
Gender	52 studies (Ahmed et al., 2020; Anandarajah, Quill and Privitera, 2018; Attenello et al., 2018; Baer et al., 2017; Campbell et al., 2010; Creager, Coutinho and Peterson, 2019; De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; De Oliveira et al., 2013; Del Carmen et al., 2019; Dyrbye et al., 2018; Dyrbye et al., 2013; Dyrbye et al., 2020; Elmore et al., 2016; Goldberg et al., 1996; Green-McKenzie et al., 2020; Gribben, Kase, et al., 2019; Hamm et al., 2020; Hillhouse, Adler and Walters, 2000; Hughes, Francis and Sciscione, 2019; Hyman et al., 2017; Kashani et al., 2015; Kimo Takayesu et al., 2014; Kuerer et al., 2007; Lapinski and Hassan, 2016; Levin et al., 2017; Lindeman et al., 2017; Melnick et al., 2020; Mirvis, Graney and Kilpatrick, 1999; O'Hara et al., 2020; Olson et al., 2019; Porter et al., 2018; Primack et al., 2010; Qureshi et al., 2015; Rabatin et al., 2016; Ramey et al., 2017; Rath et al., 2015; Robertson, Robinson and Reid, 2017; Roth et al., 2011; Shakir et al., 2020; Shanafelt, Balch, et al., 2009; Shanafelt, Gorringer, et al., 2015; Shanafelt et al., 2014; Shanafelt, Oreskovich, et al., 2012; Shanafelt, West, et al., 2009; Sheno et al., 2018; Smeds et al., 2019; Summers et al., 2019; Thrush et al., 2019; Wang et al., 2019; Weintraub et al., 2016; Zhang et al., 2019)	Inconsistency <ul style="list-style-type: none"> <li>Mixed findings across studies</li> <li>Twenty-one studies reported an association and 31 did not</li> <li>Of eight prospective studies, two found a negative association between burnout and being female, four found a positive association, and two found no association</li> </ul>	Women might be more likely to report burnout, but most studies do not find any association with gender	Low
Age	39 studies (Aggarwal et al., 2015; Attenello et al., 2018; Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Busis et al., 2017; Campbell et al., 2010; Creager, Coutinho and Peterson, 2019; De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; De Oliveira et al., 2013; Doolittle, 2020; Dyrbye et al., 2013; Dyrbye et al., 2020; Elmore et al., 2016; Gabbe et al., 2002; Goldberg et al., 1996; Green-McKenzie et al., 2020; Hyman et al., 2017; Kamal et al., 2016; Kashani et al., 2015; Kuerer et al.,	Inconsistency <ul style="list-style-type: none"> <li>Mixed findings across all studies</li> <li>Fifteen found a negative effect, four a positive effect, and 20 no association</li> <li>One prospective study found no association, one a negative effect, and one a positive effect</li> </ul>	Younger participants may be more likely to report burnout	Low

Risk Factors	Number of Studies and Citations	Reasons for Downgrading or Upgrading Quality	Findings	GRADE
Ethnicity	<p>2007; Lapinski and Hassan, 2016; Levin et al., 2017; Lindeman et al., 2017; Melnick et al., 2020; Mirvis, Graney and Kilpatrick, 1999; Olson et al., 2019; Primack et al., 2010; Qureshi et al., 2015; Rath et al., 2015; Shakir et al., 2020; Shanafelt, Balch, et al., 2009; Shanafelt, Gorringer, et al., 2015; Shanafelt et al., 2014; Shanafelt, West, et al., 2009; Shenoi et al., 2018; Somerson et al., 2020; Wang et al., 2019; Yasko, 1983)</p> <p>Ten studies (Aggarwal et al., 2015; Baer et al., 2017; Del Carmen et al., 2019; Dyrbye et al., 2018; Hamm et al., 2020; Kashani et al., 2015; O'Hara et al., 2020; Olson et al., 2019; Primack et al., 2010; Shakir et al., 2020)</p>	<p>Inconsistency, study limitation</p> <ul style="list-style-type: none"> <li>Only two studies found an effect</li> <li>One found lower burnout among Asians and one found a 3-percent burnout rate in Asians versus 30 percent in underrepresented minorities</li> <li>The two prospective studies found no effect)</li> </ul>	Ethnicity is likely not associated with burnout	Low
Children	<p>25 studies (Ahmed et al., 2020; Attenello et al., 2018; Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Cull et al., 2019; Doolittle, 2020; Dyrbye et al., 2013; Dyrbye et al., 2020; Gribben, Kase, et al., 2019; Kamal et al., 2016; Kuerer et al., 2007; Martini et al., 2004; Moore et al., 2019; O'Hara et al., 2020; Porter et al., 2018; Qureshi et al., 2015; Rath et al., 2015; Shakir et al., 2020; Shanafelt, Balch, et al., 2009; Shanafelt et al., 2014; Shenoi et al., 2018; Smeds et al., 2019; Wang et al., 2019; Yank et al., 2019; Yasko, 1983)</p>	<p>Inconsistency</p> <ul style="list-style-type: none"> <li>Only five studies found an association</li> <li>Of these, four found lower burnout among participants with children and one found higher burnout)</li> <li>Only one prospective study exists (which found a negative effect)</li> </ul>	Having children is likely not associated with burnout	Low
Marital status	<p>17 studies (Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Dyrbye et al., 2013; Dyrbye et al., 2020; Elmore et al., 2016; Goldberg et al., 1996; Kamal et al., 2016; Martini et al., 2004; Qureshi et al., 2015; Roth et al., 2011; Shakir et al., 2020; Shanafelt, Balch, et al., 2009; Shanafelt, West, et al., 2009; Shenoi et al., 2018; Smeds et al., 2019; Wang et al., 2019; Yasko, 1983)</p>	<p>Inconsistency</p> <ul style="list-style-type: none"> <li>Only two studies found an effect (negative association) and no prospective study reported on the outcome</li> </ul>	Marital status is likely not associated with burnout	Moderate



Risk Factors	Number of Studies and Citations	Reasons for Downgrading or Upgrading Quality	Findings	GRADE
<b>Professional and practice characteristics</b>				
Workload and job stress	45 studies (Ahmed et al., 2020; Allegra, Hall and Yothers, 2005; Anandarajah, Quill and Privitera, 2018; Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Blechter et al., 2018; Block et al., 2013; Busis et al., 2017; Campbell et al., 2010; Cull et al., 2019; De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; Del Carmen et al., 2019; Dyrbye et al., 2013; Dyrbye et al., 2020; Dyrbye, West, et al., 2011; Edwards et al., 2018; Elmore et al., 2016; Fargen et al., 2019; Gabbe et al., 2002; Green-McKenzie et al., 2020; Hillhouse, Adler and Walters, 2000; Hyman et al., 2017; Kamal et al., 2016; Kuerer et al., 2007; Levin et al., 2017; Marchalik, Brems, et al., 2019; Martini et al., 2004; McPhillips et al., 2007; Melnick et al., 2020; Moore et al., 2019; Ofei-Dodoo et al., 2019; Qureshi et al., 2015; Ramey et al., 2017; Rath et al., 2015; Shanafelt, Balch, et al., 2009; Shanafelt et al., 2002; Shanafelt et al., 2014; Shanafelt, Oreskovich, et al., 2012; Shanafelt, West, et al., 2009; Sliwa et al., 2019; Somerson et al., 2020; Wang et al., 2019; Yasko, 1983; Zhang et al., 2019)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>Twenty-two studies reported an association, 23 did not</li> <li>Similarly, two of four prospective studies reported an association and the others did not</li> <li>Studies used different operationalizations of workload</li> </ul>	Burnout may be associated with workload and job stress	Low
Years in practice	40 studies (Ahmed et al., 2020; Allegra, Hall and Yothers, 2005; Anandarajah, Quill and Privitera, 2018; Attenello et al., 2018; Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Blechter et al., 2018; De Oliveira, Ahmad, et al., 2011; De Oliveira et al., 2013; Del Carmen et al., 2019; Doolittle, 2020; Dyrbye et al., 2013; Elmore et al., 2016; Fargen et al., 2019; Gabbe et al., 2002; Goldberg et al., 1996; Hamm et al., 2020; Hughes, Francis and Sciscione, 2019; Kashani et al., 2015; Kuerer et al., 2007; Levin et al., 2017; Lindeman et al., 2017; Martini et al., 2004; McPhillips et al., 2007; O'Hara et al., 2020; Qureshi et al., 2015; Ramey et al., 2017; Rath et al., 2015; Rinne et al., 2020; Roth et al., 2011; Shakir et al., 2020; Shanafelt, Balch, et al., 2009; Shanafelt et al., 2014; Shenoi et al., 2018; Starmer, Frintner, and Freed, 2016; Thrush et al., 2019; Wang et al., 2019; Weintraub et al., 2016; Yasko, 1983; Zhang et al., 2019)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>Fifteen studies found an effect and 25 did not report associations</li> <li>Of these, ten reported more years was associated with less burnout, three reported that more years were associated with more burnout, and in two studies the direction was unclear</li> <li>Many studies compared first- and last-year residents</li> <li>Of four prospective studies, two found more years associated with less burnout, one found more years</li> </ul>	Years in practice may be negatively associated with burnout (fewer years in practice is associated with more reported burnout)	Low

Risk Factors	Number of Studies and Citations	Reasons for Downgrading or Upgrading Quality	Findings	GRADE
Specialty/ subspecialty	27 studies (Allegra, Hall and Yothers, 2005; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Busis et al., 2017; Creager, Coutinho and Peterson, 2019; De Oliveira Jr et al., 2011; Del Carmen et al., 2019; Dyrbye et al., 2018; Dyrbye et al., 2013; Dyrbye et al., 2020; Glover-Stief, Jannen and Cohn, 2020; Goldberg et al., 1996; Martini et al., 2004; Melnick et al., 2020; Moore et al., 2019; Olson et al., 2019; Qureshi et al., 2015; Rabatin et al., 2016; Shakir et al., 2018; Shanafelt, Balch, et al., 2009; Shanafelt, Boone, et al., 2012; Shanafelt, Gorringer, et al., 2015; Shanafelt, Oreskovich, et al., 2012; Shanafelt, West, et al., 2019; Shanafelt, West, et al., 2009; Summers et al., 2019; Tetzlaff et al., 2018; Yoon, Daley, et al., 2017)	associated with more burnout, one found no association  Inconsistency, study limitation <ul style="list-style-type: none"> <li>• Ten found an association with subspecialty and 17 found no effect</li> <li>• Difficult to assess</li> <li>• Of the three prospective studies, one compared different specialties and two found no effect</li> </ul>	Subspecialty may be associated with reported burnout (but which specialties are difficult to assess as studies assessed different specialties)	Very low
Practice setting	27 studies (Allegra, Hall and Yothers, 2005; Anandarajah, Quill and Privitera, 2018; Baer et al., 2017; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Blechter et al., 2018; Busis et al., 2017; Campbell et al., 2010; Creager, Coutinho and Peterson, 2019; Doolittle, 2020; Dyrbye et al., 2013; Dyrbye et al., 2020; Fargen et al., 2019; Green-McKenzie et al., 2020; Kamal et al., 2016; Kuerer et al., 2007; Melnick et al., 2020; Moore et al., 2019; Qureshi et al., 2015; Rath et al., 2015; Rinne et al., 2020; Robertson, Robinson and Reid, 2017; Shanafelt, Balch, et al., 2009; Shanafelt et al., 2014; Sheno et al., 2018; Yasko, 1983; Yoon, Daley, et al., 2017; Zhang et al., 2019)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>• Only five studies found a significant effect for burnout and 22 reported no association</li> <li>• Of two prospective studies, one reported rural and nonteaching practices were associated with higher burnout</li> <li>• Studies assessed different practice characteristics</li> </ul>	Practice setting is likely not associated with burnout	Low
Leadership support	16 studies (Aggarwal et al., 2015; Ahmed et al., 2020; Anandarajah, Quill and Privitera, 2018; Attenello et al., 2018; Del Carmen et al., 2019; Doolittle, 2020; Fargen et al., 2019; Gabbe et al., 2002; Glover-Stief, Jannen and Cohn, 2020; Hyman et al., 2017; Marchalik, Brems, et al., 2019; McPhillips et al., 2007; Olson et al., 2019; Shanafelt, Gorringer, et al., 2015; Smeds et al., 2019; Somerson et al., 2020)	Inconsistency <ul style="list-style-type: none"> <li>• Eleven studies found an association and five did not</li> <li>• The only prospective study reported no association</li> </ul>	Stronger leadership is associated with less burnout	Moderate

Risk Factors	Number of Studies and Citations	Reasons for Downgrading or Upgrading Quality	Findings	GRADE
Job autonomy	23 studies (Aggarwal et al., 2015; Attenello et al., 2018; Busis et al., 2017; Creager, Coutinho and Peterson, 2019; Cull et al., 2019; Cydulka and Korte, 2008; De Oliveira Jr et al., 2011; Del Carmen et al., 2019; Dyrbye et al., 2020; Gleason et al., 2020; Hyman et al., 2017; Kimo Takayesu et al., 2014; Kroth et al., 2019; Kuhn, Goldberg and Compton, 2009; Lindeman et al., 2017; Moore et al., 2019; Olson et al., 2019; Rabatin et al., 2016; Roth et al., 2011; Sliwa et al., 2019; Somerson et al., 2020; Starmer, Frintner, and Freed, 2016; Summers et al., 2019)	Inconsistency <ul style="list-style-type: none"> <li>Fourteen studies found an association and nine did not</li> <li>Where reported, more control reduced burnout</li> <li>Five of six prospective studies found an association and one did not</li> </ul>	Job autonomy is associated with less reported burnout	Moderate
Work/life balance	25 studies (Ahmed et al., 2020; Allegra, Hall and Yothers, 2005; Anandarajah, Quill and Privitera, 2018; Attenello et al., 2018; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Creager, Coutinho and Peterson, 2019; Cydulka and Korte, 2008; De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; Dyrbye et al., 2013; Dyrbye et al., 2020; Gabbe et al., 2002; Kemper et al., 2020; Kuhn, Goldberg and Compton, 2009; Levin et al., 2017; Marchalik, Brems, et al., 2019; McAbee et al., 2015; Moore et al., 2019; Ofei-Dodoo, Callaway and Engels, 2019; Porter et al., 2018; Rabatin et al., 2016; Ramey et al., 2017; Shanafelt, Oreskovich, et al., 2012; Shanafelt, West, et al., 2019; Somerson et al., 2020)	Inconsistency <ul style="list-style-type: none"> <li>Fifteen studies reported an association indicating adequate work/life balance is associated with less burnout and ten studies reported no association</li> <li>All three prospective studies reported an association indicating adequate work/life balance is associated with less burnout</li> </ul>	Inadequate work/life balance is associated with more burnout reporting	Moderate
Compensation method and reimbursement	Eight studies (Allegra, Hall and Yothers, 2005; Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Fargen et al., 2019; Moore et al., 2019; Qureshi et al., 2015; Rath et al., 2015; Shanafelt et al., 2009; Shanafelt et al., 2014)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>Three studies found an effect (one protective) and five found no effect</li> <li>No prospective study was identified</li> <li>Different operationalizations and unclear direction)</li> </ul>	Possibly no effect of compensation method on burnout but some inconsistency	Very low
Salary	Six studies (Aggarwal et al., 2015; Baer et al., 2017; Doolittle, 2020; Goldberg et al., 1996; Qureshi et al., 2015; Yasko, 1983)	Inconsistency <ul style="list-style-type: none"> <li>One study found an association and five did not</li> <li>No prospective study reported on the predictor</li> </ul>	Likely no effect of salary on burnout	Low

Risk Factors	Number of Studies and Citations	Reasons for Downgrading or Upgrading Quality	Findings	GRADE
<b>Psychological health factors</b>				
Depression	14 studies (Balch, Shanafelt, Sloan, Satele, and Freischlag, 2011; Campbell et al., 2010; De Oliveira et al., 2013; Firulescu et al., 2019; Janko and Smeds, 2019; Kuerer et al., 2007; Lapinski and Hassan, 2016; Lu et al., 2015; Ofei-Dodoo et al., 2019; Qureshi et al., 2015; Rath et al., 2015; Shanafelt et al., 2002; Smeds et al., 2019; Starmer, Frintner, and Freed, 2016)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>• Nine studies found an association and five studies found none</li> <li>• The only prospective study also showed an association</li> <li>• It is unclear whether studies addressed potential conceptual overlap</li> </ul>	Depression may be associated with burnout	Low
Anxiety	Five studies (Dyrbye et al., 2018; Firulescu et al., 2019; Janko and Smeds, 2019; Kuhn, Goldberg and Compton, 2009; Rath et al., 2015)	Consistency <ul style="list-style-type: none"> <li>• Three studies reported an association (including the only prospective study) and two did not</li> </ul>	Anxiety is likely associated with burnout	Moderate
<b>Health risks and health behavior factors</b>				
Physical health problems	Ten studies (Green-McKenzie et al., 2020; Gribben, Kase, et al., 2019; Gribben, MacLean, et al., 2019; Hyman et al., 2017; Kroth et al., 2019; Kuerer et al., 2007; Qureshi et al., 2015; Rath et al., 2015; Starmer, Frintner, and Freed, 2016; Weintraub et al., 2016)	Inconsistency, study limitations <ul style="list-style-type: none"> <li>• Six studies found an association and four did not</li> <li>• no prospective studies</li> </ul>	Physical health problems may be associated with burnout	Low
Substance use	Ten studies (De Oliveira et al., 2013; Doolittle, 2020; Goldberg et al., 1996; Hyman et al., 2017; Kuerer et al., 2007; Qureshi et al., 2015; Rath et al., 2015; Shanafelt et al., 2002; Shanafelt, Oreskovich, et al., 2012; Smeds et al., 2019)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>• Four positive effects, of which three address alcohol; six reported no effect</li> <li>• No prospective studies</li> </ul>	Substance abuse is probably not associated with burnout with the exception of alcohol use	Very low
Sleep	Eight studies (Baer et al., 2017; Cull et al., 2019; Goldberg et al., 1996; Hillhouse, Adler and Walters, 2000; Kemper et al., 2020; Lapinski and Hassan, 2016; Shanafelt et al., 2002; Starmer, Frintner, and Freed, 2016)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>• Five studies found an association and three did not</li> <li>• Of the three prospective studies, two found an association and one did not</li> <li>• It is unclear whether sleep quality is associated with burnout</li> </ul>	Lack of sleep may be associated with increased burnout	Low

<b>Risk Factors</b>	<b>Number of Studies and Citations</b>	<b>Reasons for Downgrading or Upgrading Quality</b>	<b>Findings</b>	<b>GRADE</b>
Exercise	Nine studies (Cull et al., 2019; Doolittle, 2020; Glover-Stief, Jannen and Cohn, 2020; Goldberg et al., 1996; Moore et al., 2019; Shanafelt, Oreskovich, et al., 2012; Shenoi et al., 2018; Starmer, Frintner, and Freed, 2016; Weintraub et al., 2016)	Inconsistency <ul style="list-style-type: none"> <li>• Four studies found a protective effect and five found no association</li> <li>• One prospective study found a protective effect</li> </ul>	Exercise may be negatively associated with burnout indicating a protective effect	Low
Mindfulness and meditation	Five studies (Braun et al., 2017; Glover-Stief, Jannen and Cohn, 2020; Kemper et al., 2020; Olson, Kemper and Mahan, 2015; Weintraub et al., 2016)	Inconsistency <ul style="list-style-type: none"> <li>• Three studies found an association and two did not</li> <li>• Of the two prospective studies, one reported an association and one did not</li> </ul>	Mindfulness may be negatively associated with burnout indicating a protective effect	Low
<b>Psychosocial variables</b>				
Perceived control	14 studies (Aggarwal et al., 2015; Attenello et al., 2018; Creager, Coutinho and Peterson, 2019; Cydulka and Korte, 2008; De Oliveira Jr et al., 2011; Del Carmen et al., 2019; Dyrbye et al., 2020; Hyman et al., 2017; Kroth et al., 2019; Moore et al., 2019; Olson et al., 2019; Rabatin et al., 2016; Roth et al., 2011; Sliwa et al., 2019)	Inconsistency, study limitations <ul style="list-style-type: none"> <li>• Seven studies reported an association, with six showing a protective effect and one unclear</li> <li>• Seven studies reported no association; Three of four prospective studies reported an association</li> <li>• Studies did not address conceptual overlap</li> </ul>	Perceived control may be negatively associated with burnout indicating a protective effect	Low
Coping	Seven studies (Doolittle, 2020; Gabbe et al., 2002; Gribben, Kase, et al., 2019; Gribben, MacLean, et al., 2019; Hyman et al., 2017; Kroth et al., 2019; Shanafelt et al., 2002)	Inconsistency, study limitation <ul style="list-style-type: none"> <li>• Two studies reported a protective effect and five reported no association</li> <li>• No prospective study was identified</li> </ul>	Cannot say with certainty whether coping has a protective effect	Very low
Social support	20 studies (Aggarwal et al., 2015; Anandarajah, Quill and Privitera, 2018; Attenello et al., 2018; Cull et al., 2019; De Oliveira, Ahmad, et al., 2011; De Oliveira, Almeida, et al., 2011; Dyrbye et al., 2018; Gabbe et al., 2002; Gleason et al., 2020; Glover-Stief, Jannen and Cohn, 2020; Green-McKenzie et al., 2020; Hyman et al., 2017; Janko and	Inconsistency <ul style="list-style-type: none"> <li>• Eleven studies reported a protective effect and nine did not</li> <li>• Of five prospective studies, two reported an association and three did not</li> </ul>	Social support may be negatively associated with burnout, indicating a protective effect	Moderate

Risk Factors	Number of Studies and Citations	Reasons for Downgrading or Upgrading Quality	Findings	GRADE
	Smeds, 2019; Kemper et al., 2020; Lindeman et al., 2017; McPhillips et al., 2007; Mirvis, Graney and Kilpatrick, 1999; Smeds et al., 2019; Starmer, Frintner, and Freed, 2016; Yasko, 1983)			

We downgraded the quality of evidence for study limitation (e.g., all studies have a high risk of bias or the result has not been confirmed in a prospective study) or inconsistency (inconsistent results across studies regarding an association, regarding the direction of effect, or both); in both cases, the evidence grade could be downgraded by one or two.

Results for all individual studies are documented in the evidence tables in the appendix.

## **Review D: What Are the Characteristics and Contexts of Successful Burnout Interventions Applied to Military Health Care Professionals?**

This rapid review is meant to serve as a resource that shows existing evidence and that may inspire the development of new approaches. Hence, inclusion criteria were not limited by study design, type of health care professional, type of intervention, comparator, or type of outcome. We included U.S. studies, English-language articles that described studies conducted outside the United States; and studies that included descriptive or confirmatory findings evaluated with concurrent or historic comparators. We identified 15 studies meeting the inclusion criteria (Adams et al., 2010; Benight, 2016; Bronson, 2018; Christiansen et al., 2017; Clarke-Walper et al., 2020; Duncan et al., 2011; Kang, 2016; Kearney et al., 2018; Kubát, 2016; Leary et al., 2018; Meredith et al., 2018; Rollins et al., 2016; Villasenor, 2016; Weidlich and Ugarriza, 2015; Wood et al., 2017).

Participants were generally convenience samples composed of volunteers. In the majority of cases, participants included mixed health care professionals and occasionally administrators. In some studies, military or VHA settings were mixed with community settings. Most of the interventions focused on the individual (as opposed to an organization); however, of the 15, one was a practice redesign study and one was a leadership mentoring study. There were three randomized controlled trials, but most studies had a pre-post design. Two studies were post-only evaluations that reported on program acceptability measures or on questions that incorporated pre-post time frames in the question text. Publication years ranged from 2010 to 2019. Intervention duration was variable, ranging from one to two hours to the practice redesign study that was ongoing from 2011 to 2016. Outcome measures also varied among studies. For example, burnout was assessed with the MBI, the OLBI, the VHA survey of mental health providers, and the ProQOL. For some studies, total scores were reported; in other studies, only subscales were reported. Most interventions were pilot studies, and little information on sustainability of the intervention was reported. Table A.3 summarizes the approaches used in the 15 included studies.

### ***Overview of Approaches***

Thirteen studies focused on the individual level (i.e., to directly enhance an individual's sense of well-being and performance at work). These studies addressed work-life balance, enhancing personal resources (e.g., resilience training), and education about burnout and its

components and compassion fatigue. Approaches included combinations of the following: relaxation techniques, increasing self-awareness, meditation, biofeedback, guided imagery, zero-balancing, acupuncture, mantra repetition, tai chi, journaling, and cognitive behavioral therapy. Methods of delivery also varied and consisted of internet only; internet or software with face-to-face meetings, live-meeting technology, or telephone conferences for coaching; in-person classes or sessions with assignments; and a wellness clinic that could be attended as often as schedules allowed. Two of these studies involved programs, and one study involved PTSD Clinicians Exchange web-based program.

Although some of these individual-focused studies included team building exercises, there were only two studies that were primarily focused on the organizational level (i.e., making changes to the organizational structure to enhance workplace performance and satisfaction). One addressed developing evidence-based quality improvement innovations for medical home implementation challenges, with some directed also at quality improvement enhancing provider and staff morale. The other addressed training of mental health leaders and assessed the impact on mental health providers working for those leaders.

#### Interventions with Focus on the Individual

The earliest study included in this review described the U.S. Army Professional Provider Resiliency Training (PPRT) program to combat fatigue and burnout (Adams et al., 2010). Participants came from a convenience sample of 172 out of 210 volunteer medical professionals who took the PPRT course and consisted of both civilian and military personnel. The medical professionals included physicians, nurses, behavioral health clinicians, administrators, and other enlisted personnel. The intervention consisted of training on mind-body techniques, including deep breathing, journaling, tai chi, meditation, guided imagery, and biofeedback. Acceptability measures were assessed at the conclusion of the training program. The program was valued by almost all participants: 100 percent of doctors, 98 percent of nurses, 90 percent of behavioral health providers, and 100 percent of other professionals. Program components that were found to be helpful by the greatest number of participants were deep breathing (95 percent), tai chi (86 percent), and guided imagery (85 percent). After the training, 90 percent of participants reported being “more mindful of their personal resiliency,” 92 percent reported “thinking more about conducting self-assessments,” and 93 percent “reported thoughts of developing a self-care plan.” Almost all (96 percent) planned to use learned techniques in the future. The authors suggested that the study was “not generalizable” and that additional more-stringent studies were needed.

The PPRT, renamed the Care Provider Support Program (CPSP) in 2011, was later studied in military and civilian registered nurses, licensed practical nurses, and medics assigned to an Army Medical Center (Weidlich and Ugarriza, 2015). In this pilot study, a convenience sample of 93 respondents completed baseline surveys and, of these, 28 completed follow-up surveys. Training duration was 1 to 2 hours and follow-up was 30 days after training. The goal of this program was to teach providers to educate themselves about compassion fatigue, assess their own personal



level of compassion fatigue, and then take action. No action measures other than assessment with the Ways of Coping Questionnaire (WCQ) were reported. The intervention consisted of discussion groups, interactive participation, and education on stress and resilience. Nurses and medics scheduled to take CPSP training between February and June 2013 were recruited for the study. Outcome measures included the Connor-Davidson Resilience Scale (CD-RISC), the WCQ, and ProQOL. The burnout subscale of the ProQOL indicated that burnout was significantly lower at follow-up than at baseline ( $p < 0.001$ ). No significant difference was found in the total coping score measured by the WCQ; however, one component of the WCQ, positive reappraisal, showed a statistically significant change over time.

A free mobile application of the Provider Resilience program (the PR app) was studied in psychiatrists, psychologists, social workers, psychiatric nurses, and other mental health professionals from the VHA Puget Sound Health Care System (Wood et al., 2017). Of 32 outpatient mental health professionals who signed up for the pilot study to investigate the usability, acceptability, and effectiveness of the PR app, 30 completed surveys at baseline and after one month of app use. The PR app was developed by the National Center for Telehealth and Technology to reduce provider burnout. It consisted of two assessment tools—customizable factors that were intended to encourage users to be aware of factors that increase and decrease resilience—and tools to enhance resilience and reduce burnout. Participants downloaded the app on their personal cell phones and were asked to use it regularly. A brief tutorial on how to use the app was provided. Of the 30 participants who completed the study, 40 percent used it once or twice per week; 33 percent used it two to four times per week; and 27 percent used it daily. Outcomes were measured with the ProQOL-Revision IV, the Outcome Questionnaire 45, and the CD-RISC scale at baseline and after one month of use. The System Usability Scale and Provider Resilience Questionnaire were used after one month of app use. Participants gave the PR app an overall score of 79.7 on the System Usability Scale (i.e., in the top quartile for usability). The ProQOL indicated statistically significant decreases on the burnout ( $p < 0.001$ ) and compassion fatigue ( $p < 0.001$ ) subscales. The authors suggested that future studies use a larger sample size, a control group design, and more significant levels and other measures of burnout.

The PTSD Clinicians Exchange web-based program was studied in an RCT to determine if voluntary use of a website could significantly reduce burnout among military behavioral health professionals; the website provided resources for best practices for PTSD care; a Clinicians' Corner, where clinicians could interact with one another; and self-care resources, including ways to assess burnout (Clarke-Walper et al., 2020). Social workers, psychologists, professional mental health counselors, and medical professionals with a psychiatric focus from the Department of Veterans Affairs, the Department of Defense, and the general community were recruited by email and by relevant online message boards to participate. Of the 1,453 clinicians who responded, 752 consented to participate, and 605 completed the baseline surveys. Participants were surveyed again at six and at 12 months following the baseline surveys. Using a ten-item subscale from the ProQOL-5, there were no significant differences between intervention

and control groups after 12 months, and burnout scores remained stable throughout the study period. The authors noted that a limitation of the study was the low number of participants that accessed the website.

The Support Net Intervention study, a RCT, investigated the effectiveness of a social media web-based self-care program with one-on-one peer telephonic coaching in comparison to the web-based program alone (Benight, 2016). Military mental health professionals located at U.S. military installations worldwide and mental health professionals living near U.S. military installations and listed as Tricare insurance providers were recruited for the program by email and phone with a follow-up contact. Of the 1,720 individuals solicited, 101 responded and 64 met inclusion criteria. Participants included psychiatrists, medical doctors, physician assistants, psychologists, social workers, psychotherapists, and marriage and family therapists. The Support Net Intervention had three experimental branches: (1) peer coaching with the web-based program, (2) a delayed start of eight weeks to peer coaching plus the web-based program, and (3) the web-based program only. Measurements were done preintervention, postintervention, and at follow-up. The intervention itself lasted eight weeks, and the follow-up was two months after the intervention ended.

The Support Net Intervention consisted of six telephonic peer coaching sessions. These were awareness of burnout and secondary traumatic stress; setting goals and considering challenges; obstacles faced in achieving goals; awareness of satisfaction and self-care status; promotion of social support; and consolidation of new skills and changes to empower participants to continue forward. The total time for telephonic peer coaching was 3.5 hours (60 minutes for the first session and 30 minutes for each of the other five sessions). The authors described the intervention as “easy to implement.” The peer coaching was coordinated with the existing web-based self-care program, and there was a prepared manual for each of the six coaching sessions that included the goals for each session.

Outcomes in the Support Net program were measured using the OLBI, which assessed EE and behavioral disengagement from work. Intention-to-treat and completer samples were analyzed. In the intention-to-treat sample, for the coached/web plus the delayed coached/web groups, EE was significantly lower at post-test and at followup than at pre-test. There was no improvement in the web-only group, which supported the hypothesis that the web-based program plus coaching was more effective than the web-based program alone. In the completer sample, the groups that received coaching and delayed coaching had significantly lower overall burnout and EE at post-test and at followup than at pre-test. Again, there was no improvement in the web-only group. The authors suggested that replication of results was the next step.

The Mantram Repetition program also combined an internet-based program with telehealth (i.e., telephone calls and live meeting technology) to reduce stress and burnout (Leary et al., 2018). Participants were health care workers from VHA facilities who provided direct patient care. They were volunteers in the study and were recruited using flyers and emails. Fifty-four enrolled and completed baseline surveys; of these, 39 completed the program. The intervention

consisted of six 50-minute classes given every other week over a three-month period. Participants were assessed at baseline, immediately postintervention, and three months after the intervention was completed. Class topics were (1) introduction to Mantram Repetition; (2) how to choose, use, and track Mantram practice; (3) the stress response and Mantram Repetition; (4) slowing down; (5) one-pointed attention; and (6) putting it all together. Classes consisted of lectures, PowerPoints, and discussions on “live meeting technology” and telephone conference calls. Participants were given examples of when and where to practice with tools, a downloadable manual, and a course textbook. Outcomes were assessed with the MBI and the Science of Conscience Questionnaire for the entire sample and for the participants who did not practice meditation at baseline ( $n = 16$ , 41 percent). For the entire sample, EE (considered a core component of burnout on the MBI) significantly decreased between baseline and follow-up ( $p < 0.05$ ); however, professional efficacy and cynicism (two other components of the MBI) did not change. The frequency of stressful events initially significantly decreased and troubled conscience decreased. For participants who did not practice meditation at baseline, EE, frequency of stressful events, and troubled conscience all decreased significantly. Professional efficacy improved initially. The authors suggested that results be interpreted cautiously because of small sample size, lack of control group, and lack of assessment of whether alternative types of meditation were also being used.

An abbreviated version of Jon Kabat-Zinn’s eight-week Mindfulness-Based Stress Reduction Program was studied in nurses working in high-intensity environments at a Veterans Administration (VA) medical center in the southeastern U.S. (Bronson, 2018). This was a pilot program conducted as part of the requirements for a doctoral degree in nursing. Approximately 80 registered nurses from inpatient psychiatry, the intensive care unit, urgent care and emergency departments, and outpatient psychiatry were invited to learn about the program. Twenty were recruited, and 18 completed pre- and postintervention surveys. The intervention lasted four weeks and combined face-to-face meetings with project personnel and use of mindfulness application software. During the first week, project personnel and participants met face-to-face and participants completed the preintervention surveys, were given an introduction to mindfulness concepts, and downloaded the mindfulness software program. During the second week, participants used the software 15 minutes per day and, at the end of the week, had a face-to-face meeting with project personnel to discuss progress and experiences. During the third and fourth weeks, participants continued using the software and recording their experiences. At the end of the fourth week, they met face-to-face with project personnel to discuss their progress and experiences and to complete the postintervention surveys. To facilitate use of the software, participants were given an “insight timer” to help keep track of the daily 15-minute sessions. Outcomes were measured using the MBI Human Services Scale-Medical Personnel, the Mindful Self-Care Scale, and the Perceived Stress Scale. The authors reported that “Upon completion of the [four]-week project, nurses reported improvement in burnout and stress, as well as increased acts of self-care.” Means and standard deviations, but no significance tests, were reported.

The BREATHE (Burnout Reduction: Enhance Awareness, Tools, Handouts, Education) program was studied in three VHA medical centers and two community social service agencies providing behavioral health care services in three U.S. midwestern cities (Rollins et al., 2016). The study, an RCT, investigated the comparative effectiveness of the BREATHE program in comparison to a control intervention (i.e., a daylong workshop on person-centered treatment planning). The BREATHE intervention, a daylong workshop, aimed to enhance providers' personal resources and used a "relapse-prevention framework" to help participants identify precursors of burnout and to introduce wellness strategies. Wellness strategies included cognitive-behavioral techniques (e.g., deep breathing, cognitive restructuring); contemplative practices (e.g., mindfulness meditation, imagery, yoga); approaches for enhancing social support (e.g., communication, managing conflicts); education about physical wellness (e.g., sleep, exercise) and time management (e.g., setting boundaries). The intervention was delivered by two psychologists with experience in cognitive-behavioral techniques and mindfulness. The control program was also delivered by a trained psychologist. Participants were recruited with brochures distributed during routine meetings, placed in mailboxes, and by email. Recruitment and workshops occurred in two waves over a period of ten months. Participant surveys were completed at baseline and at six weeks and six months following the workshops. Participants also received a workbook for developing a self-care plan.

Outcomes in the BREATHE study were assessed using the MBI, the ten-item Provider Expectations Scale, five satisfaction items from the Job Diagnostic Survey, and self-report questions addressing turnover intentions, sick time used, vacation time used, and work-life balance. No significant differences between intervention and control groups were identified for any outcome. However, BREATHE participants appeared to have lower scores on the MBI EE subscale ( $p = 0.03$ ) and higher positive views of clients ( $p = 0.05$ ) at six months when compared with baseline. The MBI EE subscale is often used as a proxy for total burnout. They also reported lower scores on the MBI Cynicism subscale ( $p = 0.04$ ) at six weeks when compared with baseline. No other significant differences (including for turnover intentions, work absences, and work-life balance) were found for BREATHE participants and no significant differences were found for the control participants. The authors suggested some strategies for strengthening the intervention in future studies, such as offering booster sessions, targeting the most distressed workers, and incorporating burnout reduction at the organizational level.

A Restore and Renew Wellness Clinic (RR-WC) supplying complementary and alternative medicine was studied in health care personnel at a DoD hospital (Duncan et al., 2011). Participants in this pilot program included physicians, nurses, clinical supervisors, therapists, medical technicians, administrative assistants, and housekeeping personnel. Participants could visit as often as their schedules allowed and they could choose the intervention they wanted at each visit. The clinic was open one day per week from 8 a.m. to 2 p.m. Surveys were administered after each visit assessing short-term benefits and perceived benefits over time. Over one year, there were 2,756 self-report surveys in the database. Of these, 1,010 visits were for

first-time participants; 521 participants attended the clinic for additional visits, and 300 participants visited over 12 times. Just over 50 percent of DoD beneficiaries participated. The clinic reported that it provided a calm, healing environment with support to practice mindfulness; ear acupuncture; clinical acupressure; and zero-balancing; its methods combined Western concepts of osteopathic medicine with Eastern principles of energy and healing. Participants were solicited through flyers, email, and word-of-mouth. The authors concluded that the clinic was feasible and well-utilized.

RR-WC visits were also evaluated positively by participants. Participants agreed or strongly agreed that they felt more relaxed after the sessions (98 percent of surveys), had less stress (95 percent of surveys), had more energy (84 percent of surveys), and had less pain (79 percent of surveys). They also reported that they would recommend the clinic to a coworker (97 percent of surveys). Among surveys completed after five or more visits, participants strongly agreed that they experienced increased compassion for patients, better sleep, improved mood, and more ease in relations with coworkers (59 to 85 percent of surveys) over time. The authors concluded that “[p]erceived benefits were sustained and enhanced by number of visits.”

The Compassion Cultivation Training (CCT) program, designed to increase mindfulness and compassion satisfaction and to reduce compassion fatigue and burnout, was studied in health care professionals working with veterans at a Veterans Center in Modesto, California (Villasenor, 2016). This study was a pilot program completed in partial fulfillment for a masters degree in social work. Participants consisted of social workers and administrative staff who volunteered for the program after attending a CCT informational meeting. Quantitative survey data were collected at baseline and when the CCT ended. Qualitative data were collected on the last day of the CCT using a participant focus group and at seven months after CCT completion using individual interviews. Twelve participants completed baseline surveys, six completed postprogram surveys and participated in the focus group, and nine were interviewed at the seven-month follow-up time. The intervention consisted of weekly two-hour classes over an eight-week period. Assignments included daily compassion-focused meditation practices, readings, and informative videos. Meditation exercises were also incorporated into the class time. Outcomes were assessed using the Five Facet Mindfulness Questionnaire, the Self-Compassion Scale, and the ProQOL. There were no statistically significant changes over time in mindfulness, self-compassion, burnout, secondary traumatic stress, or compassion fatigue scores. Four major themes were identified based on the qualitative data. These included an increase in mindfulness practices; skills learned that allowed participants to be more aware of expressed compassion; increased awareness of burnout and its possible impact on clients and themselves; and increased understanding of how the CCT program reduced the negative impact of working with clients’ recollections of traumatic events.

The Burn Progressive Care Unit at the U.S. Army Burn Center developed a mandatory staff development pilot program that integrated education with team building and resiliency training (Christiansen et al., 2017). Participants included civilian and military registered nurses, licensed

vocational nurses, and certified nurses' aides. All nursing staff were offered the training day and 46 of 48 staff members participated. Participants were told to wear business casual attire or jeans with nursing-related shirts to make the distinction between military and civilian personnel less apparent. The training lasted eight hours. Classes were provided by guest speakers and lecturers and by unit leadership. Educational topics included Joint Commission preparedness; a telemetry refresher; burn reconstruction; the nursing workload management system; a "What's Up" session that addressed unit metrics, patient safety events, documentation, and infection control standards; and a Q&A with the chief nurse. Team building included such activities as a casual bowling event, playing a computer simulation game, meditation, and other activities. The participants were divided into three teams. During the first training session, teams participated on Monday, Wednesday, or Friday of the same week; day and night teams overlapped by four hours. During the second training session, teams participated on one of three consecutive Wednesdays, and day and night teams met together. Participants completed a survey at the end of the training day. All activities were rated highly with a mean of 9.15  $\pm$  0.26 out of ten for the first session and a mean of 9.36  $\pm$  0.13 for the second session. Overall, participants agreed that training "increased awareness of unit performance (9.41  $\pm$  0.83) and unit cohesion/healthy work environment (9.56  $\pm$  0.71)."

A yoga-based stress reduction program at an active U.S. Army outpatient health clinic in Wiesbaden, Germany studied the impact of yoga on health care professionals (Kang, 2016). This program was completed in partial fulfillment of a doctoral degree in nursing. Staff members included both civilian and military active duty medics, nurse practitioners, physician assistants, physicians, registered nurses, social workers, pharmacists, therapists, and ancillary health care personnel. Of 80 invited staff members, 36 were recruited and filled out baseline surveys; of these, 29 completed the yoga program and filled out surveys after one month of yoga training. The intervention consisted of eight free one-hour yoga classes delivered two times per week for four weeks. The project leader introduced the program purpose, goals, and process at morning huddles and by email. Resources included use of the clinic and conference rooms during the noon hour. The same yoga instructor volunteered her time for all eight classes. The authors noted that ten staff members were still taking the weekly classes at one month following completion of the study. Outcomes were assessed using the Perceived Stress Scale. There was a significant decrease in the mean Perceived Stress Scale score from Time 1 (baseline) (mean = 16.00, standard deviation = 5.02) to Time 2 (four weeks) (mean=11.00, standard deviation = 5.16),  $p < 0.0001$ .

A yoga-based stress reduction pilot program at a military hospital in the Czech Republic also studied the impact of yoga on work-related stress in health care professionals (Kubát, 2016). Participants included physicians, nurses, and an administrator. Of 450 staff members, 36 volunteered, but only 13 completed the program. The intervention consisted of one 90-minute lesson at the workplace per week over 12 weeks to reduce job-related stress and improve flexibility and mobility. Each lesson included an opening relaxation exercise, a short breathing

exercise, a preparatory exercise, multiple yoga poses, and a closing relaxation exercise. Outcomes were assessed using the N-5 questionnaire (for rating neurasthenia and vegetative, depressive, and anxious disorders) and the Oswestry Disability Index (ODI) (for rating disability related to back pain). It is important to note that neurasthenia has been likened to and used synonymously with burnout (as described in Review A). There was a significant ( $p < 0.001$ ) decrease in the mean N-5 score from baseline, “severe neurotic tendencies” (20.1), to the end of the intervention, “normal state” (8.2). There was also a statistically significant drop in the ODI score.

### Interventions with Focus on the Organization

There were two studies that were focused at the organizational level. The VHA National Mental Health Leadership Mentoring Program, designed to enhance skills in mental health leaders, was studied in VHA mental health chiefs or deputy chiefs, mental health discipline leads (e.g., psychology, psychiatry, social work), and nurses with less than two years of experience (Kearney et al., 2018). Participants included mentees and mentors. Potential participants were identified using marketing techniques via emails and national calls; 31 mentees and 24 mentors were recruited. Mentors and mentees were matched based on mentee needs. This was based on a 360-degree evaluation that assessed communication, interpersonal effectiveness, critical thinking, organizational stewardship, customer and veteran focus, personal mastery, leading people, building coalitions, leading change, driving results, global perspective, and business acumen.

The mentoring program intervention consisted of five modules: strategic planning, human resources, system understanding, administrative operations and program evaluation, and professional and personal development. Each module had subcomponents consisting of prework materials (e.g., readings, presentations, data dashboards), discussion points, and assignments. The learning plan was flexible for each mentee-mentor pair. The pairs met for one to two hours per month to review pre-work materials, monthly assignments, modify the learning plan, and assess progress. Implementation was initiated by a five-member experienced mentoring workgroup that developed the modules and provided an initial mentor overview presentation to review timelines, resources, requirements, and to answer questions about how to manage challenges. Resources for mentors and mentees were also available through a web-based platform.

Outcomes were assessed in the mentees and mentors, and in the mental health providers led by the mentees. For the mental health providers, baseline data were collected in 2014 and intervention data were collected in 2015. The authors used data collected in the annually administered VHA survey of mental health providers which contained two questions, each with a five-point scale, that were averaged to assess job satisfaction and burnout. In facilities with a mentee as a leader, there was improvement in the job satisfaction-burnout score of the mental health providers: 3.56 to 3.85 ( $p = 0.015$ ). For the mentees, the authors used the VHA Mental

Health Leadership Skills Self-Assessment Tool and rated their level of confidence as mental health leaders. Data were collected at baseline and at the conclusion of the intervention. Also at the conclusion, mentors and mentees were asked open-ended questions about program acceptability. Statistically significant improvement was found across all five skill areas for mentees. In addition, both mentors and mentees were highly satisfied with the Mentoring Program's outcomes and all other aspects of the program. The authors stated that the program had been expanded to address additional areas of need, such as improving access, streamlining clinic efficiencies, and expanding quality oversight. They also stated that further expansion was desired.

A VHA Evidence-Based Quality Improvement Program, designed to facilitate primary care medical home transformation, was studied to determine the impact of the program on health care staff morale and job satisfaction (Meredith et al., 2018). Participants included physicians, physician assistants, nurse practitioners, mental health professionals, social workers, nurses, case/care managers, health educators, health technicians, medical assistants, dietitians/nutritionists, and pharmacists. There were 356 primary care employees (of which 107 were primary care providers) from 23 primary care practices (of which six received the intervention) within one VHA region. Trainees were excluded. A longitudinal quasiexperimental design was used to compare practices participating in and not participating in evidence-based quality improvement in implementing the medical home model. Three of the six intervention practices began the quality improvement process in 2011 (early), and three began in 2012 (late). In this study, evidence-based quality improvement-engaged practices created quality councils and workgroups to develop innovations for implementation. Providers or staff submitted brief proposals that were reviewed by the quality council or site workgroup. Regional leaders set quality improvement priorities. Approved projects received responsive evidence reviews and budgets. Volunteer projects were also undertaken. The multilevel, interdisciplinary approach engaged and empowered front-line primary care employees and connected them with local and regional health care leaders. There were 26 approved innovations addressing medical home implementation challenges; of these, six were specifically aimed at improving provider and staff morale. There were three waves of surveys administered; these occurred at baseline and at 20 and 42 months after baseline. Overall response rates were 63 percent at baseline and 48 percent at each of the two follow-up periods.

Outcomes in the study were assessed using the EE subscale (which, as noted, is often used as a proxy for burnout) of the MBI and one question addressing job satisfaction. Controlling for practice and primary care provider or staff characteristics, from wave one to wave three, EE (MBI EE scale) increased by five points for primary care providers in the comparison practices ( $p = 0.024$ ). From wave one to wave three, relative to the comparison practices, EE scores decreased by 1.4 points for providers in the early evidence-based quality improvement practices (not significant) and by 6.8 points ( $p = 0.039$ ) in the late adopting practices. There were no significant changes for staff in the EE scores. For job satisfaction, from wave one to wave three,



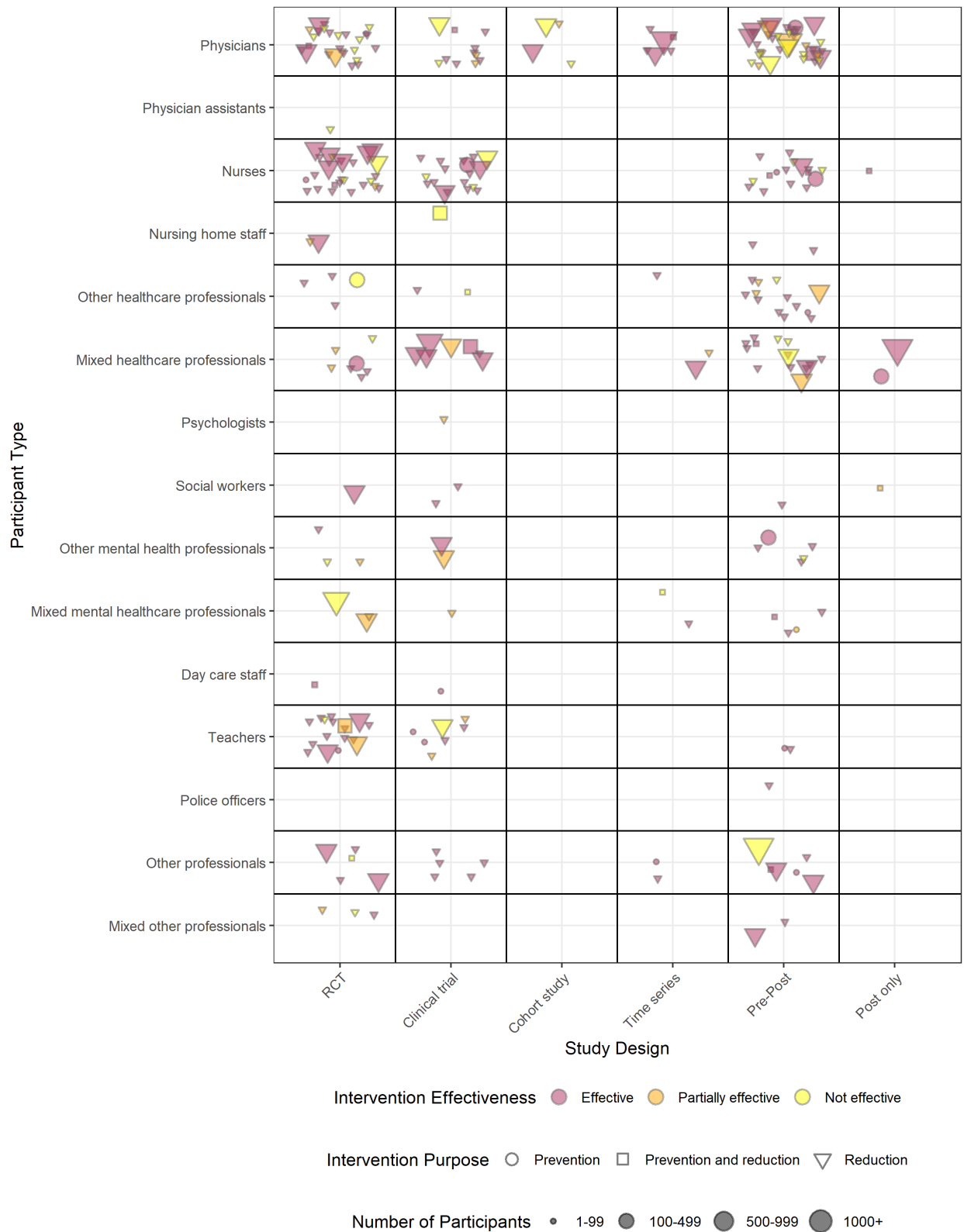
staff scores were significantly lower by 0.39 points ( $p = 0.008$ ) and there were no significant changes for staff in early or late quality improvement adopting practices. There were no significant changes in job satisfaction scores for primary care providers. Among covariates, age was the only factor significantly associated with EE scores (i.e., older primary care providers had lower EE scores [ $p = 0.039$ ]) and male primary care providers had higher job satisfaction ( $p = 0.037$ ).

## Review E: Which Burnout Interventions Have Been Evaluated in Research Studies?

We identified 282 evaluations of workplace interventions to prevent or reduce burnout. The evidence base for these interventions is presented in a bubble plot. Each included study is represented by a bubble in Figure 3.8. The size of the bubble is indicative of the size of the study. The shape of the bubble indicates whether the intervention was primarily aimed at preventing or at treating burnout or aimed to do both. The  $x$ -axis of the bubble plot shows the study designs employed to evaluate the intervention. The  $y$ -axis depicts the professional groups included in the research studies. All studies are documented in detail in Table A.1.

The following section provides a broad overview of high-level findings as a means of outlining the landscape of the evidence base of interventions to mitigate burnout.

**Figure 3.8. Evidence Map of Interventions**



## *Intervention Aim*

The vast majority of interventions focused on reducing rather than preventing burnout. Seventeen interventions were aimed at both preventing and reducing burnout.

Interventions to reduce burnout were highly variable in their approach. Individual-based interventions ranged significantly, including clinical psychological approaches such as acceptance and commitment therapy (Hosseinaei et al., 2013), mindfulness training (including awareness of modified “virtues,” such as temperance, sincerity, moderation, and humility) (Clemons et al., 2019), peer support groups, physical activity (including yoga), nutritional supplements, mindfulness training, music imagery (Brooks et al., 2010), and art therapy (Kaimal et al., 2019). There were also several instances of organizational-level interventions, including limiting work hours (Auger et al., 2012; Martini, Arfken, and Balon, 2006), providing support staff (e.g., medical scribes for physicians) (Pozdnyakova et al., 2018), extended sabbaticals (Kang, Kim, and Lee, 2010), mandated work breaks (Cordoza et al., 2018), and protected nonclinical time for physicians (Stevens, Davey, and Lassig, 2020).

The few interventions targeting prevention mirrored those to reduce burnout, including yoga and mindfulness (Harris et al., 2016), psychocognitive approaches (Kravits et al., 2010), peer support sessions (Peterson et al., 2008), physician empowerment programs (Maza et al., 2016), and alternative medicine approaches (e.g., reiki therapy) (Diaz-Rodriguez et al., 2011). Organizational-level approaches included the addition of a workload and productivity dashboard (Trinh et al., 2019), the addition of clinical supervision (Koivu, Saarinen, and Hyrkas, 2012), and implementing Schwartz rounds, a form of “grand rounds” in which the emotional impact of patient care on the care team is explored (Allen et al., 2020). Interventions aiming to both prevent and reduce burnout also incorporated several approaches, including yoga (Kubát, 2016), a resilience app (Wood et al., 2017), and mentoring from experienced colleagues (Gabbe et al., 2008).

As is apparent within the evidence map, the overwhelming majority of interventions were conducted across several types of health care professionals within health care settings ( $n = 229$ ). Several other interventions addressed burnout among the helping professions, (i.e., professions that provide personal services to aid others’ growth, health, development, and well-being). These include teachers, social workers, nursing home staff, day care staff, police officers, and clergy members. Seldom were interventions performed among non-human service professions, such as telecommunications professionals.

Interventions have been implemented across several continents and a variety of countries and health care systems, including for Italian intensive care units (Giannini et al., 2013), hospital nurses in Iran (Bagheri, 2019; Darban, 2016; Jahangard, 2019; Karimi, 2019; Norouzinia, 2017; Yektatalab, 2020), employees at insurances companies in Poland (Jaworska-Burzynska et al., 2017) and Taiwan (Tsai et al., 2013), teachers in South Africa (Johnson and Naidoo, 2013), and pastoral care workers in Australia (Stebbins et al., 2010). Despite wide geographic variation, half

of the interventions have been tested in U.S.-based populations ( $n = 136$ ).

### *Study Design and Study Size*

The majority of interventions were assessed using a pre-post study design ( $n = 103$ ). However, there were also 98 RCTs within the evidence base, 73 of which targeted mixed health care professionals. Interventions also employed a nonrandomized clinical trial designs ( $n = 58$ ); the remaining interventions used pre-post designs, including 12 time series. Study sizes ranged widely from three participants in a time series stress recovery intervention among office workers (Almén, Lisspers, and Öst, 2020) to a pre-post intervention that focused on external and internal reorganizations, educational training days, and consultancy among 1,024 human service workers (Andersen et al., 2010). The majority of interventions, however, were tested among modest sample sizes ( $n < 100$ ).

### *Effectiveness*

Despite considerable heterogeneity in the approaches, most interventions ( $n = 195$ ) were reported as effective. Only about 15 percent of interventions were determined to be ineffective ( $n = 46$ ) and a smaller proportion were partially effective ( $n = 34$ ). However, it is important to note that studies varied in terms of the outcomes, meaning there may have been an improvement in one subscale of burnout (e.g., EE) with no changes to another (e.g., DP) (van Dierendonck, Schaufeli, and Baunk, 1998). Outcome measures in addition to burnout (and its components) included work- and mental health-related outcomes, such as perceived level of teamwork (LeNoble et al., 2020), compassion fatigue (Wood et al., 2017), sleep quality (Fang and Li, 2015), and frequency of dysfunctional thoughts (Saavedra, Murvartian, and Vallecillo, 2020). In addition, not all studies included control groups, so full evaluations of effectiveness are incomplete. Among the RCTs, approximately two-thirds were deemed effective ( $n = 66$ ), while the others ( $n = 31$ ) were partially or not effective. The RCTs that were effective in addressing overall burnout also observed positive impacts on related outcomes including anxiety, DP, emotional fatigue, perceived health, self-efficacy, sleep quality, stress, and work engagement (Benight, 2016; Dunne et al., 2019; Peterson et al., 2008; Salles, Nandagopal, and Walton, 2013; Verweij et al., 2018). Interestingly, several RCTs with large sample sizes ( $n = >300$ ) were deemed ineffective (Clarke-Walper et al., 2020; Wolf et al., 2015); however, two RCTs with similar sample sizes were deemed effective (Robison et al., 2007; Unterbrink et al., 2012).

## 4. Discussion

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In this chapter, we present high-level findings across each of the five reviews on burnout, beginning with prominent concepts and themes in the burnout literature, the prevalence of burnout among U.S. providers, risk factors for burnout, strategies to mitigate and prevent burnout among military health care professionals, and tested interventions to prevent and mitigate burnout across several types of professional settings. In addition to synthesizing the findings, this discussion also aims to identify remaining, as well as emerging, questions in light of the COVID-19 pandemic and its impact on health care providers.

### Review A: Scoping Literature Review of Prominent Concepts and Themes

In this scoping review, we set out to explore prominent concepts and themes regarding burnout among the literature. Although these concepts are diverse, they are interrelated and have built off each other. We began by describing how burnout evolved from an observation among physicians to a professionalized field of inquiry. The MBI became, and has remained, the fundamental scale and conceptual model of burnout. However, scholars and theorists of burnout have several critiques of this model. In the second section of the review, we presented literature that explored additions and amendments to the initial MBI conceptualization of burnout. Several additional scales were created, and the MBI was expanded to include those outside the helping professions. In the last part of the review, we shifted away from theoretical developments of burnout and into applications of the concept. These applications were exclusively centered on the health care professions. Burnout has long been a major issue among health care providers, who are already at a higher risk than the general population for several mental health issues and suicide.

Causal models of burnout are rife with complexity at the individual, interpersonal, and organizational levels. There is also the suggestion of tipping points of burnout or *burnout cascades*, in which employees are caught in vicious cycles of negative actions and increased burnout. One example of this cycle is burnout as a precursor to committing medical errors; the medical errors cause risk for subsequent worsened burnout. Another is the burnout cascade among teachers, who might have poor student-teacher relationships, which lead to poor student performance, further deterioration of the classroom climate, use of more punitive and reactive measures, and even greater risk for burnout (Jennings and Greenberg, 2009). The vast majority of articles in this sample propose elaborate etiologic models for burnout, but their applicability and validity are hindered by the fact that many studies are cross-sectional and apply only to a particular type of employee (within a broader social and regulatory context that might dictate how and whether burnout is addressed). For example, in many European countries, burnout has

been medicalized; a burnout diagnosis is grounds for medical leave from one's place of employment and likely for workplace compensation. In contrast, in the United States, burnout is not considered a medical diagnosis, which may mitigate its stigmatization also prevent recovery (Schaufeli, Leiter, and Maslach, 2009). These different environments raise questions as to *how* burnout can or should be diagnosed and how workers accept and cope with burnout. In fact, multiple studies raised the issue of response bias from workers who are simply too burned out to complete surveys (Halbesleben and Buckley, 2004).

The MBI subscores (EE, DP, and PA) have been used as a classification tool for burnout (> 26 for EE, > 9 for DP, and < 34 for PA) (Fahrenkopf et al., 2008; Krasner et al., 2009). Although the MBI remains the gold standard (Dyrbye et al., 2008), these cutoff scores are not standardized. We also do not know whether the MBI is universally applicable, especially considering how perceptions of the workplace are deeply culturally mediated. In addition, many studies included in this review opted to only use the EE scale to assess rates of burnout, which calls into question whether the full picture of burnout is being captured.

International classifications of burnout add another layer of complexity. In Sweden's national classification of diseases, burnout is classified under "problems related to life management difficulty," with a vague description of "a state of vital exhaustion" (Schaufeli, Leiter, and Maslach, 2009). The Netherlands has similarly followed suit by classifying burnout as a stress disorder or "work-related neurasthenia and long-term loss of the occupational role" (Schaufeli, Leiter, and Maslach, 2009). As noted earlier in this report, burnout is not included as a diagnosis within the DSM-5 or the ICD-11.

Theoretical developments, particularly the Job Demands-Resources model, point to the importance of making organizational-level changes to address burnout (Shanafelt, Hasan, et al., 2015; Maslach, 2003; van den Broeck et al., 2008; Bakker et al., 2003). However, it is generally easier to implement individual-level burnout interventions than to change organizational policy (Maslach, Schaufeli, and Leiter, 2001). In turn, individual-level interventions may be treating immediate symptoms, but not addressing root causes of burnout.

It is worth noting that most of the applied publications on burnout centered on health care providers. Burnout has long been an issue among health care professionals and the evidence is strong that burnout contributes to adverse outcomes for practitioners and patients. Given the rising demands within health care systems—soaring health care costs, the rise in difficult-to-treat chronic diseases, and decreasing autonomy among health care professionals—understanding how to address burnout is all too critical.

The medical community has expressed the need to revamp the Triple Aim Framework to incorporate health care provider burnout, making burnout the fourth aim. The U.S. Military Health Service also introduced a burnout focus on the readiness of service members and the medical force's ability to deliver health care for a broad spectrum of missions (Middleton and Dinneen, 2011). It is worth noting, however, that provider burnout is not incorporated as part of medical force readiness. Perhaps the Military Health Service's acknowledgement of health care

provider burnout as a facet of medical force readiness would increase attention to and action on the issue.

The bibliometric analysis showed a clear clustering effect among initial developments of the burnout literature, expansions of the initial literature, and applied literature pertaining to burnout among health care providers. This disconnect may explain the wide variation in prevalence estimates among health care providers, heterogeneity in the use of measures to assess burnout, and a lack of clarity on optimal interventions to address burnout. In other words, applied studies of burnout among health care providers may assume standardization of burnout concepts and measures, but the theoretical and conceptual literature suggests that many of these models and ways of understanding burnout are still in flux and may warrant continued study.

This review has several limitations. First, we selected the top 50 most cited articles as a proxy for high impact. We defined high-impact articles as those with the greatest number of citations across the peer-reviewed literature base. However, just because an article has not been widely cited does not indicate that it does not offer important, novel conceptual insights. Publications since 2015 may not have been cited simply because they are new. In addition, the included publications are diverse and cover many important details, many of which are not included in this review for the sake of brevity. Included details are intended to be relevant to the broader purpose of this suite of reviews—specifically, burnout among military health care professionals. Nevertheless, some omitted details may have in fact been relevant to readers.

Despite these limitations, this initial and broad overview set the stage for the subsequent reviews in this report. This scoping review highlights the pressing need to address and better understand burnout among health care professionals, while Review B provides the latest reliable estimates of the prevalence of burnout among health care providers. However, as we presented, these estimates vary widely, an issue that may be attributed in part to inconsistent means of measuring burnout. Review C provides a systematic outlook on the multitude of individual- and organizational-level factors associated with risk for burnout among health care professionals. Review D focuses on specific approaches taken to ameliorate burnout among military health care providers. Lastly, Review E looks at the distribution and effectiveness of interventions to prevent and reduce burnout across professions, which are important for understanding how to best allocate resources going forward to address burnout.

## **Review B: Rapid Review of the Incidence and Prevalence of Burnout in U.S. Health Care Providers**

This rapid review incorporated 58 studies that assessed the prevalence of burnout among U.S. health care providers in 2015 or later. Nearly all of the studies reported burnout among physicians; very few studies exclusively examined burnout among nonphysician practitioners. Of those that did, one study included physician assistants, two included nurse practitioners, and three included APPs. We identified only three studies that evaluated burnout among mental and

behavioral health professionals and five studies reporting on burnout rates among military health care providers. Therefore, recent, reliable estimates on key populations of interest to this study are sparse.

Although this rapid review sought to include only high-quality studies, prevalence rates of burnout among physicians varied widely, ranging from 2 to 81 percent. This high variation in high-quality studies might be related to a lack of consistency in use of burnout scales and the definitions used to describe burnout across settings. Compared with the studies that used the MBI, those using self-defined burnout measures, the CFST, and the OLBI were found to report relatively lower rates of burnout (21 to 51 percent). Of those studies that used MBI subscales, two-thirds of the studies defined burnout as having either high EE or high DP, reporting burnout rates ranging from 30 to 76 percent. This range calls into question the appropriateness of using singular subscales on the MBI to classify someone as having burnout. The remaining one-third required from one to three components (e.g., EE, DP, PA) to define burnout, reporting the lowest estimate to be 2 and the highest 81 percent. These findings are nonetheless consistent with a previous systematic review (Rotenstein et al., 2018) that found the prevalence estimates to be between 0 and 81 percent. The authors noted that the considerable variation in burnout definitions and assessment methods precluded reaching reliable, let alone definitive, conclusions about the prevalence of physician burnout. Another factor that can also affect the prevalence of burnout among physicians is the variation in specialties and work settings. As demonstrated in a prospective cohort study of 3,588 U.S. residents, the prevalence of burnout varied greatly by clinical specialty, ranging from 30 to 64 percent (Dyrbye et al., 2018). However, as already described, burnout studies may have an inherent response bias because providers who are experiencing burnout may be less likely to have the capacity to respond to surveys.

Compared with physicians, advanced practice practitioners, including physician assistants and nurse practitioners, reported relatively lower burnout rates (20 to 56 percent). The prevalence among mental and behavioral health professionals fell in a similar range of 23 to 58 percent. Among military providers, the prevalence estimates ranged from 9 to at least 55 percent (using the definition of either high EE or high DP). Mental health providers in VHA appeared to have a substantially higher prevalence of burnout (at least 55 percent) than did VHA providers overall (9 percent). On the other hand, military providers outside VHA generally reported lower burnout rates, ranging from 23 to 33 percent.

Given the substantial heterogeneity in the burnout definitions, assessment measures, and care settings, however, any conclusion or comparison should be interpreted with caution. This heterogeneity also points to the need to more systematically define and measure burnout.

## **Review C: Systematic Review of Risk Factors for Predicting Burnout in U.S. Health Care Providers**

The review of risk factors associated with burnout revealed a large number of studies



spanning a wide array of different types of risk factors. How risk factors and burnout measures were operationalized also varied across studies. Age and gender were the most commonly studied demographic characteristics, with the balance of findings showing that younger age and female gender were associated with burnout; however, most studies found no association at all between age or gender and burnout, and there were some conflicting results.

Among professional and clinical practice characteristics, unsupportive leadership, workload, job autonomy, and poor work-life balance stand out as being important risk factors for burnout, while supportive leadership, perceived autonomy, and adequate time spent outside work are protective factors. Psychological health problems, such as anxiety, may be associated with greater burnout. Poor physical health and health behaviors, such as lack of sleep, were also predictors of greater burnout; exercise and meditation appear to have a protective effect. Finally, while social and psychological perceptions and experiences (such as lack of control and social stress) increase burnout, other psychosocial factors, such as social support, were found to decrease or ameliorate burnout.

The one study of military providers included in this systematic review (Summers et al., 2019) found that commitment beyond an initial service obligation was associated with lower burnout. The few studies that addressed characteristics of work environment were consistent across civilian and military/VHA health care settings. Having greater flexibility of scheduling and job support (Mirvis, Graney, and Kilpatrick, 1999) were protective factors for burnout. In the one study that compared military personnel, veterans, and civilians, no differences in burnout were found by provider type. Therefore, there is insufficient evidence to fully understand variation in burnout between providers in the military versus nonmilitary providers.

In summary, this systematic review of the risk factors predicting burnout among U.S. health care providers suggests that there is a wide variety of burnout predictors. However, there are few prospective or retrospective studies that would provide the strongest evidence for any given predictor. Consistent with West et al. (2016), organizational-level interventions (such as adequate staffing and supportive leadership) and individual-level interventions (such as training providers to recognize the signs of burnout and ways to address those signs) are needed to lessen the onset of this growing problem among health care providers (West et al., 2016).

## **Review D: Rapid Review of Interventions to Prevent and/or Reduce Burnout in Military Health Care Professionals**

Most investigations of burnout or its components (e.g., EE) in health care professionals working in military settings focus on prevalence and potential causes, as suggested by correlations in cross-sectional designs. There have been relatively few studies on interventions to prevent or reduce burnout and increase workplace satisfaction. The military setting is unique because of the complexity of treating combat-related trauma and the potential for secondary traumatic stress (Benight, 2016). Health care professionals are exposed to the injuries, both

physical and emotional, that their patients have suffered, and they might also experience the trauma directly themselves.

We only identified 15 studies that described interventions to reduce or prevent burnout or its components and related conditions, such as compassion fatigue and secondary traumatic stress. Therefore, the data generated by these studies are not sufficient to identify the most effective or appropriate interventions to address burnout among specific populations of military health professionals. Consistent across these reviews, the studies included in this rapid review suggest that some interventions may improve military health care professional burnout and job satisfaction and that the interventions can be effective at the individual or the organizational levels. One organizational study suggested that different types of health care professionals may respond to interventions differently (Meredith et al., 2018). However, as noted, organizational-level interventions can be more difficult to implement than individual-level interventions.

Although studies reported levels of burnout, the scales used to do so varied. In addition, only one study (Rollins et al., 2016) reported on the impact of burnout on work-related activities (e.g., quality of patient care, turnover rates or intentions, sick time and vacation time used). Studies that reported on intervention acceptability suggested that programs were well received and easily implemented at the individual level. Intervention programs at the organizational level, although well received, were more complex and more difficult to implement.

All but two of the studies (the RT app and the PTSD Clinicians Exchange) involved some type of personal engagement by health care professionals (or their leaders) with trainers or mentors. The Support Net study outcomes supported the hypothesis that a web-based program plus telephonic coaching was more effective than a web-based program alone. This finding was consistent with a more recent RCT that assessed the impact of the PTSD Clinicians Exchange, a web-based program, on VHA, DoD, and community behavioral health professionals (Clarke-Walper et al., 2020). The goal of the exchange was to increase familiarity with the benefits and implementation of evidence-based treatments for PTSD. Although the PTSD Clinicians Exchange provided several tools to mitigate burnout, there were no differences in the ProQOL-5 burnout scores at baseline and at 12 months. The authors suggested several reasons for the lack of improvement in burnout results, including the content provided, the dissemination mechanism, or participants' limited use of the website, all of which points to the potential issues related to a lack of fidelity to an intervention model. It also raises the question as to why participants did not use the website (e.g., being too burned out to use it, finding it irrelevant).

A recent RCT of professional telephonic coaching for the well-being of physicians (who were not in a military setting) found that absolute rates of high EE on the MBI decreased by 20 percent in the intervention group and increased by 10 percent in the control group at five months. For absolute rates of overall burnout, there was a decrease of 17 percent in the intervention group and an increase of 5 percent in the control group at five months (Dyrbye et al., 2019). These findings suggest that, in both military and nonmilitary settings, telephonic coaching programs with a design of six sessions and a total of 3.5 hours of coaching directed toward increasing self-

efficacy and social support show promising results in reducing burnout among health care professionals.

It is important to note that military mental health providers face a particular challenge of balancing the obligation to do no harm to their patients (e.g., protecting patient privacy) with the expectation to breach confidentiality if a service member's mental health issues could compromise the broader military mission. However, policies surrounding this difficult tension are unclear, often placing the onus on the providers themselves (King and Snowden, 2020). None of the existing interventions that address burnout among military health care professionals (including mental health professionals) appeared to address this complex and pervasive issue, which is particularly pressing given the persistent prevalence of mental and behavioral health issues (including PTSD and co-occurring disorders) faced by post-9/11 military service members and veterans (Walter et al., 2018; Pedersen et al., 2020). It might also be worthwhile to explore whether existing effective interventions to reduce stress and PTSD-related symptomology among military health care providers, such as Psychological First Aid, could be employed to mitigate burnout (Forbes et al., 2011).

## Review E: Evidence Map of Interventions to Prevent and/or Reduce Burnout

The evidence map of interventions for burnout among working professionals provides answers to the question of which burnout interventions have been evaluated in research studies. Evidence maps are ideal to show not only existing evidence but also to pinpoint existing research gaps in a clear and visually accessible format. Therefore, evidence maps are ideally suited to direct research and support research prioritization. We have identified successful approaches (e.g., promising approaches that have worked for other professionals) that could be tested among U.S. health care providers or among health care providers in military contexts.

The obvious overarching finding is the sheer volume of intervention studies to address burnout, including a diverse array of approaches and settings. Despite the expansiveness of the literature on burnout interventions, poor study design, inadequate follow-up, and heterogeneity in implementation of interventions makes it difficult to draw generalizations on efficacious interventions.

Despite the fact that burnout has consistently been an issue, particularly among those in helping professions, the majority of interventions are focused on reducing, rather than preventing, burnout. The evidence base would also be improved by increasing the proportion of evaluations that randomly assign participants to interventions. In addition, the lack of standardization of outcome measures also hinders a complete picture of the evidence base of interventions to prevent and reduce burnout.

A common thread among systematic reviews and meta-analyses of burnout is poor quality of the evidence base. Several systematic reviews have already broadly examined categories of

interventions in several workplace settings. A systematic review compiling evidence from a variety of employment contexts found consistent evidence that physical activity can improve exhaustion but found limited support for the positive effects of physical activity on personal efficacy and cynicism (Naczenski et al., 2017). Poor quality of the evidence limits generalizability of this finding; in addition, a subsequent meta-analysis found inconclusive evidence to suggest that exercise or physical activity can ameliorate burnout (Ochentel, Humphrey, and Pfeifer, 2018).

How burnout interventions should be implemented also remains unclear. A review that evaluated the comparative effectiveness of computer-based burnout interventions versus in-person interventions was unable to draw any conclusions, as this study, too, was hindered by small sample sizes and poor-quality evidence (Kuster et al., 2017). This, however, might be an important avenue for subsequent evaluation, given the current work constraints and need for physical distancing during the COVID-19 pandemic.

Despite the great amount of attention given to burnout, particularly within the health care workforce, the quality of the data on interventions to prevent or mitigate burnout remains low (Clough et al., 2017).

A recent meta-analysis of coping strategy interventions (e.g., mindfulness training) among nurses found that, on average, EE and DP were improved over the course of one year, while the benefits for PA were only maintained for six months (Lee et al., 2016). The heterogeneity in the study design, details of the intervention, and workplace context makes drawing generalizations from these findings difficult.

In a systematic review of a variety of burnout interventions for several types of physicians, reviewers were unable to draw generalizations across specific types of successful interventions. They suggest that future interventions should incorporate the complex and multifaceted etiology of burnout among their approaches to mitigating the condition (Wiederhold et al., 2018)—a common thread across the reviews presented here. A review focusing exclusively on cognitive and behavioral therapy interventions found that these approaches had promise in addressing burnout among physicians, but the findings are limited by a lack of methodological rigor and risk of biases (Clough et al., 2017). Likewise, yoga and meditation also show potential promise at improving the psychological health and reducing burnout among health care workers, but the evidence base, particularly in regard to assessing burnout, is weak (Cocchiara et al., 2019). In one review, communication skills training for health care providers who provide care for those with cancer had no effect on burnout (Moore et al., 2018).

Among individual-level interventions, self-care workshops decreased DP, while a meditation intervention reduced EE (Busireddy et al., 2017). Again, understanding which interventions are effective at reducing burnout among resident physicians is hampered by such methodological shortcomings as small sample sizes (Busireddy et al., 2017). However, a recent systematic review and meta-analyses of interventions to address burnout among physicians found that both individual-level (e.g., mindfulness training) and organizational-level (e.g., limiting working

hours) interventions can lead to reductions in burnout (West et al., 2016) among physicians. This is encouraging, given the fact that organizational-level interventions can be more difficult to implement; however, organizational-level interventions have been observational and the combined effects of individual-level and organizational-level interventions have not been rigorously studied (West et al., 2016; Busireddy et al., 2017). One exception is a 2009 review, which found that interventions that targeted both the individual and organizational levels had longer-lasting positive effects on burnout reduction (Awa, Plaumann, and Walter, 2010). However, a meta-analysis of RCTs and controlled pre-post studies found that although both individual-level and organizational-level interventions are effective at reducing burnout among physicians, organizational-level interventions have a greater effect size (Panagioti et al., 2017). In terms of organizational-level interventions among resident physicians, reductions in total work hours decreased EE and DP but had no impact on PA.

Interventions among mental health care workers are rife with methodological issues, but they also seem to suggest modest effects on burnout components (e.g., a reduction in EE) (Morse et al., 2012). A subsequent meta-analysis of burnout interventions among mental health providers found that individual-level interventions were more effective at reducing EE than organizational-level interventions, but that job training and education at the organizational level was also an effective intervention subtype (Dreison et al., 2018). In their 2018 meta-analysis of burnout interventions among mental health professionals, Dreison et al. elaborated on the methodological shortcomings of interventions. These included inadequate follow-up periods and a narrow scope of types of interventions that have been employed to date. Furthermore, a review of interventions among nurses found the lack of standard, objective measurement tools and experimental designs has hindered efforts to understand which approaches work best to ameliorate burnout among nurses (Henry, 2014).

## Synthesis

The first review in this series highlighted the intricacy surrounding the etiology and manifestation of burnout. This underlying complexity complicates how burnout is assessed (i.e., diagnosed), how its risk factors are identified, and how it should be addressed. Therefore, further study will require not only more-systematized data collection methods and burnout measures to adequately assess the magnitude of the problem but also an acknowledgment of the fluidity of components (e.g., whether EE causes DP, DP causes EE, or EE and DP act synergistically) and underlying causes of burnout and the shifts in these concepts over time. Although burnout is recognized as a multidimensional construct, debate exists as to whether it can be assessed unidimensionally (e.g., whether EE can be considered a proxy for burnout writ large), as is often operationalized in studies to assess the magnitude of burnout and to address it through interventions. Not surprisingly, a unidimensional, dichotomized assessment of burnout (i.e., EE as yes/no) and other abbreviated forms of the MBI have been deemed insufficient or inaccurate

(Lim et al., 2019), but studies treating burnout as multidimensional and continuous are rare (Brenninkmeijer and Van Yperen, 2003). This might be an important area for future research.

Each of the reviews highlight the need for consistency and clarity with respect to the operationalization of concepts of burnout. The lack of a bounded definition of burnout and set standards to assess it (in addition to the complication that burnout is not classified as a medical diagnosis) make it difficult to actually assess the magnitude of the issue and to make comparisons across populations and within populations longitudinally. Providing a more concrete definition and diagnostic tool for burnout, however, might require a more in-depth, qualitative exploration of the components of burnout, how burnout is experienced, and how it can be prevented and addressed. Even if this work is done as rigorously and systematically as possible, definitive concepts of burnout may still remain elusive. Still, even incremental improvements in the incorporation of conceptual models of burnout, for example, targeting ways to reduce role conflict and increase employee autonomy (Maslach, Schaufeli, and Leiter, 2001), or teach social support skills and decentralize decisionmaking (Morse et al., 2012) would be beneficial.

However unbounded the concepts of burnout may be, research on what burnout is and what causes it must keep in step with the work challenges of the present day. This series of reviews was drafted in the midst of the COVID-19 pandemic, which is virtually guaranteed to exacerbate burnout among health care providers and among those providing essential services. In addition to the existing demands imposed by shifting technologies in the clinic (e.g., EHRs), insurance coverage changes, and the educational demands needed to keep in step with the state-of-the-art of one's field, the COVID-19 pandemic has resulted in a daily deluge of crises, all while providers are putting themselves in harm's way to deliver care. The dangers of COVID-19 exposure, the magnitude of COVID-19-related morbidity and mortality, and the stigma that both health care professionals and their family members face because of proximity to the virus are exacerbating the underlying burnout among this population (Souadka et al., 2020). The COVID-19 pandemic reveals how unanticipated burdens can exacerbate burnout and potentially compromise the delivery of critical health care. Burnout among health professionals deserves collective action.

Research on burnout also gives insufficient attention to racial and ethnic disparities in both the prevalence of burnout and the effectiveness of interventions. For example, in one review, it was noted that most interventions were performed among white, middle-aged, college-educated participants (Kuster et al., 2017). However, unsurprisingly, one study found that racial bias and discrimination as a stressor was significantly associated with burnout (Ramirez et al., 1998). Subsequent in-depth explorations of differential prevalence, impact of burnout, and tailored interventions are warranted.

Even if a concrete definition of burnout remains elusive, it is important to both improve and standardize the metrics employed to measure physician burnout. Doing so will facilitate the

ability to compare both within a clinician group over time and across clinicians; it will also allow meta-analyses.

Although burnout itself is detrimental at the individual level, it is important to consider the relationship of burnout to patient health outcomes. This lends itself to the call described in Review A to consider physician wellness a quality indicator (Dyrbye et al., 2017). There is also a need to further quantify the costs incurred from medical errors by clinicians with burnout (Dyrbye et al., 2017). Further attention to the consequences of clinician burnout might help garner support for more systematically implementing evidence-based individual- and organizational-level interventions.

As noted, existing interventions on burnout have not systematically addressed the specific constraints and stressors faced by health care providers working in military settings, including issues surrounding disclosure of a service member's mental health status, vicarious trauma from treating PTSD, and working in a continuously resource-constrained environment. This might point to the need for a closer examination of military health care provider-specific burnout.

## Conclusion

This series of reviews sought to assess various aspects of the existing literature on burnout with a specific focus on burnout among health care providers. It is evident from the sheer number of studies on the topic that burnout is a salient concept across a variety of workplace settings, but the field remains largely inconclusive about what actually constitutes burnout. For example, we do not know if burnout is simply a state of being emotionally exhausted, a state of exhaustion coupled with DP or cynicism, or if burnout is these two factors plus a reduction in one's workplace productivity. As Review A shows, the ever-evolving conceptual development of burnout, coupled with the shifting demands on professionals (especially those within health care), indicates that a consistent definition of burnout will likely remain elusive. In addition, the applied literature on burnout among health care providers, which is widely cited, is not highly engaged with other influential publications on the complexities of burnout risk, onset, and measurement. In turn, this obscures a complete understanding of the magnitude of the problem.

As a result, the rapid review of prevalence estimates of burnout among U.S.-based health care providers reported widely different estimates, even within similar health care settings and roles. This issue carried over to the systematic review of risk factors for burnout, which, unsurprisingly, found several individual- and organizational-level factors associated with an increased risk for burnout. Factors like supportive leadership were found to be protective against burnout, but questions remain as to how to systematically operationalize a phenomenon as complex as supportive leadership to prevent or reduce burnout.

The complexity surrounding the etiology of burnout (which itself is perhaps a misnomer, as burnout is not universally classified as medical condition) also has not lent itself to readily apparent ways to mitigate burnout, either by reducing it among professionals or preventing it.

Review E presents the landscape of available evidence on interventions to address burnout across a variety of workplace settings. Several types of interventions have been evaluated, but the effectiveness of these approaches appears to be mixed. In addition, there are opportunities to enhance the rigor of the study designs used to evaluate these interventions. Interventions to address burnout likely will need to adapt to shifting workplace demands.

This review has several implications for U.S. military health service providers. Burnout among health care providers in military settings warrants both further evaluation and attention. Burnout among health care providers in the U.S. military should be noted as an organizational priority. In spite of variation with respect to prevalence estimates of burnout, burnout rates among military health care provider populations were consistently above 25 percent. In addition, how the context of the military shapes risk for burnout (i.e., particular risk factors for military providers) remains unclear. This might warrant in-depth qualitative research to explore how military health care provider burnout may differ from other health care contexts. Furthermore, the limited number of interventions to address burnout among military health care providers and the limited attention given to specific military-related contextual factors (e.g., disclosure protocols for certain mental and behavioral health-related issues) above and beyond those of civilian health care settings remains a rich area for exploration. Finally, given the impacts of organizational-level factors on risk of burnout, exploratory qualitative research on how health care providers within the U.S. military describe burnout and its consequences vis-à-vis their civilian counterparts would be important.

Although research data are inconclusive and more rigorous studies of burnout among military health care providers should be done, the best available data at this time suggest that burnout should be an organizational priority for military and civilian health care providers. In addition, interventions that include telephonic coaching for health care providers may be worth pursuing. The data also suggest that interventions that target individual- and organizational-level factors related to burnout might have longer-lasting positive effects on reducing burnout.

Going forward, interrogating and refining our understandings of burnout, as well as actively measuring and engaging in organizational and individual burnout prevention strategies, will be critical. Drawing attention to the differential impacts of workplace stressors leading to burnout and the consequences of having burnout across different demographic groups remains important. In addition, studies of burnout among health care providers will have to remain in step with the rapidly shifting context of health care in the United States.



## Appendix

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### Search Strategies

#### *General Search*

##### **PsycInfo**

Date: 6 August 2019

Journals, books

TI (Burnout OR “burn out” OR “burn-out”) OR TI (“chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress”) OR TI (“psychological fatigue” OR “compassion fatigue” OR “mental exhaustion”)

AND

TI ( Histor\* OR theor\* OR model\* OR construct\* OR evolution OR framework\* OR conceptual\* )

Results: 352

##### **PubMed**

Date: 6 August 2019

burnout[ti] OR “burn out”[ti] OR “burn-out”[ti] OR “chronic occupational stress”[ti] OR “work related stress”[ti] OR “chronic occupational distress”[ti] OR “chronic occupational related distress”[ti] OR “psychological fatigue”[ti] OR “compassion fatigue”[ti] OR “mental exhaustion”[ti]

AND

Histor\*[ti] OR theor\*[ti] OR model\*[ti] OR construct\*[ti] OR evolution[ti] OR framework\*[ti] OR conceptual\*[ti]

Results: 182 – duplicates = 100

##### **Business Source Complete**

Date: 6 August 2019

TI (Burnout OR “burn out” OR “burn-out”) OR TI (“chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress”) OR TI (“psychological fatigue” OR “compassion fatigue” OR “mental exhaustion”)

AND

TI ( Histor\* OR theor\* OR model\* OR construct\* OR evolution OR framework\* OR conceptual\* )

Results: 118 – duplicates = 54

TOTAL: 506

### **PsycInfo**

Date: 7 August 2019

Journals, books

English language

(Burnout OR “burn out”)

AND

TI (measure\* OR scale OR inventory OR test\* OR diagnos\* OR psychometric\* OR valid\* OR reliab\* OR dimension OR factor OR item OR IRT)

Results: 1,094

### **PubMed**

Date: 7 August 2019

English Language

Burnout OR “burn out” OR “burn-out”

AND

measure\*[ti] OR scale[ti] OR inventory[ti] OR test\*[ti] OR diagnos\*[ti] OR psychometric\*[ti] OR valid\*[ti] OR reliab\*[ti] OR dimension[ti] OR factor[ti] OR item[ti] OR IRT[ti]

Results: 530 – duplicates = 272

### **Business Source Complete**

Date: 8 August 2019

Academic journals

English Language

(Burnout OR “burn out”)

AND

TI ( measure\* OR scale OR inventory OR test\* OR diagnos\* OR psychometric\* OR valid\* OR reliab\* OR dimension OR factor OR item OR IRT)

Results: 284 – duplicates = 148

TOTAL = 1,929

### ***A. Scoping Review to Define Burnout***

#### **Web of Science**

Date: 2 June 2020

Science categories omitted

TI = (burnout OR “burn out” OR “burn-out”) OR Ab = (burnout OR “burn out” OR “burn-out”)

*B. Rapid Review to Determine Burnout Incidence and Prevalence Among U.S. Health Care Providers*

**PsycInfo**

Date: 3 June 2020

Academic journals

English Language

2009–present

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR AB (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TI (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psycholog\* OR psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\* OR “mental health staff”) OR AB (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psycholog\* OR psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\* OR “mental health staff”)

AND

prevalence OR incidence OR prevalent OR occur OR occurrence OR frequency OR tendency OR rate OR extent OR pattern\*

AND

AF us or usa or united states

Results: 313

**PubMed**

Date: 3 June 2020

English Language

2009–present

Burnout[tiab] OR “burn out”[tiab] OR “burn-out”[tiab] OR “chronic occupational stress”[tiab] OR “work related stress”[tiab] OR “chronic occupational distress”[tiab] OR “chronic occupational related distress”[tiab] OR “psychological fatigue”[tiab] OR “compassion fatigue”[tiab] OR “mental exhaustion”[tiab] OR “secondary traumatic stress”[tiab]

AND

Provider\*[tiab] OR physician\*[tiab] OR medical resident\*[tiab] OR surgical resident\*[tiab] OR nurse\*[tiab] OR psychologist\*[tiab] OR counselor\*[tiab] OR clinician\*[tiab] OR social worker\*[tiab] OR therapist\*[tiab] OR doctor\*[tiab] OR psycholog\*[tiab] OR psychiatr\*[tiab] OR patient care team\*[tiab] OR practice team\*[tiab] OR pharmacist\*[tiab] OR “mental health staff”[tiab]

AND

prevalence OR incidence OR prevalent OR occur OR occurrence OR frequency OR tendency OR rate OR extent OR pattern\*

AND

usa[Affiliation] OR AL[Affiliation] OR AK[Affiliation] OR AZ[Affiliation] OR AR[Affiliation] OR CA[Affiliation] OR CO[Affiliation] OR CT[Affiliation] OR DE[Affiliation] OR FL[Affiliation] OR GA[Affiliation] OR HI[Affiliation] OR ID[Affiliation] OR IL[Affiliation] OR IN[Affiliation] OR IA[Affiliation] OR KS[Affiliation] OR KY[Affiliation] OR LA[Affiliation] OR ME[Affiliation] OR MD[Affiliation] OR MA[Affiliation] OR MI[Affiliation] OR MN[Affiliation] OR MS[Affiliation] OR MO[Affiliation] OR MT[Affiliation] OR NE[Affiliation] OR NV[Affiliation] OR NH[Affiliation] OR NJ[Affiliation] OR NM[Affiliation] OR NY[Affiliation] OR NC[Affiliation] OR ND[Affiliation] OR OH[Affiliation] OR OK[Affiliation] OR OR[Affiliation] OR PA[Affiliation] OR RI[Affiliation] OR SC[Affiliation] OR SD[Affiliation] OR TN[Affiliation] OR TX[Affiliation] OR UT[Affiliation] OR VA[Affiliation] OR VT[Affiliation] OR WA[Affiliation] OR WV[Affiliation] OR WI[Affiliation] OR WY[Affiliation] OR Alabama[Affiliation] OR Alaska[Affiliation] OR Arizona[Affiliation] OR Arkansas[Affiliation] OR California[Affiliation] OR Colorado[Affiliation] OR Connecticut[Affiliation] OR Delaware[Affiliation] OR Florida[Affiliation] OR Georgia[Affiliation] OR Hawaii[Affiliation] OR Idaho[Affiliation] OR Illinois[Affiliation] OR Indiana[Affiliation] OR Iowa[Affiliation] OR Kansas[Affiliation] OR Kentucky[Affiliation] OR Louisiana[Affiliation] OR Maine[Affiliation] OR Maryland[Affiliation] OR Massachusetts[Affiliation] OR Michigan[Affiliation] OR Minnesota[Affiliation] OR Mississippi[Affiliation] OR Missouri[Affiliation] OR Montana[Affiliation] OR Nebraska[Affiliation] OR Nevada[Affiliation] OR New Hampshire[Affiliation] OR New Jersey[Affiliation] OR New Mexico[Affiliation] OR New York[Affiliation] OR North Carolina[Affiliation] OR North Dakota[Affiliation] OR Ohio[Affiliation] OR Oklahoma[Affiliation] OR Oregon[Affiliation] OR Pennsylvania[Affiliation] OR Rhode Island[Affiliation] OR South Carolina[Affiliation] OR South Dakota[Affiliation] OR Tennessee[Affiliation] OR Texas[Affiliation] OR Utah[Affiliation] OR Vermont[Affiliation] OR Virginia[Affiliation] OR Washington[Affiliation] OR West Virginia[Affiliation] OR Wisconsin[Affiliation] OR Wyoming[Affiliation] OR united states[Affiliation]

Results: 1,249

## **Web of Science**

Date: 3 June 2020

Articles

English Language

Indexes: SCI-EXPANDED, SSCI, A&HCI, ESCI; COUNTRIES/REGIONS: ( U.S.A )

2009–present

TS = (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TS = (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psycholog\* OR psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\* OR “mental health staff”)

AND

TS = (prevalence OR incidence OR prevalent OR occur OR occurrence OR frequency OR tendency OR rate OR extent OR pattern\*)

Results: 1,419 – duplicates = 800

## **Business Source Complete**

Date: 3 June 2020

Academic journals

English Language

2009–present

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR AB (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TI (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psycholog\* OR psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\* OR “mental health staff”) OR AB (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psycholog\* OR psychiatr\* OR patient care team\* OR practice team\*)

OR pharmacist\* OR “mental health staff”)

AND

prevalence OR incidence OR prevalent OR occur OR occurrence OR frequency OR tendency  
OR rate OR extent OR pattern\*

(no filter to apply for U.S.)

Results: 97 – duplicates/hand removal of non-U.S.= 34

TOTAL = 2,223

### *C. Systematic Review of Risk Factors for Predicting Burnout in U.S. Health Care Providers*

#### **PubMed**

Date: 4 June 2020

English Language

Burnout OR “burn out” OR burn-out

AND

risk factor[tiab] OR risk factors[tiab] OR prognos\*[tiab] OR predict\*[tiab] OR multivariate OR  
“cohort study” OR cross-sectional OR case-control

AND

(Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR  
psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR  
psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\* OR community health  
worker\* OR practitioner\* OR mediator\* )

AND

usa[Affiliation] OR AL[Affiliation] OR AK[Affiliation] OR AZ[Affiliation] OR AR[Affiliation]  
OR CA[Affiliation] OR CO[Affiliation] OR CT[Affiliation] OR DE[Affiliation] OR  
FL[Affiliation] OR GA[Affiliation] OR HI[Affiliation] OR ID[Affiliation] OR IL[Affiliation]  
OR IN[Affiliation] OR IA[Affiliation] OR KS[Affiliation] OR KY[Affiliation] OR  
LA[Affiliation] OR ME[Affiliation] OR MD[Affiliation] OR MA[Affiliation] OR  
MI[Affiliation] OR MN[Affiliation] OR MS[Affiliation] OR MO[Affiliation] OR  
MT[Affiliation] OR NE[Affiliation] OR NV[Affiliation] OR NH[Affiliation] OR NJ[Affiliation]  
OR NM[Affiliation] OR NY[Affiliation] OR NC[Affiliation] OR ND[Affiliation] OR  
OH[Affiliation] OR OK[Affiliation] OR OR[Affiliation] OR PA[Affiliation] OR RI[Affiliation]  
OR SC[Affiliation] OR SD[Affiliation] OR TN[Affiliation] OR TX[Affiliation] OR  
UT[Affiliation] OR VA[Affiliation] OR VT[Affiliation] OR WA[Affiliation] OR  
WV[Affiliation] OR WI[Affiliation] OR WY[Affiliation] OR Alabama[Affiliation] OR  
Alaska[Affiliation] OR Arizona[Affiliation] OR Arkansas[Affiliation] OR California[Affiliation]  
OR Colorado[Affiliation] OR Connecticut[Affiliation] OR Delaware[Affiliation] OR  
Florida[Affiliation] OR Georgia[Affiliation] OR Hawaii[Affiliation] OR Idaho[Affiliation] OR

Illinois[Affiliation] OR Indiana[Affiliation] OR Iowa[Affiliation] OR Kansas[Affiliation] OR Kentucky[Affiliation] OR Louisiana[Affiliation] OR Maine[Affiliation] OR Maryland[Affiliation] OR Massachusetts[Affiliation] OR Michigan[Affiliation] OR Minnesota[Affiliation] OR Mississippi[Affiliation] OR Missouri[Affiliation] OR Montana[Affiliation] OR Nebraska[Affiliation] OR Nevada[Affiliation] OR New Hampshire[Affiliation] OR New Jersey[Affiliation] OR New Mexico[Affiliation] OR New York[Affiliation] OR North Carolina[Affiliation] OR North Dakota[Affiliation] OR Ohio[Affiliation] OR Oklahoma[Affiliation] OR Oregon[Affiliation] OR Pennsylvania[Affiliation] OR Rhode Island[Affiliation] OR South Carolina[Affiliation] OR South Dakota[Affiliation] OR Tennessee[Affiliation] OR Texas[Affiliation] OR Utah[Affiliation] OR Vermont[Affiliation] OR Virginia[Affiliation] OR Washington[Affiliation] OR West Virginia[Affiliation] OR Wisconsin[Affiliation] OR Wyoming[Affiliation] OR united states[Affiliation]

Results: 1,514 – internal duplicate = 1,513

## **PsycInfo**

Date: 4 June 2020

Academic journals

English Language

Burnout OR “burn out” OR burn-out

AND

TI (risk factor OR risk factors OR prognos\* OR predict\*) OR AB (risk factor OR risk factors OR prognos\* OR predict\*) OR multivariate OR “cohort study” OR cross-sectional OR case-control

AND

(Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\* OR community health worker\* OR practitioner\* OR mediator\* )

AND

AF us or usa or united states

Results: 484 – duplicates = 223

## **BSC**

Date: 4 June 2020

Academic journals

English Language

Burnout OR “burn out” OR burn-out

AND

TI (risk factor OR risk factors OR prognos\* OR predict\*) OR AB (risk factor OR risk factors OR prognos\* OR predict\*) OR multivariate OR “cohort study” OR cross-sectional OR case-control

AND

(Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\* OR community health worker\* OR practitioner\* OR mediator\* )

Results: 188 – duplicates/non-U.S. = 115

### **Web of Science**

Date: 4 June 2020

English Language

Indexes: SCI-EXPANDED, SSCI, A&HCI, ESCI; COUNTRIES/REGIONS: ( U.S.A )

DOCUMENT TYPES: ( ARTICLE OR EDITORIAL MATERIAL OR REVIEW )

TS=( Burnout OR “burn out” OR burn-out )

AND

TS=(risk factor OR risk factors OR prognos\* OR predict\*OR multivariate OR “cohort study” OR cross-sectional OR case-control)

AND

TS=(Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\* OR community health worker\* OR practitioner\* OR mediator\* )

Results:776 – duplicates= 315

TOTAL = 2,164

### ***D. Rapid Review on Burnout Interventions in Military Health Care Professionals***

#### **PubMed**

Date: 8 June 2020

English Language

Burnout[tiab] OR “burn out”[tiab] OR “burn-out”[tiab] OR “chronic occupational stress”[tiab] OR “work related stress”[tiab] OR “chronic occupational distress”[tiab] OR “chronic occupational related distress”[tiab] OR “psychological fatigue”[tiab] OR “compassion fatigue”[tiab] OR “mental exhaustion”[tiab] OR “secondary traumatic stress”[tiab]

AND



Military[tiab] OR army[tiab] OR navy[tiab] OR “marine corps”[tiab] OR “coast guard”[tiab] OR “air force”[tiab] OR VA[tiab] OR “veterans administration”[tiab] OR “department of veterans affairs”[tiab] OR “veterans health administration”[tiab] OR VHA[tiab]

AND

Provider\*[tiab] OR physician\*[tiab] OR medical resident\* OR surgical resident\* OR nurse\*[tiab] OR psychologist\*[tiab] OR counselor\*[tiab] OR clinician\*[tiab] OR social worker\*[tiab] OR therapist\*[tiab] OR doctor\*[tiab] OR psychologist\*[tiab] OR psychiatrist\*[tiab] OR patient care team\*[tiab] OR practice team\*[tiab] OR pharmacist\*[tiab]

AND

(intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\*[tiab] OR study[tiab] OR studies[tiab] OR evaluation[tiab])

Results: 94

## **PsycInfo**

Date: 8 June 2020

Books, papers, dissertations

English Language

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR AB (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TI (Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA) OR AB (Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA)

AND

TI (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychologist\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\*) OR AB (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychologist\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\*)

AND

TI (intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation) OR AB (intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation)

Results: 87 – duplicates = 53

## **CINAHL**

Date: 8 June 2020

English Language

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR AB (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TI (Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA) OR AB (Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA)

AND

TI (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychologist\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\*) OR AB (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychologist\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\*)

AND

TI (intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation) OR AB (intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation)

Results: 69 – internal duplicates = 65 – duplicates w/above = 10

### **Web of Science**

Date: 8 June 2020

English Language

TS = (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TS = (Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA)

AND

TS = (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psycholog\* OR psychiatr\* OR patient care team\* OR practice team\* OR pharmacist\*)

AND

TS = (intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation)

Results: 144 – duplicates = 65

### **Allied and Complementary Medicine**

Date: 8 June 2020

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR ab(Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”)

AND

TI (Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA) OR ab(Military OR army OR navy OR “marine corps” OR “coast guard” OR “air force” OR VA OR “veterans administration” OR “department of veterans affairs” OR “veterans health administration” OR VHA)

AND

TI (Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychologist\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\*) OR  
ab(Provider\* OR physician\* OR medical resident\* OR surgical resident\* OR nurse\* OR psychologist\* OR counselor\* OR clinician\* OR social worker\* OR therapist\* OR doctor\* OR psychologist\* OR psychiatrist\* OR patient care team\* OR practice team\* OR pharmacist\*)  
AND

TI (intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation) OR  
ab(intervention\* OR initiative\* OR program\* OR strategy\* OR RCT OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial\* OR study OR studies OR evaluation)

Results: 3 – duplicates = 0

### **Defense Technical Information Center**

Date: 8 June 2020

SUBJECT line:

(burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) AND (provider OR providers OR physician OR physicians OR “medical resident” OR “medical residents” OR “surgical resident” OR “surgical residents” OR nurse OR nurses OR psychologist OR psychologists OR counselor OR counselors OR clinician OR clinicians OR “social worker” OR “social workers” OR therapist OR therapists OR doctor OR doctors OR psychologist\* OR psychiatrist\* OR “patient care team” OR “patient care teams” OR “practice team” OR “practice teams” OR pharmacist OR pharmacists) AND (intervention OR interventions OR initiative OR initiatives OR program OR programs OR strategy OR strategies OR “RCT” OR random OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR cohort OR manual OR trial OR trials OR study OR studies OR evaluation))

TOTAL: 138 – 4 internal duplicates = 132 – duplicates with previous databases above = 127

TOTAL = 349

### *E. Evidence Map of Research on Interventions to Prevent and/or Reduce Burnout in Working Adults*

#### **PubMed**

Date: 10 June 2020

No restrictions

Burnout[tiab] OR “burn out”[tiab] OR “burn-out”[tiab] OR “chronic occupational stress”[tiab] OR “work related stress”[tiab] OR (chronic[tiab] AND “occupational distress”[tiab]) OR “chronic occupational related distress”[tiab] OR “psychological fatigue”[tiab] OR “compassion fatigue”[tiab] OR “mental exhaustion”[tiab] OR “secondary traumatic stress”[tiab]

AND

intervention\*[tiab] OR initiative\*[tiab] OR RCT OR “randomized controlled trial” OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR (cohort AND compar\*)

Results: 3,090 – internal duplicates = 3,084

#### **Education Resources Information Center**

Date: 10 June 2020

No restrictions

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR AB (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR SU Burnout

AND

intervention\* OR initiative\* OR RCT OR “randomized controlled trial” OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR (cohort AND compar\*)

Results: 342 – duplicates = 310

#### **PsycINFO**

Date: 10 June 2020

Academic journals

TI (Burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) OR AB (Burnout OR “burn out” OR “burn-out” OR “chronic occupational

stress" OR "work related stress" OR "chronic occupational distress" OR "chronic occupational related distress" OR "psychological fatigue" OR "compassion fatigue" OR "mental exhaustion" OR "secondary traumatic stress") OR SU occupational stress

AND

intervention\* OR initiative\* OR RCT OR "randomized controlled trial" OR "clinical controlled trial" OR clinical trial\* OR "time series" OR pre-post OR before-after OR "case series" OR (cohort AND compar\*)

Results: 2,981– duplicates = 2,064

## **CINAHL**

Date: 10 June 2020

Academic journals

Exclude MEDLINE

TI (Burnout OR "burn out" OR "burn-out" OR "chronic occupational stress" OR "work related stress" OR "chronic occupational distress" OR "chronic occupational related distress" OR "psychological fatigue" OR "compassion fatigue" OR "mental exhaustion" OR "secondary traumatic stress") OR AB (Burnout OR "burn out" OR "burn-out" OR "chronic occupational stress" OR "work related stress" OR "chronic occupational distress" OR "chronic occupational related distress" OR "psychological fatigue" OR "compassion fatigue" OR "mental exhaustion" OR "secondary traumatic stress") OR (MH "Burnout, Professional")

AND

intervention\* OR initiative\* OR RCT OR "randomized controlled trial" OR "clinical controlled trial" OR clinical trial\* OR "time series" OR pre-post OR before-after OR "case series" OR (cohort AND compar\*)

Results: 1,316 – duplicates = 432

## **Business Source Complete**

Date: June 2020

No restrictions

TI (Burnout OR "burn out" OR "burn-out" OR "chronic occupational stress" OR "work related stress" OR "chronic occupational distress" OR "chronic occupational related distress" OR "psychological fatigue" OR "compassion fatigue" OR "mental exhaustion" OR "secondary traumatic stress") OR AB (Burnout OR "burn out" OR "burn-out" OR "chronic occupational stress" OR "work related stress" OR "chronic occupational distress" OR "chronic occupational related distress" OR "psychological fatigue" OR "compassion fatigue" OR "mental exhaustion" OR "secondary traumatic stress") OR DE "BURNOUT (Psychology)"

AND

intervention\* OR initiative\* OR RCT OR "randomized controlled trial" OR "clinical controlled

trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR (cohort AND compar\*)

Results: 365 – duplicates = 182

### **Scopus**

Date: 11 June 2020

Articles, reviews

TITLE-ABS (burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”) AND TITLE-ABS-KEY (intervention\* OR initiative\* OR rct OR “randomized controlled trial” OR “clinical controlled trial” OR “clinical trial\*” OR “time series” OR pre-post OR before-after OR “case series” OR (cohort AND compar\*))

Results: 3,925 – duplicates = 840

### **CENTRAL (Trials)**

Date: 11 June 2020

No restrictions

(burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”):ti OR (burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”):ab

AND

intervention\* OR initiative\* OR RCT OR “randomized controlled trial” OR “clinical controlled trial” OR clinical trial\* OR “time series” OR pre-post OR before-after OR “case series” OR (cohort AND compar\*)

Results: 897 – duplicates = 440

### **ClinicalTrials.gov**

Date: 15 June 2020

Completed Studies | burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue”

OR

Completed Studies | “mental exhaustion” OR “secondary traumatic stress”

Results: 206

## International Clinical Trials Registry Platform

Date: 15 June 2020

With Results Only:

burnout OR “burn out” OR “burn-out” OR “chronic occupational stress” OR “work related stress” OR “chronic occupational distress” OR “chronic occupational related distress” OR “psychological fatigue” OR “compassion fatigue” OR “mental exhaustion” OR “secondary traumatic stress”

Results: 55 – 1 duplicate = 54

## Bibliography and Evidence Tables

### *Bibliography Review A*

The list depicts the top 50 most cited publications on burnout:

1. Maslach C, Schaufeli WB, Leiter MP. Job burnout. Annual Review of Psychology. 2001;52:397-422. doi: 10.1146/annurev.psych.52.1.397. Number of times cited: 4627
2. Maslach C, Jackson SE. The measurement of experienced burnout. Journal of Occupational Behaviour. 1981;2(2):99-113. doi: 10.1002/job.4030020205. Number of times cited: 3354
3. Demerouti E, Bakker AB, Nachreiner F, et al. The job demands-resources model of burnout. Journal of Applied Psychology. 2001 Jun;86(3):499-512. doi: 10.1037//0021-9010.86.3.499. Number of times cited: 2888
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**Table A.1. Evidence Table: Prevalence of Burnout**

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Adler, 2017	Active duty and activated reserve component U.S. military medical staff deployed across Afghanistan Other: Military medical staff	Survey Prevalence Year estimate: 2016	Scoring high on EE and DP from the abbreviated form of the MBI-HSS	33.3 percent scored high on at least one of the two subscales
Agrawal, 2020	U.S. nephrology fellows Physicians	Survey Prevalence Year estimate: 2018	Choosing “once a week” or more frequently to either of the two single-item measures of EE and DP adapted from the MBI indicated burnout.	Overall burnout prevalence was 30.0 percent
Ahmed, 2020	Medical oncology fellows Physicians	Survey Prevalence Year estimate: 2018	Scoring high on either EE or DP or scoring high on EE in combination of either high on DP or low on PA of the MBI	Burnout calculated using either high EE or DP was 48.3 percent; requiring high EE in combination and either high DP or low PA score, resulted in a burnout rate of 27.1 percent
Anandarajah, 2018	Physicians and APPs from the Departments of Medicine, Neurology, and Psychiatry Physicians, physician assistants, nurse practitioners	Survey Prevalence Year estimate: 2015	Experiencing “I feel burned out from my work” and “I have become more callous toward people since I took this job” on the two-question version of the MBI measuring burnout and DP at least once a week was considered at high risk for burnout	45.6 percent of the providers reported high burnout, including 51.6 percent of the APPs and 41.6 percent of the physicians
Attenello, 2018	Neurosurgery residents part of American Association of Neurological Surgeons Physicians	Survey Prevalence Year estimate: 2015	Having high scores for EE (27 and higher) and/or DP (10 and higher) on the MBI	The overall burnout rate was 67 percent

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Ayyala, 2019b	Pediatric radiologists (members of the Society for Pediatric Radiology) Physicians	Survey Prevalence Year estimate: 2018	Scores on the abbreviated MBI corresponding to 27 or more for EE, 10 or more for DP, and 33 or less for PA on the MBI	The prevalence of EE was 66 percent, DP 61 percent, and perceived lack of PA 15 percent
Beck, 2020	Pediatric residents and hospitalists Physicians	Survey Prevalence Year estimate: 2019	Responding to the two items adapted from the MBI that “I feel burned out from my work,” and “I’ve become more callous toward people since I took this job” once per week or more	34.2 percent of respondents reported feeling burned out from work, while 27.6 percent reported becoming more callous toward others since taking their current job
Blechter, 2018	Primary care providers practicing in urban small independent practices Physicians, physician assistants, nurse practitioners	Survey from another study Prevalence Year estimate: 2017	Reporting “I am definitely burning out and have one or more symptoms of burnout, such as physical and [EE],” “The symptoms of burnout that I am experiencing will not go away. I think about frustrations at work a lot” and “I feel completely burned out and often wonder if I can go on practicing. I am at the point where I may need some changes” on a single-item burnout measure	13.5 percent of the respondents reported burnout
Britt, 2017	Physician and advanced practice professionals Physicians, physician assistants, nurse practitioners	Survey Prevalence Year estimate: 2016	Reporting “definitely burning out,” “symptoms won’t go away,” “completely burned out,” or “getting help” on a modified Mini Z survey question	34 percent of respondents reported burnout—36 percent of medical doctors (MDs) and doctors of osteopathic medicine (DOs) and 31 percent of APPs
Bundy, 2020	Interventional radiologists Physicians	Survey Prevalence Year estimate: 2019	Scoring high on emotion exhaustion (27 and greater) or DP (10 and greater) on the MBI	71.9 percent reported burnout
Busis, 2017; LaFaver, 2018	Neurologists and neurology trainees Physicians	Survey Prevalence Year estimate: 2016	Scoring high on the EE (27 and higher) or DP (10 and higher) subscales of the MBI-HSS	60.1 percent of respondents had at least one symptom of burnout
Cheng, 2020	Practicing urologists and residents/fellows Physicians	Survey Prevalence Year estimate: 2018	Having one or overlapping burnout measures on the abbreviated MBI	Burnout was identified in 49.6 percent of all participants

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Chew, 2017	Musculoskeletal subspecialist radiologists Physicians	Survey Prevalence Year estimate: 2016	Scoring 27 or higher on EE, ten or higher on DP, or 33 or lower on perceived lack of PA subscales of an adapted MBI	80.5 percent reported burnout along one or more dimensions
Creager, 2019	Practicing physicians seeking to continue board certification in family medicine Physicians	Mandatory certification examination registration questionnaire Prevalence Year estimate: 2017	The presence of either EE or DP once a week or more, measured using two validated items asking physicians how often they “feel burned out from my work” and “have become more callous toward people since I took this job.”	The burnout rate was 43.7 percent
Cull, 2019	Pediatricians who had participated in the American Academy of Pediatrics Life and Career Experiences Study Physicians	Survey Prevalence Year estimate: 2015–2016	Responding strongly agree or agree to a single-item question—“I am experiencing burnout among my work”	35 percent reported burnout among 2015 and 2016
Del Carmen, 2019	Physicians at a large academic medical practice Physicians	Survey Prevalence Year estimate: 2017	Scoring high on 2 of 3 scales of the MBI—3.0 or greater on the exhaustion subscale, 2.0 or greater on the cynicism subscale, or 4.0 or greater on the professional efficacy subscale	45.6 percent of physicians experienced burnout
Domaney, 2018	Psychiatrists Physicians	Survey Prevalence Year estimate: 2017	Having a score of 27 or more for EE, 13 or more for DP, or 31 or fewer for PA on the MBI–HSS (MP)	40 percent to 87 percent were at high risk for at least one of the three subdomains of burnout
Doolittle, 2020	Internal medicine physicians Physicians	Survey Prevalence Year estimate: 2015	Scoring greater than 25 in the burnout domain of the ProQOL	52 percent met the criteria for burnout
Dyrbye, 2018	Medical residents of 49 allopathic U.S. medical schools Physicians	Questionnaire Prevalence Year estimate: 2016	Scoring high (more than once per week) on the single EE or DP items adapted from the full MBI	45.2 percent reported at least one symptom of burnout

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Dyrbye, 2020	Physician assistants in state licensing database Physician assistants	Survey Prevalence Year estimate: 2016	Scoring high on the EE (score of 27 or greater), or DP (score of 10 or greater) subscale, or on both, on the MBI	41.4 percent of physician assistants had burnout symptoms
Edwards, Helfrich, 2018	Primary care physician, advanced practice clinicians (nurse practitioners and physician assistants), and staff Physicians, physician assistants, nurse practitioners Other: Clinical staff	Survey Prevalence Year estimate: 2015–2017	Single item, five-point measure validated against the EE scale of the MBI	Burnout was reported by 20.4 percent of respondents overall, including 25.1 percent of physicians, 22.6 percent advanced practice clinicians, and 20.6 percent clinical staff
Fargen, 2019	Neurointerventional physicians Physicians	Survey Prevalence Year estimate: 2018	A composite EE score of 27 or greater and/or a composite DP score of ten or greater on the MBI-HSS	56 percent met criteria for burnout
Gabbe, 2018	Chairs of academic departments of obstetrics and gynecology Physicians	Survey Prevalence Year estimate: 2017	Scoring high for EE (27 and higher) and DP (ten and higher) and low for PA (33 and lower) on an abbreviated MBI-HSS; the revised scheme reclassifies those scoring high on two subscales or high on one subscale and moderate on two others as high burnout	2.4 percent chairs fulfilled all the subscales for burnout; 22.2 percent of respondents met the revised criteria for high burnout
Garcia, 2018	Prescribing and nonprescribing VHA mental health care providers Physicians, nurse practitioners, psychologists, other mental health professionals, social workers	Survey Prevalence Year estimate: 2015	High cynicism is indicated by a subscale score of 11 or more, high exhaustion by a subscale score of 16 or more, and low professional efficacy by a range of 0–23 on the MBI-GS	55 percent reported high levels of EE, 55 percent high levels of cynicism, and 19 percent low levels of professional efficacy
Garcia, 2020	Pathologists in the American Society for Clinical Pathology Physicians	Survey Prevalence Year estimate: 2018	Expressing burnout symptoms on the Mini Z single-item burnout measure	32.9 percent reported burnout as a current issue



<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Gardner, 2019	Physicians who provide direct patient care with active Rhode Island licenses Physicians	Survey Prevalence Year estimate: 2017	Reporting one or more symptoms of burnout ( "I am definitely burning out and have one or more symptoms of burnout, e.g., [EE]"; "The symptoms of burnout I am experiencing won't go away. I think about work frustrations a lot"; "I feel completely burned out. I am at the point where I may need to seek help) on a single question item from the Mini Z	26 percent reported burnout
Goldberg, 2020	Primary care professionals from small to medium-sized practices participating in the EvidenceNOW initiative in Virginia Physicians, physician assistants, nurse practitioners	Survey Prevalence Year estimate: 2018	Responses on the single-item self-define burnout question were three or higher	Burnout was reported by 31.6 percent of the physicians, 17.2 percent of advanced practice clinicians, 18.9 percent of clinical support staff, and 17.5 percent of administrative staff
Gribben, Kase, 2019	Pediatric critical care fellows and attending physicians Physicians	Survey Prevalence Year estimate: 2018	Scoring greater than or equal to 27 on the CFST	The prevalence of burnout was 23.2 percent
Gribben, MacLean, 2019	Pediatric emergency medicine physicians Physicians	Survey Prevalence Year estimate: 2018	Scoring greater than or equal to 27 on the CFST	The prevalence of burnout was 21.5 percent
Guenette, 2017	Radiology residents in New England Physicians	Survey Prevalence Year estimate: 2016	Scoring greater than 26 for EE, greater than ten for DP, and less than 33 for PA on the MBI-HSS	37 percent had high EE, 48 percent high personalization, and 50 percent low PA
Hansen, 2018	Family physicians three years out of training Physicians	Survey Prevalence Year estimate: 2016	The presence of EE or DP once a week or more frequently, measured using two validated questions	The mean percentage of EE and DP were 39.8 percent and 23.7 percent, respectively

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Harris, 2018	Advanced practice registered nurses Nurse practitioners Other: Nurses	Survey Prevalence Year estimate: 2017	Reporting one or more symptoms of burnout ("I am definitely burning out and have one or more symptoms of burnout, e.g., [EE]"; "The symptoms of burnout I am experiencing won't go away. I think about work frustrations a lot";) "I feel completely burned out. I am at the point where I may need to seek help") on a single-question item from the Mini Z	19.8 percent reported at least one symptom of burnout
Hauer, 2018	Wisconsin physicians Physicians	Survey Prevalence Year estimate: 2017	Reporting at least one burnout symptom on the self-defined burnout question in the Mini Z survey	53.5 percent of physicians have at least one symptom of burnout
Hu, 2019	Surgical residents who completed the American Board of Surgery In-Training Examination Physicians	Survey Prevalence Year estimate: 2018	Reporting at least weekly occurrence of any of the six items in the modified, abbreviated MBI-HSS (MP)	Weekly burnout symptoms were reported by 38.5 percent of residents
Hughes, 2020	Maternal-fetal medicine subspecialist physicians Physicians	Survey Prevalence Year estimate: 2017	Either high EE or high DP or both on the MBI-HSS using established cutoffs	The physician burnout rate was 56.5 percent
Jackson, 2017	Surgical residents in the American Medical Association Physicians	Survey Prevalence Year estimate: 2016-2017	Measured using a validated tool adapted from the MBI, a high score in either of the EE or DP subcategories is considered a manifestation of professional burnout	35 percent of the residents were at high risk of burnout
Kamal, 2016	Hospice and palliative care clinicians Physicians, physician assistants, nurse practitioners, social workers Other: Nurse specialists, registered nurses, chaplains	Survey Prevalence Year estimate: 2015	Scoring 13 or higher for DP or 27 or higher for EE on the MBI	Overall burnout rate was 62 percent
Kemper, 2020 Kemper, McClafferty, 2019;	Pediatric residents across multiple programs Physicians	Survey Prevalence Year estimate: 2016, 2017, 2018	Having high subscale scores for EE ( $\geq 27$ ) and/or DP ( $\geq 13$ ) on the MBI	The prevalence of burnout was 56 percent, 54 percent, and 54 percent in 2016, 2017, and 2018, respectively

Study	Sample and Provider Type	Data Source, Incidence Prevalence, Year of Estimate	Burnout Definition	Results
Kemper, Wilson, 2019				
Knox, 2018	Primary care clinicians (physicians of family and internal medicine, physician assistants, and nurse practitioners) and staff (registered nurses, medical assistants, and administrative support) Physicians, physician assistants, nurse practitioners Other: registered nurses, medical assistants, and administrative support	Survey Prevalence Year estimate: 2016-2017	Scoring greater than or equal to 16 for EE or greater than or equal to 11 for cynicism on the 16-item MBI General Survey Answering positively to options "I am definitely burning out and have one or more symptoms of burnout, such as physical and EE"; "The symptoms of burnout that I'm experiencing won't go away. I think about work frustrations a lot"; and "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help" on a single-question item	52 percent of clinicians and 46 percent of staff reported burnout based on the MBI; 29 percent of clinicians and 31 percent of staff reported self-defined burnout
Kroll, 2020	Certified anesthesiologist assistants Physician assistants	Survey Prevalence Year estimate: 2017	Scoring high on EE and DP subscales of the MBI	24.1 percent scored high on EE, and 10.3 percent scored high on DP
Kroth, 2019	Ambulatory primary care and subspecialty clinicians (86 percent physicians), physician assistants, and nurse practitioners Physicians, physician assistants, nurse practitioners Other: DOs	Survey Prevalence Year estimate: 2016–2017	Scoring three or more on the single-item validated measure (i.e., reporting "I am definitely burning out and have one or more symptoms of burnout, such as physical and EE"; "The symptoms of burnout that I'm experiencing won't go away. I think about frustration at work a lot"; "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help") from the Physician Worklife Study	45 percent described symptoms of burnout
Lebares, 2018	General surgery residents enrolled in an accredited general surgery training program Physicians	Survey Prevalence Year estimate: 2016	Scoring high for EE or DP on an abbreviated, nine-item form of the MBI-HSS	68.95 percent of the respondents scored positive for burnout

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
LeClaire, 2019	Physicians and APPs at Hennepin Health care System Physicians, physician assistants, nurse practitioners	Survey Prevalence Year estimate: 2017	Burnout was measured with a validated single-item five-point scale question (Mini Z)	Provider burnout rates were 10 percent in intensive care units and 36 percent overall
Levin, 2017	Neurology residents and fellows, members of the American Academy of Neurology Physicians	Survey Prevalence Year estimate: 2016	Having high scores on the EE (27 and higher) or DP (10 and higher) subscales of the MBI-HSS	67.2 percent had at least one symptom of burnout
Lin, 2019	Emergency medicine residents in the United States Physicians	Survey Prevalence Year estimate: 2017	High levels of EE (27 or higher) or DP (10 or higher) measured using the MBI- HSS	76.1 percent of the respondents reported burnout
Li- Sauerwine, 2020	Emergency medicine residents Physicians	Survey Prevalence Year estimate: 2017	A score >three on either question, “I feel burned out from my work” or “I have become more callous toward people since I took this job”; a high EE ( $\geq 27$ ) or high DP ( $\geq 10$ ) score on the full MBI	77.7 percent of residents were identified as burned out using the two-question summative score, compared with 76.1 percent using the MBI
Mandeville, 2020	Licensed independent practitioners in Rhode Island Physicians	Survey Prevalence Year estimate: 2019	Scoring $\geq 3$ on the five-point validated single-item measure from the Mini Z	29.7 percent of the physicians reported symptoms of burnout
Marchalik, Brems, 2019 Marchalik, Goldman, 2019	Urology residents enrolled in an academic urology residency training program Physicians	Survey Prevalence Year estimate: 2018	Meeting the criteria for high levels of DP (10 and higher) and/or EE (27 and higher) measured with the MBI	68.2 percent met the criteria for burnout
Melnick, 2020	U.S. physicians from all specialty disciplines who were listed in the American Medical Association Physician Masterfile Physicians	Survey Prevalence Year estimate: 2017– 2018	Having a high score on the DP ( $\geq 27$ ) and/or EE subscales ( $\geq 10$ ) of the MBI	45.9 percent of respondents had at least one symptom of burnout

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Messias, 2019	Clinical providers and biomedical scientists Physicians, nurse practitioners Other: Nurses	Survey Prevalence Year estimate: 2017	Scoring 50 or greater for each dimension (personal, work-related and patient-related) on the CBI	Advanced practice nurses: 52.5 percent reported personal burnout, 55.7 percent work-related burnout, and 11.5 percent patient-related burnout; Nurses: 59.6 percent reported personal burnout, 53.1 percent work-related burnout, and 25.6 percent patient-related burnout; Physicians: 48.9 percent reported personal burnout
Moore, 2019	Female neurologists Physicians	Survey Prevalence Year estimate: 2016	Responding positively to a self-rated question of burnout from the Mini Z (options range from "I enjoy my work. I have no symptoms of burnout" to "I feel completely burned out. I am at the point where I may need to seek help")	42.6 percent of respondents reported symptoms of burnout
Morrell, 2020	Hand surgeons, active and lifetime members of the American Society for Surgery of the Hand Physicians	Survey Prevalence Year estimate: 2018	Responses to the lowest three answer options in the single burnout question of Mini Z	49 percent indicated having burnout
Ofei-Dodoo, Callaway, 2019	Residents and faculty members of the graduate medical education programs Physicians	Survey Prevalence Year estimate: 2017	Scoring high on EE and/or DP subscale of the abbreviated MBI (MBI-9)	43 percent of all respondents met the criteria for burnout
Ofei-Dodoo, Kellerman, 2019	Physicians who were active members of a medical society Physicians	Survey Prevalence Year estimate: 2018	Scoring high on EE (11 and higher) and/or DP (7 and higher) on the MBI-9	49.5 percent reported manifestations of burnout.

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Olson, 2019	Medical school faculty, hospital-employed physicians, and community-based private practitioners Physicians	Survey Prevalence Year estimate: 2016	Having either a score of score 27 or higher on EE, a score of 10 or higher on DP, or both on the MBI	Prevalence of burnout was 56.6 percent
Porter, 2018	Family medicine residency directors Physicians	Survey Prevalence Year estimate: 2016	A frequency of at least weekly on the single-item EE or DP measure adapted from the full MBI	Symptoms of high EE or high DP were reported in 27.3 percent and 15.8 percent of program directors, respectively
Puffer, 2017	Practicing family physicians Physicians	Survey Prevalence Year estimate: 2016	Responding positively to any three of five options offered for a single-item question of the Mini Z	24.5 percent reported burnout
Ramey, 2017	Radiation oncology residents invited by Association of Residents in Radiation Oncology Directors Physicians	Survey Prevalence Year estimate: 2016	Scoring high on either the EE or DP subscales of the MBI-HSS	33.1 percent experienced a high burnout level on at least one of these two MBI-HSS subscales
Rinne, 2020	VA physicians Physicians	Survey Prevalence Year estimate: 2015, 2016, 2017	Responding that either of the single-item MBI statements, "I feel burned out from my work" (EE) and/or "I worry that this job is hardening me emotionally" (DP), were true once a week or more frequently	Mean burnout rate was 37.1 percent in 2015, 36.8 percent in 2016, and 37.3 percent in 2017
Robertson, 2017	Primary care residents and teaching physicians Physicians	Survey Prevalence Year estimate: 2015	Positive responses to definitely burning out to completely burnt out on a single-item, five-point burnout scale	37 percent of the respondents indicated 1 or more symptoms of burnout
Schult, 2018	Veterans Health Administration employees Physicians Other: Nurses, other clinical staff	Survey Prevalence Year estimate: 2015	Burnout profile on the MBI represented by high DP, high EE, and low PA	8.7 percent physicians, 9.2 percent nurses and 9.2 percent other clinical staff had the withdrawing/burned out profile

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Shakir, 2018	Neurosurgery residents in an accredited U.S. neurosurgery residency program Physicians	Survey Prevalence Year estimate: 2016	Scoring high on either EE or DP subscales of the abbreviated MBI	The prevalence of burnout was 36.5 percent
Shakir, 2020	Neurosurgery residents in American Association of Neurological Surgeons database Physicians	Survey Prevalence Year estimate: 2019	Having a high score for either EE or DP on the abbreviated MBI	Burnout prevalence was 33.0 percent
Shanafelt, Sinsky, 2019 Shanafelt, West, 2019	Specialty physicians listed in Physician Masterfile of American Medical Association Physicians	Survey Prevalence Year estimate: 2,017	Having a high score on the DP (10 and higher) and/or EE (27 and higher) subscales of the MBI	43.9 percent of the physicians reported at least one symptom of burnout
Shenoi, 2018	Pediatric critical care physicians Physicians	Survey Prevalence Year estimate: 2015	Scoring high in any one of the three burnout dimensions of the MBI, severe burnout: having a high score on EE in combination with a “high negative” score on either of the two remaining MBI dimensions	49 percent scored high in at least one of the three subscales and 21 percent reported severe burnout
Simons, 2016	Residents and staff surgeons of a military orthopaedic residency program Physicians	Survey Prevalence Year estimate: Before 2016	Participants with high contribution from all three subcomponents of the MBI–Human Services Survey were considered to be experiencing burnout	Burnout was found in 7.7 percent of military orthopaedic surgeons (3.7 percent of residents and 16.7 percent of staff)
Sliwa, 2019	Physical medicine and rehabilitation physicians Physicians	Survey Prevalence Year estimate: 2018	Reporting “I am definitely burning out and have one or more symptoms of burnout, e.g., EE, “The symptoms of burnout that I am experiencing won’t go away. I think about work frustrations a lot,” or “I feel completely burned out. I am at the point where I may need to seek help” to a self-defined burnout question from the Mini Z	50.7 percent fulfilled the definition of burnout
Smeds, 2020	General surgery residents at 18 programs Physicians	Survey Prevalence Year estimate: 2018	Highest quartile of burnout scores measured using the OLBI	24.9 percent reported burnout

<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Somerson, 2020	Orthopedic surgery residents Physicians	Survey Prevalence Year estimate: 2018	Having a high score for the EE and/or DP domains on the MBI	38 percent of the respondents reported symptoms of burnout
Spinelli, 2016	Primary care providers and staff Physicians, physician assistants, nurse practitioners Other: Nurses	Survey Prevalence Year estimate: 2015	Scoring high on EE or DP subscales of the MBI	37.5 percent providers and 24.6 percent clinical assistants (registered nurses, licensed practical nurses, and certified medical assistants) reported burnout
Stearns, 2018	Military behavioral health providers Other: Behavioral health providers	Survey Prevalence Year estimate: 2017	Scoring greater than three for overall burnout (EE and disengagement) on the OLBI	23.1 percent reported overall burnout
Summers, 2019	Faculty physicians from across military health system Physicians	Survey Prevalence Year estimate: 2018	Having a high score on the EE (27 and greater) and a high score on the DP (ten and greater) subscales of the full 22-item MBI-HSS	26 percent reported burnout
Tetzlaff, 2018	Physician assistants in oncology, current or former members of the Association of Physician Assistants in Oncology Physician assistants	Survey Prevalence Year estimate: 2015-2016	Having a high score on the EE subscale (27 and greater) and/or a high score on the DP subscale (10 and greater) of the MBI	34.8 percent reported professional burnout
Waddimba, 2016	Clinicians in a rural health care network Physicians, physician assistants, nurse practitioners	Survey Prevalence Year estimate: 2015	High EE and DP measured with MBI-HSS using cutoff points in the scale's manual; responding positively (i.e., "I am definitely burning out," "Burnout symptoms won't go away," or "I am completely burned out") to a single-item burnout measure from the Physician Work Life Study; or high scores on two core items from the EE and DP subscales of the MBI-HSS	On the MBI-HSS, 36.1 percent were highly exhausted emotionally and 9.9 percent highly depersonalized; on the Physician Work Life Study measure, 32.8 percent were either "burning out" or "burned out"; on the EE core item, 36.8 percent were burned out at least once a week, and on the DP core item, 10.2 percent reported becoming "more callous towards people" on at least a weekly basis.



<b>Study</b>	<b>Sample and Provider Type</b>	<b>Data Source, Incidence Prevalence, Year of Estimate</b>	<b>Burnout Definition</b>	<b>Results</b>
Wang, 2020	Vascular surgery residents Physicians	Survey Prevalence Year estimate: 2018	Having a high level of EE or DP (i.e., occurring at least weekly) measured using two single-item measures adapted from the full MBI	30 percent met high-risk criteria for burnout
Weidner, 2018	Family physicians (who graduated from residency in 2013) Physicians	Survey Prevalence Year estimate: 2016	Reporting feeling burned out from work once a week or more often on a single item measuring the EE domain of burnout	41.9 percent reported feeling burned out from their work once a week or more
Weintraub, 2016	Neonatologists American Academy of Pediatrics, Section on Perinatal Pediatrics Neonatal Intensive Care Units (NICUs) and Neonatologists Physicians	Survey Prevalence Year estimate: 2015	Burnout was measured using a modified CFST	The prevalence of burnout was 20.8 percent
Williford, 2018	General surgery residents Physicians	Survey Prevalence Year estimate: 2016–2017	Burnout was defined by high EE or DP on the MBI	75 percent met criteria for burnout
Zhang, 2019	Breast surgeons in the American Society of Breast Surgeons Physicians	Survey Prevalence Year estimate: 2017	Scoring 1.33 or greater on the Professional Fulfillment Index assessing work exhaustion and interpersonal disengagement	41.3 percent expressed burnout

**Table A.2. Evidence Table: Risk Factors of Burnout**

**Study (design, setting):** Aggarwal, 2015 (concurrent, radiation oncology programs)

**Participants:** Physicians, directors of residency programs in radiation oncology

Number of participants recruited: 88

Number of participants evaluated: 47

**Analytic Method and Controlled Variables**

Multivariate chi-square test, Fisher exact test, t test, Pearson correlation, univariate logistic regression, multivariate logistic regression

Demographic variables (age, race, primary role, number of program residents and faculty, associate program director support, number of years on faculty previously, rank at academic institution, formal training for program director position and dealing with resident problems)

**Predictor Variables**

Demographic variables (age, race, primary role, number of program residents and faculty, associate program director support, number of years on faculty previously, rank at academic institution, formal training for program director position and dealing with resident problems); motivation for position of program director (including how the position affects their career path, program outlook, and department chair and faculty support for residency program); job satisfaction (currently, a year ago) and plans (estimated number of further years planned for serving as program director, likelihood of stepping down in the coming one to two years), self-efficacy (based on job effectiveness, professional control and efficacy regarding time management), and support (from spouse or significant other); professional stressors (impact of the ten stressors of clinical performance of resident, budget, lack of support for chairperson, adequate teaching by faculty, meeting requirements of Graduate Medical Education and Residency Review Committee of the Accreditation Council for Graduate Medical Education), program director responsibilities (portion of time spent on teaching, caring for patients, doing research, carrying out administrative duties) and salary support (stipend compensation)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for EE, DP, and PA. High burnout was defined as combined high EE, high DP, and low PA; low burnout was defined as combined low EE, low DP, and high PA; and moderate burnout was defined as everything else besides high and low burnout, with high, medium, and low burnout corresponding to those scoring in the highest third, middle third, and lowest third of the normative description, respectively.

**Results**

Job satisfaction was significantly correlated with burnout. Not having been a radiation oncology residency program director at another institution was significantly correlated with burnout (OR = 15.6) in univariate analysis.

**Study (design, setting):** Ahmed, 2020 (concurrent, hematology and medical oncology programs of Accreditation Council for Graduate Medical Education)

**Participants:** Physicians

Medical oncology fellows

Number of participants recruited: 1,674

Number of participants evaluated: 261

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Demographic variables (postgraduate year, gender, relationship or family status, educational debt level, highest education level of parents, household income in childhood), program variables (perceived adequacy of support staff, work-life integration, residency program satisfaction, on-call duties, average weekly hours worked)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and (for the multivariable analysis) defined as high EE (score above 26) in combination with either high DP (score above 9) or low PA (score below 34).

**Results**

Having a mother who graduated from college (OR = 0.27), perceiving adequate work-life balance (OR = 0.22), feeling that faculty cared about the respondent's educational success (OR = 0.16), and being in the last year of training (OR = 0.45) were negatively associated with burnout. Having a debt of \$150,000 or more (OR = 2.14) was positively correlated with burnout.

**Study (design, setting):** Allegra, 2005 (concurrent, Network for Medical Communication and Research)

**Physicians:** Oncology physicians

Number of participants recruited: 7,715

Number of participants evaluated: 1,464

**Analytic Method and Controlled Variables**

Multivariate Jonckheere-Terpstra trend test, Fisher's exact test, chi-square test, stepwise multivariate logistic regression

Location of practice and subspecialty were not statistically significant in univariate analysis, and percentage of time devoted to research was not statistically significant in multivariate analysis.

**Predictor Variables**

Colleagues with burnout, hours per week spent on patient-related activities, when completed oncology training, number of educational meetings attended in past year, number of nonweekend personal days taken in past year, percentage of time devoted to administrative activities, description of practice, number of patients seen per week, percentage of time devoted to teaching activities, percentage of time devoted to patient care activities, number of hours spent keeping up with educational needs per week, location of practice, percentage of time devoted to clinical (except patient care) or laboratory research, number of physicians in practice, definition of specialty

**Outcomes, Definition, and Operationalization**

Burnout was measured as self-reported feelings of personal burnout and perceptions of physician burnout within the oncology community.

**Results**

The highest-ranked causes for their feelings of burnout included overwork, lack of time away from the office and reimbursement concerns. The top remedies for burnout were felt to be fewer patients, more time away from the office, and increased attendance at medical meetings. The multivariate analyses demonstrated highly significant associations between burnout and hours spent on patient care, personal time off, and number of educational meetings attended.

**Study (design, setting):** Anandarajah, 2018 (concurrent, large academic center)

**Participants:** Mixture of physicians, physician assistants, nurse practitioners

Physicians and APPs from medicine, neurology, and psychiatry departments

Number of participants recruited: 528

Number of participants evaluated: 444

**Analytic Method and Controlled Variables**

Multivariate analysis of variance, general linear models, qualitative theme coding

Controlled variables unclear

**Predictor Variables**

Gender, years after training, practice characteristics (patient care, research, education, administration), full-time or part-time employment, likelihood of recommending to others the practice of medicine, type of rewarding work, morale level, top two factors making professional work difficult, top two factors sustaining sense of meaning in professional work, practical solutions to improve workplace setting, themes (lack of support, demanding workload, documentation, lack of respect, strong tone, work-life balance)

**Outcomes, Definition, and Operationalization**

Burnout was measured with a two-question version of the MBI for burnout and callousness. Burnout risk was defined as high for having burnout symptoms once or more a week, average for once or a few times a month, and low for never or a few times a year.

**Results**

Advanced practice providers had higher burnout (51.6 percent) than physicians (41.6 percent). More females (49 percent) reported being burnout than males (40 percent). Burnout increased over the first ten years of work, from 37.5 percent in the first two years to 53.5 percent in the next three years, to 55 percent over six to ten years. The percentage of providers with burnout decreased after ten years of university employment and was slowest for those at the institution for 31 years or longer (32 percent). Similarly, burnout rates were highest in six to ten years after training (54 percent) and lowest after 31 years of experience (33 percent). Burnout rates were significantly higher for those who spent over 80 percent of their time on patient care. The themes of lack of support, lack of respect, and work-life balance problems were significantly associated with burnout risk.

**Study (design, setting):** Attenello, 2018 (concurrent, American Association of Neurological Surgeons)

**Participants:** Physicians

Residents with information in the database of the American Association of Neurological Surgeons

Number of participants recruited: 1,643

Number of participants evaluated: 346

**Analytic Method and Controlled Variables**

Multivariate logistic regression in forward stepwise manner

Demographic information (age, gender, relationship status, children, number of children, postgraduate year, program location)

**Predictor Variables**

Demographic information (age, gender, relationship status, children, number of children, postgraduate year, program location), general perceptions of career (satisfaction with career as neurosurgeon, satisfaction with academic productivity, satisfaction with work-life balance, adequate time for personal growth/development, spouse understanding of work hours, affected by control over one's schedule, would choose neurosurgery again, would choose their residency program again, would recommend neurosurgery to a prospective applicant, has seriously thought of quitting, concerned about health care reform and future of medicine), historical factors (completed subinternship in one's program, adequate perception of field before applying, spent time away from education before training), program factors (position of program on original rank list, size of resident complement, social atmosphere, leadership changes, proximity of training program to immediate family), mentorship factors (any perceived benefit of mentorship relationship, as both mentee and mentor), other training factors (any other aspects of training associated with worse or better training experience), personal and professional stressors (affected in past 12–24 months)

**Outcomes, Definition, and Operationalization**

Burnout was measured with a modified version of the burnout survey for attending neurosurgeons created by McAbee et al. Burnout was defined as high EE (score of 27 or higher) and/or DP (score of 10 or higher).

**Results**

Inadequate operating room exposure (OR = 7.57), hostile faculty (OR 4.07), and social stressors outside work (OR = 4.52), and meaningful mentorship (OR = 0.338) were significantly associated with burnout among multivariate regression.

**Study (design, setting): Baer, 2017 (concurrent, New England Pediatric Residency Consortium)**

**Participants:** Physicians

Pediatric interns and residents from 11 New England Pediatric Residency Consortium programs who were not in a combined-specialty program

Number of participants recruited: 486

Number of participants evaluated: 258

**Analytic Method and Controlled Variables**

Multivariate chi-square tests and logistic regression with some variables controlled

Age, gender, and race were controlled for in the logistic regression of burnout and patient care attitude and behavior.

**Predictor Variables**

Demographic variables (gender, race, ethnicity, marital status, parental status), residency factors (training year, program size, program location, average hours worked last week, rotation schedule, total sleep hours in past week, perceived sleep deprivation, as well as relationship status, living situation, children, distance from nearest family member, income, debt burden, and—for logistic regression—patient care attitude and behavior

**Outcomes, Definition, and Operationalization**

Burnout was measured as two components adapted from the MBI—specifically, EE and DP. Burnout was defined as an affirmative answer, at least weekly, to the EE question or the question on a seven-point Likert scale.

**Results**

Younger residents (26 to 29 years old) were marginally less likely to have burnout than older residents (above 30 years old). Sleep deprivation was significantly associated with significantly greater burnout. Burnout and sleep deprivation were both associated with poor-quality patient care, with no significant interaction between burnout and sleep deprivation. In adjusted analyses, burnout was associated with significantly higher rates of suboptimal patient attitudes and behaviors in five of the seven items asked.

**Study (design and setting): Balch, Shanafelt, Sloan, 2011 (concurrent, American College of Surgeons)**

**Participants:** Physicians

American College of Surgeons member surgeons with email address on file

Number of participants recruited: 8,825

Number of participants evaluated: 536

**Analytic Method and Controlled Variables**

Demographic variables (age, marital status, profession of spouse or partner, having children, children's age), subspecialty, years in practice, weekly hours worked, weekly operating room work hours, weekly night calls, practice setting, academic rank, main method of compensation, percentage time spent on non-patient care

activities, slowdown of career advancement by committing to raising children, who cares for youngest child if ill or not in school, work-home conflict in past three weeks, how conflict was resolved, career conflict with partner or spouse, how career conflict was resolved, depression

#### **Predictor Variables**

Demographic variables (age, marital status, profession of spouse or partner, having children, children's age), subspecialty, years in practice, weekly hours worked, weekly operating room work hours, weekly night calls, practice setting, academic rank, main method of compensation, percentage time spent on non-patient care activities, slowdown of career advancement by committing to raising children, who cares for youngest child if ill or not in school, work-home conflict in past three weeks, how conflict was resolved, career conflict with partner or spouse, how career conflict was resolved, depression

#### **Outcomes, Definition, and Operationalization**

Burnout was measured with the three MBI components of EE, DP, and low PA. Burnout was defined with high DP and/or high EE as being at least one manifestation of professional burnout.

#### **Results**

Burnout was lower among surgical oncologists (36.1 percent) than among other surgeons (39.8 percent). For both burnout and depression, surgical oncology ranked in the lower third of the 14 surgical subspecialties.

**Study (design, setting):** Blechter, 2018 (concurrent, HealthyHearts NYC and a network managed by the Primary Care Information Project of the New York City Department of Health and Mental Hygiene)

**Participants:** Physicians, physician assistants, nurse practitioners

Providers in 174 small independent primary care practices participating in HealthyHearts NYC, which are members in a network managed by the Primary Care Information Project of the New York City Department of Health and Mental Hygiene

Number of participants recruited: NR

Number of participants evaluated: 235; 204 physicians, 31 nurse practitioners/physician's assistants

#### **Analytic Method and Controlled Variables**

Multivariate

N/A

#### **Predictor Variables**

Practice characteristics, number of providers, medically underserved area designation, patient-centered medical home status, Change Process Capability Questionnaire (measure of strategies for quality improvement), patient panel size, patient race/ethnicity (percentage of non-Hispanic white patients), adaptive reserve, provider characteristics, working hours per week, years in practice

#### **Outcomes, Definition, and Operationalization**

Provider burnout was assessed with a single item measure that was validated against the MBI: "Using your own definition of burnout, please indicate which of the following statements best describes how you feel about your situation at work?" Answer options included: "I enjoy my work. I have no symptoms of burnout," "Occasionally I am under stress, and I do not always have as much energy as I once did, but I do not feel burned out," "I am definitely burning out and have 1 or more symptoms of burnout, such as physical and [EE]," "The symptoms of burnout that I am experiencing will not go away. I think about frustrations at work a lot," and "I feel completely burned out and often wonder if I can go on practicing. I am at the point where I may need some changes." Consistent with previous studies, respondents were categorized as burned out if they checked one of the last three options.

#### **Results**

Adaptive reserve was negatively associated with burnout (OR 0.12; CI 0.02–0.85; P = 0.034) and other variables were not associated with burnout among bivariate analysis.

**Study (design, setting):** Block, 2013 (concurrent, three hospitals in Baltimore)

**Participants:** Physicians

First-year internal medicine residents

Number of participants recruited: 76

Number of participants evaluated: 55

#### **Analytic Method and Controlled Variables**

Multivariate chi-square tests, bivariate and multivariable linear regression, Kendall's tau b analysis

Age, gender, residency type

**Predictor Variables**

Resident schedule was measured by previous week's number of work hours, previous month's number of days off, leaving on time, overnight call rotation (working a 24-hour shift or longer at least every four days in a rotation), and adherence to Accreditation Council for Graduate Medical Education rules (leaving within 30 hours every time in the previous rotation including overnight call, working no more than 80 hours in the previous week, and having four days or more off in the previous month).

**Outcomes, Definition, and Operationalization**

Burnout was measured with a six-item modified version of the MBI questionnaire with total score ranging from 6 to 30. Scores from 13 to 17 indicated burnout and scores above 17 indicated high burnout.

**Results**

Overnight call rotation significantly predicted higher burnout, controlling for age, gender, and residency type.

**Study (design, setting): Braun, 2017 (prospective, Virginia Commonwealth University)**

**Participants:** Physicians

Internal medicine residents

Number of participants recruited: 129

Number of participants evaluated: 38

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, skewness and kurtosis tests, Mahalanobis distance tests, residual plot tests, Hosmer and Lemeshow test, hierarchical logistic regression

Gender, stress at baseline level, depression at baseline level

**Predictor Variables**

Mindfulness as measured with the short-form Five Facet Mindfulness Questionnaire (for mindfulness in observing, describing, acting with awareness, being nonjudgmental of inner experience, and being nonreactive to inner experience)

**Outcomes, Definition, and Operationalization**

Burnout was measured as the three subscales of the MBI-EE, DP, and lack of personal accomplishment. Criteria for burnout consist of high EE (score of 27 or above) or high DP (score of 10 or above) at any of the three time points 2.5 months apart when burnout was measured.

**Results**

Of the mindfulness traits, acting with awareness significantly predicted burnout, and lower dispositional mindfulness increased the probability of meeting burnout criteria. Of the internal medicine resident milestones, below-average performance in patient management with progressive responsibility and independence significantly predicted burnout, while above-average performance in accepting responsibility and following through on tasks and in effectively transitioning patients in health delivery systems significantly predicted burnout.

**Study (design, setting): Busis, 2017, LaFaver, 2018 (concurrent, American Academy of Neurology)**

**Participants:** Physicians

Neurology physicians and trainees with membership in the American Academy of Neurology

Number of participants recruited: 4,127

Number of participants evaluated: 1,671

**Analytic Method and Controlled Variables**

Multivariate chi-square test, Kruskal-Wallis test, multivariable logistic regression

Age, sex, geographical region, primary work setting, years in practice, employment status (?)

**Predictor Variables**

Career satisfaction (for career choice and specialty choice), meaning in work as measured with Empowerment at Work, satisfaction with career as measured with Physician Job Satisfaction, reasonable clerical task workload, job autonomy, meaningfulness in work, effective support staff, weekly hours worked, subspecialty in epilepsy as compared with general neurology, practice in sleep medicine, percentage of time in clinical practice, weekly number of on-call nights, weekly number of outpatients seen, age of neurologist

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI as the three domains of EE, DP, and low PA. High EE (score of at least 27), high DP (score of at least ten), or low PA (score of at least 33) indicated high burnout among that dimension.

**Results**

Clinical practice neurologists reported higher burnout, from higher EE and higher personalization, than academic practice neurologists. For academic practice neurologists, weekly numbers of work hours and percentage of clinical time were significantly associated with higher burnout, while job autonomy was significantly

associated with lower burnout. For clinical practice neurologists, number of outpatients seen was significantly associated with greater burnout, while job autonomy, meaning in work, reasonable clerical workload, effective support staff, and subspecialty in epilepsy as compared with general neurology were significantly associated with lower burnout. Additionally, number of on-call nights was also significantly associated with higher burnout, while older neurologist age was significantly associated with lower burnout.

**Study (design, setting): Campbell, 2010 (prospective, University of Colorado)**

**Participants:** Physicians

Internal medicine residents at the Denver Health Science Center of the University of Colorado

Number of participants recruited: 179

Number of participants evaluated: 86

**Analytic Method and Controlled Variables**

Multivariate chi-square test, Cochran Q test, repeated-measures analysis of variance, logistic stepwise regression

Age, primary care track at postgraduate year 3, being on-call, and hours worked per week were not statistically significant in bivariate analysis and were thus excluded from logistic regression.

**Predictor Variables**

Age, gender, primary care track at postgraduate year 3, being on-call, depression (measured at internship with a positive depression screen based on the depression section of the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire), hours worked per week

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE (score of 27 or above) or high DP (score of 10 or above). Persistent burnout was defined as burnout across all three years of residency training.

**Results**

Gender significantly predicted persistent burnout, with men constituting 64 percent of persistently burned-out residents and women constituting 61 percent of occasionally burned-out and never burned-out residents, with an odds ratio of 3.31 for men. Depression also significantly predicted burnout (OR = 4.40 for persistent burnout), and persistently burned-out residents had statistically significant more depression than other residents, with 69 percent of burned-out residents testing positive for depression and 36 percent of residents who were not persistently burned-out testing positive for depression.

**Study (design, setting): Creager, 2019 (concurrent, 2017 American Board of Family Medicine certification examination registration)**

**Participants:** Physicians

Practicing physicians seeking to continue board certification in family medicine

Number of participants recruited: 1,510

Number of participants evaluated: 1,437

**Analytic Method and Controlled Variables**

Multivariate

Personal characteristics, practice organization characteristics, practice environment characteristics (refer to Predictor variables above for details)

**Predictor Variables**

Personal characteristics (age, gender, allopathic versus osteopathic training, international medical graduate status, core faculty membership in medical school or residency), practice organization characteristics (practice type [solo private practice, group private practice, federally qualified health center, other public, hospital-owned, academic health center, health maintenance organization, federal, miscellaneous], practice ownership [self-employed, sole owner, partial owner, no ownership], practice environment characteristics [having vulnerable patients, feeling great job stress, workload control, enough time for documentation, primary work area atmosphere, alignment of professional values with department leaders, efficient care teamwork, time spent on EHRs at home, satisfaction with hours worked])

**Outcomes, Definition, and Operationalization**

Burnout was measured with an American Board of Family Medicine two-item questionnaire for EE and DP, which highly correlated with the MBI. Burnout was defined as the presence at least once a week of either feeling burned out from work or having become more callous to people since taking the job.

**Results**

Being 60 years or age or older (OR = 0.54; 95-percent CI, 0.37–0.78), being satisfied with hours worked (OR = 0.73; 95-percent CI, 0.55–0.97), having good control over workload (OR = 0.58; 95-percent CI, 0.43–0.80), having good alignment of values with department leaders (OR = 0.48; 95-percent CI, 0.36–0.62), and having enough time for documentation (OR = 0.64; 95-percent CI, 0.47–0.86) were significantly associated with less burnout. Experiencing high professional stress was associated with significantly greater burnout (OR = 3.95; 95-percent CI, 3.02–5.16).

**Study (design, setting): Cull, 2019 (prospective, American Academy of Pediatrics database)**

**Participants:** Physicians

Pediatricians who had participated in the American Academy of Pediatrics Life and Career Experiences Study

Number of participants recruited: 1,940 (2012) to 2,122 (2016)

Number of participants evaluated: 1,804

**Analytic Method and Controlled Variables**

Multivariate Mixed effects logistic regression over time, McNemar's tests, chi-square tests, t-tests

Demographic characteristics (gender, cohort, medical school location, subspecialty or no subspecialty)

**Predictor Variables**

Flexibility, busyness, change in jobs, time spent with patients, autonomy at work, increased sleep, support from colleagues, increased exercise, decreased work hours, moved to new area

**Outcomes, Definition, and Operationalization**

Burnout was measured with a single item for experiencing burnout at work and, for a cross-check subsample of 397 individuals, with the MBI for the three dimensions of EE, DP, and PA. Burnout was used to create a cumulative variable for strong agreement or agreement with experiencing burnout at any time point.

**Results**

Burnout increased up to 35 percent in 2015 and 2016. Greater flexibility in work schedule (adjusted odds ratio [AOR] = 0.28, 95-percent CI = 0.22–0.35), less work busyness (AOR = 0.28, 95-percent CI = 0.22–0.36), and job change (AOR = 0.48, 95-percent CI = 0.36–0.65) were most significantly associated with reduced burnout. Among the life changes, increased sleep (AOR, 0.62; 95-percent CI, 0.48–0.80), increased exercise (AOR = 0.70; 95-percent CI, 0.54–0.89), and becoming pregnant or having a baby (AOR, 0.68; 95-percent CI, 0.53–0.88) were associated with reduced burnout, whereas experiencing the death of a family member or close friend (AOR, 1.37; 95-percent CI, 1.06–1.79) was associated with increased burnout.

**Study (design, setting): Cydulka, 2008 (prospective, American Board of Emergency Medicine Longitudinal Study of Emergency Physicians)**

**Participants:** Physicians

Emergency medicine physicians

Number of participants recruited: 1,008

Number of participants evaluated: 740

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Career leadership, issues considered serious in day-to-day work (sufficient knowledge, energy level required for work, fatigue, sufficient time for personal life; patient acuity level, shift length, number of night shifts, opportunities to go to conferences, colleagues), work conditions/opportunities believed to exist at work position (no control over work conditions, no personal reward, emergency department census from 20,000 to 60,000)

**Outcomes, Definition, and Operationalization**

Burnout was measured with a single item: "How much of a problem is burnout among your day-to-day work for pay?"

**Results**

Taking on leadership roles in day-to-day work or organized medicine significantly negatively predicted burnout, with physicians taking on leadership roles being 40 percent less likely to report burnout as a problem. Perceived lack of control over work conditions, lack of personal reward, perceived problems of patient acuity level, shift length, number of night shifts, insufficient time for personal life, lack of energy required for work, fatigue, problematic stress, having problematic colleagues, and being unable to attend conferences were also associated with greater burnout.

**Study (design, setting): De Oliveira, Ahmad, 2011 (concurrent, American Medical Association)**

**Participants:** Physicians

Academic anesthesiology department chairpersons based on the mailing list of the 2009 to 2010 directory of the American Medical Association within Graduate Medical Education

Number of participants recruited: 117

Number of participants evaluated: 102



**Analytic Method and Controlled Variables**

Multivariate binary logistic backward regression, as well as bootstrap sampling

Age, gender, years as chairperson, weekly hours worked, department size, institutional support group, efficacy, effectiveness, job satisfaction, impact of stress on chairperson, faculty retention issues, budgeting deficits in department, high likelihood to step down within two years, family support

**Predictor Variables**

Demographic variables (age, gender, length of service in years as chairperson, department size as number of faculty, division chiefs, residents and fellows, weekly work hours, percentage of time spent on patient care, administrative duties, research, support group for chairperson at his or her medical school); work stressor-related variables consisting of current job satisfaction (currently, one year later, five years later), satisfaction with balance between professional and personal lives, self-efficacy regarding career, effectiveness as chairperson; support from spouse or significant other and family (based on items including frequency of disagreement with them over time spent on work, frequency of encouragement from them to take advantage of career opportunities)

**Outcomes, Definition, and Operationalization**

Burnout was measured with a short-version, 12-question MBI-HHS survey for the three components of DP, EE, and PA. Burnout was calculated with proportional scoring, based on which high burnout risk was defined as high EE (score above 26) and high DP (score above 12) and low PA (score of 0 to 31), and moderate burnout risk was defined as when at least two criteria for high burnout risk were met.

**Results**

Lower current job satisfaction and lower self-reported support from spouse or significant other both independently predicted burnout.

**Study (design, setting): De Oliveira, Almeida, 2011 (concurrent, academic anesthesiology department)****Participants:** Physicians

Directors of anesthesiology residency programs

Number of participants recruited: 132

Number of participants evaluated: 100

**Analytic Method and Controlled Variables**

Multivariate chi-square and Mann-Whitney U tests to compare high versus low to moderate-high risk of burnout, Kruskal Wallis H test to compare MBI subscale scores, and binary logistic regression for high versus low to moderate-high burnout with stepwise backward elimination

Controlled variables unclear

**Predictor Variables**

Age, gender, years on job as program director, weekly work hours, number of residents in program, compliance, support from family or significant others, efficacy, stressors with possible impact on job in past year and stressors' impact, current job satisfaction (currently, one year later, five years later, self-efficacy, also satisfaction with balance of professional and personal lives), family/other support likelihood to resign from job within the next one to two years, perceived control over career, effectiveness in job position

**Outcomes, Definition, and Operationalization**

Burnout was measured with a shortened, 12-question MBI-HSS. Proportional scoring was used to define burnout syndrome as high EE (score more than 26), high DP (score at least 10), and low PA (score less than 32)

**Results**

High burnout risk was significantly associated with higher likelihood of lower job satisfaction and higher likelihood of stepping down within the coming two years. Issues with compliance, self-assessed effectiveness, family or other support, perceived impact of stress—especially regarding administrative duties for compliance—and current job satisfaction predicted high burnout, and this logistic regression model had a sensitivity of 0.55 (95-percent CI of 0.34 to 0.74) and specificity of 0.99 (95-percent CI of 0.92 to 1.0).

**Study (design, setting): De Oliveira, 2013 (concurrent, American Society of Anesthesiologists)****Participants:** Physicians

Anesthesiology residents

Number of participants recruited: 2,773

Number of participants evaluated: 1,508

**Analytic Method and Controlled Variables**

Multivariate Resampling, Fisher exact test, binary logistic regression with forward and backward step elimination, principal component analysis, appropriateness of factor analysis, sampling adequacy test, split-sample validation, Pearson correlation test, Cronbach alp

Age, gender, years of training, frequency of overnight calls

**Predictor Variables**

Demographic and social and work characteristics (age, gender, relationship and parent status, number of residents in class, training year, hours of work per year, frequency of overnight calls, smoking status, alcohol weekly consumption, job satisfaction), depression (measured with the Harvard National Depression Screening Day Scale), best practice behaviors, frequency of self-reported errors

Burnout was measured using a 12-item version of the MBI for the 3 domains of EE, DP, and PA. Burnout was defined as high risk for moderate high or high scores on in two or three sub-scales. Moderate and high scores were 17–26 and 26 or higher for EE, 7 to 12 and 12 or higher for DP, and 32–38 and more than 39 for PA, respectively.

**Results**

Older providers, being female, being married, parents, nonsmokers, and modest drinkers had lower rates of burnout. Working more than 70 hours per week, having more than five drinks per week, and female gender were associated with higher burnout risk.

**Study (design, setting): Del Carmen, 2019 (prospective, academic medical practice)**

**Participants:** Physicians

Physicians at a large academic medical practice

Number of participants recruited: 1,850 (2014), 2,031 (2017)

Number of participants evaluated: 1,774 (2014), 1,882 (2017)

**Analytic Method and Controlled Variables**

Multivariate chi-square test, t test, multivariable regression

Demographic variables (gender, race, time since training, specialty)

**Predictor Variables**

Demographic variables (gender, race, time since training, specialty), career misfit, satisfaction (relationship with colleagues, quality of care, workflow, call and coverage schedule, time and resources for continuing medical education, opportunity to consult with peers, control over schedule, opportunity to impact decisionmaking, workload), agreement with (having a trusted advisor, having sufficient administrative support, administrative duty affecting ability to provide care), time spent on administrative duty

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three subscales of exhaustion, cynicism, and professional efficacy. High scores were defined as 3.0 or above in exhaustion, 2.0 or above on cynicism, and 4.0 or above in professional efficacy. Burnout was defined as a dichotomous variable of one for a high score on two of the three burnout subscales or zero otherwise.

**Results**

Early-career physicians (ten years since training) were more susceptible to burnout (OR = 1.36, 95-percent CI = 1.05–1.77) and late-career physicians (>30 years since training) were less vulnerable (OR = 0.59, 95-percent CI = 0.40–0.88) to burnout than mid-career physicians (11–20 years since training).

**Study (design, setting): Doolittle, 2020 (concurrent, American College of Physicians, Connecticut Chapter and upstate New York's Hudson Valley Region)**

**Participants:** Physicians

Attending internal medicine physicians recruited through convenience sampling

Number of participants recruited: 1,021

Number of participants evaluated: 337

**Analytic Method and Controlled Variables**

Multivariate

Demographic characteristics

**Predictor Variables**

Demographic characteristics (age, sex, income, marriage status, practice years, children, practice setting), coping strategies (measured with the COPE Inventory), resilience (measured with the Grit Scale), religious involvement (measured with the Duke University Religion Index), exercise (measured with the Rapid Assessment of Physical Activity), institutional support (a nonvalidated Likert scale instrument) and friendship (measured with a nonvalidated Likert instrument)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the ProQOL and defined as high for a score above 25 on the burnout domain of the scale.

## Results

There were significant correlations ( $p < 0.0001$ ) between grit (or resilience,  $-0.29$ ), institutional support ( $-0.35$ ), friendship ( $-0.25$ ), exercise, and coping strategies (positive coping strategies: acceptance  $[-0.19]$ , active coping  $[-0.43]$ , positive reframing  $[-0.18]$ , strategy planning  $[-0.21]$ ; negative coping strategies: denial  $[0.30]$ , disengagement  $[0.58]$ , self-blame  $0.38$ , substance abuse  $[0.12]$ , venting  $[0.12]$ ) with burnout, accounting for 55 percent of the variation of burnout.

### **Study (design, setting): Dyrbye, West, 2011 (concurrent, Department of Medicine Mayo Clinic)**

**Participants:** Physicians

Faculty physicians, specifically, academic general internists and subspecialty internists

Number of participants recruited: 566

Number of participants evaluated: 465

### **Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

### **Predictor Variables**

Demographic variables (sex, number of weeks of hospital service, number of weeks of consult service, overnight duty in house, and number of times of being called in to the hospital in the previous year), work characteristics (mean weekly work hours, inpatient roles (hospital duties in past year, number of weeks of inpatient service), procedural roles (procedural duties after hours, number of nights per year of being called in to perform procedures after hours, overnight duty in house), work or home conflict (conflict between work and personal duties in the past three weeks, how the last conflict was resolved)

### **Outcomes, Definition, and Operationalization**

Two questions corresponding to the two components of the MBI—specifically, feeling burned out from work at least weekly for EE and callousness toward people since taking on the job for DP.

## Results

Weekly work hours (1.02 OR, 95-percent CI 1.00–1.03), conflicts at work or home within the last three weeks (2.09 OR, 95-percent CI 1.10–3.97), and resolution of the conflict at work or home in favor of work (1.88 OR, 95-percent CI 1.13–3.12) were associated with burnout.

### **Study (design, setting): Dyrbye, 2013 (concurrent, all specialty disciplines)**

**Participants:** Physicians

Physicians with all specialty disciplines

Number of participants recruited: 27,276

Number of participants evaluated: 7,288

### **Analytic Method and Controlled Variables**

Multivariate Kruskal-Wallis test or chi-square test, and forward-stepping logistic model with backwards stepping

Gender and other personal and professional variables were controlled for in the logistic regression.

### **Predictor Variables**

Demographic factors (age, gender, children, marital status), weekly hours worked, overnight call frequency, specialty discipline (primary care, surgery, medicine, pediatrics), number of years in practice past residency and fellowship (early, middle, late career stage), primary practice setting (private, academic medical, veterans, military), work-home conflicts (between clinical or administrative work and personal duties in past three weeks, resolution in favor of work/personal/both duties), career satisfaction (with career, specialty, work-life balance, intent to decrease clinical work hours, intent to leave current practice, recommendation of medicine as career option to children if any), career stage (early, middle, late)

### **Outcomes, Definition, and Operationalization**

Burnout was measured with the three MBI subscales of EE, DP, and low PA. Burnout was defined as high EE (score of 27 or higher) or high DP (score of ten or higher). Being retired or not practicing was independently associated with burnout (OR = 1.93, 95-percent CI = 1.03–3.59).

## Results

Burnout was more likely among middle career than among early or late career physicians, even when analyzed by gender.

### **Study (design, setting): Dyrbye, 2018 (prospective, U.S. medical schools)**

**Participants:** Physicians

Second-year medical resident physicians identified from a stratified random sample of 49 U.S. medical schools

Number of participants recruited: 5,823

Number of participants evaluated: 3,588

### **Analytic Method and Controlled Variables**

Multivariate intraclass correlation tests, fixed-effects logistic regression with robust standard errors and adjusted by school clustering

Demographic variables (age, gender, race, marital status, parental status, born in U.S., household income in residency), educational debt, score on U.S. Medical Licensing Examination Step 1, anxiety, empathy, social support in year 4 of medical school

### **Predictor Variables**

Clinical specialty, demographic variables (sex, race), debt in education, score on U.S. Medical Licensing Examination Step 1, anxiety, empathy, social support in medical school

### **Outcomes, Definition, and Operationalization**

Burnout was measured with two single-item measures modified from the MBI.

### **Results**

Urology, neurology, emergency medicine, ophthalmology, and general surgery training were associated with higher relative risk (ranging from 1.23 to 1.48) of burnout among year 2 of residency as compared with internal medicine training. Dermatology training was associated with lower relative risk (RR = 0.60, 95-percent CI = 0.39–0.88) of burnout. Female gender (RR = 1.19, 95-percent CI = 1.09–1.29) and higher anxiety in year 4 of medical school (RR = 1.08 per increase of 1 point, 95-percent CI = 1.06–1.10, RD = 1.7 percent per increase of 1 point, 95-percent CI = 1.5–1.9 percent) were associated with higher risk of burnout. Higher empathy in year 4 of medical school (RR = 0.99 per increase of 1 point, 95-percent CI = 0.99–1.00, RD = –0.5 percent per increase of one point, 95-percent CI = –0.5 to –0.2 percent) was associated with a lower risk of burnout among residency.

### **Study (design, setting): Dyrbye, 2020 (concurrent, Redi-data database)**

**Participants:** Physician assistants, mixed sample (different types)

Physician assistants and a probability-based sample of other workers who were not physician assistants or physicians

Number of participants recruited: 2,031

Number of participants evaluated: 600

### **Analytic Method and Controlled Variables**

Multivariate

(For physician assistants only) age, gender, relationship status, parent status, hours worked in the past week, years as a physician assistants, practice setting, specialty, years in specialty area, satisfaction with work-life integration, satisfaction with work autonomy, satisfaction with collaborating physician, satisfaction with control over workload; (for physician assistants and other workers) age, gender, relationship status, hours worked per week, satisfaction with work-life integration

### **Predictor Variables**

(For physician assistants only) parent status, practice characteristics (medical and surgical inpatient, intensive care, operating or recovery room, obstetrics, ambulatory or outpatient clinic, hospice, home health, nonclinical (e.g., management), public health), specialty, satisfaction with work autonomy, satisfaction with collaborating physicians, satisfaction with workload control; (for physician assistants and other workers) demographic variables (age, gender, relationship status), number of hours worked, satisfaction with work-life integration

### **Outcomes, Definition, and Operationalization**

Burnout was defined with the MBI, based on two items of EE (feeling burned out from work) and DP (becoming more callous toward other people since starting the job) and defined as a frequency of at least once a week for either item.

### **Results**

In the study of physician assistants only, the prevalence of burnout differed across specialties, with those in emergency medicine having higher risk (overall P value 0.006, referent: primary care; emergency medicine OR 2.73, 95-percent CI 1.30–5.75; other direct care specialty OR 1.69, 95-percent CI 0.76–3.77; other/unknown work area OR 0.96, 95-percent CI 0.53–1.73; pediatric or internal medicine subspecialty OR 0.51, 95-percent CI 0.22–1.19; surgical area OR 0.88, 95-percent CI 0.48–1.63; Table 3). Physician assistants with children were less likely to have burnout than those without (OR 0.38, 95-percent CI 0.21–0.66,  $p < 0.001$ ). Physician assistants who were not satisfied with work-life integration were more likely to have burnout (OR 2.92, 95-percent CI 1.85–4.60,  $p < 0.001$ ) than those who were neutral or not satisfied with workload control (OR 4.21, 95-percent CI 2.67–6.63,  $p < 0.001$ ).

In the pooled analysis of physician assistants and other U.S. workers, older age was associated with lower odds of burnout (for every year increase in age, OR 0.99, 95-percent CI 0.98–0.99,  $p < .001$ ). Gender and relationship status were also associated with burnout, with women (OR 1.23, 95-percent CI 1.09–1.39,  $p = 0.001$ ) and single people at higher risk (overall P value 0.002, referent married; partnered OR 1.09, 95-percent CI 0.81–1.45; single OR 1.31, 95-percent CI 1.14–1.50; and widowed OR 1.19, 95-percent CI 0.75–1.89). Being neutral or not satisfied with work-life integration also predicted burnout (OR 2.86, 95-percent CI 2.52–3.24,  $p < 0.001$ ). Physician assistants were more likely to have burnout (OR 1.38, 95-percent CI 1.13–1.69,  $p = 0.002$ ) than other workers.

In multivariate analysis, working in emergency medicine and dissatisfaction with control of workload and work-life integration were independently associated with having higher odds of burnout. Physician assistants were more likely to have burnout than other workers but did not have greater struggles with work-life integration.

**Study (design, setting): Edwards, Helfrich, 2018 (concurrent, VA primary care clinics)**

**Participants:** Mixed sample (different types)

Local primary care personnel at Department of VA primary care clinics

Number of participants recruited: N/A

Number of participants evaluated: 721 primary care physicians and 598 nurses; 777 dyads in 554 teamlets

**Analytic Method and Controlled Variables**

Multivariate “multivariable logistic regression to explore associations with burnout at the respondent level”

N/A

**Predictor Variables**

A composite task delegation/reliance score was calculated from the mean of scores for respondents across all 15 tasks, and the mean task delegation/reliance score for each task and task grouping was also calculated. Other predictor variables for burnout included appropriate staffing, staff turnover, minutes in huddle, presence of PACT coach, and years at VA.

**Outcomes, Definition, and Operationalization**

Burnout was measured with a single five-point item used in the Worklife Study and several other large burnout studies among U.S. physicians and previously validated against the EE subscale of the MBI. A score of 3 or more was considered burnout.

**Results**

Among primary care physicians, composite task delegation was negatively associated with burnout (OR 0.62 for composite task delegation; CI 0.49–0.78). Having a PACT coach was associated with significantly lower burnout for primary care physicians (OR 0.62; CI 0.44–0.86).

**Study (design, setting): Elmariah, 2017 (prospective, Duke University Medical Center)**

**Participants:** Physicians

Internal medicine residents

Number of participants recruited: 3,936

Number of participants evaluated: 944

**Analytic Method and Controlled Variables**

Multivariate analysis of variance, post hoc Tukey analysis, and fixed effects and mixed effects models

Controlled variables unclear

**Predictor Variables**

Postgraduate year level, most recent rotation, duration on most recent rotation, inpatient versus outpatient rotations, type of work schedule, season of the year

**Outcomes, Definition, and Operationalization**

Burnout was measured with an abbreviated MBI and burnout severity was defined as the average of the five survey questions.

**Results**

Residency program, postgraduate level, specific rotations, and rotation type were significantly associated with burnout. Postgraduate year 2 residents had significantly more burnout, started the year with greater burnout than their counterparts, and spiked in burnout at the end of the year. Interns peaked in burnout among the middle of the academic year, then recovered after winter holidays. Postgraduate year 3 through 5 residents generally had less burnout throughout the year. Categorical residents had significantly more burnout than preliminary/combined program residents. Inpatient rotation residents had significantly higher burnout than outpatient rotation residents (difference in means 0.73). After excluding consult rotations, inpatient rotation resident burnout increased by 0.11. Among inpatient rotations, residents on general medicine rotations, including night float, had significantly more burnout. Among specific rotations, night float rotation residents had the greatest burnout (3.84 versus other inpatient rotations) and elective rotation residents had the least burnout. Inpatient rotation residents had significantly higher burnout severity than outpatient or consultation rotation residents (3.1 versus 2.2 versus 2.2), and night float rotations had the highest burnout severity (3.8).

**Study (design, setting): Elmore, 2016 (concurrent, general surgery training program)**

**Participants:** Physicians

All general surgery residents who were enrolled in a general surgery training program accredited by the Accreditation Council for Graduate Medical Education

Number of participants recruited: 753

Number of participants evaluated: 665

**Analytic Method and Controlled Variables**

Multivariate Chi-square tests, one-way analysis of variance, multivariate logistic regression, and multinomial logistic regression  
Relationship status, having children, program type, program location, and age were not associated with burnout among univariate analysis.

**Predictor Variables**

Sociodemographic variables (age, gender, marital status, family size), educational and professional variables (clinical year, research and further degrees, training interruptions and career goals, considerations of dropping out, choice of general surgery residency, training program geographic region, program type, structured mentoring program, average work hours)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the BMI for EE, DP, and PA. Burnout was defined as scores in the highest tertile of EE (27 or greater), the highest tertile of DP (10 or greater), or the lowest tertile of PA (34 or greater).

**Results**

Age, female gender, absence of a structured mentoring program, and longer work hours were more likely to meet the criterion for burnout. Chief residency position and plans for academic careers were less likely to meet the criterion for burnout. In multinomial logistic regression, longer work hours met criterion for burnout on two subscales as compared with one subscale (odds ratio 1.043, 95-percent CI 1.013–1.074). No variables were independently associated with burnout on all three MBI scales as compared with either one or two MBI scales.

**Study (design, setting): Fargen, 2019 (concurrent, neurointerventional physician societies)****Participants:** Physicians

Neuro-interventional physicians

Number of participants recruited: 557

Number of participants evaluated: 320

**Analytic Method and Controlled Variables**

Multivariate Pearson correlation, Kendall's tau rank correlation, chi-square test, stepwise multiple logistic regression

Number of hospitals covered, practice setting, feeling of underappreciation by hospital or department leadership, and extra payment for neurointerventional call were the predictor variables used in the final logistic regression model.

**Predictor Variables**

Training background, practice setting, years of independent practice, neurointerventional call frequency, presence of a senior partner to help with decision-making, number of hospitals covered on call, professional satisfaction (life happiness, career choice happiness (work duties affecting personal/family lives, feeling underappreciated by leadership of hospital or department, consideration of quitting career), compensation (inadequate compensation for work, additional payment for neurointerventional calls), workload (mechanical thrombectomy and ruptured and unruptured aneurysm treatment procedures expected next year)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE (composite score of 27 or above) and/or high DP (composite score of 10 or above).

**Results**

The feeling of underappreciation by hospital leadership (OR = 3.71) and covering more than one hospital on call (OR = 1.96) were strongly associated with burnout among multiple logistic regression. Extra compensation for a call was an independent negative predictor for burnout (OR = 0.70).

**Study (design, setting): Firulescu, 2019, Firulescu, 2020 (concurrent, teaching hospital)****Participants:** Physicians

Medical residents

Number of participants recruited: N/A

Number of participants evaluated: 62

**Analytic Method and Controlled Variables**

Multivariate hierarchical multiple regression

Depression, anxiety, personal bullying, interpersonal rejection sensitivity, perceived stress scale

**Predictor Variables**

Depression, anxiety, workplace bullying, personal bullying, interpersonal rejection sensitivity, perceived stress scale, trait forgiveness, anxiety, depression

**Outcomes, Definition, and Operationalization**

Work burnout was measured with the MBI.

## Results

Anxiety and trait forgiveness significantly predicted work burnout, contributing to 10.4 percent and 17.5 percent of work burnout variance, respectively.

**Study (design, setting): Gabbe, 2002 (concurrent, obstetrics and gynecology academic departments)**

**Participants:** Physicians

Chairs of obstetrics and gynecology academic departments in the U.S. and Puerto Rico, based on 2000–2001 directory of American Medical Education in the Association of American Medical Colleges and membership of Council of University Chairs of Obstetrics a

Number of participants recruited: 131

Number of participants evaluated: 119

### **Analytic Method and Controlled Variables**

Multivariate chi-square tests and t tests or ANOVA, Student-Newmann-Keuls post hoc comparisons, Fisher exact tests, and logistic regression with significant covariates

The impact of current problems on the chair, the balance between personal and professional lives, and support from a spouse or partner were adjusted for in the logistic regression of burnout on self-efficacy.

### **Predictor Variables**

Demographic variables (duration of service as chair; department size; weekly hours worked; time spent on administration, caring for patients, teaching, research); potential stressors (budget deficits of hospital, budget deficits of departments, billing audits for Medicare and Medicaid, loss of important faculty, disputes of union, dismissal of staff, dismissal of faculty or resident, malpractice defendant, dispute with dean, dispute regarding tenure or promotion, dispute regarding credentialing—identified from a list of 15 potential stressors), job satisfaction (currently, one year ago, five years ago), likelihood of stepping down as chair in the coming one to two years, satisfaction with balance of personal and professional life, stress coping methods, presence of chair support group at institution; professional life self-efficacy, effectiveness

### **Outcomes, Definition, and Operationalization**

Burnout was measured as the three subscales of the MB—specifically, EE, DP, and PA. High burnout was defined as high EE, high DP, and low PA. Low burnout was defined as high PA, low EE, and low DP. Stratifying further, low-moderate burnout was defined as low scores on one or two subscales. Moderate-moderate burnout was defined as moderate scores on all three subscales or else a high score on one subscale, a moderate score on another, and a low score on the third. High-moderate burnout was defined as high scores on two subscales or high on one subscale and moderate on two others. Upon revision, burnout was stratified as low burnout (original low burnout and low-moderate burnout), moderate burnout (original moderate-moderate burnout), and high-burnout (original high burnout and original high-moderate burnout).

## Results

(Revised) high burnout was associated with significantly less time having been a chair as compared with low burnout. High burnout was associated with significantly younger age than for moderate or low burnout. Low burnout was associated with being less affected by stressors and being more satisfied with balance between personal and professional lives than for moderate or high burnout. High burnout was associated with lower self-reported effectiveness as chair than for moderate or low burnout. Burnout was inversely associated with self-efficacy. High burnout was associated with significantly lower support from a spouse or partner than for moderate or low burnout. Meanwhile, when adjusting for impact of current problems on the chair, the balance between personal and professional lives, and support from a spouse or partner, high burnout given low self-efficacy had an OR of 3.5 (1.0–212.4) as compared with given high self-efficacy. High burnout given low support from a spouse or partner had an odds ratio of 7.5 (2.3–24.1) as compared with given high support from a spouse or partner.

**Study (design, setting): Gardner, 2019 (concurrent, Rhode Island Department of Health)**

**Participants:** Physicians

Physicians who provide direct patient care with active Rhode Island licenses and addresses in Rhode Island or adjacent states (Connecticut or Massachusetts)

Number of participants recruited: 4,197

Number of participants evaluated: 1,792

### **Analytic Method and Controlled Variables**

Multivariate chi-square tests, multivariable logistic regression, sensitivity analyses including ordered logit sensitivity analysis

Demographic characteristics (age, gender, practice setting, size of practice, type of provider, type of degree), other technology-related variables (use of EHRs improves communication with physicians and staff, EHRs improves patient care, use of EHRs improve clinical workflow, use of EHRs improves job satisfaction)

### **Predictor Variables**

Stress related to use of health information technology (EHRs adding to daily frustration, enough time for documentation, amount of time spent on EHRs at home)

**Outcomes, Definition, and Operationalization**

Burnout was measured using a single five-point item from the Mini Z instrument from the Physician Work Life Study for measuring symptoms of burnout

**Results**

Poor/marginal time for documentation was associated with higher burnout risk (OR = 2.8, 95-percent CI = 2.0–4.1), moderately high/excessive time spent on EHRs at home (OR = 1.9, 95-percent CI = 1.4–2.8), and EHRs adding to daily frustration (OR = 2.4, 95-percent CI = 1.6–3.7) were associated with higher burnout risk

**Study (design, setting): Gleason, 2020 (concurrent, large academic surgery program)**

**Participants:** Physicians

General surgery residents

Number of participants recruited: 69

Number of participants evaluated: 60

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Emotional intelligence (measured using the Trait Emotional Intelligence Questionnaire Short Form for overall score and components of well-being, self-control, emotionality, and sociability), disruptive behaviors (measured using the Association of American Medical Colleges Graduation Questionnaire for public humiliation, credit for work taken by others, assignment of work for punishment, physical abuse, threats to career, gender-based discrimination, racial discrimination, or discrimination based on sexual orientation in the past six months), perceptions of job resources (measured using the Job Demands-Resources Scale resources subscale for autonomy, social support, meaningful feedback, professional development opportunities)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI and defined as high EE (score of 27 or higher) or high DP (score of 10 or higher). Burnout was defined as an element of compassion fatigue because of hopelessness or difficulties when dealing with work.

**Results**

Residents with burnout had lower emotional intelligence (5.64 versus 5.18,  $p = 0.0021$ ) as well as lower emotionality (5.14 versus 5.65,  $p = 0.0165$ ) and lower well-being (5.58 versus 6.1,  $p = 0.0037$ ) than those without burnout. Residents who experienced disruptive behavior at work were more likely to be at high risk for burnout than those who did not (68.2 percent versus 31.8 percent,  $p = 0.0103$ ). Residents with high burnout scores had lower perceptions of job resources (19 versus 26,  $p = 0.0038$ ) as well as lower perceptions of meaningful feedback (2 versus 3,  $p = 0.0004$ ) and professional development (3 versus 3.5,  $p = 0.0082$ ).

**Study (design, setting): Glover-Stief, 2021 (concurrent, Facebook page for nurse practitioners)**

**Participants:** Nurse practitioners

Nurse practitioners currently in practice recruited from a nurse practitioner Facebook page

Number of participants recruited: 238

Number of participants evaluated: 208

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Potential protective factors of practice state levels (in full, restricted, reduced), education level, practice specialty, mindfulness practice (meditative practice), social support (feelings of support from family and friends, coworkers, work direct management, work administration), physical activity (aerobic activity)

**Outcomes, Definition, and Operationalization**

Burnout was one of the three components (compassion satisfaction, burnout, secondary traumatic stress) measured by ProQOL. Burnout was defined as an element of compassion fatigue because of hopelessness or difficulties when dealing with work.

**Results**

There was a significant association between burnout and engaging in meditative practices ( $p = 0.042$ , Cramer V = 0.219). Participants who engaged in meditative practices at least three times a week had lower rates of burnout (14 [46.7 percent], 12 [70.6 percent], 23 [63.9 percent]). Burnout was correlated with support from family and friends ( $p < 0.001$ , Cramer V = 0.37), support from coworkers ( $p < 0.001$ , Cramer V = 0.44), support from work direct management ( $p < 0.001$ , Cramer V = 0.339), and support from work administration ( $p < 0.001$ , Cramer V = 0.348). Support from family and friends was significantly associated with burnout and had a large effect size, with 42 (68.9 percent) of participants having lower burnout rates and 45 (57.0 percent) having support on most or all days.



**Study (design, setting) Goldberg, 1996 (concurrent, American College of Emergency Physicians)**

**Participants:** Physicians

Physician registrants at the Annual Scientific Assemblies of the American College of Emergency Physicians

Number of participants recruited: N/A

Number of participants evaluated: 1,272

**Analytic Method and Controlled Variables**

Multivariate chi-square test, stepwise logistic regression

Controlled variables unclear

**Predictor Variables**

Gender, marital status, age, board certification, group membership, number of shifts per month, number of night shifts per month, years in practice, will practice emergency medicine in five years, will practice emergency medicine in ten years, would advise friend to pursue emergency medicine, practice clinical emergency medicine, sought therapy, residency year, number of cigarette packs smoked, alcohol consumption more than once a week, trouble sleeping at night, trouble staying asleep, self-assessed burnout, frequency of exercise, minutes of exercise per session, subspecialty satisfaction, ancillary service satisfaction, career satisfaction, income satisfaction, body weight, body fat, job involvement, systolic blood pressure, diastolic blood pressure, serum cholesterol level, productivity level

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and burnout raw scores were converted to eight phases, with low degree for phases I–III, moderate degree for phases IV–V, and high degree for phases VI–VIII.

**Results**

Self-recognition of burnout, lack of job involvement, negative self-assessment of productivity, career dissatisfaction, sleep disturbances, more shifts per month, specialty service dissatisfaction, intent to leave practice within ten years, greater alcohol consumption, and lower levels of exercise were significantly correlated with burnout.

**Study (design, setting): Green-McKenzie, 2020 (concurrent, American College of Occupational and Environmental database)**

**Participants:** Physicians

Active members of American College of Occupational and Environmental with an MD or DO degree and practicing medicine in continental U.S. or in Alaska, Hawaii, or Puerto Rico

Number of participants recruited: 2,398

Number of participants evaluated: 481

**Analytic Method and Controlled Variables**

Multivariate

Demographic variables (unspecified which), social support factors (having someone to tell private worries and fears to, being able to relax and have fun outside work, being happy with financial resources, feeling life relationships are filled with love)

**Predictor Variables**

Gender, age, patient care hours; practice setting (government/military, private medical center group, employed occupational medicine, hospital/medical center group, academic (nonresident), corporate medicine, other practice type, self-employed, consultant); social support factors (having someone to tell private worries and fears to, being able to relax and have fun outside work, being happy with financial resources, having someone to help with chores if sick, drawing satisfaction from friends, feeling life relationships are filled with love, being satisfied with family relationship, having someone to help with suggestions for personal problems, finding someone to watch movies with, feeling goals and values are important in life)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI and defined as high EE (score of 27 or higher) or high DP (score of 10 or higher).

**Results**

Women, greater age and clinical patient hours were each associated with greater odds of burnout. Burnout was highest in government practice settings (48 percent), followed by private medical center groups (46 percent), employed occupational medicine (45 percent), and hospital or medical center groups (42 percent), and lowest in consulting (15 percent). As for social support, physicians with burnout were significantly less likely to report having relationships that are filled with love, having someone to help with chores if sick, or having someone to tell personal worries and fears to ( $p < 0.0001$ ). They were also significantly less likely to report feeling that goals and values are important in their lives ( $p < 0.004$ ). Physicians with burnout were significantly more likely to report being dissatisfied with family relationships, being unhappy with financial resources, and feeling goals and values were unimportant ( $p < 0.0001$ ). Adjusting for demographics, the odds of burnout increased with younger age, not having someone to tell personal worries and fears to, being unable to relax and have fun outside work, being dissatisfied with financial resources and feeling life

relationships were not filled with love. Common themes for sources of burnout were stress from personal health, having to take care of elderly parents, and having to maintain board certification credits.

**Study (design, setting): Gribben, Kase, 2019 (concurrent, pediatric critical care practices)**

**Participants:** Physicians

Pediatric critical care fellows and attending physicians

Number of participants recruited: 1,705

Number of participants evaluated: 609

**Analytic Method and Controlled Variables**

Multivariate hierarchical linear regression, following preliminary tests for normality, linearity, multicollinearity, homoscedasticity

Gender

**Predictor Variables**

Gender, compassion satisfaction, compassion fatigue, physical exhaustion, emotional depletion, distress (clinical situation, physical work environment, administrative issues, coworkers, health), coping with work stress (creative arts, socialization with family/friends, not talking about work-related issues), number of in-house calls per month, formal training (bereavement counseling, self-care), prepared for didactics on the day the survey was done, cared for critically ill child in past month, number of debriefing after patient death, number of debriefing after traumatic clinical event, palliative care involvement with care of critically ill patients, palliative care team involved during delivery of bad news, number of children in household, living alone

**Outcomes, Definition, and Operationalization**

Burnout was measured with a slightly modified version of the 66-item CFST for the three subscales of compassion fatigue, burnout, and compassion satisfaction.

**Results**

Compassion fatigue, distress about administrative issues and/or coworkers, preparing for didactics on the day the survey was done, and feeling that self-care was not a priority were statistically significant predictors of burnout among the final hierarchical linear regression model, contributing to 66 percent of the total variance in burnout. Female gender, compassion satisfaction, and distress because of physical work environment were significant independent predictors of lower burnout. Thus, the largest predictors of burnout were compassion fatigue and compassion satisfaction, with all other significant factors contributing another 6 percent of the variance in burnout after controlling for compassion fatigue and compassion satisfaction.

**Study (design, setting): Gribben, MacLean, 2019 (concurrent, accredited fellowship programs for Pediatric Emergency Medicine through the Accreditation Council for Graduate Medical Education)**

**Participants:** Physicians

Pediatric emergency medicine physicians

Number of participants recruited: 1,716

Number of participants evaluated: 518

**Analytic Method and Controlled Variables**

Multivariate

Sex, race, household members, provider type, years as an attending, academic center, urban/rural

**Predictor Variables**

Physical exhaustion, emotional depletion, distress, and coping/self-care

**Outcomes, Definition, and Operationalization**

Compassion fatigue score, burnout, and compassion satisfaction scales on the CFST

**Results**

Compassion fatigue score, emotional depletion, and distress because of coworkers were each significant determinants of higher burnout.

**Study (design, setting): Hamm, 2020 (concurrent, large tertiary care center)**

**Participants:** Physicians

Millennial and Generation X residents and fellows, except for trainees in radiology and family practice, at a large tertiary care center

Number of participants recruited: 930

Number of participants evaluated: 588

**Analytic Method and Controlled Variables**

Multivariate

Gender, race, postgraduate year

**Predictor Variables**

Generation affiliation (Millennial, Generation X), race, gender, postgraduate year

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI and calculated as a burnout score and as the three subscales of EE, DP, and PA.

**Results**

In the adjusted model, postgraduate year level was significantly associated with burnout rate ( $p = 0.001$ ), with postgraduate year four and above trainees having lower burnout rate than postgraduate year 1 trainees.

**Study (design, setting): Harris, 2018 (concurrent, Rhode Island Department of Health)**

**Participants:** Nurse practitioners

Advanced practice registered nurses

Number of participants recruited: 1,197

Number of participants evaluated: 371

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, Fisher's exact tests, multivariable logistic regression with some controlled variables

Demographic variables (age, gender), practice characteristics (practice setting, practice size, use medical scribe), other EHR-related stress measures

**Predictor Variables**

Electronic health record-related stress measures (contributes to daily frustration, enough time for documentation, time spent on EHRs at home) which were adapted from the Mini Z survey

**Outcomes, Definition, and Operationalization**

Burnout was measured with the ten-item Mini Z survey from the Physician Work Life Study for burnout symptoms.

**Results**

Insufficient time for documentation (adjusted odds ratio [AOR] = 3.72, 95-percent CI = 1.78–7.80) and EHR adding to daily frustration (AOR = 2.17, 95-percent CI = 1.02–4.65) significantly predicted burnout among adjusted multivariate logistic regression.

**Study (design, setting): Hillhouse, 2000 (prospective, southeastern internal medicine and residency programs)**

**Participants:** Physicians

1st-year to 4th-year resident physicians

Number of participants recruited: 46

Number of participants evaluated: 40

**Analytic Method and Controlled Variables**

Multivariate moderated hierarchical regression analysis

Gender, specialty, and citizenship were controlled for in the regression of work dissatisfaction and unprofessional patient relationship subscales onto predictors of perceived stress, specifically, hours worked, hours on call, and hours slept and resident stress scores.

**Predictor Variables**

Gender, perceived stress (based on total hours of work, hours on call, average nightly hours of sleep; patient, competency, time issues using a modified Simpson and Grant scale; and perceived stress using the Perceived Stress Scale)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the 30-item Staff Burnout Scale for Health Professionals consisting of the four subscales of work dissatisfaction, psychological and interpersonal tension, physical illness and distress, and unprofessional relationships with patients. Burnout was measured as a single outcome variable and consisted of two types, job-related burnout and patient-related burnout. Burnout was defined as a total score of 20 for no burnout and a total score of 140 for severe burnout.

**Results**

An examination of the association between time two perceived stress and time three burnout showed that higher perceived stress and male gender significantly predicted both job burnout and patient burnout, contributing to 31 percent of the variance of job burnout and 37 percent of the variance of patient burnout.

**Study (design, setting): Hughes, 2020 (retrospective, Society for Maternal-Fetal Medicine)**

**Participants:** Physicians

All regular, associate, and affiliate members of the Society for Maternal-Fetal Medicine who live in the United States with a working e-mail address

Number of participants recruited: 1,220

Number of participants evaluated: 564

**Analytic Method and Controlled Variables**

Multivariate

Self-identified gender, years in practice, career stage, time spent charting after work hours, in-house call, marital status, number of children, exercising, and satisfaction with supervisor and career

**Predictor Variables**

Demographics, self-perception of burnout, less career satisfaction, after-work charting, fewer years in practice, and dissatisfaction with supervisor

**Outcomes, Definition, and Operationalization**

Burnout was defined as either high EE or high DP or both using established cutoffs.

**Results**

Factors associated with burnout included female gender, being five to 20 years in practice, self-perceived burnout, being somewhat or very dissatisfied with career or supervisor and charting for more than four hours per day.

**Study (design, setting): Hyman, 2017 (concurrent, American Society of Anesthesiologists)**

**Participants**

Physicians

Participants at webinar co-sponsored by American Society of Anesthesiologists and Anesthesiology journal, 99 percent physicians

Number of participants recruited: 221

Number of participants evaluated: 170

**Analytic Method and Controlled Variables**

Multivariate adjusted linear regression, residual diagnostics, parametric bootstrap method to assess statistical power

Controlled variables unclear

**Predictor Variables**

Physical health and mental health (measured with the SF-12 subset of the Short-Form Health Survey SF-36), social support and personal coping (measured with the Social Support and Personal Coping SSPC-25 survey for work satisfaction, workload and work control, professional support, personal satisfaction), substance use for tobacco and alcohol and cannabis (last year, in past five years, and ever used), demographic variables (age, gender, job title, work area)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the full 22-item MBI. Burnout was operationalized as high on EE, and DP and low on PA.

**Results**

Male gender (adjusted regression coefficient = 0.300, 95-percent CI = 0.032–0.568,  $p = 0.03$ ), mental health (–0.047, –0.059–0.035,  $p < 0.01$ ), and physical health (–0.025, –0.039–0.010,  $p < 0.01$ ) were significantly associated with burnout total score.

**Study (design, setting): Jackson, 2017 (concurrent, American Medical Association)**

**Participants:** Physicians

Surgical residents in the American Medical Association

Number of participants recruited: 3,349

Number of participants evaluated: 582

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Screening positive for PTSD, at risk for PTSD (both measured with the Primary Care PTSD Screen)

**Outcomes, Definition, and Operationalization**

Burnout was measured from a tool adapted from the MBI and scores were calculated for EE, DP, and overall burnout. Professional burnout was defined as either high EE (high score) or high DP (high score).

**Results**

Screening high-risk for professional burnout ( $p < 0.001$ ) was associated with a higher prevalence of screening positive for PTSD. Even simply being “at risk” for PTSD was associated with high risk for professional burnout ( $p < 0.001$ ).

**Study (design, setting): Janko, 2019 (concurrent, all vascular surgeons in the United States)**

**Participants:** Physicians

Vascular surgery trainees

Number of participants recruited: 514

Number of participants evaluated: 177

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, univariate and multivariate logistic regression

Gender, mentor, social events sponsored by program, marital status, children, friends outside medicine, unhealthy alcohol use, resident/training status, educational events sponsored by program, final-year training, would choose vascular surgery again

**Predictor Variables**

Perceived stress (measured with the Perceived Stress Scale for perception of stress), depression (measured with the Patient Health Questionnaire for Depression and Anxiety for frequency of symptoms of depression or anxiety), self-efficacy (measured with the New General Self-Efficacy Scale), social support (measured with the short version of the Medical Outcomes Study Social Support Scale)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the 16-item Oldenberg Burnout Inventory for EE and DP. Burnout was calculated as a total sum score.

**Results**

Greater depression (OR = 1.6) and perceived stress (OR = 1.2) were associated with higher burnout, and lower perceived stress (OR = 0.67) was associated with lower burnout among multivariate analysis.

**Study (design, setting): Kamal, 2016 (concurrent, American Academy of Hospice and Palliative Medicine)**

**Participants:** Mixed sample (different types)

Clinician members of the American Academy of Hospice and Palliative Medicine, 68 percent physicians

Number of participants recruited: 4,456

Number of participants evaluated: 1,357

**Analytic Method and Controlled Variables**

Multivariate Spearman correlation tests, bootstrap multivariable stepwise logistic regression

Marital status, children at home, colleagues in practice (three or less versus four or more), physician versus nonphysician, weekly hours worked (greater than 50 versus fewer than 50), and age (under 50 versus 50 or older) were variables used in multivariable logistic regression.

**Predictor Variables**

Marital status, children at home, colleagues in practice (three or less versus four or more), physician versus nonphysician, weekly hours worked (greater than 50 versus fewer than 50), age (under 50 versus 50 or older)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI-HSS and was defined as high EE (score of 27 or higher) or high DP (score of 13 or higher)

**Results**

Working at least 50 hours per week (versus less than 50 hours per week, OR point estimate = 1.672, 95-percent CI = 1.245 to 2.246), working with fewer colleagues (three or fewer versus four or more, OR 1.657, 95-percent CI 1.253–2.192), being younger (under 50 years of age versus 50 or older, OR = 1.914, 95-percent CI = 1.454–2.521), being a nonphysician (not MD nor DO, OR = 1.959, 95-percent CI = 1.439–2.665), and working on weekends often or all the time (versus other, OR = 1.648, 95-percent CI = 1.240–2.188) were associated with burnout among multivariable logistic regression. Younger (under 50 years of age) nonphysicians who worked for over 50 hours a week, worked with fewer colleagues, and worked on weekends often exhibited the highest burnout risk.

**Study (design, setting): Kashani, 2015 (concurrent, tertiary care academic medical center)**

**Participants:** Physicians

Critical care fellows at a tertiary care academic medical center

Number of participants recruited: 58

Number of participants evaluated: 21

**Analytic Method and Controlled Variables**

Multivariate ANOVA, t-test, Wilcoxon rank-sum test, with Bonferroni adjustments

Gender, age, fellowship type, fellowship stage, fellowship training year were the variables for stratification.

**Predictor Variables**

Gender, age, race, fellowship type, fellowship stage, fellowship training year, gratitude (measured with the Gratitude Questionnaire-Six Item Form), life satisfaction (measured with the Satisfaction with Life Scale, happiness (measured with the Subjective Happiness Scale), and perceived stress (measured with the 14-item Perceived Stress Scale).

**Outcomes, Definition, and Operationalization**

Burnout was measured with an abbreviated MBI for EE and DP.

**Results**

Asian fellows reported significantly lower burnout and graduating fellows reported significantly higher burnout than new and transitioning fellows.

**Study (design, setting):** Kemper, 2020; Kemper, McClafferty, 2019; Kemper, Wilson, 2019 (prospective, Longitudinal Educational Assessment Research Network of the Association of Pediatric Program Directors, consisting of 34 residency programs in 2016, 43 in 2017, and 49 in 2018)

**Participants:** Physicians

Residents in categorical or combined programs at sites of the Longitudinal Educational Assessment Research Network of the Association of Pediatric Program Directors

Number of participants recruited: 9,653

Number of participants evaluated: 6,058

**Analytic Method and Controlled Variables**

Multivariate

Burnout in 2017, risk factors in 2018

**Predictor Variables**

Demographic characteristics, program characteristics, personal qualities, experiences, support satisfaction, work-life balance, learning environment, mindfulness, self-compassion, stress

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE (score of 27 or above) and/or high DP (score of 13 or above).

**Results**

Perceived stress (2016 AOR 2.4 [1.9–2.9], 2017 AOR 2.1 [1.7–2.5], 2018 AOR 1.7 [1.4–2.0], sleepiness (2016 AOR 1.2 [1.1–1.4], 2017 AOR 1.3 [1.15–1.5], 2018 AOR 1.3 [1.2–1.5], work-life balance dissatisfaction (2016 AOR 1.6 [1.1–2.3], 2017 AOR 2.1 [1.5–2.8], 2018 AOR 1.9 [1.4–2.5]), and recent medical error (2016 AOR 1.4 [1.02–2.0], 2017 AOR 1.4 [1.1–1.9], 2018 AOR 1.6 [1.2–2.2]) were significantly associated with a greater risk of burnout. Empathy (2016 AOR 0.67 [0.6–0.8], 2017 AOR 0.7 [0.6–0.75], 2018 AOR 0.7 [0.6–0.8]), self-compassion (2016 AOR 0.8 [0.6–0.9], 2017 AOR 0.8 [0.7–0.9], 2018 AOR 0.7 [0.6–0.8]), quality of life (2016 AOR 0.7 [0.6–0.9], 2017 AOR 0.8 [0.7–0.99], 2018 AOR 0.7 [0.6–0.9]), and confidence in providing compassionate care (2016 AOR 0.8 [0.7–0.98], 2017 AOR 0.8 [0.7–0.9], 2018 AOR 0.9 [0.8–0.99]) were significantly associated with a lower risk of burnout ( $p < 0.05$ ). Controlling for burnout among 2017 burnout and risk factors (such as recent error, sleepiness, rotation, time off) in 2018, quality of life in 2017 was associated with burnout among 2018. After controlling for baseline burnout levels in linear mixed-model regression analyses, mindfulness in 2016 was protective for levels of stress and confidence in providing care in 2017. Self-compassion in 2016 was protective for burnout, stress, and confidence in providing compassionate care in 2017.

**Study (design, setting):** Kimo Takayesu, 2014 (concurrent, Northeast, Midwest, South)

**Participants:** Physicians

Emergency medicine residents from eight training programs across the Northeast, Midwest, Southern U.S.

Number of participants recruited: 289

Number of participants evaluated: 142

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, two-tailed t-tests

Medical degree, postgraduate year, age, gender, marital status, number of children

**Predictor Variables**

Intolerance of uncertainty, reluctance to reveal mistakes to patients, job satisfaction

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three dimensions of EE, DP, and decreased PA.

**Results**

Having a significant other or spouse yielded a significantly higher prevalence of burnout (60 percent versus 40 percent for single), with such male residents having a higher prevalence of burnout (80 percent versus 65 percent for females, 57 percent for single females, and 53 percent for single males). Poor job satisfaction (in terms of administrative autonomy, clinical autonomy, and global satisfaction) and intolerance of uncertainty were significantly correlated with burnout.

**Study (design, setting):** Kroth, 2019 (concurrent, Stanford Hospital and Clinics: University of New Mexico; and Centura Health Physician Group, Westminster, Colorado)

**Participants:** Mixture of physicians, physician assistants, nurse practitioners

Physicians and advanced practice clinicians, including

nurse practitioners and physician assistants

Number of participants recruited: 640

Number of participants evaluated: 282

**Analytic Method and Controlled Variables**

Multivariate

Age, sex, race/ethnicity, clinician type, practice type, roles, patient panel complexity, intent to stay, time for personal and family life, workload control

**Predictor Variables**

Work conditions, EHR design and use factors, and coping strategies

**Outcomes, Definition, and Operationalization**

Stress level with four-item validated measure and burnout with a single item from the Physician Worklife Study (score of three or more indicates burnout)

**Results**

Overall, EHR design and use factors accounted for 12.5 percent of variance in measures of stress and 6.8 percent of variance in measures of burnout. Work conditions, including EHR use and design factors, accounted for 58.1 percent of variance in stress; key work conditions were office atmospheres control of workload, and physical symptoms attributed to EHR use. Work conditions accounted for 36.2 percent of variance in burnout, where challenges included chaos (adjusted odds ratio, 1.39; 95-percent CI, 1.10–1.75;  $p = .006$ ) and physical symptoms perceived to be from her use (adjusted odds ratio, 2.01; 95-percent CI, 1.48–2.74;  $p < .001$ ). Coping strategies were associated with only 2.4 percent of the variability in stress and 1.7 percent of the variability in burnout.

**Study (design, setting):** Kuerer, 2007 (concurrent, Society of Surgical Oncology)

**Participants:** Physicians

Members of the Society of Surgical Oncology

Number of participants recruited: 1,519

Number of participants evaluated: 549

**Analytic Method and Controlled Variables**

Multivariate Cochran-Armitage trend test, simple linear regression, stepwise logistic regression

Controlled variables unclear

**Predictor Variables**

Age, gender, having children, mental and physical quality of life (measured with the Medical Outcomes Study Short Form), current practice setting (private), years since training, hours worked per week, cases per week, nights on call per week, percentage of time devoted to research, depression (measured with the Primary Care Evaluation of Mental Disorders), alcohol use and dependence (measured with items from the Alcohol Use Disorders Identification Test), choice to be a physician again, choose to be a surgical oncologist again

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three domains of EE, DP, and low PA.

**Results**

Burnout was more common among respondents age 50 years or younger (31 percent versus 22 percent;  $p = .029$ ) and women (37 percent versus 26 percent;  $p = 0.031$ ). Factors associated with a higher risk of burnout on multivariate analysis were devoting less than 25 percent of time to research, had lower physical quality of life, and were age 50 years or younger. Burnout was associated with lower satisfaction with career choice.

**Study (design, setting):** Kuhn, 2009 (concurrent, American College of Emergency Physicians)

**Participants:** Physicians

American College of Emergency Physicians members with a mailing address and in active practice of emergency medicine

Number of participants recruited: 450

Number of participants evaluated: 193

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, t-tests or Wilcoxon rank sum tests, multivariable logistic regression

All predictor variables other than high anxiety because of concern for poor outcomes—satisfaction with autonomy in administrative work, autonomy in clinical work, resources available, relationships at work, lifestyle satisfaction, challenges of practicing emergency medicine; demographic characteristics; anxiety because of uncertainty, reluctance in disclosing uncertainty to patients, reluctance in disclosing mistakes

**Predictor Variables**

Work-life satisfaction (with autonomy in administrative work, autonomy in clinical work, resources available, relationships at work, lifestyle satisfaction, challenges of practicing emergency medicine) from the Career Satisfaction Survey of Emergency Physicians instrument, demographic characteristics, reactions of uncertainty (anxiety because of uncertainty, concern regarding poor outcomes, reluctance in disclosing uncertainty to patients, reluctance in disclosing mistakes) based on the Physicians' Reactions to Uncertainty: Refining the Constructs and Scales measure

**Outcomes, Definition, and Operationalization**

Career burnout was measured as a binary variable based on having any highest-category score among the three scales of the MBI of EE, DP, and reduced PA.

**Results**

No demographic variables significantly predicted burnout. Dissatisfaction with clinical autonomy, challenges in practicing emergency medicine, and lifestyle stress significantly predicted high burnout. Anxiety because of uncertainty and anxiety because of poor outcomes were associated with career burnout. High anxiety because of concern for poor outcomes most strongly predicted career burnout when all other predictor variables were controlled for.

**Study (design, setting): Lapinski, 2016 (concurrent, American College of Osteopathic Family Physicians)**

**Participants:** Physicians

Osteopathic medicine residents in family medicine whose email addresses were listed with the American College of Osteopathic Family Physicians

Number of participants recruited: 1,700

Number of participants evaluated: 316

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Nonmodifiable factors (gender, age, sexual orientation, relationship status, depression), work environment (on-call schedule, night/weekend schedule, work schedule, sleeping habits), personal and professional life satisfaction

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI and was defined as high EE or low PA.

**Results**

Women were 1.8 times more likely than men to experience burnout (95-percent CI, 1.14–2.99;  $p = 0.01$ ). Residents with higher depression levels were more likely to experience burnout than those not depressed ( $\chi^2(5, 273) = 64.17, p < 0.001$ ).

**Study (design, setting): Levin, 2017 (concurrent, American Academy of Neurology)**

**Participants:** Physicians

Neurologists who were members of the American Academy of Neurology

Number of participants recruited: 938

Number of participants evaluated: 354

**Analytic Method and Controlled Variables**

Multivariate chi-square test, Kruskal-Wallis test, and multivariable logistic regression

Neurologist trainees versus practicing (resident and fellow) neurologists

**Predictor Variables**

Personal characteristics (age, gender, geographic region, training year), professional characteristics and work/life balance (hours worked per week, percentage of time devoted to clinical practice, percentage of time devoted to research, percentage of time devoted to administrative work, percentage of time devoted to other activities, number of nights on call per week, median number of outpatients in clinic per week, median number of outpatients in clinic per week, median number of inpatients per day, median number of weekends round in hospital)



**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI and defined as high EE (score of 27 and higher) or high DP (score of 10 and higher).

**Results**

Among residents, greater work-life balance satisfaction, greater meaning in work, and older age were associated with lower burnout risk. Among fellows, greater work-life balance satisfaction and effective support staff were associated with lower burnout risk.

**Study (design, setting): Lindeman, 2017 (prospective, academic surgery programs)**

**Participants:** Physicians

All residents in general surgery at two academic surgery programs

Number of participants recruited: 145

Number of participants evaluated: 55

**Analytic Method and Controlled Variables**

Multivariate T-tests, analysis of variance, Spearman correlation tests, chi-square tests, Wilcoxon signed-rank test, statistical power analysis, multiple linear regression

Controlled variables unclear

**Predictor Variables**

Personality characteristics (extroverted, agreeable, conscientious, emotionally stable, open to new experiences, as measured with the Ten-Item Personality Inventory), emotional intelligence (well-being, self-control, emotionality, sociability), as measured with the Trait Emotional Intelligence Questionnaire Short Form), work experiences (job autonomy, social support, work feedback, personal and professional development opportunities, as measured with the job demands and resources questionnaire), demographic variables (age, sex, postgraduate year, training program, clinical status)

**Outcomes, Definition, and Operationalization**

Burnout was measured as two of the components of the MBI—specifically, EE and DP. Burnout was defined by EE only, with scores of 27 or greater for high burnout and scores of under 16 for low burnout.

**Results**

Emotional intelligence (well-being, self-control, emotionality, sociability) and work experiences (job autonomy, social support, work feedback, personal and professional development opportunities), and some personality characteristics (including agreeable, emotionally stable, conscientious) were significantly inversely correlated with burnout. Perceived positive work experiences were significantly inversely correlated with burnout, and perceived negative work experiences were significantly correlated with burnout, but perceived positive work experiences showed the stronger relationship with burnout. Total scores for emotional intelligence scores, total scores for positive work experience, and the personality characteristic of being agreeable all independently predicted lower burnout. Age and being female were also associated with higher rates of burnout.

**Study (design, setting): Lu, 2015 (concurrent, university residency programs)**

**Participants:** Physicians

Attending physicians and postgraduate 2nd- to 4th-year resident physicians in emergency medicine at two university programs

Number of participants recruited: 155

Number of participants evaluated: 77

**Analytic Method and Controlled Variables**

Multivariate Fischer's exact test, student's t test

Controlled variables unclear

**Predictor Variables**

Depression (measured with part of the Primary Care Evaluation of Mental Disorders Instrument), quality of life (self-reported overall quality of life in the past week), career satisfaction (choice to be a doctor again, if given chance to reconsider career choice)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three dimensions of DP, EE, and low PA. Burnout was dichotomized and defined as high DP or high EE.

**Results**

Among emergency physicians, burnout was significantly associated with depression (38.6 percent versus 12.1 percent) and less career satisfaction (77.3 percent versus 97.0 percent). Emergency physicians with high burnout were significantly more likely to perform suboptimal care practices more often in the 6 domains of early admission or discharge of patients, not discussing options or answering questions, ordering more tests, not treating pain, failing to communicate important handoffs, and not discussing plans with staff.

**Study (design, setting): Marchalik, Brems, 2019, Marchalik, Goldman, 2019 (concurrent, urology resident training programs)**

**Participants:** Physicians

Urology residents enrolled in an academic urology residency training program

Number of participants recruited: 1304

Number of participants evaluated: 211

**Analytic Method and Controlled Variables**

Multivariate

Gender, training level, work hours, and structured mentorship programs

**Predictor Variables**

Regularly read for relaxation, time with family and friends, worked more than 80 hours, access to a structured mentorship program, access to mental health services

**Outcomes, Definition, and Operationalization**

Burnout is an occupational syndrome resulting from persistent work-related stress.

**Results**

Residents working >80 hours versus 60 to 80 hours and <60 hours per week were more likely to exhibit burnout (77.6 percent versus 66.1 percent versus 47.1 percent, respectively,  $p = 0.044$ ). Institutional factors such as structured mentorship programs ( $p = 0.019$ ) and access to mental health services ( $p < 0.001$ ) were associated with decreased burnout. On multivariable analysis, unavailable or difficult-to-access mental health services were associated with increased odds of burnout.

**Study (design, setting): Martini, 2004 (concurrent, Wayne State University School of Medicine)**

**Participants:** Physicians

All residents and interns in dermatology, general surgery, internal medicine, family medicine, neurology, obstetrics/gynecology, ophthalmology, and psychiatry

Number of participants recruited: 321

Number of participants evaluated: 110

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Specialty, year of residency, hours worked, satisfaction with clinical faculty, family stress, marital status, children, relocation

**Outcomes, Definition, and Operationalization**

Percentage of residents meeting burnout criteria on the MBI

**Results**

50 percent of residents met criteria for burnout. Residents in their first year had significantly higher rates of burnout (77.3 percent) even after controlling for program or working more than 80 hours per week. Burnout was also significantly higher among residents who were dissatisfied with their clinical faculty, unmarried, and experiencing a family-related stress.

**Study (design, setting): McAbee, 2015 (concurrent, American Association of Neurological Surgeons)**

**Participants:** Physicians

Neurosurgeons

Number of participants recruited: 3,247

Number of participants evaluated: 783

**Analytic Method and Controlled Variables**

Multivariate univariate analysis, forward multivariable logistic regression, subgroup analysis

Gender, age, marital status, children, type of practice, academic or university affiliation, duration of practice

**Predictor Variables**

Accusation of malpractice, academic affiliation, professional perceptions (uncertainty over future earnings/health care reform, challenges at work, good work/life balance, enough time for personal development)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE or high DP.

**Results**

Accusation of malpractice (OR 1.6) and uncertainty over future earnings/health care reform (OR 1.96) significantly increased the odds of burnout, while work-life balance (OR = 0.45), academic affiliation (OR = 0.69), challenges at work (OR = 0.60), and enough time for personal development (OR = 0.57) decreased the odds of burnout.

**Study (design, setting): McPhillips, 2007 (concurrent, Association of Medical School Pediatric Department Chairs)**

**Participants:** Physicians

Former and current members of Association of Medical School Pediatric Department Chairs between 1993 and 2005

Number of participants recruited: 250

Number of participants evaluated: 148

**Analytic Method and Controlled Variables**

Multivariate T-tests, chi-square tests, Fisher exact test, Pearson correlation test, logistic regression, statistical power calculation

Number of years as chair of medical school pediatric department, weekly hours typically worked at office, weekly hours worked away from office/home, weekly evenings at work events, annual weeks of vacation, annual weeks attending on inpatient service; workload, supportive-receptive work style, choice-independence (as measured with an abbreviated Workplace Climate Questionnaire for workload, choice-independence, and supportive-receptive subscales for workload)

**Predictor Variables**

Number of years as chair of medical school pediatric department, weekly hours typically worked at office, weekly hours worked away from office/home, weekly evenings at work events, annual weeks of vacation, annual weeks attending on inpatient service; workload, supportive-receptive work style, choice-independence (as measured with an abbreviated Workplace Climate Questionnaire for workload, choice-independence, and supportive-receptive subscales for workload)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI-HSS for EE, DP, and PA. Burnout was defined as high DP or high EE.

**Results**

Number of years as medical school pediatric department chair (odds ratio = 0.9, 95-percent confidence interval = 0.80-0.99), work exceeding 1 night per week (OR = 5.9, 95-percent CI = 1.5–22.9), high workload (OR = 3.0, 95-percent CI = 1.3–6.7), and lack of a supportive work environment (OR = 2.2, 95-percent CI = 1.1–4.2) were independently and significantly associated with burnout.

**Study (design, setting): Melnick, 2020 (concurrent, American Medical Association Physician Masterfile)**

**Participants:** Physicians

Physicians from all specialty disciplines who were listed in the American Medical Association Physician Masterfile

Number of participants recruited: 30,456 (1,250 for subsurvey)

Number of participants evaluated: 5,197 (870 for subsurvey)

**Analytic Method and Controlled Variables**

Multivariate

Age, gender, medical specialty, practice setting, number of hours worked, number of nights on call per week, perceived EHR usability

**Predictor Variables**

Demographic characteristics (age, gender, relationship status), medical specialty, number of hours worked per week, number of nights on call per week, practice setting, perceived EHR usability (measured with the System Usability Scale)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high DP (score of 27 or above) and/or high EE (score of 10 or above).

**Results**

EHR usability was independently associated with the odds of burnout, and a one-point increase was significantly associated with a 3-percent reduction in odds of burnout (OR = 0.97, 95-percent CI = 0.97–0.98,  $p < 0.001$ ). EHR usability and medical specialty accounted for 5.8 percent and 3.3 percent, respectively, of variance in burnout.

**Study (design, setting): Mirvis, 1999 (prospective, VA medical centers)**

**Participants:** Physicians

VA medical center directors, associate directors, chiefs of staff

Number of participants recruited: 284

Number of participants evaluated: 88

**Analytic Method and Controlled Variables**

Multivariate analysis of variance, multiple linear regression including path analysis

Burnout phase, age, job position, role clarity, role conflict, availability of resources, work support, other support, general satisfaction, satisfaction with VA system, satisfaction with VAMC, frustration, intent to stay were used to identify variables that were significant independent associated with burnout phase.

**Predictor Variables**

Demographic variables (age, gender, service duration), job satisfaction (general job satisfaction, satisfaction with local VA medical center, satisfaction with national VA system, job frustration, intent to stay in VA system), job role characteristics (clarity, job role conflict, resource availability), social support (work support, personal support), previous survey's burnout phase

**Outcomes, Definition, and Operationalization**

Burnout was calculated as a "phase" of burnout, based on the 3 subscales of the 1986 Maslach and Jackson burnout inventory—DP, EE, and PA—with burnout phase I corresponding to all three scores being low, phase II for high DP score alone, phase III for high PA alone, phase IV for both high DP and high PA, phase V for high EE alone, phase VI for both high DP and high EE, phase VII for both high PA and EE, and phase VIII for all three being high.

**Results**

Mean phase values of burnout rose in later surveys, with levels of burnout among phases VI–VIII rising significantly in proportion from 1992–1997. Lower respondent age and higher 1992 burnout phase were associated with higher 1997 burnout phase. Lower resource adequacy and less 1989 job role clarity were associated with higher 1992 burnout phase. Lower age, less job role clarity, and less resource availability in 1992 were associated with higher 1997 burnout phase. Lower job satisfaction, less resource availability, and higher intention to stay in the VA medical center in 1989 were associated with higher 1992 burnout phases. In sum, significant predictors of burnout phase were previous burnout phase, job role clarity, resource availability, and age.

**Study (design, setting): Moore, 2019 (concurrent, Facebook group)**

**Participants:** Physicians

Female neurologists from Women Neurologists Group on Facebook

Number of participants recruited: 798

Number of participants evaluated: 181

**Analytic Method and Controlled Variables**

Multivariate Kendall's tau-b, multiple logistic regression, chi-square tests, qualitative analysis of text (by two raters, inductive analysis, coding)

The predictor variables were used in multiple logistic regression.

**Predictor Variables**

Career characteristics (medical training, involvement with fellowship, subspecialty, stage of career, adult versus pediatric neurology, size of community, practice setting, rank, employment status, full time versus part-time work, clinical time in inpatient versus outpatient settings, percentage of time spent on clinical duties, hours worked per week, average on-call nights per month, compensation method), family life and work-life balance (number of children, age of youngest child, average daily stress level, satisfaction with work-life balance, maternity leave and child-care, exercise), gender-based discrimination (current experience of it at workplace, sources), stressful environment, lack of control, number of hours, gender discrimination and sources,

**Outcomes, Definition, and Operationalization**

Burnout was measured as one of many dimensions of the 11-item Mini Z survey.

**Results**

Higher stress levels (OR = 3.29 for highest quartile of stress), working more than 61 hours versus less than 40 hours a week (OR = 4.7 ), poor or marginal versus satisfactory, good, or optimal control over workload (OR = 3.5), and gender discrimination (Kendall's tau-b = 0.21) were significantly associated with greater burnout among multivariable logistic regression. More administrative support, more time at work to manage nonbillable clerical burdens, and more time to see patients were themes on measures to reduce burnout among qualitative analysis.

**Study (design, setting): Ofei-Dodoo, Calloway, 2019 (concurrent, graduate medical education residency programs)**

**Participants:** Physicians

Residents and faculty of 13 graduate medical education residency programs that are sponsored by the University of Kansas School of Medicine-Wichita

Number of participants recruited: 439

Number of participants evaluated: 218

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Career status (faculty versus resident-physician), perceived causes of burnout among peers (open-ended question)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI-9 which assesses EE, DP, and PA; burnout was defined as high EE (a score of 11 or more) or high DP (a score of seven or more)

**Results**

Residents had higher rates of burnout than core faculty members (51 percent versus 31 percent,  $p < 0.05$ ). Five themes were possible causes of burnout: lack of work-life balance, systemic issues, low morale, difficult patient populations, and unrealistic expectations.

**Study (design, setting): Ofei-Dodoo, Kellerman, 2019 (retrospective, members of the Medical Society of Sedgewick County)**

**Participants:** Physicians

Physicians who were active members of the medical society

Number of participants recruited: 442

Number of participants evaluated: 197

**Analytic Method and Controlled Variables**

Unclear

Controlled variables unclear

**Predictor Variables**

Suicidal ideation, depression, level of fatigue, and hours worked per week

**Outcomes, Definition, and Operationalization**

Scoring high on EE (11 and higher) and/or DP (seven and higher on the MBI-9)

**Results**

49.5 percent reported manifestations of burnout. Suicidal ideation, depression, fatigue, and working more than 50 hours per week had greater burnout.

**Study (design, setting): O'Hara, 2020 (concurrent, large academic teaching hospital in urban setting)**

**Participants:** Physicians

Pediatric providers, including hospitalists, intensivists, ambulatory care providers, physicians-in-training

Number of participants recruited: 132

Number of participants evaluated: 62

**Analytic Method and Controlled Variables**

Multivariate

Some variables were adjusted, but unspecified, for burnout.

**Predictor Variables**

General demographic variables were gender, race/ethnicity, trainee versus attending, and years in practice. Child abuse and neglect demographic variables were how many child abuse and neglect patients, last child abuse and neglect patients patient, child abuse prevention assisting, and last training in child abuse and neglect patients. Experiences with child abuse and neglect patients consisted of having made a call independently as a mandated reporter, experiencing a fatality, experience of feeling that "one patient" had the most emotional impact, and type of maltreatment.

**Outcomes, Definition, and Operationalization**

Burnout was one of three outcome scores measured by the ProQOL-5, modified for involvement with care of patients with suspected child abuse and neglect.

**Results**

Caring for all types of child abuse and neglect predicted burnout. Burnout was significantly associated ( $p = 0.013$ ) with types of maltreatment experienced. Being exposed to multiple cases of physical and sexual abuse and neglect was significantly associated with an 8.46-point increase in burnout ( $p = 0.004$ ), as compared with mostly physical abuse only and adjusted for other variables.

**Study (design, setting): Olson, 2015 (concurrent, urban children's hospital)**

**Participants:** Physicians

First-year pediatric residents and medicine-pediatric residents at a large urban children's hospital in the Midwest

Number of participants recruited: 45

Number of participants evaluated: 45

**Analytic Method and Controlled Variables**

Multivariate ANOVA, Pearson correlation test

Gender was controlled for in examining the association of EE with mindfulness and compassion.

**Predictor Variables**

Emotional intelligence (measured with the Emotional Social Competency Inventory), empathy (Jefferson Scale of Physician Empathy), mindfulness (Five Facet Mindfulness Questionnaire (for being nonreactive to inner experience, noting feelings and thoughts, acting with awareness, using words to describe, nonjudgmental attitude toward experience), self-compassion (short-form Neff's Self-Compassion Scale for kind, nonjudgmental self-attitude in suffering, recognition of experiences as part of the greater common human experience, balancing painful thoughts and feelings without judgment or dwelling or self-pity), resilience (Smith's Brief Resilience Scale)

**Outcomes, Definition, and Operationalization**

Burnout was defined as both high EE (score of 27 or higher) and low PA (score of 33 or below). Burnout was measured in month 8, while resilience and the predictor variables were measured in month 9 of the internship year.

**Results**

ANOVA of burnout showed a significant inverse association between mindfulness and burnout ( $F = 4.06, p = 0.05$ ). Mindfulness and self-compassion significantly negatively predicted EE, controlling for gender.

**Study (design, setting): Olson, 2019 (concurrent, academic medical center)**

**Participants:** Physicians

Medical school faculty, hospital-employed physicians, and community-based private practitioners

Number of participants recruited: 1,252

Number of participants evaluated: 475

**Analytic Method and Controlled Variables**

Multivariate logistic regressions

Model or practice, specialty, age, race, gender

**Predictor Variables**

Model or practice, specialty, age, race, gender, workload control, efficient teamwork, work atmosphere, sufficient time for EMR documentation, EMR proficiency, time spent on EMR at home, alignment of values with departmental leadership

**Outcomes, Definition, and Operationalization**

Burnout was one of three wellness measures in the ten-item Mini Z for satisfaction, stress, and burnout. Burnout that was associated with Mini Z predictive variables was calculated from the MBI—which measures the three domains of EE, DP, and PA, and for which burnout was defined as high EE (score of 27 or higher), high DP (score of ten or greater), or both—then compared with the Mini Z single item for burnout, for which a score of three defined “burning out,” a score of four defined “experiencing burnout that will not go away,” and a score of five defined “completely burned out.”

**Results**

Males experienced less burnout, every decade of higher age was associated with less burnout, and academic faculty and hospital-employed physicians had more burnout than community-based private practitioners. Poor workload control (with adjusted odds ratio of 8.24 and 95-percent confidence interval of 4.81 to 14.11], inefficient teamwork (OR 7.61, 95-percent CI 3.28–17.67), insufficient documentation time (OR 5.83, 95-percent CI 3.35–10.15), hectic-chaotic work atmosphere (OR 3.49, 95-percent CI 2.12–5.74), lack of alignment of values with leadership (OR 3.27, 95-percent CI 2.12–5.74), and excessive EMR time at home (OR 1.99, 95-percent CI 1.21–3.27) were predictors of burnout.

**Study (design, setting): Porter, 2018 (concurrent, Association of Family Medicine Residency Directors)**

**Participants:** Physicians

Directors of family medicine residency programs accredited by the Accreditation Council for Graduate Medical Education as identified by the Association of Family Medicine Residency Directors

Number of participants recruited: 465

Number of participants evaluated: 245

**Analytic Method and Controlled Variables**

Multivariate two-sample Wilcoxon rank sum test

Controlled variables unclear

**Predictor Variables**

Demographic characteristics (program type, program regional location, community size, proportion of residents who graduated from international medical schools, program director tenure, gender), other personal characteristics (personal time after work, healthy work-life balance, ability to stop thinking of work once going home, feeling overwhelmed by personal responsibilities, number of children, number of vacation days taken in last year, financial stress)

**Outcomes, Definition, and Operationalization**

Burnout was measured using two single-item measures from the MBI originally for EE, DP, and PA. Burnout was defined as high EE and high DP.

**Results**

Occasionally to never having personal time (27.58+15.31 versus 18.71+14.5, 9.75+8.55 versus 7.25+7.40), healthy work-life balance (27.90+15.48 versus 17.19+13.50, 10.05+8.65 versus 6.50+6.85), ability to stop thinking about work (27.09+15.66 versus 16.56+12.96, 9.95+8.45 versus 5.80+6.65), moderate to great level of being overwhelmed by personal responsibilities (34.38+14.49 versus 19.89+14.22, 13.20+8.85  $p < 0.01$ ), and considerable or severe financial stress (32.85+15.84 versus 23.04+15.39,  $p < 0.01$ ; 13.50+10.00 versus 8.25+7.84;  $p = 0.02$ ) were significantly correlated with higher EE and higher DP.

**Study (design, setting): Primack, 2010 (concurrent, medical school institute)**

**Participants:** Physicians

Medical students, resident physicians, fellows, trainees, and faculty who are enrolled at degree or career development programs at Institute for Clinical Research

Medicine at University of Pittsburgh School of Medicine

Number of participants recruited: 188

Number of participants evaluated: 179

**Analytic Method and Controlled Variables**

Multivariate chi-square tests and Fisher's exact test

Controlled variables unclear

**Predictor Variables**

Sociodemographic variables of age (at most 35 versus under 35), sex, race (underrepresented minority (African American, Hispanic, Native American), Caucasian, Asian), and training program level

**Outcomes, Definition, and Operationalization**

Burnout was defined as a dichotomous variable based on not being burned out (enjoy work with no burnout symptoms, occasional stress with not always as much energy but not burned-out, definitely burned out with at least one burnout symptom) versus being burned out (burnout symptoms would not go away with frequent thoughts of frustration at work, feel totally burned out and often wonder if can go on and may need change or help)

**Results**

Burnout was statistically significantly more common among those above 35 years of age (29 percent) versus those 35 years old or younger (13 percent) and among females (22 percent) versus males (1 percent). Burnout was highest among underrepresented minorities (30 percent), followed by Caucasians (18 percent) and Asians (3 percent), with differences being statistically significant.

**Study (design, setting): Qureshi, 2015 (concurrent, American Society of Plastic Surgeons)**

**Participants:** Physicians

Members of the American Society of Plastic Surgeons

Number of participants recruited: 5,942

Number of participants evaluated: 1,691

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, Kruskal-Wallis test, multivariate logistic regression with backward elimination,

Controlled variables unclear

**Predictor Variables**

Age, gender, marital status, child-rearing status, subspecialty, years in practice, number of hours worked and nights on call per week, practice setting, academic rank, compensation method, percentage of time spent on nonpatient care activities and protection of time, self-reported medical errors, conflicts among work and home and family, depression screen, mental and physical quality of life, alcohol and substance abuse, impairment, satisfaction with career

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high DP (score above 10) and/or high EE (score above 27).

**Results**

Subspecialty, number of hours worked and night calls per week, annual income, practice setting, and academic rank were significantly associated with burnout risk.

Older age, being married, and having kids were significantly associated with lower burnout risk.

**Study (design, setting): Rabatin, 2016 (prospective, primary care practices)**

**Participants:** Physicians

Physicians in primary care practices in Chicago, New York, Wisconsin

Number of participants recruited: 1,795

Number of participants evaluated: 422

**Analytic Method and Controlled Variables**

Multivariate two-level logistic regression models, with controlled variables and Sidak's adjustment for multiple comparisons

Age, sex, race

**Predictor Variables**

Gender, job satisfaction, job stress, time pressure during visits, chaotic work conditions, work control (measured with an adapted Physician Worklife Study for office pace, including chaos), workplace emphasis on work-life balance, specialty, intent to leave practice.

**Outcomes, Definition, and Operationalization**

Burnout was measured with one five-item question that correlates with the EE subscale of the MBI.

**Results**

Women physicians reported significantly more burnout (36 percent versus 19 percent). Clinicians with burnout had significantly less satisfaction (9 percent versus 59 percent), more job stress, more time pressure during visits, more chaotic work conditions (four times more likely), less work control (4 percent versus 28 percent), less emphasis on work-life balance at their workplaces four times less likely), and greater intent to leave the practice (56 percent versus 21 percent).

**Study (design, setting): Ramey, 2017 (concurrent, Association of Residents in Radiation Oncology Directory)**

**Participants:** Physicians

Radiation oncology residents

Number of participants recruited: 733

Number of participants evaluated: 232

**Analytic Method and Controlled Variables**

Multivariate Univariable and multivariable logistic regression

Gender, postgraduate year, relationship status, spouse also works in health care/unmarried, personality style (all except for indecisive), education debt, as well as call assignment of seven weeks or more per year, staying late three or more weeknights in a call week, seeing four or more consultations outside clinic in a call week, adequate physics support, and adequate dosimetry support were not significant in univariate analysis and thus not included in final multivariate logistic regression.

**Predictor Variables**

Personal characteristics (gender, postgraduate year, relationship status, spouse also works in health care/unmarried, personality style (perfectionist, very empathetic, indecisive, idealistic), education debt), program characteristics (adequacy of support staff, work-life balance, satisfaction with program, on-call duties, hours worked per week)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE or high DP.

**Results**

Perceived adequacy of work-life balance (OR = 0.37, 95-percent CI = 0.17–0.83) was significantly inversely associated with burnout among multivariable analysis.



**Study (design, setting): Ratanawongsa, 2008 (prospective, 15 urban community-based clinics in Baltimore, Maryland)**

**Participants:** Mixed sample (different types)

A cohort consisting of the control and intervention groups from the Patient-Physician Partnership Study, with sample drawn from 15 urban community-based clinics in Baltimore, Maryland, and physicians providing primary care to adult patients considered eligible if their primary care physician was enrolled, they were at least 18 years old, English-speaking, and had had at least one ICD-9 claim for hypertension within the past year.

Number of participants recruited: 117 physicians

Number of participants evaluated: 40 physicians, 235 patients

**Analytic Method and Controlled Variables**

Multivariate

Visit length, patient health insurance status, physician gender, status of graduating from a U.S. or international medical school, and interaction between physician school status of graduating from a US or international medical school and physician burnout

**Predictor Variables**

Patient-physician communication in primary care encounters - consisting of positive rapport-building, negative rapport-building, emotional rapport-building, and social rapport-building; global affect ratings indicating physician positive affect and patient positive affect; patient-centeredness or physician-centeredness; verbal dominance ratio indicating more physician statements or more patient statements; as well as patient satisfaction with visit, confidence in physician's knowledge and skills, trust in physician to look for patients' best interests

**Outcomes, Definition, and Operationalization**

Physician burnout was measured with a six-item scale previously derived from the MBI that captured the domains of EE and reduced sense of PA, rated on a five-point Likert scale, with total scores ranging from 6 to 30, and categorized as low or medium or high.

**Results**

Physician rapport-building behaviors did not show a significant association with physician burnout scores. However, patient communication during visits was related to physician burnout. Patients of higher burnout physicians reported almost twice as many negative rapport-building statements (medium burnout incident risk ratio (IRR) 1.85, CI 1.30 – 2.61,  $p = 0.001$ ; high burnout IRR 2.06, CI 1.48 – 2.86,  $p < 0.001$ ) and were more likely to use reassurance/optimism statements (CI = 1.40–1.66,  $p < 0.001$ ), a kind of emotional rapport-building. Individual global affect ratings did not differ significantly for physicians or patients by physician burnout. Composite physician positive affect and patient positive affect did not differ significantly by physician burnout. Physician burnout was not significantly associated with differences in patient-centeredness, verbal dominance, visit length, patients' satisfaction with those visits, confidence in physicians' knowledge and skills, or trust in physicians to look out for their best interests.

**Study (design, setting): Rath, 2015 (concurrent, Society of Gynecologic Oncology)**

**Participants:** Physicians

Society of Gynecologic Oncology senior, full, or candidate member physicians with a directory working email address

Number of participants recruited: 1,086

Number of participants evaluated: 369

**Analytic Method and Controlled Variables**

Multivariate Fisher exact method, Wilcoxon rank sum method, Holme procedure with errors adjusted for multiple testing, and both univariate and multivariate logistic regression

Controlled variables unclear

**Predictor Variables**

Age, gender, relationship status, employment status and type (for spouse or partner), number of children and their ages, type of child care, years of practice, weekly hours worked, weekly operating room hours, call, practice setting, model of compensation, time devoted to non-patient care activities, chemotherapy administration, number of manuscripts published last year, vacation time available and used, career choice of becoming a physician again, career choice of becoming a gynecologic oncologist again, encouragement of their children to pursue medicine career, medical errors in last three months and factors thereof), physical and psychological well-being, depression, suicidal ideation, anxiety or stress, use of antidepressants, formal psychiatric evaluation within the past year, reluctance to seek psychiatric help, and alcohol use

**Outcomes, Definition, and Operationalization**

Burnout was measured with the three MBI subscales of EE, DP, and lack of PA and defined as high EE or DP.

**Results**

Being female, low mental quality of life, depression, stress, suicidal ideation, reluctance to seek mental health care, and with high alcohol use were associated with higher odds of burnout. Being older and being satisfied with one's career were associated with lower odds of burnout. According to multivariate logistic regression, having low mental quality of life (OR 3.23, 95-percent CI 1.82–5.62), being depressed (OR 2.81, 95-percent CI 1.56–5.07), being stressed and/or overwhelmed (OR 2.81, 95-percent CI 1.58–4.98), and being reluctant to seek mental health care (OR 2.72, 95-percent CI 1.56–4.74) were associated with increased odds of burnout, and encouraging a child to pursue a medicine career (OR 0.42, 95-percent CI 0.24–0.73) was associated with decreased odds of burnout.

**Study (design, setting): Rinne, 2020 (prospective, VA All Employee Survey 2013–2017)**

**Participants:** Physicians

Physicians who self-identified as practicing in any of nine clinical service core areas located at 140 VA sites

Number of participants recruited: 284,634 (2013) to 330,732 (2017) (range)

Number of participants evaluated: 40,382

**Analytic Method and Controlled Variables**

Multivariate

Demographic characteristics

**Predictor Variables**

Job satisfaction, attitudes, perspectives of practice environment, organizational characteristics (site complexity, average number of patients per year per site, location, geography, rurality, teaching hospital)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI single-item statements for EE (feeling burned out from the work) and DP (worrying the job is hardening oneself emotionally) and was dichotomized, with having burnout defined as responding positively to either statement at least once per week and not having burnout defined as responding positively to both statements at most a few times per month. Site-level burnout, the primary outcome, was given by the unadjusted proportion of physicians with burnout among a given year and was measured for each service and for each year between 2013 and 2017.

**Results**

Primary care physicians experienced the highest burnout rate, followed by mental health physicians and emergency medicine physicians. High burnout sites were more likely to be rural, have nonteaching facilities, have lower complexity, and receive fewer unique per year per site. In secondary analysis, tenure at the VA was strongly associated with burnout, with 44.5 percent burnout for providers with ten to 15 years of tenure and 18.4 percent for those with less than six months of experience. Rural primary care providers had a 58.9 percent burnout rate, while urban primary care providers had a rate of 54.1 percent ( $\chi^2(1,8933)$ ,  $p < 0.001$ ,  $\phi = .03$ ). Primary care providers in nonteaching facilities had a 57.9 percent burnout rate, while primary care providers in teaching facilities had a 52.8 percent rate ( $\chi^2(1, 8933) = 21.58$ ,  $\phi = 0.05$ ).

**Study (design, setting): Robertson, 2017 (concurrent, primary care residency programs of the I3 Population Health Collaborative [consisting of 20 family medicine, two internal medicine, two pediatrics residency practices in Virginia, North Carolina, South Carolina, Florida])**

**Participants:** Physicians

Primary care residents

Number of participants recruited: 866

Number of participants evaluated: 585

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Practice characteristics (number of physicians, EHR used in practice, amount of time for which EHR had been in place, number of different EHRs in the past ten years)

**Outcomes, Definition, and Operationalization**

Burnout was measured using a single-item five-point scale (not the MBI) that had shown some evidence of validity and calculated as a dichotomous variable.

**Results**

Physicians who spent over 6 hours per week outside normal clinic hours on EHR work were more likely to report burnout (OR = 2.9, 95-percent CI 1.9–4.4), and more likely to attribute it to EHR (OR = 3.9, 95-percent CI 1.9–8.2). Males were less likely than females to report burnout (OR = 0.64, 95-percent CI 0.43–0.95).

**Study (design, setting): Roth, 2011 (concurrent, pediatric practices in the United States and Canada)**

**Participants:** Physicians

Practicing pediatric oncologists at pediatric practices in the U.S. and Canada

Number of participants recruited: 1,047

Number of participants evaluated: 410

**Analytic Method and Controlled Variables**

Multivariate Fisher's exact test, multivariable logistic stepwise regression

Satisfaction with life outside work, years in practice, control over work schedule, availability of services, availability of forum for debriefing

**Predictor Variables**

Gender, years in practice, marital status, time dedicated to clinical care, religiosity/spirituality, patient deaths, control over hours, control over work schedule, works managing inpatient floors, satisfaction with work, satisfaction with life outside work, services available for staff experiencing burnout

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for EE, DP, and low PA. Burnout was defined as high EE, high DP, and low PA.

**Results**

Satisfaction with their lives outside work was significantly associated with burnout (OR = 0.238, 95-percent CI = 0.143–0.396). Availability of a forum for debriefing and services for burnout-affected physicians were both significantly associated with lower burnout (24 percent versus 46 percent, 23 percent versus 46 percent).

**Study (design, setting): Shakir, 2018 (concurrent, neurosurgery residency programs)**

**Participants:** Physicians

106 residency training programs in neurosurgery

Number of participants recruited: 1,200

Number of participants evaluated: 255

**Analytic Method and Controlled Variables**

Multivariate two-sample Mann-Whitney test, Kruskal-Wallis test, two-tailed Fisher's exact test, with Bonferroni correction

Controlled variables unclear

**Predictor Variables**

Specialty (neurosurgery versus other specialty residents, fellows, and practicing physicians)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE (score between 13–18) or high DP (score between 13 to 18).

**Results**

Neurosurgery residents had significantly less burnout (36.5 percent) than non-neurosurgery specialty residents/fellows (60.0 percent), early career physicians (51.3 percent), and practicing physicians (53.5 percent).

**Study (design, setting): Shakir, 2020 (concurrent, Database of American Association of Neurological Surgeons)**

**Participants:** Physicians

Neurosurgery residents

Number of participants recruited: 1,385

Number of participants evaluated: 427

**Analytic Method and Controlled Variables**

Multivariate

A control population consisted of other institutions' residents/fellows, early-career physicians, and practicing physicians in all specialties.

**Predictor Variables**

Demographic variables (age, gender, postgraduate year, race, clinical or research rotation status, number of social or personal stressors, marital status, children), grit (measured with Short Grit Scale), resilience (measured using the Connor-Davidson Resilience Scale)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the abbreviated MBI and calculated as an overall score and as individual subscale scores for EE, DP, and PA. Burnout was defined as high for either high EE (13 to 18 points) or high DP (13 to 18 points).

**Results**

Neurosurgery residents experienced a significantly lower prevalence of burnout (33.0 percent) than all physicians (53.5 percent;  $p < 0.001$ ), early-career physicians (51.3 percent;  $p < 0.001$ ), and other residents or fellows (60.0 percent;  $p < 0.001$ ). Similarly, neurosurgery residents had significantly more high DP scores (50.8 percent) than all physicians (33.8 percent;  $p < 0.001$ ) and early-career physicians (37.4 percent;  $p < 0.001$ ), but fewer than other residents or fellows (50.3 percent;  $p =$

0.959). Burnout was associated with postgraduate year ( $p = 0.026$ ), social or personal stressors ( $p = 0.034$ ), clinical or research rotations ( $p < 0.001$ ), and parental status ( $p = 0.014$ ). High burnout was associated with greater social or personal stressors ( $p = 0.002$ ), clinical rotations ( $p = 0.001$ ), and not having children ( $p = 0.016$ ).

**Study (design, setting): Shanafelt, 2002 (concurrent, University of Washington)**

**Participants:** Physicians

All internal medicine residents at University of Washington program, other than the study author

Number of participants recruited: 151

Number of participants evaluated: 115

**Analytic Method and Controlled Variables**

Multivariate chi-square test, Fisher exact test, forward stepwise logistic regression

The demographic factors, depression screening responses, major depression in residency, at-risk use of alcohol, and recreational substance use were controlled for in the regression of burnout on suboptimal patient care practices.

**Predictor Variables**

Patient care practices and attitudes (at least monthly suboptimal patient care practices and at least one suboptimal patient care practice weekly), depression and substance abuse (including parts of the Primary Care Evaluation of Mental Disorders questionnaire and the Alcohol Use Disorders Identification Test for alcohol dependence, at-risk alcohol use, and heavy drinking or active abuse or dependence of alcohol; and recreational substance use), demographic and other personal factors, experience of residency work and satisfaction with career (stress of residency, value of coping strategies, value of well-being features in residency program)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high DP (score of 10 or above) or high EE (score of 27 or higher).

**Results**

Taking a longer than one-year break between college and medical school, rates of major depression and positive tests for depression, suboptimal patient care practices, insufficient sleep, working longer than 24-hour shifts, not enough leisure time, and uncertainty about the future were significantly associated with burnout. Career satisfaction was significantly negatively associated with burnout. Burnout was significantly negatively associated with rating as important the program well-being features of stress and depression presentations, constructive feedback, and career counseling, and coping strategies.

**Study (design, setting): Shanafelt, Balch, 2009; Dyrbye, Shanafelt, Balch, 2011; Balch, Shanafelt, Sloan, 2011 (concurrent, American College of Surgeons)**

**Participants:** Physicians

All surgeons with membership in the American College of Surgeons and an email address on file with consent for use

Number of participants recruited: 24,922

Number of participants evaluated: 7,905

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, Kruskal-Wallis tests, logistic regression with backward elimination

Demographic variables (age, gender, marital status, spouse employment outside house, spouse's job, children, children's age) and practice characteristics (subspecialty, number of years in practice, weekly hours worked, weekly hours worked in operating room, weekly nights on call, practice setting, academic rank, compensation primary method, percent of time for nonpatient care) were the variables used in logistic regression with backward elimination.

**Predictor Variables**

Demographic variables (age, gender, marital status, spouse employment outside house, spouse's job, children, children's age), practice characteristics (subspecialty, number of years in practice, weekly hours worked, weekly hours worked in operating room, weekly nights on call, practice setting, academic rank, compensation primary method, percent of time for nonpatient care), hours of direct patient care, work-home conflict, resolution of work-home conflict, career conflict, resolution of career conflict

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for EE, DP, and low PA. Burnout was defined as high for either high DP or high EE.

**Results**

The demographic variables of younger age and having a spouse employed outside home as nonphysician and the professional variable of dedicating the majority of professional effort to nonpatient care were independently associated with greater burnout. Having children (especially youngest children under the age of 21) and the professional characteristics of area of specialization (trauma surgery, urology, otolaryngology, vascular surgery, general surgery), weekly number of nights on call, weekly hours worked, number of years in practice, and having compensation based entirely on billing were associated with greater burnout. Stratified by specialty: Age was positively associated with burnout. Practice setting (academic versus private practice) was independently associated with burnout (odds ratio = 1.172). Among academic surgeons, trauma surgery (OR = 1.513, nights on call (OR = 1.062), and hours worked (OR = 1.019) were the main significant predictors

of burnout. In private practice, urologic surgery (OR = 1.497), spending 31 percent to 50 percent time on nonclinical activities (OR = 1.404), incentive based pay (OR = 1.344), nights on call (OR = 1.045), and hours worked (OR = 1.015) were the main significant predictors of burnout.

**Study (design, setting): Shanafelt, West, 2009 (concurrent, Mayo Clinic)**

**Participants:** Physicians

All physicians who were permanent faculty members of the DOM, Mayo Clinic, Rochester, Minnesota, were eligible for participation in this study.

Number of participants recruited: 556

Number of participants evaluated: 485

**Analytic Method and Controlled Variables**

Multivariate Wilcoxon rank sum tests, simple linear regression, stepwise logistic regression

Personal characteristics (age, gender, marital status), professional characteristics (average total weekly work hours, average hours at work, average hours working from home, hours for maintaining certification, number of part-time faculty, specialty, most personally meaningful aspect of work)

**Predictor Variables**

Personal characteristics (age, gender, marital status), professional characteristics (average total weekly work hours, average hours at work, average hours working from home, hours for maintaining certification, number of part-time faculty, specialty, most personally meaningful aspect of work)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI for the three subscales of EE, DP, and low PA. Professional burnout was defined as high DP (score of 10 or higher) and/or high EE (score of 27 or higher).

**Results**

Generalists was significantly associated with more burnout than subspecialists (42.3 versus 20.7 percent). Burnout was significantly associated with working more than almost five or mean average hours per week (mean hours worked, 72.1 versus 67.5). Spending less than 20 percent of time, about one day a week, on the most meaningful activity, and younger age were significantly associated with burnout (53.8 versus 29.9 percent).

**Study (design, setting): Shanafelt, Boone, 2012; Dyrbye, Sotile, 2014 (concurrent, American Medical Association)**

**Participants:** Physicians

A sample of physicians from all the specialty disciplines was assembled from the American Medical Association Physician Masterfile

Number of participants recruited: 89,831

Number of participants evaluated: 7,288

**Analytic Method and Controlled Variables**

Multivariate Kruskal-Wallis test or chi-square test, multivariable logistic regression, pooled multivariate logistic regression with physician and population control

Age, gender, occupation, relationship status, employment status, weekly hours worked, level of highest education completed, weekly hours worked, symptoms of depression, satisfaction with work-life balance, suicidal ideation in the past year, employment status, highest level of education completed

**Predictor Variables**

Provider specialty, work-home conflicts

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three domains of EE, DP, and low PA. Burnout was measured using the MBI and also a two-item measure adapted from the MBI for the physician group using the two-item measure for the population control.

**Results**

Physicians were more likely to have burnout (37.9 percent versus 27.8 percent) and dissatisfaction with work-life balance (40.2 percent versus 23.2 percent) than the population control. In multivariable analysis, the highest education level completed was related to burnout when adjusted for age, gender, relationship status, and weekly hours worked. MD or DO degree holders yielded significantly higher burnout risk than high school graduates (OR = 1.36). Those with a bachelor's degree (OR = 0.80), master's degree (OR = 0.71), or professional or doctoral degree other than an MD or DO (OR = 0.64) had significantly lower burnout risk.

Physicians and partners with a recent experience of work-home conflict were more likely to have burnout than physicians and partners without recent such experience, respectively (47.1 percent versus 24.0 percent and  $p < 0.0001$  for physicians; 24.0 percent versus 7.8 percent and  $p < 0.0001$  for partners).

**Study (design, setting): Shanafelt, Oreskovich, 2012 (concurrent, American College of Surgeons)**

**Participants:** Physicians

Surgeon members of the American College of Surgeons who permitted use of email

Number of participants recruited: 27,457

Number of participants evaluated: 7,197

**Analytic Method and Controlled Variables**

Multivariate Wilcoxon-Mann-Whitney tests, Fisher exact tests, multivariable logistic regression with both forward and backward elimination  
Demographic characteristics (gender), professional characteristics (weekly hours worked, weekly nights on call, specialty), health habits (alcohol use, tobacco use, exercise), wellness strategies

**Predictor Variables**

Demographic characteristics (gender), professional characteristics (weekly hours worked, weekly nights on call, specialty work/life balance), health habits (alcohol use, tobacco use, exercise), wellness strategies

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three subdomains of EE, DP, and PA. Burnout was defined as combined high EE and high DP.

**Results**

Placing greater emphasis on meaning in work, the important things in life, positive outlook, and philosophy that promotes work/life balance were associated with lower likelihood of burnout.

**Study (design, setting): Shanafelt, 2014 (concurrent, American Society of Clinical Oncology)**

**Participants:** Physicians

Oncologists from the membership file of the American Society of Clinical Oncology

Number of participants recruited: 3,000

Number of participants evaluated: 1,117

**Analytic Method and Controlled Variables**

Multivariate Kruskal-Wallis tests, chi-square tests, Wilcoxon-Mann-Whitney tests, Fisher's exact tests, multivariable logistic regression

Age, gender, having children, youngest child, marital status, student loan debt, hours spent on patient care each week, hours spent on administrative tasks per week, hours spent on work tasks at home per week, nights on call per week, outpatients seen per week, focus on a type of cancer, time spent for new outpatient visits, time spent for return outpatient visit, weekends making rounds in hospital per year, compensation method (salary, salary with bonus, incentive)

**Predictor Variables**

Age, gender, having children, weekly hours spent on patient care, weekly hours spent on work tasks while at home, weekly hours spent on administrative tasks at work, focusing on one type of cancer, time spent for each return patient visit, weekends on call per year, relationship status, student loan debt, years in practice, practice setting, time spent supervising physicians in training, patient volume, hospital rounding, compensation method

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three domains of EE, DP, and PA. Burnout was defined as high EE (score of 27 or higher) and/or high DP (score of ten or higher) for at least one manifestation of professional burnout.

**Results**

Lower age was independently associated with burnout, with a one-year increase in age reducing burnout risk by 4–5 percent. Time spent on patient care each week was independently associated with burnout, with each extra hour spent on patient care every week increasing burnout risk by 2–5 percent. In the overall model, each extra hour per week spent on work tasks while at home also increased burnout risk by 2 percent, and focusing on one type of cancer increased burnout risk by 40 percent. Having children was associated with 55 percent decrease in burnout risk among private practice oncologists (OR = 0.45). Female gender was associated with a 65 percent increase in burnout risk among academic practice oncologists but not among private practice oncologists. Each extra hour per week spent on administrative duties at work increased burnout risk by 5 percent among private practice oncologists, and each extra hour per week spent on work tasks at home increased burnout risk by 3.5 percent among academic practice oncologists. Among academic practice oncologists, focusing on one type of cancer was associated with a 320 percent increase in burnout risk (OR = 3.24), and having less time allocated for each return patient visit (20-minute return slots had a 36 percent increase in burnout risk versus 30-minute return slots) and each extra weekend on call per year also increased burnout risk.

**Study (design, setting): Shanafelt, Gorringer, 2015 (concurrent, Mayo Clinic)**

**Participants:** Physicians

Physicians and scientists at the 3 academic campuses or 70 facilities of the Mayo Clinic Health System

Number of participants recruited: 3,896

Number of participants evaluated: 2,813

**Analytic Method and Controlled Variables**

Multivariate T tests, chi-square tests, two-tailed bivariate Pearson correlations, multivariate logistic regression analysis adjusting for controlled variables, sensitivity analysis

Demographic variables (age, gender, duration of employment, specialty)

**Predictor Variables**

Demographic variables (age, gender, duration of employment, specialty area), leadership qualities of immediate supervisor (based on the 12 dimensions of the supervisor discussing career development together, inspiring respondents to do their best, empowering respondents to do their job, being interested in respondents' opinions, encouraging respondents to suggest ideas for improvement, treating respondents with respect and dignity, giving respondents helpful feedback and coaching on performance, recognizing respondents for job well done, keeping respondents informed of changes at Mayo Clinic, encouraging respondents to develop their talent and skills, respondent would recommend working for supervisor, respondent satisfaction with immediate supervisor)

**Outcomes, Definition, and Operationalization**

Burnout was measured using two single-item measures from the MBI for EE and DP.

**Results**

Each of the 12 dimensions of leadership quality (supervisor discussing career development with respondents, inspiring respondents to do their best, empowering respondents to do their job, being interested in respondents' opinions, encouraging respondents to suggest ideas for improvement, treating respondents with respect and dignity, giving respondents helpful feedback and coaching on performance, recognizing respondents for job well done, keeping respondents informed of changes at Mayo Clinic, encouraging respondents to develop their talent and skills, respondent would recommend working for supervisor, respondent satisfaction with immediate supervisor) and the composite leadership score were strongly correlated with physician burnout. A one-point increase in composite leadership score was significantly associated with a 3.3-percent decrease in physician burnout risk, and the score for each supervisor was significantly correlated with burnout prevalence (correlation = 0.330,  $r^2 = 0.11$ ) and satisfaction (correlation = 0.684,  $r^2 = 0.47$ ) at the level of division or department.

**Study (design, setting): Shanafelt, 2016 (concurrent, American Medical Association)**

**Participants:** Physicians

Physicians of all specialty disciplines with information from the Physician Masterfile of the American Medical Association

Number of participants recruited: 35,922

Number of participants evaluated: 6,880

**Analytic Method and Controlled Variables**

Multivariate Kruskal-Wallis test, chi-square test, multivariable logistic regression adjusting for some controlled variables

Age, gender, specialty, practice setting, weekly hours worked

**Predictor Variables**

Use of EHRs (yes, no), use of computerized physician order entries (in clinic, hospital, clinic and hospital, no, not applicable), documentation method (dictate and use transcription service, self-enter with voice recognition software, self-enter handwritten or typed, someone else enters on behalf, other)

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI for the three domains of EE, DP, and PA. Burnout was defined as high DP (score) or high EE (score) for manifestation of professional burnout.

**Results**

Use of computerized physician order entries was significantly associated (OR = 1.29, 95-percent CI = 1.12-1.48) with higher burnout risk in adjusted multivariable analysis.

**Study (design, setting): Shanafelt, Sinsky, 2019; Shanafelt, West, 2019 (concurrent, AMA Physician Masterfile)**

**Participants:** Physicians

All specialty physicians with information in Physician Masterfile of American Medical Association

Number of participants recruited: 30,456

Number of participants evaluated: 5,197

**Analytic Method and Controlled Variables**

Multivariate Kruskal-Wallis test, chi-square test, multivariate logistic regression

Age, gender, relationship status, hours worked per week

**Predictor Variables**

Physician specialty, satisfaction with work-life integration

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for EE, DP, and PA. Burnout was defined as high DP and/or high EE.

**Results**

Physicians had significantly higher burnout risk (OR = 1.39, 95-percent CI = 1.26–1.54) and less likelihood of satisfaction with work-life integration (OR = 0.77, 95-percent CI = 0.70–0.85) than other working U.S. adults in adjusted multivariate analysis.

**Study (design, setting): Shenoi, 2018 (concurrent, pediatric critical care practices)**

**Participants:** Physicians

Nonrandom sample of pediatric critical care physicians

Number of participants recruited: 686

Number of participants evaluated: 275

**Analytic Method and Controlled Variables**

Multivariate chi-square test, Fisher exact test, Cochran-Armitage trend test, multivariable logistic regression, hot value imputation, Mann-Whitney U test, Spearman's correlation test

Gender, age

**Predictor Variables**

Personal characteristics (gender, age, marital status, having children, practicing religion, practicing relaxation technique, exercising regularly), practice characteristics (years of practice, practice type, pediatric intensive care unit [PICU], PICU beds, supervising residents/fellows, in-house calls), psychological distress and mental disorders in community and work settings (measured with the General Health Questionnaire)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three dimensions of EE, DP, and reduced PA. Burnout was defined as high burnout for high scores on any of the 3 subscales and as severe burnout for high EE and either high negative DP or high negative PA.

**Results**

Burnout risk was about twice as high in females (OR = 1.97, 95-percent CI = 1.2–3.4) and higher among younger providers. Regular physical exercise (OR = 0.56, 95-percent CI = 0.32–0.99) seemed to be protective against burnout. 30.5 percent of participants and 69 percent of those with severe burnout also had psychological distress. About 90 percent of physicians with severe burnout have considered leaving their practice.

**Study (design, setting): Sliwa, 2019 (prospective, American Board of Physical Medicine and Rehabilitation)**

**Participants:** Physicians

Psychiatrists identified from the American Board of Physical Medicine and Rehabilitation

Number of participants recruited: 8,825

Number of participants evaluated: 1,536

**Analytic Method and Controlled Variables**

Multivariate logistic regression

Demographic variables (gender, age, years in practice), practice characteristics (practice type, practice focus, practice area, practice group size, hours worked per week)

**Predictor Variables**

Other Mini Z questions: (job satisfaction, job stress, proficiency with EHRs)

**Outcomes, Definition, and Operationalization**

Burnout was measured with 14 items from the Mini Z Burnout Survey, one item for callousness from the MBI, and several questions for drivers of burnout.

**Results**

Job satisfaction, stress, workload control, sufficiency of time for documentation, and alignment of values with department leaders were significantly associated with burnout. High job stress and working more hours per week were associated with high burnout. The three most important causes of burnout among physiatrists were growing regulatory demands, workload and job demands, and inefficiency of practice and lack of resources.

**Study (design, setting): Smeds, 2020 (concurrent, general surgery programs)**

**Participants:** Physicians

General surgery residents at 18 programs

Number of participants recruited: 645

Number of participants evaluated: 273

**Analytic Method and Controlled Variables**

Multivariate



Controlled variables unclear

**Predictor Variables**

Depression, perceived stress, self-efficacy, social support, unhealthy alcohol use, debt, weekends off, gender, marital status, children, having a mentor, would choose surgery again

**Outcomes, Definition, and Operationalization**

Highest quartile of burnout scores measured using the 16-item OLBI

**Results**

Burnout was associated with depression, higher perceived stress/debt, fewer weekends off, less programmatic social events, and residents were less likely to reconsider surgery if given the chance. Low burnout was associated with lower depression/stress, higher social support/self-efficacy, more weekends off per month, program mentorship, lower debt, and residents being more likely to choose surgery again if given the chance. On multivariate analysis, higher depression/perceived stress were associated with burnout, and lower burnout scores were associated with lower stress/higher self-efficacy.

**Study (design, setting): Somerson, 2020 (concurrent, all 161 orthopedic surgery residency programs accredited by the Accreditation Council for Graduate Medical Education, specifically, the Fellowship and Residency Electronic Interactive Database)**

**Participants:** Physicians

Orthopedic surgery residency directors

Number of participants recruited: 3,500

Number of participants evaluated: 203

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Demographic variables (postgraduate year, sex, age, relationship and family status, indebtedness, spouse and parent information, future career plan information), program characteristics (urban/rural location of training program, call details, work hours, work autonomy, time spent on EMR and noneducational tasks, work-life balance, support from department, verbal abuse, program use of feedback)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE and/or high DP.

**Results**

Working over 80 hours per week (OR 2.8; 95-percent CI 1.1-7.8;  $p = 0.03$ ), using electronic medical records more than 20 hours per week (OR 2.1; 95-percent CI 1.0-4.5;  $p = 0.048$ ), and being verbally abused by faculty more than rarely (OR 3.7; 95-percent CI 1.3-11.5;  $p = 0.01$ ) were significantly associated with burnout. Conversely, having adequate nursing support at one's institution (OR 0.2; 95-percent CI 0.04-0.5;  $p < 0.01$ ) was associated with less burnout.

**Study (design, setting): Starmer, 2016 (concurrent, American Academy of Pediatrics)**

**Participants:** Physicians

Early career pediatricians

Number of participants recruited: 2,495

Number of participants evaluated: 840

**Analytic Method and Controlled Variables**

Multivariate chi-square tests, multivariable logistic regression with nonresponse and poststratification attrition-adjusted weighting

Gender, having children, location of medical school, measures of health (general status, sleep, exercise), past year sadness or depression, experience of major negative life events in past year; primary work position, status of practice ownership, years at current position, working 50 hours or more in a typical week, work schedule advance notice, clinical decision-making autonomy, adequate patient care resources, and physician colleagues for personal support which were variables in multivariable logistic regression

**Predictor Variables**

Personal factors consisting of demographics, location of medical school (U.S., Canada, international), measures of health (general status, sleep, exercise), past year sadness or depression (based on modified Physician Worklife Study question), experience of major negative life events in past year (death in family, financial problems, divorce, infertility, postpartum depression); work characteristics consisting of primary work position, status of practice ownership, years at current position, working 50

hours or more in a typical week, work schedule advance notice, clinical decision-making autonomy, adequate patient care resources, physician colleagues for personal support

**Outcomes, Definition, and Operationalization**

Burnout was measured with a single item that assessed for current experience of burnout among work.

**Results**

Sadness or depression, experience of negative life events, hectic or chaotic work setting, and working for at least four years at the current position were associated with burnout. Having excellent or very good health, having personal support from physician colleagues, and having adequate patient care resources were all associated with significantly reduced odds of burnout.

**Study (design, setting): Summers, 2019 (concurrent, military health system)**

**Participants:** Physicians

Physician core faculty in Graduate Medical Education programs across the military health system

Number of participants recruited: 1,769

Number of participants evaluated: 622

**Analytic Method and Controlled Variables**

Multivariate logistic regression

Predictor variables were used in multivariable logistic regression.

**Predictor Variables**

Gender, military rank, service branch, academic rank, teaching experience, specialty choice, training location

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI and defined as high EE (score of 27 or higher) and high DP (score of 10 or higher)

**Results**

Increasing the numbers of deployments (OR = 1.38, 95-percent CI = 1.07–1.77) was the only independent risk factor for burnout. A desire to stay beyond the initial obligation of active duty service (OR = 0.45, 95-percent CI = 0.26–0.77) was significantly associated with lower likelihood of burnout.

**Study (design, setting): Tetzlaff, 2018 (concurrent, Association of Physician Assistants in Oncology)**

**Participants:** Physician assistants

Membership of the Association of Physician Assistants  
in Oncology and attendee registration at the APAO Continuing Medical Education Conference

Number of participants recruited: 855

Number of participants evaluated: 250

**Analytic Method and Controlled Variables**

Multivariate Wilcoxon rank sum test, Kruskal-Wallis test, chi-square test, Fisher's exact test, Cochran-Armitage test, multivariable logistic regression

Age, gender, years as an oncology physician assistant, hours worked per week, practice type, subspecialty

**Predictor Variables**

Lower perceived level of collaborating physician leadership, portion of time devoted to direct and indirect patient care

**Outcomes, Definition, and Operationalization**

Burnout was measured with the MBI for the three domains of EE, DP, and lack of PA. Burnout was defined as high EE (score of 27 or higher) and/or high DP (score of ten or higher).

**Results**

Respondents who disagreed or were neutral regarding collaborating physician leadership qualities were more likely to be burned out (AOR = 3.37, 95-percent CI = 1.05–10.80; OR = 7.85, 95-percent CI = 2.76–22.3) than those who agreed. Subspecialty was independently associated with burnout, with medical oncology physician assistants being significantly less likely to have burnout than radiation oncology and pediatric or other subspecialty physician assistants.

**Study (design, setting): Thrush, 2019 (prospective, University of Arkansas for Medical Sciences)**

**Participants:** Physicians

All resident and fellow physicians at University of Arkansas for Medical Sciences, a moderately large-sized academic health center

Number of participants recruited: 633

Number of participants evaluated: 281

**Analytic Method and Controlled Variables**

Multivariate cross-sectional analyses, correlations, multivariable linear regression, repeated measures ANOVAs, paired t tests, Tukey post hoc tests  
Gender, postgraduate year level, service area (hospital-based, medical-based, surgical-based)

**Predictor Variables**

Postgraduate year, gender, service area (hospital-based, medical-based, surgical-based), engagement in burnout-alleviating activities in the last 4 months

**Outcomes, Definition, and Operationalization**

Burnout was measured with the 19-item CBI for physical and psychological fatigue related to personal, work, or patient care burnout. Burnout was defined as no burnout for a score of 0, seldom for 25, and always for 100, with moderate to high burnout for 50 or higher.

**Results**

Postgraduate year two residents ( $33.7 \pm 19.1$ ) had significantly higher patient-related burnout than postgraduate year 4 residents ( $21.6 \pm 15.4$ ) at time 1. Females ( $54.2 \pm 16.3$ ) had significantly higher personal burnout than males ( $43.2 \pm 17.4$ ) at time 2 and also at time 3 ( $53.0 \pm 17.3$ ,  $46.2 \pm 18.8$ ). Females ( $50.2 \pm 16.7$ ) had higher work burnout than males ( $41.8 \pm 18.3$ ) at time 2 and also at time 3 ( $50.9 \pm 17.0$ ,  $43.4 \pm 18.3$ ). Work burnout means at time 3 significantly differed by postgraduate year level. Multivariable models for average burnout showed no interaction effects between the explanatory variables, and the final model included only postgraduate year level and gender as explanatory factors. Females ( $53.7 \pm 16.3$ ) scored an average of 9.5 points higher than males ( $44.6 \pm 17.5$ ) ( $\beta = 9.5 \pm 2.0$ ; 95-percent CI, 5.5 and 13.5) in personal burnout, and gender contributed to 7 percent of variance in personal burnout. Both gender and postgraduate year level independently significantly predicted work burnout, contributing to 4 percent and 3 percent of total variance, respectively. In the model explaining patient-related burnout scores, postgraduate year level was the only significant explanatory factor for patient-related burnout, accounting for 4 percent of total variance in patient-related burnout. Postgraduate year 1 residents and postgraduate year 2 residents had significantly higher patient-related burnout than postgraduate year 4 residents, by about 8.1 and 7.3 points, respectively ( $\beta = 8.1 \pm 2.9$ ,  $\beta = 7.3 \pm 2.8$ ). Tukey post hoc tests for these differences also were significant for postgraduate year 1 versus postgraduate year 4 residents and for postgraduate year 2 versus postgraduate year 4 residents.

**Study (design, setting): Tran, 2019 (concurrent, primary care clinics)**

**Participants:** Mixture of physicians, physician assistants, nurse practitioners

All faculty and staff at ten primary care clinics at Oregon Health and Science University

Number of participants recruited: 190

Number of participants evaluated: 107

**Analytic Method and Controlled Variables**

Multivariate Fisher's Exact Test, simple linear regression

Clinical full-time equivalent was controlled in the association of time in EHRs and burnout

**Predictor Variables**

Time spent on tasks related to EHRs after hours

**Outcomes, Definition, and Operationalization**

Burnout was measured using the nine-item, five-point Likert scale Mini Z questionnaire, based on the Physician Worklife Study, to assess burnout, work satisfaction, and work stress. This measure yielded a single item burnout score.

**Results**

Higher clinical full-time equivalents (0.7 or greater) were significantly associated with burnout. When clinical full-time equivalents were held constant, providers with burnout showed a 22.5-percent lower same day completion rate of charts versus nonburnout providers and had 2.1 more incomplete call messages with patients than providers without burnout, and burnout was significantly associated with an increase of 3.6 in the number of incomplete results message. More EHR time exhibited a dose dependency with burnout, but with inflection for those with 0.5–0.6 clinical full-time equivalents.

**Study (design, setting): Wang, 2020 (concurrent, surgery training programs)**

**Participants:** Physicians

Residents across 51 institutions, enrolled in integrated vascular surgery training programs accredited by the Accreditation Council for Graduate Medical Education

Number of participants recruited: 284

Number of participants evaluated: 212

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Demographic and training factors (age, gender, marital status, having children, region of training, average hours worked per week, postgraduate year), gender based discrimination and bias (frequency of experiencing or witnessing the forms of being asked to do nonmedical tasks, inappropriate verbal communication, less trust from provider, less trust from patient, less responsibility)

**Outcomes, Definition, and Operationalization**

Burnout was measured with two items of the 22-item MBI, for EE and DP. Burnout was defined as high levels of (at least weekly) EE or DP.

**Results**

Gender-based discrimination and bias significantly predicted burnout, with an odds ratio of 1.9 (95-percent confidence interval of 1.1–3.5), as did longer work hours (above 80 work hours a week) with an odds ratio of 2.8 (95-percent confidence interval of 1.1–7.1).

**Study (design, setting): Weintraub, 2016 (concurrent, American Academy of Pediatrics)**

**Participants:** Physicians

2011 U.S. and Canada Directory of Section on Perinatal Pediatrics NICUs and Neonatologists of the American Academy of Pediatrics

Number of participants recruited: 1,258

Number of participants evaluated: 433

**Analytic Method and Controlled Variables**

Multivariate Pearson's correlation, Spearman's correlation, chi-square tests, Fisher exact tests, independent t-tests, multivariable logistic and linear regression analyses, principal component analysis, two-step cluster analyses

Gender, race, household member types, years/level as a NICU attending physician, recent on-call clinical activities

**Predictor Variables**

Current distress (because of clinical context, physical work setting, coworkers, personal health), recent substantial experiences (physical exhaustion, emotional depletion), self-care activities (talking about distressing issues, exercise, prayer or meditation, doing creative arts, reading), gender, race, current household members, years at NICU attending, NICU level, current feelings of distress ascribed to,

**Outcomes, Definition, and Operationalization**

Burnout was measured with a modified 54-item version of the Compassion Fatigue and Satisfaction Self-Help Test for Helpers for the three subscales of compassion fatigue, burnout, and compassion satisfaction, and with a separate 36-item questionnaire for self-reported professional and personal details that may affect development of burnout.

**Results**

Substantial emotional depletion in the past two weeks, distress from the work environment, distress from coworkers, and not talking about distressing issues significantly predicted burnout among both multivariable logistic regression and linear regression.

**Study (design, setting): Weintraub, 2020 (retrospective, members of accredited fellowship programs for pediatric hematology-oncology through the Accreditation Council for Graduate Medical Education)**

**Participants:** Physicians

Pediatric hematology-oncology physicians

Number of participants recruited: 1,771

Number of participants evaluated: 496

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variable**

Compassion fatigue score, not working on the day of survey, and distress about academic stress/administrative burden, and distress about coworkers

**Outcomes, Definition, and Operationalization**

Burnout subscale on the CFST

**Results**

Compassion fatigue score, and distress about administrative burden/academic stress and coworkers were associated with higher burnout scores. Compassion satisfaction score and socializing were associated with lower burnout scores.

**Study (design, setting): Windover, 2018 (concurrent, Cleveland Clinic Health System)**

**Participants:** Physicians

Physicians from multiple specialties

Number of participants recruited: 1,528

Number of participants evaluated: 1,145

**Analytic Method and Controlled Variables**

Multivariate

Physician sex, race, age, years in practice, marital status, dependents younger than 18 years, percent full-time equivalent, specialty, practice setting, meeting and vacation days used per year

**Predictor Variable**

Employment-related data: ombudsman complaints, productivity, satisfaction

**Outcomes, Definition, and Operationalization**

MBI: Three domains plus overall burnout

**Results**

There was no significant association between burnout and productivity or patient satisfaction with inpatient or specialty care.

**Study (design, setting): Wright, 2011 (concurrent, three large VA hospitals, two in the southern United States and one on the West Coast)**

**Participants:** Mixed sample (different types)

Health care workers from three VA hospitals, 53 percent physician assistants

Number of participants recruited:

Number of participants evaluated: 221

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Workplace conflict style (integrating, avoiding, dominating, obliging, compromising) was measured using the Organizational Conflict Inventory II.

**Outcomes, Definition, and Operationalization**

Burnout was measured using the MBI. Job burnout was defined using the 2 dimensions of EE and DP.

**Results**

Avoiding conflict style and dominating conflict style significantly predicted increased job burnout (0.17, 0.19,  $p < 0.05$ ). Integrating, obliging, and compromising conflict styles predicted lower job burnout (−0.16, −0.09, 0.03), although the results were not statistically significant.

**Study (design, setting): Yank, 2019 (concurrent, Physicians Moms Group online community)**

**Participants:** Physicians

Physician mothers with additional caregiving responsibilities, including adoptive and foster mothers, who are members of the Physicians Moms Group online community

Number of participants recruited: 5,613

Number of participants evaluated: 918

**Analytic Method and Controlled Variables**

Multivariate

Age, race/ethnicity, marital status, type of practice, specialty, self-perceived medical mistake ever

**Predictor Variables**

Having additional caregiving responsibilities (caring for very ill children, spouses, parents, or others)

**Outcomes, Definition, and Operationalization**

Burnout was identified with the Mini Z Burn-out Survey.

**Results**

Physician mothers who had additional caregiving responsibilities experienced significantly higher burnout rates and adjusted risk ratios (1.25; 95-percent CI, 1.06-1.46;  $P = 0.007$ ) than physician mothers without such responsibilities.

**Study (design, setting): Yasko, 1983 (concurrent, 35 states and Washington, D.C.)**

**Participants:** Nurse practitioners

Masters-level nurses working full-time in oncology clinical nursing

Number of participants recruited: 265

Number of participants evaluated: 185

**Analytic Method and Controlled Variables**

Multivariate T-test, Pearson correlation, multiple regression including stepwise multiple regression

Controlled variables unclear

**Predictor Variables**

Personal resources (age, marital status, number of children, income, master's level curriculum), personal perceptions (psychological support, stress, satisfaction with role at work, choice of work, development stage of burnout), role-related variables (years on job, work setting, appointment type, presence of written job description, presence of office at work, presence of role model at work, average weekly work hours related to job, average weekly hours with cancer patients, weekly number of cancer patients cared for)

**Outcomes, Definition, and Operationalization**

Burnout was measured with the 30-item Jones Staff Burnout Scale for Health Professionals for psychological, behavioral, and physiological burnout symptoms. Burnout was calculated as a score between 20 (no burnout) and 140 (severe burnout).

**Results**

Multiple regression analysis yielded significant associations between burnout and psychological support (beta coefficient 0.17), stress (0.22), satisfaction with role (–0.36), developmental stage of burnout (0.19), and years in role (0.14), which together yielded a multiple correlation coefficient of 0.716 and contributed to 51.3 percent of variance in burnout. Stepwise multiple regression with a final equation containing satisfaction with role, stress, developmental stage of burnout, and psychological support, contributed to 46.3 percent of variance in burnout.

**Study (design, setting): Yoon, Daley, 2017 (concurrent, American Medical Association Physician Masterfile database with all practicing U.S. physicians)**

**Participants:** Physicians

A stratified random sample of 1,504 U.S. primary care physicians and 512 psychiatrists age 65 years old or younger was created from the American Medical Association Physician Masterfile database of practicing US physicians. Primary care physicians had primary board specialties of internal medicine, family medicine, or general practice, and had no secondary specialty.

Number of participants recruited: 1,504 primary care providers, 512 psychiatrists

Number of participants evaluated: 896 primary care providers, 312 psychiatrists responded out of 1,427 primary care providers, 487 psychiatrists

**Analytic Method and Controlled Variables**

Multivariate

Age, sex, race/ethnicity, geographic census region, immigration history

**Predictor Variables**

Senses of calling as measured by single-item adapted from a previous study and categorized as low, moderate, and high levels of agreement with a statement about the practice of medicine being a calling for oneself

**Outcomes, Definition, and Operationalization**

Burnout was measured with a single-item, five-scale measure of experiences of burnout that was used in previous primary care provider studies, with a score of 3 or higher considered to be burnout as defined in previous studies.

**Results**

In multivariable analysis, physicians' sense of calling was negatively associated with burnout (17 percent high calling versus 31 percent low calling, OR 0.4, CI = 0.3–0.7). Psychiatrists were less likely to report burnout (15 percent psychiatrists versus 23 percent primary care providers, OR 0.6, CI 0.4–0.8).

**Study (design, setting): Yoon, Hunt, 2017 (concurrent, American Medical Association)**

**Participants:** Physicians

Stratified random sample of all practicing physicians in the U.S. as identified from American Medical Association database Physician Masterfile

Number of participants recruited: 1,878

Number of participants evaluated: 1,156

**Analytic Method and Controlled Variables**

Multivariate case weighting, t-test, Pearson chi-square test, multivariable logistic regression

Demographic variables (age, gender, race, history of immigration, region), religious characteristics (affiliation, importance of religion)

**Predictor Variables**

Frequency of exposure to clinical encounters that involved dying patients, clinical specialty, (general versus end-of-life specialties), patient centeredness of clinical environments

**Outcomes, Definition, and Operationalization**

Burnout was measured as one item in a validated measure. Burnout was defined as not burned out for a score of one to two, and as high burnout for a score of three or higher.

**Results**

Physicians who preferred to work in clinical environments that were profit-centered (33 percent versus 20 percent for patient-centered clinical environments, odds ratio = 1.9, 95-percent confidence interval = 1.3 to 2.8) and physicians who often or always had EE after caring for the dying (31 percent versus 19 percent for never, rarely, or sometimes, OR = 2.1, CI = 1.4–3.0) were more likely to experience burnout. Physicians who were often or always emotionally energized after having cared for the dying were statistically significantly less likely to experience burnout (19 percent versus 25 percent for never, rarely, or sometimes,  $p = 0.049$ )

**Study (design, setting): Zhang, 2019 (concurrent, American Society of Breast Surgeons)**

**Participants:** Physicians

Members of the American Society of Breast Surgeons

Number of participants recruited: 2,568

Number of participants evaluated: 660

**Analytic Method and Controlled Variables**

Multivariate

Controlled variables unclear

**Predictor Variables**

Years in practice, gender, relationship status, practice settings, practice community size, hours worked per week, and extent of time dedicated to breast surgery

**Outcomes, Definition, and Operationalization**

Scoring 1.33 or greater on the Professional Fulfillment Index assessing work exhaustion and interpersonal disengagement

**Results**

In the multivariable analysis, years in practice was inversely associated with burnout and positively correlated with professional fulfillment. Working more than 60 hours per week was positively associated with burnout

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**Table A.3. Evidence Table: Interventions for Military Health Care Professionals**

**Study: Adams, 2010**

**Participants:** Convenience sample of medical professionals; predominantly in the Army; consisted of civilian and military personnel

Physicians

Other: Nurses, behavioral health professionals, administrators, other enlisted personnel

**Study Design and Duration**

Post only

Duration of the intervention was not documented; however, total hours were stated to be consistent with another study that provided 35 hours of training over a five-week period

**Intervention**

Professional Provider Resiliency Training (PPRT) course consisted of training on mind-body techniques including deep breathing, journaling, tai chi, meditation, guided imagery, and biofeedback

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: N/A

Spread: 172 out of 210 volunteer medical professionals who took the PPRT course

Sustainability: N/A

**Outcome and Results**

Valued the training:

- doctors (100 percent),
- nurses (98 percent)
- behavioral health providers (90 percent)
- other professionals (100 percent).

Participants found deep breathing (95 percent), tai chi (86 percent), and guided imagery (85 percent) to be the most helpful

After the training:

- 90 percent of participants were “more mindful of their personal resiliency”
- 92 percent were “thinking more about conducting self-assessments”
- 93 percent “reported thoughts of developing a self-care plan”
- 96 percent planned to use learned techniques in the future

**Study: Benight, 2016**

**Participants:** Military mental health professionals (located on U.S. military installations worldwide); also, mental health professionals living near U.S. military installation and listed as Tricare insurance providers

Physicians : Medical doctors and psychiatrists, physician assistants, psychologists, mental health professionals, social workers

Other: Psychotherapists, marriage and family therapists

**Study Design and Duration**

RCT

Intervention duration: eight weeks; follow-up at two months after intervention ended (i.e., four months after the start of the intervention)

**Intervention**

Support Net Intervention (combined social media web-based self-care program with one-on-one telephonic peer coaching);

Coaching involved six sessions: awareness of burnout and secondary traumatic stress, setting goals and considering challenges; obstacles faced in achieving goals; awareness of satisfaction and self-care status; promotion of social support; and consolidation of new skills and changes to empower participants to continue forward; total time for coaching was 3.5 hours—first session was 60 minutes and the other five were 30 minutes each



**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Described as “easy to implement;” had session-by-session manual for coaching that includes goals for each session; participants recruited by email and phone with a follow-up contact

Spread: 1,720 solicited; 101 responded; 64 met inclusion criteria

Sustainability: N/A

**Outcome and Results**

Used the OLBI to assess EE and behavioral disengagement from work

Intention-to-treat sample ( $n = 64$ ):

- For coached at start plus delayed groups, exhaustion significantly lower at postintervention and at follow-up than at preintervention; supported hypothesis that website plus coaching more effective than website alone; Completer sample ( $n = 14$  or  $15$ )

For coached at start plus delayed groups, overall burnout and exhaustion were significantly lower at postintervention and at follow-up than at preintervention

**Study: Bronson, 2017**

**Participants:** High intensity environments at a Veteran Affairs Medical Center in southeastern United States

Other: Nurses

**Study Design and Duration**

Pre-post

Pilot mindfulness-based stress management program lasting four weeks

**Intervention**

Mindfulness-based program (abbreviated version of the Jon Kabat-Zinn’s eight-week Mindfulness Based Stress Reduction Program)

- Week 1, face-to-face meeting with project personnel and participants for preintervention surveys, introduction of mindfulness concepts and software download
- Week 2, participants used the application software 15 minutes per day with end-of-week face-to-face meeting to discuss progress and experiences.
- Week 3, continued use of application software and recording of experiences
- Week 4, participants continued use of application software with end-of-week face-to-face meeting to discuss progress and experiences and complete postintervention surveys

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Intervention consisted of two face-to-face meetings with project personnel; software mindfulness applications, and “insight timer” to facilitate 15-minute practice per day

Spread: All of approximately 80 registered nurses from inpatient psychiatry, ICU, urgent care/emergency, and outpatient psychiatry invited; 20 recruited. 18 completed pre- and postintervention surveys

Sustainability: N/A

**Outcome and Results**

MBI-HSS (MP), Mindful Self-Care Scale, and the Perceived Stress Scale (were measured pre- and postintervention

Means and standard deviations, but no significance tests, reported

Results reported as follows: “Upon completion of the four-week project, nurses reported improvement in burnout and stress, as well as increased acts of self-care.”

**Study: Christiansen, 2017**

**Participants:** A mix of civilian and military nurses in the Burn Progressive Care Unit at the U.S. Army Burn center

Other: Registered nurses, licensed vocational nurses, and certified nurses’ aides

**Study Design and Duration**

Post only

Eight hours

**Intervention**

Mandatory staff development consisting of education, team building, and resiliency training

Provided by guest speakers and lecturers, and also unit leadership

Classes included Joint Commission preparedness, telemetry refresher, burn reconstruction, nursing workload management system, unit metrics/patient safety/documentation/infection control, and Q&A with the chief nurse; team building included a casual bowling/computer simulation, meditation, and other team-building activities

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Participants divided into three teams. At the first session, the day and night teams overlapped over four hours on Monday, Wednesday, or Friday of the same week. At the second session, day and night teams met together on one of three consecutive Wednesdays.

Spread: All nursing staff offered an eight-hour training day; 46 of 48 staff members participated

Sustainability: N/A

**Outcome and Results**

Program evaluation:

- All activities were rated highly with a mean of 9.15  $\pm$  0.26 out of 10 for the first session and a mean of 9.36  $\pm$  0.13 for the second session.
- Overall, trainees agreed that training increased “awareness of unit performance” (9.41  $\pm$  0.83 out of ten) and “unit cohesion and healthy work environment” (9.56  $\pm$  0.71 out of ten).

**Study: Clarke-Walper, 2020**

**Participants:** 605 behavioral health clinicians from the U.S. Department of Veterans Affairs, the Department of Defense, and the community who were treating posttraumatic stress disorder in military populations

Psychologists, social workers

Other: Professional mental health counselor; medical professional with psychiatry focus

**Study Design and Duration**

RCT

Participants were assessed at baseline and again at six and 12 months after baseline.

**Intervention**

The PTSD Clinicians' Exchange had three sections: Engage (26 key practices for PTSD); Connect (interactive activities to bring clinicians together; Inspire (self-care resources to manage stress, burnout, secondary traumatic stress). There was also a self-assessment component. Use of the website was voluntary; tracked during the intervention; and categorized as no access, having access but not using the website, or using the website one or more times.

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: N/A

Spread: 1,453 clinicians responded to recruitment emails or online message boards; 792 agreed to participate; 605 completed the baseline survey

Sustainability: N/A

**Outcome and Results**

Used a ten-item subscale of the ProQOL-5 to assess burnout

- No significant differences in burnout between the intervention and control groups were found at 12 months and burnout scores remained stable over the course of the study

A noteworthy limitation of the study was the low number of intervention group participants who used the website

**Study: Duncan, 2011**

**Participants:** Wellness clinic for staff at a United States Department of Defense hospital

Physicians, other: Nurses, clinical supervisors, therapists, medical technicians, administrative assistants, housekeeping

**Study Design and Duration**

Post only

Surveys administered after each visit; questions addressed short-term benefits and perceived benefits over time

Could visit as often as schedules allowed

Participants could choose the intervention at each visit

**Intervention**

Restore & Renew Wellness Clinic providing complementary and alternative medicine :

- Calm, healing environment with support to practice mindfulness
- Ear acupuncture
- Clinical acupressure
- Zero-balancing (“integrates Western concepts of osteopathic medicine with Eastern principles of energy and healing”)

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Participants were solicited by flyers, email, and word-of-mouth

Clinic open one day per week from 8 a.m. to 2 p.m.

Spread: 2756 visits to the clinic over 1 year (2,756 self-report surveys in the database); 1,010 unique first-time participants to the clinic; 521 attended the clinic for additional visits; 50.2 percent of DoD beneficiaries participated

300 participants visited over 12 times

Sustainability: Authors concluded the Wellness Clinic "is feasible, well-utilized"

### **Outcome and Results**

Program evaluation:

Participants agreed or strongly agreed; percent of surveys:

- Felt more relaxed after sessions (97.9 percent),
- Less stress (94.5 percent),
- More energy (84.3 percent),
- Less pain (78.8 percent)
- Would recommend it to a coworker (97 percent of surveys)

Among surveys completed after five or more visits, participants strongly agreed:

- Experienced increased compassion for patients, better sleep, improved mood, and more ease in relations with coworkers (59 percent-85 percent of surveys)

"Perceived benefits were sustained and enhanced by number of visits."

### **Study: Kang, 2016**

**Participants:** Health care employees of a military outpatient primary care clinic serving U.S. Army, Navy, Marine, Air Force personnel and their families in Wiesbaden, Germany

Physicians, physician assistants, nurse practitioners, social workers

Other: Active duty medics, registered nurses, pharmacists, therapists, and ancillary health care personnel

### **Study Design and Duration**

Pre-post

Surveys were completed at baseline and after one month of yoga training

### **Intervention**

Weekly yoga-based stress reduction program:

- eight onsite yoga classes (two times per week for four weeks)

### **Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Project leader described the project purpose, goals, and process at morning huddles and by email

Resources included use of the clinic and conference rooms

Yoga instructor donated services

Spread: Of 80 invited participants, 36 were recruited and filled out baseline surveys. 29 completed the second set of surveys after one month of yoga training

Sustainability: ten participants were still participating in yoga training one month after the end of the project training

### **Outcome and Results**

Used Perceived Stress Scale:

mean Perceived Stress Scale score decreased from Time 1 (baseline) ( $M = 16.00$ ,  $SD = 5.02$ ) to Time 2 (four weeks) ( $M = 11.00$ ,  $SD = 5.16$ ),  $t(28) = 4.72$ ,  $p < 0.0001$ .

### **Study: Kearney, 2018**

**Participants:** Participants were new VHA mental health facility leaders or mental health discipline service chiefs with less than two years of experience

Other: Mental health chiefs or deputy chiefs, and mental health discipline leads (e.g., psychology, psychiatry, social work), and nurses

### **Study Design and Duration**

Pre-post

For this article, baseline data collected in 2014 and intervention data collected in 2015

### **Intervention**

Structured VA national mental health leadership mentoring pilot program

- Five modules: strategic planning, human resources, systems understanding, administrative operations and program evaluation, and professional and personal development.

- Mentors and mentees were matched based on mentee needs
- Modules had subcomponents with prework materials (reading materials, presentations, data dashboards); discussion points; and assignments
- Learning plan was flexible for each mentee-mentor pair

Pairs met for one to two hours per month to review prework materials, monthly assignments, modify the learning plan, and assess progress

#### **Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Mentoring workgroup:

- Developed the modules
- Provided an initial mentor overview presentation to review timelines, resources, requirements, and to answer questions about how to manage challenges

Sharepoint site for mentors and mentees

Mentees and mentors identified by using marketing techniques via emails and national calls

Spread: 31 mentees and 24 mentors identified

Sustainability: N/A

#### **Outcome and Results**

Burnout-job satisfaction:

- Used annually administered VHA survey of mental health providers that contained two questions, each with a five-point scale, that were averaged to assess job satisfaction and burnout
- In facilities with a fiscal year 2015 mentee as a leader, there was improvement in the job satisfaction-burnout scale: 3.56 to 3.85 ( $p = 0.015$ )

Leadership skills:

Used the VHA Mental Health Leadership Skills Self-Assessment Tool

- Statistically significant improvement was found across all 5 skill areas for mentees

Program success:

Mentors and mentees both very pleased with the mentoring program outcomes and all other aspects of the program

#### **Study: Kubát, 2016**

**Participants:** Military hospital in the Czech Republic

Physicians

Other: nurses, administrator

#### **Study Design and Duration**

Pre-post

12-week intervention with surveys at baseline and at the end of the last session

#### **Intervention**

Participants engaged in a 12-week yoga course to reduce job-related stress and improve flexibility and mobility

- One 90-minute lesson per week, at the workplace
- Each lesson included relaxation, short breathing exercise, preparatory exercise, yoga poses (shoulder stand, fish pose, back stretched out, boat pose, bridge post, half fish lord pose, thunderbolt pose, gate pose, tree pose), relaxation

#### **Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Participants voluntarily enrolled in the pilot study

Spread: Out of approximately 450 employees, 36 initially joined the pilot intervention; 13 completed it

Sustainability: N/A

**Outcome and Results**

Used N-5 questionnaire for the rating of neurasthenia, vegetative, depressive and anxious disorders

Also used the Oswestry disability index questionnaire for disability related to back pain

Mean scores of the N5 questionnaire dropped from 20.1 to 8.2 ( $p < 0.001$ ) at the end of the intervention

Drop in Oswestry disability index also statistically significant

**Study: Leary, 2018**

**Participants:** Health care workers from VHA facilities who provided direct patient care

Unclear: No more specific information provided

**Study Design and Duration**

Pre-post

Intervention delivered over a three-month period; participants were assessed at baseline (T1), immediately postintervention (T2), and at three months after the intervention was completed (T3)

**Intervention**

Internet-delivered Mantram Repetition Program

- Consisted of six 50-minute classes given every other week over a three-month period
- Class topics were: (1) Introduction to Mantram Repetition; (2) How to choose, use, and track Mantram practice; (3) The stress response and Mantram Repetition; (4) Slowing down; (5) One-pointed attention; (6) Putting it all together

Classes consisted of lectures, PowerPoints, and discussions on live meeting technology and telephone conference calls

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Participants were volunteers in the Program and were recruited with flyers and emails

Participants were given examples of when and where to practice with tools, a downloadable manual, and a course text book

Spread: 54 enrolled; 39 completed the program

Sustainability: N/A

**Outcome and Results**

Used MBI, Science of Conscience Questionnaire:

For the entire sample:

- Exhaustion significantly ( $p < 0.05$ ) declined between T1 and T3; professional efficacy and cynicism did not change. Frequency of stressful events significantly declined between T1 and T2 and troubled conscience declined between T1 and T3

For participants who did not practice meditation at baseline ( $n = 16$ , 41 percent):

- Significantly decreased: exhaustion, frequency of stressful events, and troubled conscience between T1 and T3,
- Significantly improved: professional efficacy between T1 and T2.

**Study: Meredith, 2018**

**Participants:** Primary care employees excluding trainees (107 primary care providers and 249 staff) from 23 primary care practices (6 intervention and 17 comparison) within one VHA region

Physicians, physician assistants, nurse practitioners, mental health professionals, social workers; Other: Nurses, case/care managers, health educators, health technicians, medical assistants, dietitians/nutritionists, pharmacists

**Study Design and Duration**

Time series

Three intervention practices began evidence-based quality improvement innovations in 2011 (early) and three more began evidence-based quality improvement innovations in 2012 (late)

Three waves of surveys were administered across 42 months beginning in November 2011 and ending in January 2016

**Intervention**

Developing evidence-based quality improvement innovations and tools for spread:

- Multilevel, interdisciplinary approach for engaging frontline primary care practices
- Six of 26 approved evidence-based quality improvement innovations directly addressed provider and staff morale; all 26 addressed medical home implementation challenges

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Review and approval process:

- Brief innovation proposals from providers and staff
- Proposed through a quality council or site workgroup
- Regional leaders set quality improvement priorities
- --Approved projects received responsive evidence reviews and budgets
- Volunteer projects were also undertaken
- Spread: There were three survey waves and survey response rates were 63 percent for baseline and 48 percent for both follow-up waves

Sustainability: N/A

**Outcome and Results**

Main outcome measures—EE subscale from the MBI; job satisfaction:

- Age was associated with lower burnout among primary care providers ( $p = 0.039$ )
- Male primary care providers had higher satisfaction ( $p = 0.037$ )

Controlling for practice and primary care physician/staff characteristics, EE (MBI EE scale) increased by five points for primary care physicians in comparison practices ( $p = 0.024$ ) and decreased by 1.4 points for early and 6.8 points ( $p = 0.039$ ) for late evidence-based quality improvement innovations practices

**Study: Rollins, 2016; Salyers, 2015; Eliacin, 2018**

**Participants:** Employees from three VA medical centers and two community social service agencies in three Midwestern cities

Other: Behavioral health providers

**Study Design and Duration**

RCT

BREATHE: Day-long workshop

Surveys at baseline, at six weeks, and at six months postintervention

Control: Day-long workshop on person-centered treatment planning

Recruitment and workshops in two waves over ten months

**Intervention**

BREATHE:

- Enhances providers personal resources
- Uses "relapse-prevention framework to help participants identify antecedents of burnout and introduces wellness strategies," including cognitive-behavioral techniques, contemplative processes, approaches for enhancing social support, and information about physical wellness and time management

**Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Recruitment with brochures distributed in routine meetings, mailboxes, and emails

Delivered by two psychologists with experience in mindfulness and cognitive behavioral approaches

Participants received workbook for developing a self-care plan

Spread: 145 participants with 109 from the VA and 36 from the community agencies

Sustainability: N/A

**Outcome and Results**

- Used MBI, ten-item Provider Expectations Scale, five satisfaction items from Job Diagnostic Survey, and self-report questions assessing turnover intentions, sick time used, vacation time used, and work-life balance
- No significant differences between intervention and control groups
- BREATHE participants showed small but statistically significant improvements in cynicism (at six weeks) and in EE and positive views of clients (at six months) when compared with baseline
- No significant changes over time in the control group

**Study: Villasenor, 2016**

**Participants:** Health care professionals working with veterans at a Veterans Center in Modesto, California

Social workers

Other: Administrative staff

### **Study Design and Duration**

Pre-post

Duration was eight weeks

Quantitative survey data collected at baseline and after Compassion Cultivation Training completion

Qualitative data collected on last day of Compassion Cultivation Training with participant focus group and at seven-month follow-up using individual interviews

### **Intervention**

Compassion Cultivation Training program:

- On mindfulness, burnout, compassion fatigue
- Consisted of weekly two-hour sessions over an eight-week period
- Assigned daily compassion-focused meditation practices, readings, and informative videos
- Meditation exercises incorporated into the two-hour sessions

### **Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Researchers conducted staff meeting to explain the program

Participant focus group at end of Compassion Cultivation Training

Individual interviews at seven-month follow-up

Spread: Participants were volunteers; 12 completed baseline surveys; six completed postprogram surveys and participated in a focus group; and nine were interviewed even months after completing the intervention

Sustainability: N/A

### **Outcome and Results**

- Used Five Facet Mindfulness Questionnaire, Self Compassion Scale, ProQOL
- No statistically significant changes in quantitative mindfulness, self-compassion, burnout, secondary traumatic stress, or compassion fatigue scores over time.
- Qualitative data identified four major themes: an increase in mindfulness practices; skills learned allowed participants to be more aware of expressed compassion; increased awareness of burnout and its possible impact on clients and themselves; and increased understanding of how the Compassion Cultivation Training program reduced negative impact of working with clients' recollection of traumatic events.

### **Study: Weidlich, 2015, Weidlich, 2014**

**Participants:** Military and civilian nurses and medics assigned to an Army Medical Center

Other: Registered nurses, licensed practical nurses, and medics

### **Study Design and Duration**

Pre-post

Training usually lasts one to two hours

Follow-up was 30 days after training

### **Intervention**

CPSP:

- PPRT program (which was renamed CPSP)
- Goal to teach providers to educate themselves about compassion fatigue, assess their own personal level of compassion fatigue, and to take action
- Consists of discussion groups, interactive participation, and education on stress and resilience

### **Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Participants scheduled to take CPSP training between February and June 2013 were recruited

Spread: Convenience sample: 93 completed baseline surveys and 28 completed follow-up surveys

Sustainability: N/A

### **Outcome and Results**

Used CD-RISC, WCQ, and ProQOL

- ProQOL burnout subscale indicated that burnout was significantly lower at follow-up (19.79) than at baseline (28.71,  $p < 0.001$ )
- One component of the WCQ (positive reappraisal) showed a statistically significant change over time

### **Study: Wood, 2017**

**Participants:** Mental health professionals from the VHA Puget Sound Health care System

Physicians

Psychiatrists, psychologists, mental health professionals, social workers

Other: Psychiatric nurses

### **Study Design and Duration**

Pre-post

Duration of the intervention was one month

Surveys at baseline and after one month of using the app

### **Intervention**

PR app:

- Free to use
- Developed by the National Center for Telehealth and Technology to reduce provider burnout
- Pilot study to investigate usability, acceptability, and effectiveness of the app
- Consisted of two assessment tools, customizable “builders” and “killers” to encourage users to be aware of factors that increase and decrease resilience; and tools to enhance resilience and reduce burnout.

### **Implementation, Organization Penetration (spread), and Sustainability**

Implementation: Participants downloaded the Provider Resilience app on their personal cell phones and were asked to use the app “regularly”

Brief tutorial on how to use the app was provided

Spread: Of 32 outpatient mental health professionals who signed up for the pilot study, 30 completed surveys at baseline and at the end of the intervention

Sustainability: N/A

### **Outcome and Results**

Surveys at baseline and at one month included the following:

- ProQOL
- Outcome Questionnaire 45
- Connor-Davidson Resilience Scale
- Surveys at one month included the following:
- System Usability Scale
- Provider Resilience Questionnaire—Usability, Acceptability

Participants gave the PR app an overall score of 79.7 on the System Usability Scale (in the top quartile for usability)

Professional Quality of Life Scale indicated significant decreases on the Burnout ( $t = 3.65, p < 0.001$ ) and Compassion Fatigue ( $t = 4.54, p < 0.001$ ) subscales

Of the 30 participants who completed the study, 40 percent used it once or twice a week; 33 percent, two to four times a week; and 27 percent used it daily.

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**Table A.4. Evidence Table: Interventions for Burnout**

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Abos, 2019	Teachers Public secondary schools in Huesca, Spain	RCT Study design: 106	Physical activity Prevention and reduction	Partially effective. Improvements in relatedness satisfaction, vigor, absorption, and satisfaction, but no improvements in dedication and burnout at work.
Adams, 2010	Mixed health care professionals (doctors, nurses, behavioral health providers and other professionals) The Army Medical Department Center and School, United States	Post only Study design: 172	Resiliency training Prevention	Effective Participants found the training valuable and indicated that they will use the learned mind-body resiliency techniques
Adams, 2019	Nurses Emergency department at a community hospital in southeast Texas	Pre-Post Study design: 30	Cultural Change Toolkit Reduction	Effective. Decrease in turnover scores and burnout scores
Aggarwal, 2017	Physicians Residents New Jersey Medical School	Pre-Post Study design: 188	Neuroscience education and easy-to-practice evidence- based exercises Reduction	Effective. Positive feedback from the residents.
Alenezi, 2019	Nurses (mental health nurses) Mental health clinic in Riyadh, Saudi Arabia	Clinical trial Study design: 296	Burnout prevention program Reduction	Effective. Reduction in burnout scores.
Alexander, 2015	Nurses U.S. teaching hospital	RCT Study design: 40	Yoga intervention Reduction	Effective. Improvement in mindfulness, EE, and DP
Ali, 2011	Physicians intensivists Medical intensive care units in U.S. academic hospitals	RCT Study design: 45	Weekend respite work schedule Reduction	Effective. Better scores in burnout, work-home life imbalance, and job distress for weekend respite for weekend respite than continuous schedule.
Allen, 2020	Other mental health professionals Inpatient acute psychiatric unit, United Kingdom	Pre-Post Study design: 150	Schwartz Rounds Prevention	Effective. Rounds were rated as helpful, insightful, and relevant, and at six years follow-up still rated as valuable (for the opportunity to express emotions).

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Almén, 2020	Other professionals (office workers) Office workplace, Östersund, Sweden	Time series Study design: 3	Stress-recovery management Reduction	Effective. Improvements in stress, worry, anxiety, depression, burnout, type A behavior, unwinding and recuperation from work stress, and insomnia .
Ancona, 2014	Teachers Baltimore City public schools serving low-income neighborhoods	RCT Study design: 43	Yoga and mindfulness Reduction	Effective. Reductions in perceived stress and EE.
Andersen, 2010	Other professionals (human service workers) Danish human service sector	Pre-Post Study design: 1024	External and internal reorganizations, educational days, and consultancy Reduction	Not effective. No reductions in burnout.
Anderson, 2000	Teachers (middle school teachers) Middle school teachers in the State of Iowa	Clinical trial Study design: 167	Rational emotive behavior therapy intervention Reduction	Not effective. No difference in EE, DP, and PA
Arapovic-Johansson, 2018	Other health care professionals (health care employees) Primary health care units, Sweden	RCT Study design: 118	Participatory work place Prevention	Not effective. No difference in job strain, effort-reward imbalance, exhaustion, sleep and recovery.
Ares, 2019	Physicians University of Pittsburgh Medical Center neurosurgery department	Pre-Post Study design: 28	Wellness Initiative Reduction	Not effective. No difference in MBI scores.
Ash, 2020	Other professionals (hospital chaplain residents) Spiritual Health at Emory Health care, U.S.A	Clinical trial Study design: 15	Compassion meditation Reduction	Effective. Decreases in burnout and anxiety.
Auger, 2012	Physicians (interns) Large U.S. pediatric teaching hospital	Clinical trial Study design: 11	Work hour restrictions Reduction	Partially effective. Increased rest; increase in work compression and adverse consequences in education and professionalism.
Auserón, 2018	Mixed health care professionals Primary care, Spain	RCT Study design: 48	Mindfulness and Self-Compassion training program Reduction	Effective. Improvement in mindfulness, perceived stress, self-kindness and emotional fatigue.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Babbar, 2019	Physicians (obstetrics, gynecology residents and maternal-fetal medicine fellows) Department of Obstetrics, Gynecology and Women's Health, Saint Louis University	Pre-Post Study design: 29	Yoga-Based Wellness Initiative Reduction	Effective. Decrease in scores of DP and anxiety
Back, 2014	Physicians (cancer care clinicians) Barnes-Jewish Hospital, St. Louis, MO	Time series Study design: 15	Compassion fatigue resiliency program Prevention and reduction	Effective. Decrease in secondary traumatic stress scores, improvement in The Revised Impact of Event Scale
Bagheri, 2019	Nurses Hospital in Tehran, Iran	RCT Study design: 60	Cognitive-behavioral therapy Reduction	Effective. Decrease in burnout.
Baldelli, 2004	Nursing home staff Nursing home, Modena, Italy	Pre-Post Study design: 21	Occupational therapy and cognitive rehabilitation for patients Reduction	Effective. Reduction in job burnout.
Barbosa, 2015 Barbosa, 2016	Other health care professionals (direct care workers) Aged-care residential facilities, Portugal	RCT Study design: 53	Psychoeducational Intervention Reduction	Effective. Decrease in burnout and stress levels; improvement in several communicative behaviors.
Barcons, 2019	Physicians Public ambulatory mental-health service in Barcelona, Spain	Clinical trial Study design: 38	Multimodal training Reduction	Partially effective. No improvement in burnout levels; better scores on global psychopathological state and satisfaction at work.
Bar-Sela, 2012	Physicians Oncology faculty, Israel	Pre-Post Study design: 15	Balint group meetings Reduction	Partially effective. Burnout levels decreased for junior but increased for senior residents.
Bartello, 2017	Social workers U.S. nonprofit organization for child services	Post only Study design: 32	Worksite Wellness Program Prevention and reduction	Partially effective Participants have high confidence in and intention to adopt the intervention

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Benight, 2016	Mixed mental health care professionals (clinical psychologists, psychotherapist, marriage and family therapist, medical doctor, physician assistant, psychiatrists, social workers) U.S. military installations throughout the world	RCT Study design: 64	Coaching plus social media web-based self-care program with one-on-one telephonic peer coaching Reduction	Partially effective. Reduced some aspects of job burnout (OLBI measure of burnout, Burnout Management Self-Efficacy Scale.).
Bentley, 2018	Physicians (psychiatry residents) Academic medical center in a mid-size city in the southeast U.S.A	Pre-Post Study design: 7	Relational mindfulness and empathy training Reduction	Effective. Increased awareness of cognitive and emotional experiences and ability to care for others, decrease in mean scores on all MBI-HSS subscales.
Berry, 2012	Other mental health professionals Low secure unit within Greater Manchester, United Kingdom	Pre-Post Study design: 25	Behaviour workshop Reduction	Not effective. No significant changes in MBI scales; even an increase in EE.
Biglan, 2013	Day care staff (early childhood special education staff) U.S. early childhood special education	RCT Study design: 42	Acceptance and Commitment Therapy Prevention and reduction	Effective. Decrease in experiential avoidance; increase in mindful awareness and valued living; improvement in sense of efficacy
Bittman, 2003	Social workers United Methodist Retirement Community in Meadville, Pennsylvania	RCT Study design: 112	Recreational music-making Reduction	Effective. Reductions in multiple burnout and mood dimensions.
Boren, 2011	Mixed other professionals (University staff) Large southwestern university	RCT Study design: 46	Enacted social support training intervention Reduction	Not effective. No change in psychological and physiological stress.
Brady, 2012	Mixed health care professionals Inpatient behavioral health unit in a large Midwestern hospital	Pre-Post Study design: 16	Mindfulness-based stress reduction Reduction	Effective. Decrease in stress levels and improvement in self-care

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Bragard, 2010	Physicians Medical Residents Cancer care institutions in Belgium	RCT Study design: 96	Communication and stress management training Reduction	Not effective. No change in EE, DP, and PA.
Brainch, 2018	Physicians Psychiatric emergency services in a large, urban, independent community hospital in the United States	Cohort study Study design: 32	Duty-hour changes Reduction	Not effective. No difference in exhaustion and cynicism.
Brake, 2001 Gorter, 2001	Other health care professionals Dentists Dutch health care (dentists)	Clinical trial Study design: 92	Burnout intervention program Prevention and reduction	Not effective. No reduction in burnout.
Brennan, 2019	Physicians family medicine residents Family medicine, Toledo, Ohio	Time series Study design: 32	Resiliency program to increase resiliency and decrease burnout Reduction	Effective. Lower scores in DP and EE.
Briones-Peralta, 2020	Nursing home staff Nursing home in Cuenca, Spain	Pre-Post Study design: 36	Practical burnout training program Reduction	Effective. Improvement in EE and DP scores.
Bronson, 2018	Nurses from high-intensity care areas Veteran Affairs Medical Center	Pre-Post Study design: 18	Mindfulness Based Stress Management program Reduction	Effective. Improvements in burnout, self-care, and perceived stress.
Brooks, 2010	Mixed health care professionals U.S. urban university-affiliated hospital system	RCT Study design: 65	Music-imagery Reduction	Partially effective. No change in self-reported burnout, sense of coherence, and job satisfaction; qualitative benefits that help relax, rejuvenate, and refocus.
Butow, 2015	Physicians (oncologists) Australian/New Zealand and Swiss/German/Austrian oncology centers	RCT Study design: 62	Consultation skills training Reduction	Not effective. No change in stress and burnout.
Butow, 2008	Physicians oncologists Tertiary care hospitals in six Australian cities	RCT Study design: 30	Communication skills training program Reduction	Not effective. No decrease in stress and burnout.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Carmel, Fruzzetti, 2014	Mixed mental health care professionals therapists Large, urban public behavioral health system in northern California	Pre-Post Study design: 9	Training in dialectical behavior therapy Reduction	Effective. Burnout scores decreased.
Carmel, Villatte, 2014	Physicians U.S. hospital-based outpatient mental health clinic	RCT Study design: 8	Bug-in-the-eye (supervisor observing therapy session broadcasting brief suggestions and feedback) Reduction	Not effective. No difference in burnout or satisfaction with supervision.
Carson, 1999	Nurses Hospitals, London, United Kingdom	RCT Study design: 53	Social support Reduction	Not effective. No reduction in stress and burnout.
Caruso, 2013	Mixed mental health care professionals mental health staff members Community rehabilitation unit, northeast Italy	Time series Study design: 12	Contextual cognitive-analytic therapy based training Reduction	Effective. Decrease in EE, SES Availability subscale, and GEQ Attraction to Group; increase in MB PA scores.
Cezar da Costa, 2019	Nurses State Institute of the Brain, Brazil	RCT Study design: 39	Stretching exercises Reduction	Effective. Decrease in stress level.
Chacón Roger, 2006	Nurses Cuban oncology hospitals	Clinical trial Study design: 63	Psycho-didactic workshops Reduction	Effective. Improvement in EE, DP and lack of personal fulfillment.
Cheek, 2003	Teachers Suburban school district in southwest United States	RCT Study design: 51	Cognitive behavioral /music therapy Reduction	Effective. Improvement in DP and PA.
Cheon, 2014	Teachers Schools (elementary, middle schools, high schools) in Seoul, South Korea	RCT Study design: 27	Autonomy-supportive teaching Reduction	Effective. Decrease in emotional and physical exhaustion; increase in teaching motivation, skill and well-being (vitality, job satisfaction).
Chesak, 2020	Nurses Nursing department Mayo Clinic	RCT Study design: 36	Authentic Connections Groups Reduction	Effective. Improvements in depression, self-compassion, and perceived stress.
Chirico, 2019	Teachers Catholic school in Italy	RCT Study design: 50	Christian prayer and focus group of prayer-reflection Prevention	Effective. Decrease in EE, DP, and psychological impairment; increase in job satisfaction.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Christiansen, 2017	Nurses The Burn Progressive Care Unit at the U.S. Army Burn center	Post only Study design: 46	Staff development program to improve nurse satisfaction, resiliency, unit cohesion, morale, and staff awareness of unit performance Prevention and reduction	Effective High scores of awareness of unit performance and unit cohesion/healthy work environment
Christopher, 2016 Kaplan, 2017	Police officers Police department in a medium-sized city in the Pacific Northwest	Pre-Post Study design: 43	Mindfulness-Based Resilience Training program Reduction	Effective. Improvement in self-reported mindfulness, resilience, perceived stress, burnout, emotional intelligence, mental health, physical health, anger, fatigue, and sleep disturbance.
Clarke-Walper, 2020	Mixed mental health care professionals U.S. behavioral health clinicians	RCT Study design: 605	PTSD Clinicians Exchange Reduction	Not effective. No change in burnout scores.
Clayton, 2013	Physicians Large teaching hospital in Sydney, Australia	Pre-Post Study design: 22	Communication-skills training Reduction	Not effective. No change in burnout levels.
Clemons, 2019	Physicians (oncologists and a palliative care physician) Canadian health care	Pre-Post Study design: 13	Modified “virtues” (temperance, silence, order, resolution, frugality, industry, sincerity, justice, moderation, cleanliness, tranquility, chastity, and humility) program Reduction	Not effective. No significant change in burnout (EE, DP, PA).
Clubbs, 2019	Nurses U.S. community hospital neonatal intensive care unit	Pre-Post Study design: 32	Volunteers helping in NICU Reduction	Effective. Decrease in EE and DP
Çoban, 2004 Çoban, 2007	Other professionals school counselors School counselors, private and public schools in Gaziantep, Turkey	Clinical trial Study design: 16	Structured peer consultation Reduction	Effective. Improvement in burnout level.
Cohen, 2005	Social workers, hospital social workers Rambam Medical Center at the north of Israel	Pre-Post Study design: 25	Skill-Development Training Reduction	Effective. Decrease in EE and DP; increase in PA.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Cohen-Katz, Wiley, Capuano, Baker, Deitrick, 2005 Cohen-Katz, Wiley, Capuano, Baker, Kimmel, 2005 Congiusta, 2020	Nurses Hospital, Allentown, Pennsylvania  Physicians Medical group of a large integrated health care system in the New York City metropolitan area	RCT Study design: 25  RCT Study design: 63	Mindfulness-based Stress Reduction (MBSR) Reduction  Online training to improving patient experience and physician burnout Reduction	Effective. Reduction in EE and DP; improvement in PA.  Effective. Lower DP and burnout scores; higher Personal Achievement.
Cooley, 1996	Teachers (special education teachers) U.S. education	RCT Study design: 92	Stress-management workshops and peer-collaboration program Reduction	Effective. Improvement in job satisfaction, DP, PA, organizational commitment, and EE.
Corcoran, 1984	Social workers Social services, Texas	Clinical trial Study design: 36	Affective-oriented training Reduction	Effective. Reduction in the reported frequency of EE.
Cordoba, 2018	Nurses Medical center in Portland, Oregon	Clinical trial Study design: 29	Daily work breaks in a hospital garden Reduction	Effective. Improvement in EE and DP
Corrigan, 1997	Other mental health professionals University of Chicago Center for Psychiatric Rehabilitation	Pre-Post Study design: 35	Interactive training Reduction	Effective. Improvement in attitudes about behavioral interventions, increased perceptions of collegial support; less EE.
Dalcin, 2018	Teachers Elementary school in a metropolitan region in Brasil	Pre-Post Study design: 20	Meetings Prevention	Effective. Increase in illusion for work, problem-focused coping, and variability of emotions at work.
Damásio, 2014	Psychologists from 22 different municipalities Health care in Brazil	Clinical trial Study design: 30	Cognitive-Behavioral Group-Therapy Training Program Reduction	Partially effective. Decrease in DP, stabilization in EE, reduction in professional efficacy.
Darban, 2016	Nurses Hospital in Iran	RCT Study design: 60	Communication Skills Training Reduction	Effective. Decrease in intensity of burnout.
Del Valle, 2011	Physician assistants Pediatric residents General hospital in Buenos Aires, Argentina	RCT Study design: 74	Self-care workshops Reduction	Not effective. No change in burnout scores.
Diamond, 2019	Teachers	RCT Study design: 18	Tools of the mind Reduction	Effective. Reduction in burnout of teachers.



Study	Participants Setting	Study Design Study Size	Intervention Prevention/Reduction	Measures and Author Conclusions
Diaz-Rodriguez, 2011	Public elementary schools in Vancouver and Surrey, Canada Nurses University Hospital San Cecilio, Granada, Spain	RCT Study design: 18	Reiki treatment Prevention	Effective. Improvement in sIgA concentration and decrease in diastolic blood pressure.
Donahoo, 2018	Teachers and professional staff Western Kentucky University and school system	Clinical trial Study design: 27	Mindfulness and prayer Reduction	Partially effective. Decrease in stress and compassion fatigue; increase in burnout.
Doyle, 2007	Other health care professionals Adult forensic medium secure unit, Manchester, United Kingdom	Clinical trial Study design: 26	Psychosocial interventions Reduction	Effective. Increase in the PA score; decrease in EE and depersonalisation scores.
Dreyer, 2012	Other professionals (college staff members) College in New Zealand	Clinical trial Study design: 81	High-intensity exercise Reduction	Effective. Improvements in stress symptoms, job stress and EE.
Duarte, 2016	Nurses Oncology hospitals in Portugal	Clinical trial Study design: 48	Mindfulness-based intervention Reduction	Effective. Decreases in compassion fatigue, burnout, stress, experiential avoidance; increases in satisfaction with life, mindfulness and self-compassion.
Ducar, 2020	Other health care professionals emergency medical technicians U.S. emergency medical service	Time series Study design: 11	Mindfulness-based stress reduction Reduction	Effective. Increases in compassion satisfaction and trait mindfulness; decreases in burnout
Duncan, 2011	Mixed health care professionals (nurses, physicians, clinicians, support staff, and administrators) Restore & Renew Wellness Clinic at a United States Department of Defense hospital	Post only Study design: 2756	Complementary and alternative medicine Reduction	Effective More relaxed, less stress, more energy, and less pain
Dunn, 2007	Physicians	Time series Study design: 32	Data-guided program Reduction	Effective.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Dunne, 2019	Legacy Clinic, in Portland, Oregon Mixed health care professionals (emergency multidisciplinary team members) Emergency Department, Dublin, Ireland	RCT Study design: 47	Attention-based training program Reduction	Decrease in emotional and work-related exhaustion. Effective. Reduction in burnout, stress and anxiety; improvements in heart rate, sleep and pro-inflammatory cytokine expression
D'Urso, 2019	Mixed health care professionals Level 3 neonatal intensive care unit in the United Kingdom	Pre-Post Study design: 160	Staff support intervention Reduction	Partially effective. Reduction in days absent because of stress-related sickness and in stress-related illness; no change in burnout.
Dyrbye, 2019	Physicians Mayo Clinic sites in Arizona, Florida, Minnesota, and Wisconsin	RCT Study design: 88	Individualized coaching Reduction	Effective Decrease in EE and overall burnout. Improvement in quality of life and resilience.
Eagle, 2012	Mixed health care professionals (physicians, nurses, social workers, and respiratory therapists) U.S. pediatric intensive care unit	Pre-Post Study design: 22	Facilitated peer support Reduction	Not effective. No changes in Copenhagen Burnout Inventory and Hogan Grief Reaction Checklist.
Elder, 2014	Teachers Therapeutic school for children with behavioral problems in Vermont	RCT Study design: 40	Transcendental Meditation program Reduction	Effective. Reduction in perceived stress, depression and overall teacher burnout
Erler, 2012	Mixed health care professionals Primary care practice in Germany	Pre-Post Study design: 20	Primary Care Practice Reduction	Effective. Decrease in workload and more leisure time; higher MBI scores for personal fulfillment; higher work satisfaction.
Essary, 2020	Other health care professionals Nonprofit organization that provides hospice and palliative care in a large southwestern city, United States	Pre-Post Study design: 43	Narrative medicine and mindfulness program Reduction	Not effective. No significant changes in EE or empathy.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Ewers, 2002	Nurses Medium secure psychiatric unit in the United Kingdom	RCT Study design: 20	Psychosocial intervention training Reduction	Effective. Decrease in burnout rates.
Fabbro, 2020	Teachers Comprehensive school in northeast Italy	Clinical trial Study design: 39	Mindfulness training Reduction	Effective. Higher trait mindfulness and conscientiousness and lower neuroticism and stress and burnout levels.
Fang, 2015	Nurses General hospital in China	RCT Study design: 120	Yoga intervention Reduction	Effective. Improvements in sleep quality and work stress.
Flanders, 2020	Nurses Pediatric intensive care unit in a children's hospital in the south central part of the United States	Pre-Post Study design: 70	Resilience program Prevention and reduction	Effective. Reduction in levels of compassion fatigue and increase in levels of compassion satisfaction.
Flarity, 2016	Nurses U.S. urban hospital emergency department, level II trauma center	Pre-Post Study design: 7	Multifaceted education program Reduction	Effective. Increase in compassion satisfaction; decrease in secondary traumatic stress and burnout.
Flook, 2013	Teachers Elementary school in a medium-sized Midwestern city	RCT Study design: 18	Mindfulness-Based Stress Reduction Reduction	Effective. Decrease in psychological symptoms and burnout; improvements in performance and self-compassion.
Frank, 2015	Teachers (high school educators) Suburban high schools in Pennsylvania	Clinical trial Study design: 36	Mindfulness-based stress reduction Reduction	Effective. Improvements in self-regulation, self-compassion, mindfulness-related skills (observation, nonjudgment, and nonreacting) and sleep quality.
Freitas, 2014	Nurses Cancer hospital, Brazil	Pre-Post Study design: 21	Workplace physical activity program Reduction	Not effective. No significant change in mood disorders, burnout, or occupational stress.
Fujimori, 2014	Physicians Oncologists National Cancer Center Hospital East, Japan	Pre-Post Study design: 16	Communication skills training Reduction	Effective. Decrease in EE.
Gabbe, 2008	Other professionals chairs of departments of obstetrics and gynecology U.S. Council of University Chairs of Obstetrics and Gynecology	RCT Study design: 27	Mentoring by experienced chairs Prevention and reduction	Not effective. No significant change in burnout rates.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Galantino, 2005	Mixed other professionals employees serving in administrative and direct patient care U.S. university hospital	Pre-Post Study design: 69	Mindfulness meditation Reduction	Effective. Decline in EE; Increase in Profile of Mood States—Short Form (POMS-SF)
Garland, 2012	Physicians Intensivists Intensive care units in Winnipeg, Manitoba, Canada	Clinical trial Study design: 24	Around-the-clock intensivist presence Reduction	Effective. Reduced burnout for shift work model.
Gauthier, 2015	Nurses PICU in urban pediatric academic hospital, United States	Pre-Post Study design: 38	Mindfulness-based intervention Reduction	Effective. Decrease in stress.
Gelfand, 2004	Physicians U.S. urban, university-based department of surgery	Pre-Post Study design: 64	Change to 80-hour workweek Reduction	Not effective. No change in EE, DP, and PA.
Ghannam, 2019	Physicians medical residents Medical Corporation, Doha, Qatar	Pre-Post Study design: 256	Stress management and wellness training Prevention and reduction	Effective. EE and DP decreased, satisfaction with medicine increased.
Ghetti, 2009	Physicians Obstetrics and gynecology residents Department of Obstetrics, Gynecology, and Reproductive Sciences, University of Pittsburgh School of Medicine	Pre-Post Study design: 36	Balint training Reduction	Not effective. No significant changes burnout level.
Giannini, 2013	Mixed health care professionals ICU doctors and nurses Italian intensive care units	Pre-Post Study design: 235	Partial liberalization of visiting policies Reduction	Not effective. Increase in burnout levels (despite positive views of participants on acknowledged benefits).
Goitein, 2005	Physicians Internal medicine residents University of Washington Affiliated Hospitals Internal Medicine Program, Seattle.	Pre-Post Study design: 118	Work-hour limitations Reduction	Partially effective. Increase in career satisfaction, decrease in EE; no change in DP or PA.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Goldhagen, 2015	Physicians (resident physicians) Departments of Family Medicine, Psychiatry, and Anesthesia at Duke University, Durham, North Carolina	Pre-Post Study design: 30	Mindfulness-based resilience training Reduction	Partially effective. No short-term change in stress, burnout, mindful-awareness, or cognitive failure; trend of reduction in DASS-21 scores for females, PGY1, PGY2, and those with higher perceived initial stress.
Goldstein, 1991	Other professionals (federal employees) Comptrollers Branch of the Canadian International Development Agency	Pre-Post Study design: 30	Individual counseling sessions, group problem solving meetings, and a stress clinic Reduction	Effective. Self-evaluated satisfaction with program.
Gopal, 2005	Physicians (internal medicine residents) University of Colorado Health Science Center	Pre-Post Study design: 106	Work-hour restriction Reduction	Effective. Decrease in EE, DP and positive depression screening; no change in PA.
Grabbe, 2020	Nurses Large, urban tertiary care hospitals, Atlanta, Georgia	RCT Study design: 196	Community Resiliency Model Reduction	Effective. Improvement in well-being, resiliency, secondary traumatic stress, and physical symptoms.
Gregory, 2018	Physicians Large, urban, integrated health care delivery system in the United States	Clinical trial Study design: 70	Workload change Reduction	Effective. Decrease in EE and DP.
Grumbach, 2019	Physicians San Francisco Health Network	Time series Study design: 613	Primary care transformation that included promoting well-being among the primary care workforce Reduction	Effective. Improvement in EE and cynicism.
Gunasingam, 2015	Physicians (junior doctors) Australian metropolitan teaching hospital	RCT Study design: 31	Debriefing sessions Reduction	Not effective. No change in MBI scores.
Günüşen, 2010	Nurses University Hospital in Izmir, Turkey	RCT Study design: 108	Coping and support group interventions Reduction	Not effective. Initial EE decrease after the intervention but increased at follow-up; no change in DP and PA.
Guo, 2020	Nurses Chinese tertiary general hospital	RCT Study design: 77	Positive psychotherapy Reduction	Effective. Improvement in job contribution, task performance, facilitation of interpersonal relations and self-efficacy.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Haber, 2020	Other health care professionals (radiology Trainees) Brigham and Women's Hospital, Department of Radiology, Boston, Massachusetts	Pre-Post Study design: 37	Retreat curriculum Reduction	Effective. Improvement in residency experience and personal wellness.
Hallberg, 1994	Nurses (psychiatric nurses) Child psychiatric unit, Sweden	Pre-Post Study design: 11	Systematic clinical supervision Reduction	Not effective. No change in the degree of burnout.
Hamilton-West, 2018	Physicians (general practitioners) General practitioners, England	Time series Study design: 22	Modified mindfulness-based cognitive therapy (MBCT) course Reduction	Effective. Improvement in stress, EE, DP, and PA.
Harris, 2016	Teachers U.S. middle schools	Clinical trial Study design: 64	Yoga and mindfulness Prevention	Effective. Improvements in mindful observation, distress tolerance, positive affect, time urgency, MBI DP, physical symptoms, blood pressure, and cortisol awakening response.
Hart, 2019	Physicians (emergency medicine residents) U.S. urban health care	Pre-Post Study design: 46	Corporate wellness initiative Reduction	Not effective. No improvement in MBI scores.
Härtel, 2003	Mixed mental health care professional staff members at residential drug and alcohol detoxification wards German residential drug and alcohol detoxification wards	Time series Study design: 44	Team supervision Prevention and reduction	Not effective. No difference in MBI scores.
Hayes, 2019	Teachers Schools across the southwest of England	RCT Study design: 80	Teacher classroom management program Reduction	Not effective. No difference in MBI scores
Hilcove, 2020	Nurses Community-based hospital in the southwestern United States	RCT Study design: 80	Mindfulness-based yoga Reduction	Effective. Improvements in stress, burnout, vitality, sleep, serenity/inner haven, and mindfulness.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Hill, 2010	Other health care professionals Alcohol inpatient ward, South London	Pre-Post Study design: 19	Whole team training designed to reduce levels of burnout Reduction	Effective. Reduction in levels of EE and DP; increase in PA.
Hosseinaei, 2013	Mixed other professionals (university staff) Islamic Azad University, Iran	RCT Study design: 96	Group acceptance and commitment therapy based training Reduction	Partially effective. Decrease in job stress; no effect on job burnout.
Huang, Huigen, 2020	Nurses Intensive care units in Guangdong province, China	RCT Study design: 152	Balint group training Reduction	Effective. Improvement in the DP and EE.
Huang, Lei, 2020	Physicians University hospital, China	RCT Study design: 36	Balint groups Prevention	Effective. Decrease in burnout scores for EE and DP; increase in the scores for PA and job satisfaction.
Hunnicut, 1983	Other mental health professionals (staff of mental health agencies) Community mental health agencies west of the Mississippi	Clinical trial Study design: 251	Workshop and program development Reduction	Effective. Decrease in EE.
Hutter, 2006	Physicians Surgical residents and attending surgeons General Hospital, Boston, Massachusetts	Pre-Post Study design: 116	80-hour resident workweek Reduction	Effective. Decrease in EE. More sleep, lighter workload, and higher motivation to work.
Innstrand, 2002 Innstrand, 2004	Mixed health care professionals staff members working with people with intellectual disabilities Norwegian health care	Clinical trial Study design: 112	Organizational interventions (not specified) Prevention and reduction	Effective. Reduction in stress and burnout.
Ireland, 2017	Physicians intern doctors Emergency department in a major Australian hospital	RCT Study design: 44	Mindfulness training intervention Reduction	Effective. Reduction in stress and burnout.
Italia, 2008	Mixed health care professionals doctors and nurses Hospital units in Catalonia, Spain	Pre-Post Study design: 65	Art therapy treatment Reduction	Effective. Decrease in level of burnout

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Jacobs, 2017	Other health care professionals (paraprofessionals) Paraprofessional in agencies in Chicago	Pre-Post Study design: 26	Mindfulness skills Reduction	Effective. Reductions in perceived stress and EE; improvement in sleep quality.
Jahangard, 2019	Nurses Hamadan University of Medical Sciences Hospital, Iran	RCT Study design: 43	Omega-3-polyunsaturated fatty acids Reduction	Effective. Decrease in EE and DP; increase in sense of PA.
Jakel, 2016	Nurses (oncology nurses) Medical center in California	Clinical trial Study design: 25	Provider Resilience mobile application Reduction	Not effective. No change in secondary traumatic stress, compassion satisfaction, and burnout
Jaworska-Burzynska, 2017	Other professionals Insurance brokers Polish insurance corporation	RCT Study design: 48	Massage Reduction	Effective. Reduction in parameters of burnout syndrome and anxiety-state.
Jennings, 2013	Teachers Urban and suburban public schools in small northeastern U.S. metropolitan area	RCT Study design: 50	Cultivating awareness and resilience in education Reduction	Effective. Improvements in well-being, efficacy, burnout/time-related stress, and mindfulness.
Johnson, 2013	Teachers Schools in South Metro, Western Cape, South Africa	Clinical trial Study design: 30	Transpersonal psychology Prevention	Effective. Reductions in anxiety, personal, and work burnout.
Kaimal, 2019	Mixed health care professionals Oncology professionals and informal caregivers Radiation oncology units in an urban hospital in the northeastern United States	Pre-Post Study design: 34	Art therapy and coloring Reduction	Effective. Increases in positive affect, creative agency, and self-efficacy; reduction in negative affect, anxiety, perceived stress, and burnout.
Kamath, 2017	Other professionals engineering and consulting professionals Mayo Clinic, United States	Pre-Post Study design: 120	Resilience skill-building Reduction	Effective. Decrease in burnout. Feedback from staff supported the efficacy of the burnout and resilience programmes.



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Kang, 2010	Other professionals (human service organizations) Nonprofit human service organizations (community welfare centers and residential care centers) in South Korea	Clinical trial Study design: 16	Month-Long sabbatical program Reduction	Effective. Decrease in burnout level; increase in level of general health, organizational commitment, and sense of well-being.
Kang, 2016	Mixed health care professionals (clinic staff) U.S. army clinic in Wiesbaden, Germany	Pre-Post Study design: 29	Yoga training Reduction	Effective. Decrease in perceived stress.
Karimi, 2012	Nurses Hospitals of Ahvaz University of medical sciences, Iran	RCT Study design: 30	Cognitive-behavioral stress management training Reduction	Effective. Improvement of DP and PA
Kashani, 2015	Physicians (critical care coordinators) Tertiary care academic medical center	Pre-Post Study design: 21	Stress management intervention Reduction	Not effective. No reduction in burnout.
Kearney, 2018	Other mental health professionals (facility leaders) Veterans Health Administration mental health facilities, U.S.	Pre-Post Study design: 31	Leadership Mentoring Program Reduction	Effective Improvement in job satisfaction and burnout
Kersten, 2019	Nurses Dialysis facilities in Germany	Clinical trial Study design: 77	Health-promoting intervention Reduction	Effective. Improvement in sense of community and burnout.
Khaghanizadeh, 2008	Mixed health care professionals (hospital staff) Hospital in Tehran, Iran	Clinical trial Study design: 118	Care suggestions' system Reduction	Effective. Reduction in job burnout.
Kim, 2011	Physicians Children's National Medical Center, Washington, D.C.	Cohort study Study design: 56	Duty hour limits Reduction	Partially effective. No changes in self-reported errors, depression, job satisfaction, or overall educational experience. Improvements in body fluid exposures, motor vehicle crashes, burnout, and willingness to take this job.

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Klingman, 2002	Other professionals (school counselors) School counselling in Israel	Pre-Post Study design: 64	Brief 'helping the helper' intervention Prevention and reduction	Effective. Improvement in satisfaction with the intervention components for dealing with stress and work issues.
Koivu, 2012	Nurses University Hospital, Kuopio, Finland	Clinical trial Study design: 166	Clinical supervision Prevention	Effective. Improvement in job resources; decrease in professional inefficacy and psychological distress.
Kotb, 2014	Physicians Family practice centers in Egypt	Pre-Post Study design: 31	Educational program Reduction	Partially effective. Limited effect on reducing professional burnout.
Krasner, 2009	Physicians Primary care in Rochester, New York	Pre-Post Study design: 70	Educational program in mindful communication Reduction	Effective. Improvements in mindfulness, burnout, empathy, physician belief, total mood disturbance, and personality.
Kravits, 2010	Nurses (new-graduate and experienced nurses) Comprehensive cancer center in southern California	Pre-Post Study design: 248	Psycho-educational program Prevention	Effective. EE and DP decreased; PA increased.
Kubát, 2016	Mixed health care professionals (nurses, physicians, administrators) Military hospital in the Czech Republic	Pre-Post Study design: 13	Yoga Prevention and reduction	Effective. Reduced scores on the N5 questionnaire (neurasthenic, vegetative, depressive and anxious disorders) and the Oswestry disability index related to back pain.
Kushnir, 1994	Day care staff (directors of day-care centers) Israeli day-care centers	Clinical trial Study design: 34	Cognitive group intervention program Prevention	Effective. Reduction in stress and tension.
Kuske, 2009	Nursing home staff Nursing homes in Leipzig, Germany	RCT Study design: 96	Training program in dementia care Reduction	Partially effective. Effective for knowledge and the use of physical restraints; no change in level of burnout, health complaints or the use of sedative drugs.
Lamanna, 1992	Other mental health professionals (residential counselors) The Family Life Development Center, New York State College	RCT Study design: 51	Therapeutic crisis intervention training Reduction	Partially effective. No effect on job competence or stress; decrease in reported sense of DP.
Landrigan, 2008	Physicians	Cohort study Study design: 220	Duty hours change Reduction	Effective.

Study	Participants Setting	Study Design Study Size	Intervention Prevention/Reduction	Measures and Author Conclusions
Le Blanc, 2007	U.S. pediatric hospital departments  Mixed health care professionals (oncology care providers) General hospitals in the Netherlands	Clinical trial Study design: 664	Team-based burnout intervention program Reduction	Decrease in rate of resident burnout (despite no improvement in rates of medication errors, depression and resident injuries). Effective. Reduction in EE and DP.
Leary, 2018	Other health care professionals VHA facilities providing direct patient care	Pre-Post Study design: 39	Mantram Repetition Program Reduction	Effective Decrease in exhaustion, the frequency of stressful events significantly, and troubled conscience
Lee, 1988	Nurses General hospital in Taipei, Republic of China	RCT Study design: 60	Stress coping interventions Reduction	Effective. Increase in assertiveness levels; decrease in stress levels.
Lee, 2017	Nurses in emergency rooms Korean health care	Clinical trial Study design: 36	Violence coping program based on middle-range theory of resilience Reduction	Effective. Levels of resilience, active coping behavior and nursing competency increased; levels of passive coping behavior and burnout decreased.
Lefebvre, 2019	Physicians Emergency medicine, Alberta, Canada	Pre-Post Study design: 58	Wellness curriculum Reduction	Effective. Improvement in resident wellness.
LeNoble, 2020	Physicians The oncology sample included 409 oncology employee at the Cancer Institute, United States	Pre-Post Study design: 409	Team-focused Reduction	Effective Higher levels of teamwork and lower levels of burnout
Lindeman, 2013	Physicians General surgery, Johns Hopkins Hospital	Pre-Post Study design: 97	Duty-hour regulations Reduction	Effective. Improvement in quality of life, including burnout.
Linzer, 2014	Physicians (clinicians) Clinics in the upper Midwest and New York City	RCT Study design: 166	Improvements in work conditions Reduction	Effective. Improvement in burnout, dissatisfaction and retention.
Linzer, 2015	Physicians Clinics in the upper Midwest and New York City	RCT Study design: 135	Work conditions Reduction	Effective. Improvements in burnout and satisfaction.

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Lloyd, 2013	Other professionals British government department	RCT Study design: 100	Cognitive behavioural therapy Reduction	Effective. Decrease in EE and strain.
Loiselle, 2018	Physicians (academic physicians) U.S. medical school hospital and affiliated VA hospital	RCT Study design: 40	Transcendental meditation Reduction	Effective. Decrease in burnout, depression and insomnia
Luberto, 2017	Mixed health care professionals (hospital employees) Large academic medical center in the Midwest	Pre-Post Study design: 65	Mindfulness-Based Cognitive Therapy Reduction	Effective. Decreases in stress and burnout.
Lucas, 2012	Physicians U.S. university-affiliated teaching hospital in Chicago, Illinois	RCT Study design: 62	Inpatient attending physician rotations Reduction	Effective. The 2-week rotations is better by self-rated physician burnout and EE (though worse by trainee evaluation).
Luo, 2019	Nurses Tertiary hospital, China	Clinical trial Study design: 87	Positive psychological intervention Reduction	Effective. Decrease in exhaustion scores.
Mackenzie, 2006	Nurses Long-term and complex continuing care units in a large urban geriatric teaching hospital, Canada	RCT Study design: 30	Mindfulness-based stress reduction Reduction	Effective. Improvements in burnout symptoms, relaxation, and life satisfaction.
Magtibay, 2017	Nurses Mayo Clinic (large academic tertiary medical center)	Pre-Post Study design: 50	Stress Management and Resiliency Training program Reduction	Effective. Decreases in stress, personal burnout, work- related burnout, and client-related burnout; increase in happiness and mindful attention.
Mari, 2019	Physicians Harvard South Shore Psychiatry	Pre-Post Study design: 14	Wellness program Reduction	Effective. Reduction in burnout.
Martini, 2006	Physicians (medical residents) Wayne State University School of Medicine, Detroit, Michigan	Pre-Post Study design: 118	Work hours limits Reduction	Effective. Decrease in burnout prevalence.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Martins, 2011	Physicians (pediatric residents) Tertiary care pediatric hospital in Argentina	RCT Study design: 74	Self-care workshops Reduction	Partially effective. No change in the prevalence of burnout; improvement in DP
Maza, 2016	Physicians Health maintenance organization in Israel	Pre-Post Study design: 256	Physician empowerment programme Prevention	Effective. Increase in job satisfaction, sense of managerial capability, coping with managerial dilemmas, and belonging to the organization.
McCue, 1991	Physicians (residents) Departments of Medicine and Pediatrics at Baystate Medical Center, Springfield, Massachusetts	Clinical trial Study design: 64	Stress management workshop Reduction	Effective. Improvement in Stress Systems Instrument scale and EE.
McGonagle, 2020	Physicians Medical practices in a large city in the northeastern United States	RCT Study design: 59	Coaching Reduction	Effective. Improvement in burnout, work engagement, psychological capital, and job satisfaction.
Mealer, 2014	Nurses Academic institution, Colorado	RCT Study design: 27	Resilience training program Prevention and reduction	Effective. Improvements in level of resilience and psychological outcomes (symptoms of anxiety, depression, burnout syndrome, and PTSD).
Mehr, 1994	Other (mental health professionals) Mental health clinics, Los Angeles	Pre-Post Study design: 27	Stress-reduction program Reduction	Effective. Reduction in EE, DP, and fear of failure.
Mehrabi, Gorji, Zolfaghari, 2015 Mehrabi, Gorji, Zolfaghari, Razmjoo, 2015 Melchior, 1996	Mixed (other professionals) Investment company employees Iran chemical industry  Nurses Psychiatric hospitals in the Netherlands	RCT Study design: 66  Clinical trial Study design: 161	Rosmarinus herbal tea Reduction  Primary nursing Reduction	Effective. Improvement in occupational burnout.  Not effective. No change in burnout levels.

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Melo, 2011	Mixed health care professionals Portuguese palliative care units	Clinical trial Study design: 150	Training in communication, offering emotional and spiritual support to patients, and personal introspection on death anxiety Reduction	Effective. Reduction in burnout and death anxiety; increase in personal well-being and professional fulfillment.
Meredith, 2018	Physicians Clinics in the desert Pacific administrative region of the VHA	Time series Study design: 356	Evidence-based quality improvement Reduction	Effective Decrease in burnout (MBI) over time
Milstein, 2009	Mixed health care professionals (medical house officers) University of California Davis Health System	RCT Study design: 15	Self-administered psychotherapeutic tool Reduction	Not effective. No reduction in burnout scores.
Mistretta, 2018	Other health care professionals Large research hospital and medical center, Arizona	RCT Study design: 60	Resilience training Reduction	Effective. Improvements in well-being, stress and emotional burnout.
Moffatt-Bruce, 2019	Mixed health care professionals care providers University Medical Center in Ohio	Pre-Post Study design: 168	Mindfulness in Motion and “flipped classroom” mindfulness training Reduction	Effective. Flipped classroom had improvements in confidence and providing care; mindfulness training had improvement in perceived stress, DP, interpersonal self-transcendence, and work engagement; Gabbe Wellness program reduction in MBI score
Moody, 2013 Moody, 2012	Mixed health care professionals (nurses, social workers, physicians, nurse practitioners, psychologists, and child-life specialists) Children’s Hospital in New York City, United States and Children’s Hospital in Petach Tikva, Israel	RCT Study design: 48	Mindfulness-based course Reduction	Partially effective. No change in burnout, perceived stress or depression scales; improvement in stress, inner peace, compassion, joy, focus and self-awareness, and somatic symptoms qualitatively.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Morita, 2014	Nurses Palliative care units/inpatient hospices, general medical wards, Japan	RCT Study design: 76	Education program Reduction	Partially effective. Improvements in confidence and helplessness; no improvements in attitudes toward caring for patients, burnout scale, meaning of life and knowledge score.
Muse, 2016	Other professionals (clergy) U.S. United Methodist and Presbyterian clergy	Clinical trial Study design: 46	Multitherapist intensive outpatient program Reduction	Effective. Improvement in depression, EE, and DP.
Norouzinia, 2017	Nurses Hospitals in Karaj, Iran	Clinical trial Study design: 60	Mindfulness-based stress reduction Reduction	Effective. Reduction in job stress and burnout.
Nwabuko, 2019	Teachers Primary school in Southeast Nigeria	RCT Study design: 86	Rational-emotive adult education Reduction	Effective. Reduction in burnout symptoms.
Ofei-Dodoo, 2020	Other health care professionals University of Kansas School of Medicine–Wichita	Pre-Post Study design: 43	Mindfulness-based yoga Reduction	Effective. Improvements in PA, depression, anxiety, stress, perceived resilience, and compassion.
Oman, 2006	Other health care professionals Large hospital in Colorado	RCT Study design: 58	Passage meditation Reduction	Effective. Reduction in stress and enhancement of mental health.
Onyett, 2009	Physicians Different NHS regions in England	Pre-Post Study design: 159	Local whole systems for improved teamworking and leadership Reduction	Not effective. No significant change in MBI
Ortega Ruiz, 2008	Other health care professionals Palliative care unit, University Hospital, Madrid, Spain	Pre-Post Study design: 15	Acceptance and Commitment Therapy Reduction	Effective. Reductions in DP and increases in PA.
Ospina-Kammerer, 2003	Physicians family (physicians) Family practice residents from a city in southeastern United States	Clinical trial Study design: 24	Respiratory One Method Prevention and reduction	Effective. Decrease in EE scores.

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Ossebaard, 2000	Mixed mental health care professionals (employees at addiction care center) Urban addiction care center in the Netherlands	Clinical trial Study design: 67	Brain wave synchronizers Reduction	Partially effective. Immediate decrease in state anxiety; no long-term effect on burnout or anxiety.
Özbaş, 2016	Nurses Hacettepe University Oncology Hospital in Ankara, Turkey	Clinical trial Study design: 82	Psychological empowerment program based on psychodrama Reduction	Effective. Increase in psychological empowerment and perception of workplace empowerment; decrease in levels of burnout
Palsson, 1996	Nurses Primary health care districts in Sweden	Clinical trial Study design: 33	Systematic clinical supervision Reduction	Not effective. No change in burnout, empathy and sense of coherence.
Pan, 2019	Nurses Hospital in Changsha, China	Pre-Post Study design: 20	Mindfulness-based intervention Reduction	Not effective. No changes in burnout scores.
Parshuram, 2015	Physicians Academic medical–surgical ICUs in Toronto, Ontario	RCT Study design: 47	Revised resident schedules Reduction	Not effective. No change in overnight fatigue or burnout.
Penque, 2019	Nurses Tertiary care hospital in the upper midwestern U.S.	Pre-Post Study design: 53	Mindfulness-based stress reduction Reduction	Effective. Improvements in MBI scores.
Peterson, 2008	Mixed health care professionals physicians, registered nurses, nursing assistants, social workers, occupational therapists, physiotherapists, psychologists, dental nurses and hygienists, dentists, service staff, administrators, teachers and technicians County council area in Sweden	RCT Study design: 151	Reflecting peer-support groups Prevention	Effective. Favorable effects on exhaustion, quantitative demands at work, perceived general health.
Pflugeisen, 2016	Physicians MultiCare Health System's in Puyallup, Washington	Pre-Post Study design: 23	Mindfulness program Reduction	Effective. Decreases in stress, PA, and EE; increases in mindfulness skills.



<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Podgurski, 2019	Mixed health care professionals Interprofessional group of palliative care providers U.S. palliative care section in an academic medical center	Time series Study design: 29	Brief mindfulness-based self-care curriculum Reduction	Partially effective. Increase in mindfulness levels and mindfulness practices; no change in burnout levels.
Pollak, 2019	Physicians U.S. academic community health system and a community-based hospice	RCT Study design: 22	Communication coaching Reduction	Effective. Improvement in EE and DP scores.
Potash, 2014	Mixed health care professionals (nurses, social workers, counsellors, clergy, physical therapists, occupational therapists, and volunteers) Hong Kong health care	Clinical trial Study design: 132	Art-therapy-based supervision Reduction	Effective. Reductions in exhaustion and death anxiety; increases in emotional awareness
Potter, 2013	Nurses oncology nurses U.S. comprehensive cancer center	Pre-Post Study design: 13	Compassion fatigue resiliency program Prevention and reduction	Effective. EE improved, burnout decreased, secondary traumatization declined, participants positively evaluated program.
Pozdnyakova, 2018	Physicians U.S. academic general internal medicine clinic	Pre-Post Study design: 6	Providing medical scribes Reduction	Partially effective. No change in burnout, improvement in physician satisfaction.
Quenot, 2012	Other health care professionals (ICU caregivers) Critical care department university hospital, France	Pre-Post Study design: 62	Intensive communication Reduction	Effective. Reduction in the rate of burnout syndrome and depression.
Rabin, 2000	Social workers Production factories, hi-tech institutions and service industries in Israel	Clinical trial Study design: 21	Multifaceted mental health training program Reduction	Effective. Increase in professional self-efficacy and professional social support; decrease in cognitive weariness and listlessness.
Rajeswari, 2020	Nurses Medical College Hospital, India	RCT Study design: 120	Accelerated recovery program Reduction	Effective. Improvement in Compassion Satisfaction, Burnout, and Secondary Traumatic Stress.

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Redhead, 2011	Nurses National Health Service facility in the northwest of England	RCT Study design: 42	Psychosocial intervention Reduction	Partially effective. Reduction in DP of qualified nurses, but increase in burnout levels of unqualified staff.
Rees, 2020	Physicians Large medical practice in rural Australia	Pre-Post Study design: 7	Mindful self-care and resiliency Reduction	Effective. Reductions in burnout, psychological strain and negative affect.
Riall, 2018	Physicians (general surgery residents) University of Arizona surgery department	Pre-Post Study design: 49	Energy Leadership Well-Being and Resiliency Program Reduction	Effective. Improvement in perceived stress, EE, emotional intelligence, life satisfaction, and perception of the residency program.
Richman, 1989	Nurses North Carolina health care	Clinical trial Study design: 45	Interventions for nursing practice problems Reduction	Effective. Reduction in burnout and DP; increase in PA.
Ricou, 2018	Nurses (nurses and nursing auxiliaries) University-affiliated hospital in Switzerland	RCT Study design: 166	Psychological intervention Reduction	Effective. Decrease in burnout scores.
Riley, 2017	Other mental health professionals Department of Psychiatry at a large regional hospital in New England	RCT Study design: 75	Cognitive behavioral stress management; Yoga-based stress management Reduction	Effective. Improvement in relaxation and awareness, professional quality of life, compassion satisfaction, burnout, depression, and stress levels.
Ripp, 2015	Physicians Hospitals in New York, Philadelphia, and Boston	Cohort study Study design: 231	Duty hours restrictions Reduction	Not effective. No change in job burnout and self-reported sleepiness.
Ripp, 2016	Physicians (internal medicine residents) Academic hospital, New York	RCT Study design: 51	Facilitated discussion group intervention Reduction	Not effective. No change in burnout scores.
Ripp, 2019	Mixed health care professionals Mount Sinai Health System in New York, United States	RCT Study design: 43	Discussion reflection Reduction	Effective. No changes in levels of burnout.
Robinson-Kurpius, 1994	Nurses (outpatient surgery nurses) U.S. hospital	Clinical trial Study design: 30	Team-building group activities Reduction	Effective. Improvement in morale, job satisfaction and burnout.

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Robison, 2007	Nursing home staff Partners in Caregiving in a Special Care Environment intervention in 20 facilities in three Connecticut counties	RCT Study design: 384	Communication and cooperation Reduction	Effective. Decrease in depression and burnout.
Roeser, 2013	Teachers (elementary and secondary school teachers) Public schools in western Canada and the western United States	RCT Study design: 113	Mindfulness training Reduction	Effective. Improvement of mindfulness, focused attention, working memory capacity, occupational self- compassion, occupational stress and burnout.
Rollins, 2016 Salyers, 2015; Eliacin, 2018	Mixed (mental health care professionals, behavioral health providers) VA medical centers and community social service agencies	RCT Study design: 145	BREATHE uses a relapse- prevention framework to help participants identify antecedents of burnout and introduces wellness strategies, including cognitive-behavioral techniques for stress reduction Reduction	Partially effective. No significant differences in burnout; small improvements in cynicism, EE, and positive expectations.
Rosada, 2015	Physicians (mental health clinicians) Community mental health agencies in New England	RCT Study design: 45	Reiki Reduction	Effective. Reduction in burnout and DP.
Rosas-Santiago, 2019	Other professionals (civil servants) State Human Rights Commission of Veracruz, Mexico	RCT Study design: 31	Cognitive behavioral and psychoeducational Reduction	Effective. Decrease in their levels of burnout.
Rosdahl, 2014	Physicians Ophthalmology department Duke University	Pre-Post Study design: 18	Mindfulness Training Reduction	Effective. Improvements in Stress and Burnout.
Roth, 2019	Nurses Adult critical care departments, Idaho	Pre-Post Study design: 131	Relationship-based care Reduction	Effective. Increase in PA; decrease in EE levels.
Rowe, 1999	Mixed health care professionals Hospital settings in the Philadelphia area	Time series Study design: 118	Coping strategies Reduction	Effective. Decreases in EE and lack of PA.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Saavedra, 2020	Other health care professionals (health care assistants) Home health care, Andalusia, Spain	Pre-Post Study design: 29	Training for care givers Reduction	Partially effective. No change in MBI scores yet reduction in dysfunctional thoughts and social dysfunction.
Sabanciogullari, 2015	Nurses Turkish university hospital	Clinical trial Study design: 63	Professional identity development program Reduction	Effective. Reduction in burnout levels.
Saechao, 2017	Other health care professionals (nurses, patient-care assistants, and unit secretaries) Intensive care unit in U.S. community hospital	Pre-Post Study design: 103	Webinar, book club and retreat Reduction	Partially effective. Reduction in outcomes was not statistically significant; improvement in the overall moral distress of all of the staff.
Salles, 2013	Physicians (surgery residents) Hospitals	RCT Study design: 35	Brief intervention targeting burnout Reduction	Effective. Decrease in rates of burnout.
Salyers, 2011	Mixed mental health care professionals Public agency providing mental health and substance abuse services in a large Midwestern city in the United States	Pre-Post Study design: 84	One-day retreat Reduction	Effective. Decreases in EE and DP; increases in positive views toward consumers.
Sarazine, 2021	Nurses Midwestern urban academic medical center and its affiliated community hospital, United States	Pre-Post Study design: 52	Mindfulness workshops Reduction	Effective. Increase in perceptions of mindfulness and PA; decreased EE.
Scarella, 2017	Physicians (psychiatric residents) Brigham and Women's Hospital, Boston, Massachusetts	Pre-Post Study design: 15	Yearlong night float (instead of 24-h call shift) Reduction	Effective. Compared with night float, 24-hour call increased burnout and decreased quality of life.
Scarnera, 2009	Mixed mental health care professionals Mental health department, southern Italy	Pre-Post Study design: 25	Interpersonal relationship Prevention	Partially effective. Reduction in DP but no change in EE and PA.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Schroeder, 2016	Physicians U.S. family medicine and internal medicine departments	RCT Study design: 33	Mindful medicine curriculum Reduction	Effective. Improvements in stress, mindfulness, EE, and DP.
Schuh, 2011a Schuh, 2011b	Physicians U.S. neurology departments	Clinical trial Study design: 34	Work duty hour Reduction	Not effective. Decline in quality of life and education satisfaction.
Schwarzkopf, 2019	Physicians Interdisciplinary intensive care units in a German university hospital	Pre-Post Study design: 174	Multifaceted intervention to improve timeliness, clinician involvement, and organisational support Reduction	Not effective. Increased risk of clinician burnout.
Sherwood, 2002	Nurses Regional hospitals in Australia	Pre-Post Study design: 5	Philophonetics counselling Prevention	Effective. Improvement in experience of burnout symptoms.
Slavin, 2017	Physicians St Louis University School of Medicine, St Louis, Missouri	Clinical trial Study design: 35	Resilience training Reduction	Effective. Decreases in scores for DP and EE and mean anxiety scores.
Sluiter, 2005	Mixed health care professionals (staff of a pediatric intensive care unit) University-affiliated medical center in the Netherlands	Pre-Post Study design: 61	Multidisciplinary structured work shift evaluations Reduction	Effective. Decrease in EE.
Song, 2020	Physicians (surgical interns) General, vascular, cardiac, plastic, and Urologic surgery departments at a tertiary academic center, United States	Pre-Post Study design: 25	Resilience coaching Reduction	Partially effective. Increase in Brief Resilience Scale score; yet no changes in burnout, satisfaction with life, or positive/negative affect.
Soulen, 2020	Teachers U.S. urban public school district	Clinical trial Study design: 52	Standardized interventions from school librarian Reduction	Partially effective. No difference on the MBI-ES; Increase in resilience; positive qualitative results.
Stahl, 2005	Mixed health care professionals (nurses and physicians) General hospital operating room, United States	Clinical trial Study design: 150	Technology system for operating room Reduction	Partially effective. Personal accomplishment increased among surgeons but decreased among nurses; EE increased among surgeons but decreased among nurses.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Stebbins, 2010	Other professionals (managers of a pastoral care organisation) Pastoral care organisation in Australia	Time series Study design: 24	Leadership program to prevent burnout Prevention	Effective. Reductions in risk status across the domains of Control, Managerial Support, Peer Support, Relationships, Role and Change.
Stevens, 2020	Physicians Department of Otolaryngology at the University of Minnesota	Clinical trial Study design: 19	Protected nonclinical time Reduction	Effective. Decrease in the EE score.
Taylor, 2020	Physicians Hospital in Sydney, Australia	RCT Study design: 21	Yoga Reduction	Effective. Reduction in burnout and depersonalisation; increase in compassion satisfaction and PA.
Thimmapuram, 2017	Mixed health care professionals Large community teaching hospital, United States	Clinical trial Study design: 47	Heartfulness meditation Reduction	Effective. Improvement in all measures of burnout and most attributes of Emotional Wellness Assessment.
Train, 2013	Other health care professionals (home-based carers) Home-based carers, South Africa	Pre-Post Study design: 11	Psychophonetics methodology Reduction	Effective. Improvement in secondary traumatic stress, a component of compassion fatigue.
Trinh, 2019	Other health care professionals (pharmacy technicians) Pharmacy department, Oregon Health & Science University, Portland, Oregon	Pre-Post Study design: 21	Workload and productivity dashboard Prevention	Effective. Improvement in symptoms of burnout and decrease in the overall turnover rate.
Trowbridge, 2017	Other health care professionals (pediatric health care social workers) Social work department of a regional children's health care system in the Midwest	Pre-Post Study design: 26	Mindfulness-based stress reduction Reduction	Partially effective. No change in scores on Compassion Satisfaction and Burnout; decrease in Secondary Traumatic Stress; increase in mindfulness.
Tsai, 2013	Mixed other professionals Banking and insurance workers Banks and insurance company in Taipei, Taiwan	Pre-Post Study design: 109	Exercise program Reduction	Effective. Improvement in person burnout and work-related burnout.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Ugwoke, 2018	Teachers (special education teachers) Schools for students with special needs in Southeast zone of Nigeria	RCT Study design: 54	Rational-emotive stress management intervention Reduction	Effective. Reduction in job-related burnout symptoms and dysfunctional distress
Unterbrink, 2012	Teachers School districts in southwestern Germany	RCT Study design: 337	Manual-based psychological group program Reduction	Effective. Improvement in EE, PA and the ERI subscale Appreciation.
van Dierendonck, 1998	Other mental health professionals (direct care professionals working with mentally disabled individuals) Dutch health care organization for mental disabilities	Clinical trial Study design: 149	Individual burnout intervention program Reduction	Partially effective. Reduction in EE, absence, and deprived feelings; no changes in DP, interpersonal equity, and absence frequency.
van Dierendonck, 2005	Other professionals engineering Industrial companies in the Netherlands	Pre-Post Study design: 38	Psychosynthesis-based prevention Prevention	Effective. Reduction in burnout and increase in happiness, emotional intelligence and feelings of spirituality.
van Rhenen, 2005	Other professionals telecommunication employees Telecommunications company in the Netherlands	Pre-Post Study design: 130	Stress-reducing programme Reduction	Effective. Improvements in psychological complaints, burnout and fatigue.
Verweij, 2016	Physicians Dutch training hospitals	Clinical trial Study design: 50	Mindfulness-based stress reduction Reduction	Effective. Decrease in burnout symptoms and increase in work engagement and well-being.
Verweij, 2018	Physicians medical residents University Medical Center in the Netherlands	RCT Study design: 148	Mindfulness-Based Stress Reduction (MBSR) Reduction	Partially effective. No reduction in EE; improvement of PA, worry, and mindfulness skills.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Villasenor, 2016	Mixed health care professionals (Social workers, helping professionals and administrators who work with veterans) Veteran Center of Modesto, California	Pre-Post Study design: 9	Compassion Cultivation program Reduction	Not effective. No significant change in levels of burnout or compassion fatigue.
Warde, 2015	Mixed health care professionals Large VA multispecialty outpatient clinic	Pre-Post Study design: 48	6-step practice innovation Reduction	Effective. Decrease in burnout rates and improvement in perception of control over work interruptions.
Watanabe, 2019	Nurses Inpatient wards general hospitals, Japan	RCT Study design: 80	Mindfulness-based stress management Reduction	Not effective. No difference in scores of MBI and the Hospital Anxiety and Depression Scale.
Weaver, 2019	Teachers Public school districts in the Midwestern United States	Pre-Post Study design: 97	Workshop Reduction	Effective. Weaker association between emotional labor and burnout.
Wei, 2017	Nurses Comprehensive high-level hospitals in Jinan, China	RCT Study design: 102	Active intervention with comprehensive management Reduction	Effective. Reduction in EE and DP.
Weidlich, 2015 Weidlich, 2014	Mixed health care professionals (licensed practical nurses, registered nurses, and medics) U.S. Army Medical Center	Pre-Post Study design: 28	Care provider support program to address compassion fatigue Reduction	Effective. Reduced burnout scores.
Weight, 2013	Physicians medical residents and fellows Mayo Clinic in Rochester, Minnesota	Pre-Post Study design: 628	Team-based, incentivized exercise program Reduction	Partially effective. Increase in physical activity and quality of life, but no significant difference in burnout.
West, 2014	Physicians Department of Medicine at the Mayo Clinic in Rochester, Minnesota	RCT Study design: 74	Small-group curriculum Prevention and reduction	Effective. Decrease in rates of DP, EE, and overall burnout.
Williamson, 2020	Physicians Emergency departments in the United States	Clinical trial Study design: 437	Wellness curriculum Reduction	Not effective. No changes in global burnout scores.



<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Winefield, 1998	Physicians (women general practitioners) General practitioners in Australia	Pre-Post Study design: 20	Work stress management Reduction	Effective. Decrease in psychological distress and EE.
Winkel, 2010	Physicians Obstetrics and gynecology department, U.S. academic teaching hospital	Pre-Post Study design: 20	Writing workshop Reduction	Not effective. No change in in MBI and Interpersonal Reactivity Index scores.
Winkel, 2016	Physicians (obstetrics and gynecology residents) Obstetrics and gynecology departments in large U.S. medical centers	Pre-Post Study design: 66	Narrative Medicine Workshops Reduction	Effective. Decrease in EE
Wolever, 2012	Other professionals Insurance employees National insurance carrier, United States	RCT Study design: 239	Mind-body stress reduction Reduction	Effective. Improvements in perceived stress, sleep quality, and the heart rhythm coherence ratio of heart rate variability.
Wolf, 2015	Teachers Schools in the southeastern Katanga province, Democratic Republic of the Congo	RCT Study design: 346	Learning to Read in a Healing Classroom Reduction	Partially effective. No change in burnout; increases in job dissatisfaction for female teachers and motivation for the least experienced teachers.
Wolk, 2019	Other mental health professionals Mental health at schools in Philadelphia	RCT Study design: 25	TeamSTEPPS Reduction	Not effective. Increase in burnout.
Wood, 2017	Mixed mental health care professionals (psychiatrists, psychiatric nurses, social workers, psychologists, other mental health professionals) U.S. outpatient setting	Pre-Post Study design: 30	Provider resilience app Prevention and reduction	Effective. Decreased burnout and compassion fatigue scores.
Yektatalab, 2020	Nurses Hospitals in Iran	Clinical trial Study design: 104	Web-based life skills Reduction	Effective. Reduction in total burnout score, EE and DP; increase in PA.

<b>Study</b>	<b>Participants Setting</b>	<b>Study Design Study Size</b>	<b>Intervention Prevention/Reduction</b>	<b>Measures and Author Conclusions</b>
Yong, 2011	Nurses (hospital middle manager nurses) Large university-affiliated hospital in Seoul, South Korea	Clinical trial Study design: 51	Spirituality training program Reduction	Effective. Reduction in burnout, improvement in spiritual well-being, spiritual integrity, and leadership practice.
Zolnierczyk-Zreda, 2005	Teachers Teachers in Poland	RCT Study design: 59	Burnout intervention program Reduction	Effective. Reduction in EE, perceived workload and somatic complaints.
Zwakhalen, 2018	Nursing home staff Nursing home care in the Netherlands	Clinical trial Study design: 305	Small-scale living facilities (versus regular nursing home) Prevention and reduction	Not effective. No effects on burnout symptoms

## Abbreviations

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AOR	adjusted odds ratio
APP	advanced practice provider
BREATHE	Burnout Reduction: Enhance Awareness, Tools, Handouts, Education
CBI	Copenhagen Burnout Inventory
CCT	Compassion Cultivation Training
CD-RISC	Conner-Davidson Resilience Scale
CFST	Compassion Fatigue and Satisfaction Self-Test for Helpers
CI	confidence interval
CPSP	Care Provider Support Program
DO	doctor of osteopathic medicine
DoD	Department of Defense
DP	depersonalization
DSM-5	<i>Diagnostic and Statistical Manual of Mental Disorders</i> (fifth edition)
EE	emotional exhaustion
EHR	electronic health record
GRADE	Grading of Recommendations Assessment, Development and Evaluation
ICD-11	International Classification of Diseases 11th Revision
MBI	Maslach Burnout Inventory
MBI-GS	Maslach Burnout Inventory–General Survey
MBI-HSS	Maslach Burnout Inventory–Human Services Survey
MBI-HSS (MP)	Maslach Burnout Inventory–Human Services Survey (Medical Personnel)
MD	doctor of medicine
NICU	neonatal intensive care unit
OLBI	Oldenburg Burnout Inventory
OR	odds ratio

PA	personal accomplishment
PICU	pediatric intensive care unit
PPRT	U.S. Army Professional Provider Resiliency Training
PR app	Provider Resilience Program
ProQOL	Professional Quality of Life Questionnaire
PTSD	posttraumatic stress disorder
RCT	randomized controlled trial
RR-WC	Restore and Renew Wellness Clinic
UWES	Utrecht Work Engagement Scale
VA	Veterans Affairs
VHA	Veterans Health Administration
WCQ	Ways of Coping Questionnaire

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**T**he provision of mental health treatment is affected by the strength, health, and well-being of the healthcare workforce. Healthcare provider burnout—defined as chronic occupational-related stress, emotional exhaustion, disengagement, depersonalization, anhedonia, and hopelessness—poses a critical threat to mental and behavioral healthcare. This report presents a series of literature reviews related to burnout. Of over 14,000 screened citations, 469 studies met inclusion criteria. The report documents what is known about the concept of burnout, shows burnout prevalence in healthcare facilities, evaluates the presence and absence of evidence for suggested risk factors of burnout, outlines approaches for burnout among military healthcare providers, and provides an overview of organizational interventions that have been suggested to prevent and mitigate workforce burnout.

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