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ORIGINAL RESEARCH ARTICLE

Prevalence and Severity of Burnout Risk Among Musculoskeletal Allied Health Practitioners: A Systematic Literature Review and Meta-analysis

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Abstract

This systematic literature review and meta-analysis aimed to determine the prevalence and severity of burnout among musculoskeletal allied health clinicians according to the three dimensions of burnout – emotional exhaustion, depersonalisation, and personal accomplishment. Search terms were used to identify original research articles investigating burnout among musculoskeletal allied health professionals (chiropractors, occupational therapists, physical therapists, and podiatrists) using three electronic databases. To ensure consistency across data analysis and interpretation, only studies which employed the gold standard Maslach Burnout Inventory to measure burnout risk were included. Meta-analyses were conducted to calculate the pooled prevalence of high burnout for each of the three domains of the Maslach Burnout Inventory (emotional exhaustion, depersonalisation, personal accomplishment). Subgroup analyses by health profession and continent were also conducted. The search identified 54 eligible studies for inclusion. The pooled prevalence of high burnout risk for each of the three domains of the Maslach Burnout Inventory were as follows: high emotional exhaustion, 0.40 (95% confidence interval: 0.29–0.51); high depersonalisation, 0.26 (95% confidence interval: 0.07–0.53); and low personal accomplishment, 0.25 (95% confidence interval: 0.05–0.53). Pooled mean total scores indicated moderate levels of burnout risk across all three domains. Subgroup analyses showed physical therapists had the greatest overall burnout risk, and chiropractors the lowest. Geographical differences were also observed. Musculoskeletal allied health professionals frequently experience increased burnout risk related to emotional exhaustion and depersonalisation. Differences in burnout risk prevalence and severity were also evident among professions and geographical locations, indicating that techniques for resolving burnout should be adapted to specific professions and cultural contexts.

Keywords Burnout · Allied health professionals · Prevalence · Systematic review · Maslach burnout inventory

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Introduction

Occupational burnout, which is described as emotional exhaustion and a lack of drive and commitment (Freudenberger, 1975), has become a prominent focus within the medical literature (De Hert, 2020; National Academies of Sciences Engineering and Medicine, 2019; Schaufeli & Greenglass, 2001). Although the emotional stress that human services personnel face, and their coping mechanisms, has a significant impact on professional identities and workplace behaviour (Maslach, 1981), the World Health Organization recognises burnout as an 'occupational phenomenon' and excluded it as a medical condition in its 11th revision of the International Classification of Disease (World Health Organization, 2019).

A number of theoretical frameworks have been proposed to explain the development of burnout among human services personnel (Edú-Valsania et al., 2022). The Social Exchange Theory proposes that burnout is triggered by a lack of reciprocity or imbalance between professional efforts and rewards (Cropanzano et al., 2017). As a result, the interpersonal demands of patients become emotionally consuming for the practitioner who then develops depersonalisation, and ultimately low personal fulfilment as a result (Schaufeli et al., 2011; Schaufeli, 2006). The Social Cognitive Theory purports that burnout is triggered when the individual begins to doubt their own effectiveness in achieving their professional goals, leading to low professional fulfilment and the development of emotional exhaustion and cynicism as coping strategies (Manzano-Garcia & Ayala-Calvo 2013). Other theories of burnout development, including Organisational Theory, attribute burnout to organisational and work stressors. As a result of work overload, practitioners decrease their organisation commitment which, in turn, leads to depersonalisation, low personal accomplishment and emotional exhaustion (Golembiewski et al., 1983). Many of the components and outcomes of burnout development described in these theories can be measured among human services workers using the Maslach Burnout Inventory (MBI) (Maslach, 2001). This instrument is currently the most widely used and validated tool for assessing burnout across three dimensions of emotional exhaustion (EE), depersonalisation (DP) and personal accomplishment (PA). This tool is considered the gold standard for burnout assessment (Maslach, 1981; Rotenstein et al., 2018; Shi et al., 2019).

While research on burnout risk among health professionals has primarily focused on medical physicians (Marques-Pinto et al., 2021; McKinley et al., 2020), allied health practitioners make up the majority of the health care workforce. While allied health professions are often grouped under a broad umbrella, there are significant differences across the roles and care each vocation provides. Musculoskeletal-based professions, including chiropractors, occupational therapists, physical therapists, and podiatrists, work collaboratively to restore movement and function alongside treating injury, illness, and disability. The occupational tasks vary across these professions based on their specific areas of expertise and training (**Online Resource 1**). For example, chiropractors assess, treat and care for patients by manipulation of the spine and musculoskeletal system; occupational therapists assess, plan and organise rehabilitative programs for people with disability or development delays; physical therapists assess, plan, organise, and participate in rehabilitation programs

for people with disease or injury; and podiatrists diagnose and treat diseases and deformities specific to the lower limb and foot. Despite these task-related differences, these musculoskeletal allied health professionals share many common occupational activities including active listening and social perceptiveness which allow them to identify, understand, and solve the often complex needs of their patients (National Center for O*NET Development (2023). As a result of these shared occupational activities, musculoskeletal allied health professionals share a number of occupational attributes which are centred in empathy, idealism, and selflessness allowing them to provide both physical and emotional support to patients, as well as endure depressive and aggressive patient behaviours (Paans et al., 2013). Their occupational activities require them to accept criticism and deal calmly and effectively with high-stress situations. In addition to dealing with heavy workloads, musculoskeletal allied health professionals have further daily responsibilities related to working within collaborative rehabilitation teams which requires additional energy in providing services and communicating with colleagues (Babiker et al., 2014). These factors may place them at a greater risk for burnout.

Burnout is associated with a number of consequences that directly impact professional performance associated with negative feelings about patient encounters. This heightens the risk of medical errors and suboptimal patient care practices (Aiken et al., 2002). Consequently, patients may experience longer recovery times, poorer health outcomes, and greater dissatisfaction with healthcare services (Welp et al., 2015). Burnout is also correlated with reduced job satisfaction and commitment leading to increased staff turnover, attrition, absenteeism and early retirement (Lee & Ashford, 1996; Paris & Hoge, 2010). Depersonalisation in particular, has been shown to predict occupational turnover in human services personnel (Leiter & Maslach, 2009). These consequences are detrimental to organisational productivity while being associated with significant economic costs (Han et al., 2019).

Numerous studies have investigated burnout among allied health professionals (Balogun et al., 2002; Cantu et al., 2021; Gibb et al., 2010; Mandy, 2004; Peterson et al., 2008; Rubin et al., 2021; Teo et al., 2021), however, the extent of clinician burnout across musculoskeletal allied professions has not been synthesised systematically. Therefore, this systematic literature review and meta-analysis aims to determine the prevalence and severity of burnout among musculoskeletal allied health clinicians according to the three dimensions of burnout– EE, DP, and PA.

Methods

Study Design

This study was a systematic review and meta-analysis of prevalence and severity of burnout risk among musculoskeletal allied health professionals. This review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009). This statement encompasses a set of research-informed guidelines for use when conducting systematic

reviews and meta-analyses to facilitate transparent reporting of the purpose of the review, the methods adopted, and the conclusions drawn from the results.

Search and Screening Strategy

The search was undertaken in October 2022 and updated in August 2023. The following databases were searched: Ovid Medline, CINAHL, and Scopus, with no limitation on publication year, using the following search term: (burnout OR "burn* out") AND ("allied health" OR chiropract* OR "occupational therap*" OR podiatr* OR chiropod* OR "physical therap*" OR physiotherap*).

All identified studies were exported into Rayyan, an online systematic review application (Johnson & Phillips, 2018). After duplicate removal, two reviewers (MC, SS) independently screened titles and abstracts of all identified studies against the following inclusion criteria: original research studies of a quantitative or mixed methods design which report clinician burnout risk among musculoskeletal allied health professions (chiropractor, occupational therapist, physical therapist, and podiatrist ((ASAHP) Association of Schools Advocating Health Professions, 2015). To ensure consistency across data analysis and interpretation only studies which employed the gold standard MBI to measure burnout were included.

Studies were excluded if they were a non-English publication; included only medical, midwifery, nursing, or non-musculoskeletal allied health professionals; were case reports, case series, commentary letters, conference abstracts or review articles; employed burnout tools other than the MBI; or were of a qualitative study design. Studies reporting data presented in an already included study were excluded. Two independent reviewers (SS, MC) screened the full text of all included studies against the above criteria. Any differences were resolved with a third reviewer (MF).

Maslach Burnout Inventory (MBI)

The original and most extensively used version of the MBI is the MBI-Human Services Survey (MBI-HSS). The creation of this 22-item inventory is directed towards human services personnel, and it assesses the risk of developing burnout according to the three domains of burnout development: emotional exhaustion (MBI-EE, nine items), depersonalisation (MBI-DP, five items) and personal accomplishment (MBI-PA, eight items). Importantly, the MBI-HSS was developed to measure burnout on a continuum (i.e., one's risk of developing burnout) and was not designed to provide a concrete diagnosis. Similar to the MBI-HSS, the MBI-General Survey (MBI-GSS) involves 22 items across three domains, which although named differently, parallel those in the MBI-HSS: exhaustion (MBI-EX, nine items), cynicism (MBI-CY, five items), and personal efficacy (MBI-PE, eight items). For the purpose of this review, studies using either version of the MBI were analysed together under the MBI-HSS domain names. The item scores are summated to provide total mean scores for each domain. High scores for MBI-EE and MBI-DP and low scores for MBI-PA indicate a greater risk of developing burnout. Using various cut-points, the scores can also be used to determine the prevalence of low, moderate, or high burnout (Maslach et al., 1997). However, it is recommended that the MBI scores be viewed on the continu-

ous scale due to the lack of diagnostic validity in using cut-points, which have been removed from the latest MBI manual. Despite this, published studies using this tool continue to use cut-points to report their results, and were therefore included in the current analysis. Importantly, these cut-points were interpreted as having a low, moderate or high risk of developing burnout, as opposed to having a definitive diagnosis of burnout. Although cut-points vary across the literature, the most widely used cut-points were considered for the current analysis: < 16 (low), 17–26 (moderate), and ≥27 (high) for the MBI-EE domain; < 6 (low), 7–12 (moderate), and ≥13 (high) for the MBI-DP domain, and ≥38 (low), 33–37 (moderate), ≤ 32 (high) for the MBI-PA domain (Maslach et al., 1997).

Quality Assessment

The methodological quality of the included studies was assessed using the 14-item National Health Lung and Blood Institute (NHLBI) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart Lung and Blood Institute, 2021). Satisfied items scored a 'yes', items not satisfied scored a 'no', items which were not reported and therefore could not be determined were scored as 'not reported,' and those that were not applicable, 'NA'. Two authors (MC, SS) independently scored the included studies using the NHLBI guidance document to assist with interpretation and scoring of each item. Any disagreements were resolved by a third author (MF).

Data Extraction

Data from all included studies were extracted into a standardised Microsoft Excel spreadsheet. A reliability exercise was undertaken by two reviewers (MC, SS) involving ten randomly selected studies to ensure consistency with data extraction. Following this, a single reviewer (MC) then extracted all data. The following characteristics were extracted: study characteristics (first author surname, year of publication, country of study recruitment, sample population, setting of study sample, study design, data collection method), participant characteristics (description of allied health profession(s), sample size(s) (n), gender, age of participants (years), practice experience (years)), MBI details (version of inventory used, scoring system used, and domain cut-points used), and study results (raw data reporting mean MBI scores for each of the three domains, and prevalence of low, moderate, and high burnout risk for each of the three domains). For intervention studies, where burnout risk was assessed pre- and post-intervention, only baseline data were extracted.

Meta-analysis

Meta-analyses were undertaken using both categorical and continuous measures of burnout. Categorical measures of burnout were included from studies which reported the number of practitioners who had high emotional exhaustion, high depersonalisation and/or low personal accomplishment. Only data from studies which utilised the standard MBI cut-points were included for analysis (high MBI-EE ≥27, high MBI-

DP > 12, and low MBI-PA < 31). Three meta-analyses using categorical data were conducted to represent each of the three MBI domains. From these analyses, the pooled prevalence and 95% confidence interval were reported. For meta-analysis of the continuous measures of burnout, data were included from studies which reported the mean total scores and standard deviations from participants for each of the three domains of the MBI. Three meta-analyses using continuous data were conducted as above and the pooled mean prevalence and 95% confidence interval were reported.

Heterogeneity for all meta-analyses was examined using the I^2 statistic and random effects models were used for all $I^2 > 0\%$ in accordance with recommendations by the Cochrane Collaboration (Higgins et al., 2019). The random effects model allows representation of all studies (regardless of variable effect sizes) in the pooled estimates by weighting studies based on the ratio of within-study and between-study variance (Borenstein et al., 2010). Forest plots were generated to provide visual representations of the pooled estimates and their 95% confidence intervals. Although musculoskeletal allied health professionals share occupational attributes, the distinct tasks and activities each profession undertakes varies (National Centre for O*Net development, 2023) and it is unknown whether this variation may translate into variation in burnout risk. Therefore, to explore possible differences in the risk of burnout development between health care professions, a sub-group analysis by occupation was also undertaken. In addition, a subgroup analysis by geographical location (continent) was performed due to global differences in healthcare systems and their potential contribution to differences in burnout risk (Balogun et al., 2002; Fila & Wilson, 2018; Fish et al., 2022; Narayanan et al., 1999; Teo et al., 2021; Woo et al., 2020). All meta-analyses were performed in RStudio (version 4.1) using the metaprop command and a significance level of < 5%.

Results

Study Selection/Search Outcome

The initial literature search identified a total of 2,374 studies. After removal of duplicates and screening of titles and abstract, 123 full-text studies were screened. Of these, 69 did not meet the inclusion criteria, leaving a total of 54 studies included in the review (Fig. 1).

Characteristics of Included Studies and Participants

Characteristics of the 54 included studies are shown in **Online Resource 2**. All but one study employed a cross-sectional design. Studies were published between 1987 and 2023. The included studies examined burnout among musculoskeletal based allied health professions, comprising physical therapists ($n = 23$ studies), occupational therapists ($n = 21$ studies), chiropractors ($n = 2$ studies), and podiatrists ($n = 1$ studies). Six additional studies included both occupational therapists and physical therapists, and one study included occupational therapists, physical therapists, and podiatrists. Studies were conducted in 19 different countries across six continents.

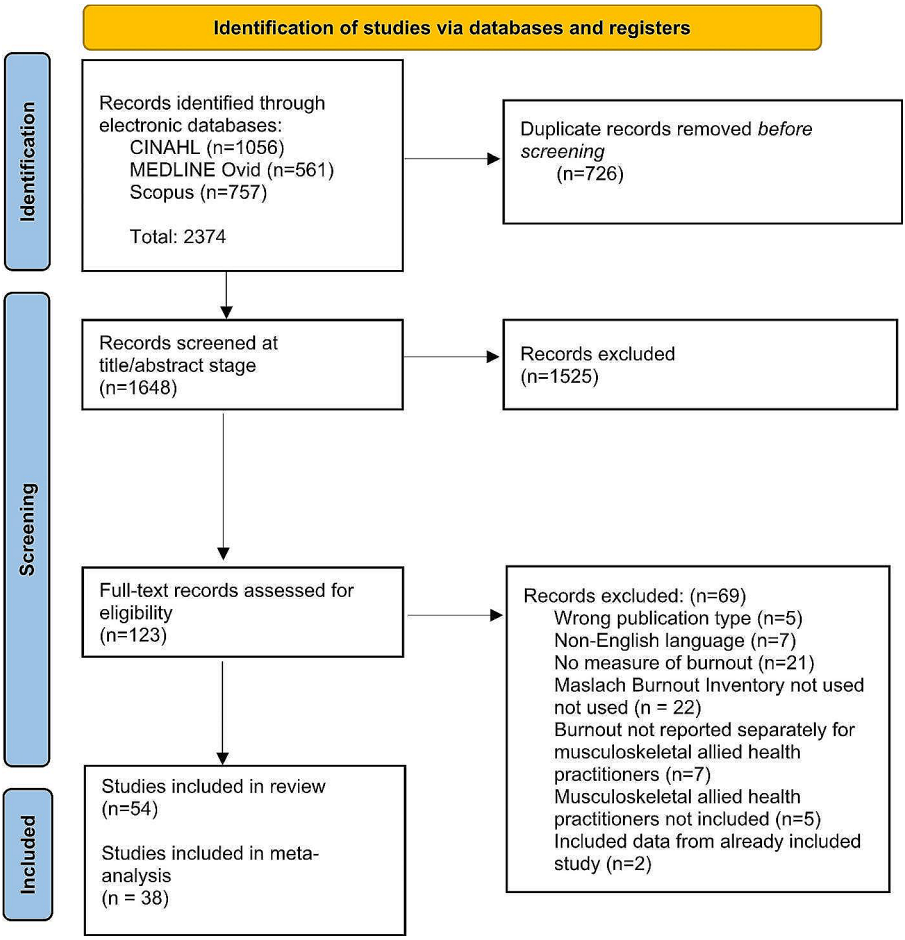

Fig. 1 PRISMA flowchart of the systematic literature review process

The majority of studies were from North America ($n=18$, 33.3%) and Europe ($n=18$, 33.3%). Ten studies (18.5%) were from Asia, 3 (5.6%) were from Oceania, and 3 studies (5.6%) from Africa. One additional study (2.2%) involved practitioners from both Europe and Oceania. Total sample sizes ranged from 13 to 1,162 participants. Practitioner experience varied from student to >31 years.

Quality Assessment

A summary of the overall results from the NHLBI quality assessment are shown in **Online Resource 3**, with individual study data shown in **Online Resource 4**. All studies ($n=45$, 100%) provided a clearly stated research question, while only 24 (44.4%) studies provided a clear description of the study population, including demographics, location and time period.in which they were selected or recruited. The majority of studies ($n=44$, 81.5%) provided a sufficient description of the participant

eligibility criteria and applied it consistently to all participants recruited for the study. Just over half ($n=31$, 57.4%) of included studies provided sample size calculations or effect size estimates which is important to establish whether the study was powered to detect an association if one existed. Almost all studies ($n=43$, 79.6%) assessed the influence of practitioner factors on burnout (including qualifications, years of practice, workplace conditions, or type of therapist) which greatly lends credibility to the hypothesis of causality. Almost half of studies ($n=25$, 46.3%) reported recruiting only practitioners who were registered or licensed with a professional governing body which ensures that the occupation of all participants was defined accurately and reliably. Over one third ($n=22$, 40.7%) of studies statistically explored potential confounding factors influencing burnout in addition to presenting the prevalence and/or severity of burnout using descriptive statistics. Due to the cross-sectional nature of the majority of included studies, items relating to assessment over time, blinding and loss to follow up were not applicable for all but one study, and items related to timing of assessment and sufficient timeframes were all scored as 'no' for cross-sectional studies.

Maslach Burnout Inventory

The original MBI-HSS was used by the majority of included studies ($n=49$, 90.7%), while five (9.3%) studies used the MBI-GS. The 22-item version of the inventory was used by all but two studies which adopted a modified 16-item version (**Online Resource 5**). Item scoring was fairly consistent across studies, with 51 (94.4%) studies using the 7-point likert scale (ranging from 0 to 6), and two (3.7%) studies using a 5-point likert scale. Item scoring in the remaining one study was not clear. All studies calculated total domain scores by summing the scores from all items in each domain, and of these, six (11.1%) studies then divided the summated scores by the number of items in each domain. Included studies reported the mean scores for each of the three MBI domains and/or the number of participants classified as having low, moderate, or high burnout risk scores for each domain. For the latter, a range of cut-point definitions were used to classify participants (**Online Resource 5**). Table 1 summarises the burnout findings by health profession.

Meta-analyses

Pooled Prevalence of Burnout Risk Among Musculoskeletal Allied Health Professionals (Using the Categorical Measure of Burnout)

Nineteen studies reported the prevalence of high burnout risk across the three domains of the MBI. However only 12 of these studies used consistent scoring and cut-off scores and could be included in the meta-analyses (**Online Resource 5**). The total sample of musculoskeletal allied health professionals from these 12 studies was 3,119 (including 1,252 chiropractors, 1,636 physical therapists, and 106 occupational therapists), with 2,013 from North America, 739 from Europe, and 367 from Africa.

Table 1 Summary of burnout assessment and findings from included studies ($n=64$)

Study	Country of recruitment	Sample size	Burnout Measure	Reported burnout
Chiropractors				
Williams, 2013	United States	90	MBI-HSS	**EE**: mean (SD) 16.13 (12.5); low ($n=52$), moderate ($n=22$), high ($n=16$) **DP**: mean (SD) 4.07 (5.17); low ($n=70$), moderate ($n=14$), high ($n=6$) **PA**: mean (SD) 41.89 (6.68); low ($n=6$), moderate ($n=19$), high ($n=65$) Overall low burnout ($n=42$) Overall mixed burnout ($n=46$) Overall high burnout ($n=2$)
Williams, 2014	United States	1162	MBI-HSS	**EE**: mean (SD) 16.16 (12.3); low ($n=696$), moderate ($n=223$), high ($n=241$) **DP**: mean (SD) 4.53 (5.07); low ($n=873$), moderate ($n=190$), high ($n=98$) **PA**: mean (SD) 41.63 (6.82); low ($n=94$), moderate ($n=180$), high ($n=887$)
Occupational Therapists				
Balogun et al., 2002	United States	138	MBI-HSS	**EE**: mean (SD) 29.0 (6.1) **DP**: mean (SD) 18.1 (4.7) **PA**: mean (SD) 18.0 (8.0)
Brollier, 1987	United States	129	MBI-HSS	Physical disability OTs **EE**: mean 22.64 **DP**: mean 9.48 **PA**: mean 38.67 Developmental disability OTs **EE**: mean 21.5 **DP**: mean 9.36 **PA**: mean 38.91 Mental health OTs **EE**: mean 21.52 **DP**: mean 10.82 **PA**: mean 39.48
Brown, 1992	Canada	89	MBI-HSS	**EE**: mean (SD) 18.71 (8.67) **DP**: mean (SD) 5.83 (4.67) **PA**: mean (SD) 37.9 (6.65)
Brown, 2018	Canada	139	MBI-HSS	**EE**: mean 16.78 **DP**: mean 9.0 **PA**: mean 38.3
Bruce, 2022	South Africa	261	MBI-HSS	**EE**: mean (SD) 35.8 (10.8); low ($n=7$), moderate ($n=49$), high ($n=205$) **DP**: mean (SD) 12.98 (5.51); low ($n=32$), moderate ($n=101$), high ($n=128$) **PA**: mean (SD) 38.11 (5.93); low ($n=157$), moderate ($n=58$), high ($n=46$)
Bruschini et al., 2018	Italy	80	MBI-HSS	Total number at minor risk of burnout ($n=68$) Total number at greater risk of burnout ($n=12$)
Escudero-Escudero et al., 2020	Spain	758	MBI-GS	**EE**: low ($n=277$), high ($n=481$) **DP**: low ($n=257$), high ($n=501$) **PA**: low ($n=742$), high ($n=16$)

Table 1 (continued)

Study	Country of recruitment	Sample size	Burnout Measure	Reported burnout
Gupta et al., 2012	Canada	63	MBI-GS	**EE**: mean (SD) 2.81 (1.26); low (n=22), moderate (n=17), high (n=24) **DP**: mean (SD) 2.23 (1.40); low (n=16), moderate (n=17), high (n=30) **PA**: mean (SD) 4.39 (0.90); low (n=17), moderate (n=27), high (n=19) (total domain scores were divided by total number of domain items)
Jahrami, 2009	Bahrain	13	MBI-HSS	**EE**: mean (SD) 28.07 (10.67) **DP**: mean (SD) 11.92 (5.67) **PA**: mean (SD) 36.07 (5.72)
Janus et al., 2018	Poland	97	MBI-HSS	**EE**: mean (SD) 18.2 (11.3) **DP**: mean (SD) 5.6 (4.7) **PA**: mean (SD) 35.5 (4.7)
Juy et al., 2022	Spain	127	MBI-GS	**EE**: mean (SD) 21.69 (12.37); high (n=49) **DP**: mean (SD) 7.26 (5.32); high (n=45) **PA**: mean (SD) 37.98 (5.51); low (n=33)
Kim et al., 2020	Republic of Korea	109	MBI-HSS	Small hospitals **EE**: mean (SD) 2.0 (0.64) **DP**: mean (SD) 1.29 (0.55) **PA**: mean (SD) 3.28 (0.55) Large hospitals **EE**: mean (SD) 1.82 (0.28) **DP**: mean (SD) 0.89 (0.42) **PA**: mean (SD) 3.48 (0.47) (total domain scores were divided by total number of domain items)
Lee et al., 2021	South Korea	109	MBI-HSS	**EE**: mean (SD) 1.9 (0.63) **DP**: mean (SD) 1.17 (0.55) **PA**: mean (SD) 3.41 (0.5) (total domain scores were divided by total number of domain items)
Lloyd, 2004	Australia	196	MBI-HSS	**EE**: mean (SD) 22.5 (9.9) **DP**: mean (SD) 5.9 (4.5) **PA**: mean (SD) 36.2 (6.1)
Painter et al., 2003	United States	521	MBI-HSS	**EE**: mean (SD) 23.3 (11) **DP**: mean (SD) 4.2 (4.4) **PA**: mean (SD) 37.4 (6.3)
Piedmont, 1993	United States	36	MBI-HSS	**EE**: mean (SD) 24.6 (7.1) **DP**: mean (SD) 5.4 (3.6) **PA**: mean (SD) 37.9 (6.6)
Pranger, 1993	Canada	91	MBI-HSS	**EE**: mean (SD) 18.74 (8.67) **DP**: mean (SD) 5.83 (4.67) **PA**: mean (SD) 37.9 (6.65)
Reyes, 2018	Philippines	57	MBI-HSS	**EE**: mean (SD) 23.56 (10.29) **DP**: mean (SD) 6.44 (5.23) **PA**: mean (SD) 38.18 (6.17)
Rogers, 1988	United States	99	MBI-HSS	**EE**: mean (SD) 19.95 (8.61) **DP**: mean (SD) 5.62 (5.12) **PA**: mean (SD) 38.06 (4.95)

Table 1 (continued)

Study	Country of recruitment	Sample size	Burnout Measure	Reported burnout
Sadeghi et al., 2023	Iran	35	MBI-HSS	**EE**: mean (SD) 24.62 (11.11) **DP**: mean (SD) 9.31 (4.47) **PA**: mean (SD) 24.05 (6.66)
Schlenz et al., 1995	United States	21	MBI-HSS	**EE**: mean (SD) 26.38 (9.4) **DP**: mean (SD) 6.71 (3.7) **PA**: mean (SD) 38.43 (4.7)
Shin et al., 2022	United States	178	MBI-HSS	**EE**: mean (SD) 26.3 (12.1) **DP**: mean (SD) 7.0 (5.9) **PA**: mean (SD) 38.8 (6.3)
Struwig, 2023	South Africa	75	MBI-HSS	**EE**: mean (SD) 3.20 (1.35); low ($n=11$), moderate ($n=23$), high ($n=41$) **DP**: mean (SD) 1.78 (1.16); low ($n=30$), moderate ($n=28$), high ($n=17$) **PA**: mean (SD) 4.16 (0.998); low ($n=25$), moderate ($n=29$), high ($n=21$) (total domain scores for continuous measures were divided by total number of domain items)
Sturgess, 1983	Australia	106	MBI-HSS	**EE**: mean 21.97 **DP**: mean 5.71 **PA**: mean 36.89
Tan, 2004	Singapore	37	MBI-HSS	**EE**: mean (SD) 19.19 (8.27) **DP**: mean (SD) 7.03 (5.13) **PA**: mean (SD) 36.77 (5.97)
Teo et al., 2021	Singapore	33	MBI-HSS	Overall burnout: low ($n=21$), high ($n=12$)
Toellner et al., 2007	South Africa	31	MBI-HSS	**EE**: low ($n=5$), moderate ($n=18$), high ($n=8$) **DP**: low ($n=24$), moderate ($n=7$), high ($n=0$) **PA**: low ($n=0$), moderate ($n=1$), high ($n=30$)
Physical therapists				
Al-Imam, 2014	Saudi Arabia	119	MBI-GS	**EE**: mean (SD) 14.22 (7.3); low ($n=23$), moderate ($n=45$), high ($n=50$) **DP**: mean (SD) 10.6 (6.5); low ($n=28$), moderate ($n=47$), high ($n=40$) **PA**: mean (SD) 26.4 (7.1); low ($n=34$), moderate ($n=37$), high ($n=45$)
Balogun et al., 2002	United States	169	MBI-HSS	**EE**: mean (SD) 28.8 (7.4) **DP**: mean (SD) 18.4 (4.7) **PA**: mean (SD) 18.0 (6.1)
Bejer et al., 2019	Poland	86	MBI-HSS	**EE**: mean (SD) 15.99 (10.84) **DP**: mean (SD) 4.31 (4.77) **PA**: mean (SD) 31.63 (8.97)
Berry, 2015	United States	113	MBI-HSS	**EE**: low ($n=68$), moderate ($n=20$), high ($n=25$) **DP**: low ($n=98$), moderate ($n=10$), high ($n=5$) **PA**: low ($n=90$), moderate ($n=17$), high ($n=6$) Working solo (no co-workers) **EE**: mean (SD) 16.09 (13.88) **DP**: mean (SD) 3.75 (4.69) **PA**: mean (SD) 40.78 (5.7) Working with co-workers **EE**: mean (SD) 17.41 (11.9) **DP**: mean (SD) 3.6 (4.08) **PA**: mean (SD) 40.05 (4.72)

Table 1 (continued)

Study	Country of recruitment	Sample size	Burnout Measure	Reported burnout
Bruschini et al., 2018	Italy	210	MBI-HSS	Total number at minor risk of burnout ($n=177$) Total number at greater risk of burnout ($n=33$)
Carmona-Barrientos et al., 2020	Spain	272	MBI-HSS	**EE**: mean (SD) 21.64 (10.57); low ($n=81$), moderate ($n=103$), high ($n=83$) **DP**: mean (SD) 6.57 (4.65); low ($n=80$), moderate ($n=90$), high ($n=101$) **PA**: mean (SD) 39.52 (5.97); low ($n=84$), moderate ($n=96$), high ($n=91$)
Corrado et al., 2019	Italy	118	MBI-HSS	**EE**: mean (SD) 19.1 (11.3) **DP**: mean (SD) 9.6 (5.75) **PA**: mean (SD) 32.3 (8.6)
de Medeiros et al, 2022	Brazil	80	MBI-HSS	**EE**: high ($n=46$) **DP**: high ($n=22$) **PA**: low ($n=13$)
Donohoe et al., 1993	United States	122	MBI-HSS	**EE**: mean (SD) 23.54 (10.7); low ($n=34$), moderate ($n=32$), high ($n=56$) **DP**: mean (SD) 7.63 (5.75); low ($n=69$), moderate ($n=28$), high ($n=25$) **PA**: mean (SD) 37.26 (8.46)); low ($n=73$), moderate ($n=18$), high ($n=31$)
Ferguson et al., 2023	Unites States	94	MBI-HSS	**EE**: mean (SD) 25.93 (11.74); low ($n=22$), moderate ($n=28$), high ($n=44$) **DP**: mean (SD) 7.24 (5.69); low ($n=62$), moderate ($n=15$), high ($n=17$) **PA**: mean (SD) 40.9 (4.57); low ($n=78$), moderate ($n=14$), high ($n=2$)
Fischer et al., 2013	Italy	132	MBI-HSS	**EE**: mean (SD) 23.64 (7.88); low ($n=27$), moderate ($n=60$), high ($n=46$) **DP**: mean (SD) 9.19 (3.59); low ($n=35$), moderate ($n=74$), high ($n=24$) **PA**: mean (SD) 34.61 (3.38); low ($n=16$), moderate ($n=98$), high ($n=19$)
Grande-Alonso et al., 2023	Spain	174	MBI-HSS	Freelance **EE**: median (IQR) 16 (8-30.75) **DP**: median (IQR) 6 (3-9.75) **PA**: median (IQR) 39.5 (34–43) Contracted **EE**: median (IQR) 33.5 (26.25-41) **DP**: median (IQR) 13 (9-16.75) **PA**: median (IQR) 31 (26–39)
Kim et al., 2020	Republic of Korea	216	MBI-HSS	Small hospitals **EE**: mean (SD) 2.1 (0.65) **DP**: mean (SD) 1.42 (0.6) **PA**: mean (SD) 2.97 (0.55) Large hospitals **EE**: mean (SD) 1.78 (0.25) **DP**: mean (SD) 1.03 (0.65) **PA**: mean (SD) 3.47 (0.53) (total domain scores were divided by total number of domain items)

Table 1 (continued)

Study	Country of recruitment	Sample size	Burnout Measure	Reported burnout
Lee et al., 2021	South Korea	216	MBI-HSS	**EE**: mean (SD) 2.0 (0.69) **DP**: mean (SD) 1.3 (0.64) **PA**: mean (SD) 3.32 (0.58) (total domain scores were divided by total number of domain items)
Martinussen et al., 2011	Norway	244	MBI-HSS	**EE**: mean (SD) 1.7 (1.13) **DP**: mean (SD) 0.7 (0.79) **PA**: mean (SD) 4.6 (0.83) (total domain scores were divided by total number of domain items)
Morisawa et al., 2022	Japan	566	MBI-GS	**EE**: median (IQR) 18 (12–25) **DP**: median (IQR) 10 (7–15) **PA**: median (IQR) 22 (16–28) Overall burnout ($n=99$)
Pavlakis et al., 2010	Greece	172	MBI-HSS	**EE**: mean (SD) 16.55 (9.9) **DP**: mean (SD) 5.2 (4.61) **PA**: mean (SD) 39.5 (5.58)
Pniak et al., 2021	Poland	106	MBI-HSS	**EE**: mean (SD) 32.31 (14.75) **DP**: mean (SD) 16.25 (9.23) **PA**: mean (SD) 26.25 (9.56)
Pustułka-Piwnik et al., 2014	Poland	151	MBI-HSS (Polish)	**EE**: mean (SD) 20.58 (10.86) **DP**: mean (SD) 5.98 (5.28) **PA**: mean (SD) 34.36 (7.46)
Rodríguez-Nogueira et al., 2021	Spain	472	MBI-HSS	**EE**: mean (SD) 26.9 (10.3); low ($n=123$), moderate ($n=128$), high ($n=221$) **DP**: mean (SD) 9.6 (4.1); low ($n=56$), moderate ($n=217$), high ($n=199$) **PA**: mean (SD) 35.2 (5.1); low ($n=74$), moderate ($n=202$), high ($n=195$)
Rodríguez-Nogueira et al., 2022a	Spain	461	MBI-HSS	**EE**: mean (SD) 26.8 (10.4) **DP**: mean (SD) 9.6 (4.2) **PA**: mean (SD) 38.3 (5.1)
Rodríguez-Nogueira et al., 2022b	Spain	471	MBI-HSS	**EE**: mean (SD) 26.9 (10.4) **DP**: mean (SD) 9.7 (4.22) **PA**: mean (SD) 38.2 (5.1)
Schlenz et al., 1995	United States	19	MBI-HSS	**EE**: mean (SD) 24.21 (9.4) **DP**: mean (SD) 6.10 (3.7) **PA**: mean (SD) 40.37 (4.7)
Scutter, 1995	Australia	66	MBI-HSS	**EE**: low ($n=26$), moderate ($n=24$), high ($n=16$) **DP**: low ($n=37$), moderate ($n=23$), high ($n=6$) **PA**: low ($n=4$), moderate ($n=20$), high ($n=41$)
Szwamel et al., 2022	Poland	106	MBI-HSS	**EE**: mean (SD) 21.78 (12.64) **DP**: mean (SD) 5.87 (5.32) **PA**: mean (SD) 36.39 (8.26)
Teo et al., 2021	Singapore	28	MBI-HSS	Overall burnout: low ($n=17$), high ($n=11$)
Tragea et al., 2012	Greece	176	MBI-HSS	**EE**: mean (SD) 20.9 (8.8); low ($n=92$) **DP**: mean (SD) 6.7 (5.1); low ($n=86$) **PA**: mean (SD) 37.4 (6.5); moderate ($n=80$)

Table 1 (continued)

Study	Country of recruitment	Sample size	Burnout Measure	Reported burnout
Wandling, 1997	United States	387	MBI-HSS	**EE**: mean (SD) 18.7 (9.3) **DP**: mean (SD) 5.4 (4.4) **PA**: mean (SD) 41.8 (5.0)
Yousaf et al., 2021	Pakistan	387	MBI-HSS	Private **EE**: mean (SD) 32.61 (11.28) **DP**: mean (SD) 17.11 (8.39) **PA**: mean (SD) 33.55 (8.33) Public **EE**: mean (SD) 30.97 (12.88) **DP**: mean (SD) 12.72 (7.55) **PA**: mean (SD) 28.91 (12.28)
Podiatrists				
Mandy, 2004	United Kingdom and Australia	492	MBI-HSS	United Kingdom **EE**: mean (SD) 45.29 (7.02) **DP**: mean (SD) 57.73 (11.4) **PA**: mean (SD) 28.48 (15.57) Australia **EE**: mean (SD) 46.1 (7.4) **DP**: mean (SD) 58.0 (11.5) **PA**: mean (SD) 25.9 (15.4)
Teo et al., 2021	Singapore	5	MBI-HSS	Overall burnout: low ($n=3$), high ($n=2$)
Occupational therapists and physical therapists				
Roundy et al., 2023	United States	125 (Occupational therapist=31; Physical therapist=94)	MBI-HSS	**EE**: mean (SD) 21.52 (11.35); high ($n=41$) **DP**: mean (SD) 5.06 (4.99); high ($n=19$) **PA**: mean (SD) 38.07 (4.75); low ($n=17$)

MBI=Maslach Burnout Inventory; HSS=Human services survey; GS=General survey; EE=Emotional exhaustion; DP=Depersonalisation; PA=Personal accomplishment.

High Emotional Exhaustion The pooled prevalence of high MBI-EE was 0.40 (95% confidence interval (CI) 0.29, 0.51) (**Online Resource 6**, Table 2). Subgroup analyses by health profession, showed that physical therapists and occupational therapists had a significantly higher prevalence of high MBI-EE compared to chiropractors ($P<0.001$), while no significant differences were observed by continent ($P=0.49$) (Table 2).

High Depersonalisation The pooled prevalence of high MBI-DP was 0.26 (95% CI 0.07, 0.53) (**Online Resource 6**, Table 2). Subgroup analyses showed that the prevalence high MBI-DP was significantly higher in physical therapists compared to chiropractors and occupational therapists ($P=0.02$), and no significant differences were observed by continent ($P=0.59$) (Table 2).

Low Personal Accomplishment The pooled prevalence of low MBI-PA was 0.25 (95% CI 0.05, 0.53) (**Online Resource 6**, Table 2). Subgroup analyses showed that chiropractors had the highest prevalence of low MBI-PA compared to occupational

Table 2 Meta-analyses for pooled prevalence of MBI subscale scores

		No. studies	Total sample	Pooled % (95% CI)	Heterogeneity		Subgroup difference	
					I^2	P	χ^2_2	P
Overall								
High MBI-EE		12	3119	0.40 (0.29, 0.51)	98%	<0.001		
High MBI-DP		8	2319	0.26 (0.07, 0.53)	99%	<0.001		
High MBI-PA		8	2338	0.25 (0.05, 0.53)	99%	<0.001		
Sub-analysis by health professional								
High MBI-EE	Chiropractors	2	1252	0.21 (0.18, 0.23)	0%	0.49	16.91	**<0.001**
	Occupational therapists	2	106	0.41 (0.15, 0.69)	87%	0.01		
	Physical therapists	7	1514	0.47 (0.33, 0.61)	97%	<0.001		
High MBI-DP	Chiropractors	2	1252	0.08 (0.07, 0.10)	0%	0.54	7.99	**0.02**
	Occupational therapists	2	106	0.06 (0.00, 0.45)	95%	<0.001		
	Physical therapists	4	961	0.52 (0.19, 0.84)	99%	<0.001		
Low MBI-PA	Chiropractors	2	1252	0.08 (0.07, 0.10)	0%	0.62	16.24	**<0.001**
	Occupational therapists	1	31	0.00 (0.00, 0.03)	-	-		
	Physical therapists	5	1055	0.44 (0.14, 0.77)	99%	<0.001		
Sub-analysis by continent								
High MBI-EE	Africa	3	367	0.54 (0.24, 0.83)	95%	<0.001	1.41	0.49
	Europe	2	739	0.39 (0.24, 0.55)	94%	<0.001		
	North America	7	2013	0.34 (0.23, 0.47)	97%	<0.001		
High MBI-DP	Africa	3	323	0.17 (0.00, 0.59)	97%	<0.001	1.07	0.59
	Europe	1	271	0.37 (0.32, 0.43)	-	-		
	North America	4	1681	0.30 (0.00, 0.82)	100%	<0.001		
Low MBI-PA	Africa	2	292	0.19 (0.00, 0.94)	99%	<0.001	0.17	0.92
	Europe	1	271	0.31 (0.26, 0.37)	-	-		
	North America	5	1775	0.26 (0.02, 0.64)	99%	<0.001		

MBI=Maslach Burnout Inventory; EE=emotional exhaustion; DP=depersonalisation; PA=personal accomplishment

therapists and physical therapists ($P<0.001$), with no significant differences evident between continents ($P=0.92$) (Table 2).

Pooled Mean Burnout Risk Scores Among Musculoskeletal Allied Health Professionals (Using the Continuous Measures of Burnout)

Forty-six studies reported mean scores for the three domains of the MBI (**Online Resource 5**). Of these, three studies were excluded from the meta-analyses because SDs were not provided for mean scores. Three additional studies were excluded because 5-point or 6-point likert scales were used for item scoring, as opposed to the traditional 7-point likert scale. Three more studies were excluded because they used a 16-item modified version of the original 22-item inventory. One further study was excluded because the reported mean scores exceeded the maximum range of possible scores (the author could not be contacted). Two final studies were excluded because a different method was used to calculate the final scores. Therefore, a total of 35 studies were included in the meta-analyses of pooled mean MBI domain scores. The total sample of musculoskeletal allied health professionals from these studies was 7,255 (including 4,143 physical therapists, 1,735 occupational therapists, and 1,252 chiropractors). Five studies were from Asia, 13 from Europe, 15 from North America, one each from Oceania and Africa.

Emotional Exhaustion The pooled mean MBI-EE score was 23.13 (95% CI 21.48, 24.78) indicating a moderate level of burnout risk (**Online Resource 7**, Table 3). Subgroup analyses showed significant differences by health professional, with chiropractors experiencing the lowest mean MBI-EE scores and physical therapists and occupational therapists highest ($P<0.001$) (Table 3). There was also a significant difference in mean MBI-EE scores across continents, with practitioners in Africa and Asia experiencing the highest mean MBI-EE scores ($P<0.001$) (Table 3).

Depersonalisation The pooled mean MBI-DP score was 7.94 (95% CI 6.64, 9.23) indicating a moderate level of burnout risk (**Online Resource 8**, Table 3). As with the previous MBI domain, mean MBI-DP scores were lowest in chiropractors, while physical therapists reported the highest ($P<0.001$) (**Table 6**). Practitioners from Africa reported the highest mean MBI-DP scores, while practitioners from Oceania reported the lowest ($P<0.001$) (Table 3).

Personal Accomplishment The pooled mean MBI-PA score was 35.89 (95% CI 34.03, 37.75) indicating a moderate level of burnout risk (**Online Resource 9**, Table 3). Again, subgroup analysis by health professional showed chiropractors reported the lowest burnout risk, with the highest scores, while physical therapists and occupational therapists reported the lowest scores, and therefore greatest burnout risk ($P<0.001$) (Table 3). There was also a significant difference in mean MBI-PA scores across continents with Africa reporting the highest (and therefore lowest burnout risk) scores, and Asia and Europe the lowest (and therefore highest burnout risk) scores ($P=0.002$) (Table 3).

Table 3 Subgroup meta-analyses by health professional for MBI mean subscale scores

		No. studies[a]	Total sample	Pooled mean (95% CI)	Heterogeneity		Subgroup difference	
					I^2	P	χ^2_2	P
Overall								
MBI-EE		35	7255	23.13 (21.48, 27.78)	98%	< 0.001		
MBI-DP		35	7255	7.94 (6.64, 9.23)	99%	< 0.001		
MBI-PA		35	7255	35.89 (34.03, 37.75)	99%	< 0.001		
Sub-analysis by health professional								
MBI-EE	Chiropractors	2	1252	16.16 (16.06, 16.26)	0%	0.98	91.96	< **0.001**
	Occupational therapists	15	1735	22.81 (20.88, 24.75)	94%	< 0.001		
	Physical therapists	19	4143	24.03 (21.36, 26.71)	98%	< 0.001		
MBI-DP	Chiropractors	2	1252	4.50 (3.01–5.98)	0%	0.42	29.73	< **0.001**
	Occupational therapists	15	1735	7.43 (5.51, 9.35)	99%	< 0.001		
	Physical therapists	19	4143	8.77 (6.78, 10.77)	99%	< 0.001		
MBI-PA	Chiropractors	2	1252	41.65 (40.78, 42.52)	0%	0.72	39.32	< **0.001**
	Occupational therapists	15	1735	35.26 (31.94, 38.58)	98%	< 0.001		
	Physical therapists	19	4143	35.67 (33.04, 38.30)	99%	< 0.001		
Sub-analysis by continent								
MBI-EE	Africa	1	261	35.80 (34.49, 37.11)	-	-	251.11	< **0.001**
	Asia	4	494	26.90 (19.94, 33.86)	96%	< 0.001		
	Europe	13	2815	22.26 (19.42, 25.10)	97%	< 0.001		
	North America	16	3454	22.01 (19.86, 24.18)	98%	< 0.001		
	Oceania	1	196	22.50 (21.11, 23.89)	-	-		
MBI-DP	Africa	1	261	12.98 (12.31, 13.65)	-	-	236.31	< **0.001**
	Asia	4	494	11.05 (5.52, 16.58)	98%	< 0.001		
	Europe	13	2815	7.83 (5.96, 9.70)	98%	< 0.001		
	North America	16	3454	6.92 (4.78,9.06)	99%	< 0.001		
	Oceania	1	196	5.90 (5.27, 6.53)	-	-		

Table 3 (continued)

		No. studies[a]	Total sample	Pooled mean (95% CI)	Heterogeneity		Subgroup difference	
					I^2	P	χ^2_2	P
MBI-PA	Africa	1	261	38.11 (37.39, 38.83)	-	-	17.36	**0.002**
	Asia	4	494	34.71 (30.20, 39.22)	92%	< 0.001		
	Europe	13	2815	35.64 (33.39, 37.90)	97%	< 0.001		
	North America	16	3454	36.92 (33.39, 40.46)	99%	< 0.001		
	Oceania	1	196	36.20 (35.35–37.05)	-	-		

[a]One study included both occupational therapists and physical therapists. MBI = Maslach Burnout Inventory; EE = emotional exhaustion; DP = depersonalisation; PA = personal accomplishment.

Discussion

This is the first study to systematically review the prevalence and severity of burnout risk among musculoskeletal allied health practitioners. Burnout risk was common, with mean scores indicating moderate burnout risk across all three domains of the MBI (emotional exhaustion, depersonalisation, and personal accomplishment). Significant differences were also observed between health professionals, with physical therapists experiencing the greatest overall burnout risk and chiropractors the lowest. Geographical differences were also observed in the prevalence and severity of burnout risk.

Emotional exhaustion, was experienced by over a third (40%) of musculoskeletal allied health practitioners in this review, while high depersonalisation was experienced by just over a quarter (26%). These findings are consistent with pooled estimates reported in meta-analyses of other health professionals, including mental health professionals, paediatric nurses, oncologists, psychiatrists, radiation therapists and oncologists, dentists, and primary care workers, in which the prevalence of high emotional exhaustion ranges from 28 to 29%, and high depersonalisation from 15 to 19%. (**Online Resource 10**). Emotional exhaustion leads to feeling overburdened and depleted of emotional and physical resources, leading to a loss of enthusiasm for work. Although many musculoskeletal allied health professionals felt emotionally exhausted and cynical towards others, this did not appear to impact their feelings of personal accomplishment, with a pooled 25% of participants classified as having low personal accomplishment. This is considerably lower than many other healthcare professionals, in which recent meta-analyses have indicated prevalence rates of low personal accomplishment reaching up to 46% among intensive care nurses (**Online Resource 10**), which may be attributed to their longer work hours (Filho et al., 2019). However, reduced personal accomplishment is often considered a consequence rather than a defining feature of burnout (Kristensen et al., 2005). Although these results suggest that high burnout among musculoskeletal allied health professionals may not substantially impact their feelings of competence and successful achievement in their work (Maslach et al., 2001), it may also suggest that they may not yet have progressed to this stage of the burnout continuum.

In the current review, physical therapists had the greatest burnout risk across all three domains of the MBI, while chiropractors had the lowest. The reasons for differences between these professions is not clear but may be attributed to a range of varying work-related factors unique to each profession. Although both physical therapists and chiropractors share many common occupational tasks, activities and attributes, physical therapists (unlike chiropractors) carry an additional role as an 'instructor' which requires them to implement learning strategies to teach and coach patients and their families through rehabilitation programmes that often take place outside of the clinic environment (i.e., within the patient's home) (National Centre for O*Net Development, 2023). However, further research is required to determine whether the added responsibility in ensuring the patient's management and care is continued outside of the clinic environment contributes to greater demands on the physical therapist and therefore a greater risk of developing burnout. Previous studies have also identified several work-related factors that are strongly associated with burnout among other allied health professionals, including varying administrative duties, practice settings, shift patterns and working hours, workplace conflicts, and varying philosophical perspectives within the professions (Elbarazi et al., 2017; Saura et al., 2022; Williams et al., 2013). Younger practitioners or those with less work experience have also been reported to experience greater burnout due to less advanced coping strategies (Hsu, 2018; Saura et al., 2022; Teo et al., 2021). This may have implications for future workforce development and the unmet need of allied health care professionals.

The findings from this review have also highlighted that burnout risk among musculoskeletal allied health professionals is a global phenomenon. However, subgroup analyses suggest that the prevalence and severity of burnout risk may demonstrate geographical differences. Observed differences were dependent on the MBI domain being assessed, with practitioners from Africa and Asia experiencing the highest emotional exhaustion and depersonalisation and practitioners from Asia and Europe experiencing the lowest sense of personal accomplishment. Asian representation across all three burnout domains is consistent with the higher reporting of burnout among Asian nurses compared to other geographical locations (Woo et al., 2020). Many Asian countries are impacted by huge health workforce shortages (World Health Organization, 2018), along with rapid economic growth, urbanisation, and an aging population, which increases the demand for healthcare and may impact burnout among practitioners (Ramesh & Wu, 2008; Sheikh et al., 2017). Cultural differences may also play a role in this. For example, the traditional Chinese attitude towards working or fulfilling one's duty is to withstand hardship without complaint, making one more prone to developing burnout (Lo et al., 2018). Similarly, higher rates of burnout have also been reported among healthcare workers in Africa which has been associated with less support or resources to management workloads (Levert et al., 2000; Dubale et al., 2019).

Although this review was conducted in line with the PRISMA guidelines (Liberati et al., 2009) to ensure methodological rigour, there are a number of limitations that warrant consideration. Firstly, non-English publications were excluded; and although the current review included a diverse range of populations from across the globe, the results may not reflect true global differences in burnout among non-English speaking countries. Secondly, many of the included studies involve small sample sizes and extensive variance in study quality which should be considered in light of the results. Thirdly, although there

are several tools used to assess burnout risk, only studies utilising the MBI were included due to analytical consistency. Furthermore, a number of studies were excluded from the meta-analyses due to variations in cut-points and scoring systems used. Additionally, physical therapists and occupational therapists were reasonably well represented within this review, yet few studies reported data on chiropractors and podiatrists. This may limit the ability to comment and draw conclusions specifically on these professions. Finally, the included studies were cross-sectional in nature, and longitudinal observations may be required to explore the impact of emotional exhaustion and depersonalisation on the development of reduced personal accomplishment in practitioners over a longer period of time.

Although beyond the scope of this review, the impact of COVID-19 on healthcare worker burnout is undeniable (Bradley & Chahar, 2020; Leo et al., 2021). Due to the timing of this review in relation to the pandemic, only four COVID-19-specific studies were included, limiting the ability to draw accurate conclusions on this issue. Further research may also explore factors contributing to the varying levels of burnout risk observed between different musculoskeletal allied health professions and geographical locations, which would facilitate the development of more targeted and effective burnout interventions. Intervention strategies for healthcare worker burnout can be organisation-directed or individual-directed, or a combination of the two (Awa et al., 2010). Such interventions have been shown to result in a range of positive outcomes among healthcare workers, including improving well-being, work engagement and quality of life, while reducing burnout, stress, anxiety and depression (Cohen et al., 2023). Although a recent systematic review suggests that organisational-level interventions may be more effective in targeting healthier workplaces (Cohen et al., 2023), from a feasibility perspective, they are more difficult to implement (Fox et al., 2022).The most commonly studied interventions targeting healthcare worker burnout have therefore been at the individual-level, including mindfulness, stress management, and small group discussions, which have all be shown to be effective approaches in reducing burnout (West et al., 2016). Organisational-directed measures involve system level changes, such as task restructuring or work evaluation and supervision which aim to decrease job demand or increase job control. In fact, burnout research among physical therapists demonstrated only one third were offered clinical supervision and support by their employer and the authors suggested that more support in the workplace and during training may prevent burnout development among this profession (Fischer et al., 2013).

In conclusion, this systematic review and meta-analysis has demonstrated that musculoskeletal allied health professionals frequently experience a risk of burnout related to emotional exhaustion and depersonalisation. However, feelings of lower personal accomplishment, which develop later in the burnout continuum, are observed in fewer practitioners. Differences in burnout risk prevalence and severity were also evident among professions and geographical locations, suggesting that tools aimed at addressing burnout should be tailored toward the practitioners' vocation and cultural position.

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References

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association*, *288*(16), 1987–1993.

Al-Imam, D. M., & Al-Sobayel, H. I. (2014). The prevalence and severity of burnout among physiotherapists in an arabian setting and the influence of organizational factors: An observational study. *Journal of Physical Therapy Science*, *26*(8), 1193–1198. https://doi.org/10.1589/jpts.26.1193.

Association of Schools Advocating Health Professions (ASAHP) (2015). https://www.asahp.org/what-is.

Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention programs. *Patient Education and Counseling*, *78*(2), 184–190.

Babiker, A., El Husseini, M., Al Nemri, A., Al Frayh, A., Al Juryyan, N., Faki, M. O., Assiri, A., Al Saadi, M., Shaikh, F., & Zamil, A., F (2014). Health care professional development: Working as a team to improve patient care. *Sudan Journal of Paediatrics*, *14*(2), 9–16.

Balogun, J. A., Titiloye, V., Balogun, A., Oyeyemi, A., & Katz, J. (2002). Prevalence and determinants of burnout among physical and occupational therapists. *Journal of Allied Health*, *31*(3), 131–139.

Bejer, A., Domka-Jopek, E., Probachta, M., Lenart-Domka, E., & Wojnar, J. (2019). Burnout syndrome in physiotherapists working in the Podkarpackie province in Poland. *Work (Reading, Mass.)*, *64*(4), 809–815. https://doi.org/10.3233/WOR-193042

Berry, J. W., & Hosford, C. C. (2015). A regional survey & analysis of burnout among physical therapists in frontier counties. *HPA Resource*, *15*(3), J1–J11.

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, *1*(2), 97–111. https://doi.org/10.1002/jrsm.12.

Bradley, M., & Chahar, P. (2020). Burnout of healthcare providers during COVID-19. *Cleveland Clinic Journal of Medicine*. https://doi.org/10.3949/ccjm.87a.ccc051.

Brollier, C., Bender, D., Cyranowski, J., & Velletri, C. M. (1987). OTR burnout: A comparison by clinical practice and direct service time. *Occupational Therapy in Mental Health*, *7*(1), 39–54.

Brown, C. A., & Pashniak, L. M. (2018). Psychological health and occupational therapists: Burnout, engagement and work addiction. *Work (Reading, Mass.)*, *60*(4), 513–525. https://doi.org/10.3233/WOR-182759.

Brown, G. T., & Pranger, T. (1992). Predictors of burnout for psychiatric occupational therapy personnel. *Canadian Journal of Occupational Therapy*, *59*(5), 258–267.

Bruce, M., de Witt, P. A., Botha, M., & Franzsen, D. (2022). Burnout in inexperienced South African occupational therapists during the COVID-19 pandemic lockdown. *Occupational Therapy in Mental Health*. https://doi.org/10.1080/0164212X.2022.2100557.

Bruschini, M., Carli, A., & Burla, F. (2018). Burnout and work-related stress in Italian rehabilitation professionals: A comparison of physiotherapists, speech therapists and occupational therapists. *Work (Reading, Mass.)*, *59*(1), 121–129. https://doi.org/10.3233/WOR-172657.

Cantu, R., Carter, L., & Elkins, J. (2021). Burnout and intent-to-leave in physical therapists: A preliminary analysis of factors under organizational control. *Physiotherapy Theory and Practice*, 1–10. https://doi.org/10.1080/09593985.2021.1967540.

Carmona-Barrientos, I., Gala-León, F. J., Lupiani-Giménez, M., Cruz-Barrientos, A., Lucena-Anton, D., & Moral-Munoz, J. A. (2020). Occupational stress and burnout among physiotherapists: A cross-sectional survey in Cadiz (Spain). *Human Resources for Health*, *18*(1). https://doi.org/10.1186/s12960-020-00537-0.

Corrado, B., Ciardi, G., Fortunato, L., & Servodio Iammarrone, C. (2019). Burnout syndrome among Italian physiotherapists: A cross-sectional study. *European Journal of Physiotherapy*, *21*(4), 240–245. https://doi.org/10.1080/21679169.2018.1536765.

Cropanzano, R., Anthony, E. L., Daniels, S. R., & Hall, A. V. (2017). Social exchange theory: A critical review with theoretical remedies. *Academy of Management Annals*, *11*(1), 479–516.

De Hert, S. (2020). Burnout in healthcare workers: Prevalence, impact and preventative strategies. *Local and Regional Anaesthesia*, *13*, 171–183. https://doi.org/10.2147/lra.S240564.

de Medeiros, A. I. C., de Mesquita, R. B., Macêdo, F. S., Matos, A. G. C., & Pereira, E. D. (2022). Prevalence of burnout among healthcare workers in six public referral hospitals in northeastern Brazil during the COVID-19 pandemic: A cross-sectional study. *Sao Paulo Medical Journal*, *140*(4), 553–558. https://doi.org/10.1590/1516-3180.2021.0287.R1.291021.

Donohoe, E., Nawawi, A., Wilker, L., Schindler, T., & Jette, D. U. (1993). Factors associated with burnout of physical therapists in Massachusetts rehabilitation hospitals. *Physical Therapy*, *73*(11), 750–761. https://doi.org/10.1093/ptj/73.11.750.

Dubale, B. W., Friedman, L. E., Chemali, Z., et al. (2019). Systematic review of burnout among healthcare providers in sub-saharan Africa. *Bmc Public Health*, *19*, 1247. https://doi.org/10.1186/s12889-019-7566-7.

Edú-Valsania, S., Laguía, A., & Moriano, J. A. (2022). Burnout: A review of theory and measurement. *International Journal of Environmental Research and Public Health*, *19*(3), 1780. https://doi.org/10.3390/ijerph19031780.

Elbarazi, I., Loney, T., Yousef, S., & Elias, A. (2017). Prevalence of and factors associated with burnout among health care professionals in arab countries: A systematic review. *BMC Health Services Research*, *17*(1), 491. https://doi.org/10.1186/s12913-017-2319-8.

Escudero-Escudero, A. C., Segura-Fragoso, A., & Cantero-Garlito, P. A. (2020). Burnout syndrome in occupational therapists in Spain: Prevalence and risk factors. *International Journal of Environmental Research and Public Health*, *17*(9). https://doi.org/10.3390/ijerph17093164.

Ferguson, J. J., Fritsch, A., Rentmeester, C., Clewley, D., & Young, J. L. (2023). Feeling exhausted: How outpatient physical therapists perceive and manage job stressors. *Musculoskeletal Care*. https://doi.org/10.1002/msc.1761.

Fila, M., & Wilson, M. (2018). Understanding cross-cultural differences in the work stress process: A review and theoretical model. *IGI GLoabl*. https://doi.org/10.4018/978-1-5225-3776-2.ch011.

Filho, F., Rodrigues, M., & Cimiotti, J. (2019). Burnout in Brazilian intensive care units: A comparison of nurses and nurse technicians. *Advances in Critical Care*, *30*, 16–21.

Fischer, M., Mitsche, M., Endler, P. C., Mesenholl-Strehler, E., Lothaller, H., & Roth, R. (2013). Burnout in physiotherapists: Use of clinical supervision and desire for emotional closeness or distance to clients. *International Journal of Therapy and Rehabilitation*, *20*(11), 550–558. https://doi.org/10.12968/ijtr.2013.20.11.550.

Fish, J. A., Sharplin, G., Wang, L., An, Y., Fan, X., & Eckert, M. (2022). Cross-cultural differences in nurse burnout and the relationship with patient safety: An East-West comparative study. *Journal of Advanced Nursing*, *78*(4), 1001–1011. https://doi.org/10.1111/jan.15024.

Fox, K. E., Johnson, S. T., Berkman, L. F., et al. (2022). Organisational- and group-level workplace interventions and their effect on multiple domains of worker wellbeing: A systematic review. *Work & Stress*, *36*, 30–59.

Freudenberger, H. J. (1975). The staff burnout syndrome in alternative institutions. *Psychotherapy: Theory Research and Practice*, *12*, 73–82.

Gibb, J., Cameron, I. M., Hamilton, R., Murohey, E., & Naji, S. (2010). Mental health nurses' and allied health professionals' perceptions of the role of the Occupational Health Service in the management of work-related stress: How do they self-care? *Psychiatric and Mental Health Nursing*, *17*(9), 838–845. https://doi.org/10.1111/j.1365-2850.2010.01599.x.

Golembiewski, R. T., Munzenrider, R., & Carter, D. (1983). Phases of progressive burnout and their work site covariants: Critical issues in OD research and praxis. *Journal of Applied Behavioural Sciences*, *19*(4), 461–481. https://doi.org/10.1177/002188638301900408.

Grande-Alonso, M., Castillo-Alcaniz, B., Paraiso-Iglesias, P., Cuenca-Martinez, F., La Touche, R., & Vidal-Quevedo, C. (2023). Comparative analysis of the burnout syndrome index between contract and freelance physiotherapists: An observational study. *Work (Reading, Mass.)*. https://doi.org/10.3233/WOR-220238.

Gupta, S., Paterson, M. L., Lysaght, R. M., & von Zweck, C. M. (2012). Experiences of burnout and coping strategies utilized by occupational therapists. *Canadian Journal of Occupational Therapy*, *79*(2), 86–95. https://doi.org/10.2182/cjot.2012.79.2.4.

Han, S., Shanafelt, T. D., Sinsky, C. A., Awad, K. M., Dyrbye, L. N., Fiscus, L. C., Trockel, M., & Goh, J. (2019). Estimating the attributable cost of physician burnout in the United States. *Annals of Internal Medicine*, *170*(11), 784–790. https://doi.org/10.7326/M18-1422.

Higgins, J. P., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. A. (2019). *Cochrane handbook for systematic reviews of interventions*. Wiley.

Hsu, H. C. (2018). Age differences in work stress, exhaustion, well-being, and related factors from an ecological perspective. *International Journal of Environmental Research and Public Health*, *16*(1). https://doi.org/10.3390/ijerph16010050.

Jahrami, H. (2009). A survey of burnout of the mental health occupational therapy staff in the Psychiatric Hospital, Bahrain. *British Journal of Occupational Therapy*, *72*(10), 458–464. https://doi.org/10.1177/030802260907201008.

Janus, E., Gawalkiewicz, P., & Bac, A. (2018). Professional burnout in occupational therapists. *Advances in Rehabilitation*, *32*(2), 49–56. https://doi.org/10.5114/AREH.2018.77937.

Johnson, N., & Phillips, M. (2018). Rayyan for systematic reviews. *Journal of Electronic Resources Librarianship*, *30*(1), 46–48. https://doi.org/10.1080/1941126X.2018.1444339.

Juy, R., Nieto, A., Contador, I., Ramos, F., & Fernandez-Calvo, B. (2022). Psychosocial factors associated with burnout and self-perceived health in Spanish occupational therapists. *International Journal of Environmental Research and Public Health*, *20*(1). https://doi.org/10.3390/ijerph20010044.

Kim, J. H., Kim, A. R., Kim, M. G., Kim, C. H., Lee, K. H., Park, D., & Hwang, J. M. (2020). Burnout syndrome and work-related stress in physical and occupational therapists working in different types of hospitals: Which group is the most vulnerable? *International Journal of Environmental Research and Public Health*, *17*(14), 1–18. https://doi.org/10.3390/ijerph17145001. Article 5001.

Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, *19*(3), 192–207. https://doi.org/10.1080/02678370500297720.

Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, *81*(2), 123.

Lee, S. J., Jung, S. I., Kim, M. G., Park, E., Kim, A. R., Kim, C. H., Hwang, J. M., & Jung, T. D. (2021). The influencing factors of gender differences on mental burdens in young physiotherapists and occupational therapist. *International Journal of Environmental Research and Public Health*, *18*(6), 1–13. https://doi.org/10.3390/ijerph18062858.

Leiter, M. P., & Maslach, C. (2009). Nurse turnover: The mediating role of burnout. *Journal of Nursing Management*, *17*(3), 331–339.

Leo, C. G., Sabina, S., Tumolo, M. R., Bodini, A., Ponzini, G., Sabato, E., & Mincarone, P. (2021). Burnout among healthcare workers in the COVID 19 era: A review of the existing literature. *Frontiers in Public Health*, *9*, 750529. https://doi.org/10.3389/fpubh.2021.750529.

Levert, T., Lucas, M., & Ortlepp, K. (200). Burnout in psychiatric nurses: Contributions of the work environment and a sense of coherence. *South African Journal of Psychology*, *30*(2), 36–43.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: Explanation and elaboration. *British Medical Journal*, 339. https://doi.org/10.1136/bmj.b2700.

Lloyd, C., & King, R. (2004). A survey of burnout among Australian mental health occupational therapists and social workers. *Social Psychiatry and Psychiatric Epidemiology*, *39*(9), 752–757. https://doi.org/10.1007/s00127-004-0808-7.

Lo, D., Wu, F., Chan, M., et al. (2018). A systematic review of burnout among doctors in China: A cultural perspective. *Asia Pac Fam Med*, *17*, 3. https://doi.org/10.1186/s12930-018-0040-3.

Mandy, A., & Tinley, P. (2004). Burnout and occupational stress: Comparison between United Kingdom and Australian podiatrists. *Journal of the American Podiatric Medical Association*, *94*(3), 282–291. https://doi.org/10.7547/0940282.

Manzano-García, G., & Ayala-Calvo, J. C. (2013). New perspectives: Towards an integration of the concept burnout and its explanatory models. *Anales De Psicologia*, *29*, 800–809. https://doi.org/10.6018/ANALESPS.29.3.145241.

Marques-Pinto, A., Moreira, S., Costa-Lopes, R., Zózimo, N., & Vala, J. (2021). Predictors of burnout among physicians: Evidence from a national study in Portugal. *Frontiers in Psychology*, 12. https://doi.org/10.3389/fpsyg.2021.699974.

Martinussen, M., Borgen, P. C., Richardsen, A. M., Mandy, A., Pavlakis, A., Raftopoulos, V., & Cossman, L. (2011). Burnout and engagement among physiotherapists. *International Journal of Therapy & Rehabilitation*, *18*(2), 80–89. https://doi.org/10.12968/ijtr.2011.18.2.80.

Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behaviour*, *2*(2). https://doi.org/10.1002/job.4030020205.

Maslach, C., Jackson, S., & Leiter, M. (1997). The Maslach Burnout Inventory Manual. In (Vol. 3, pp. 191–218).

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job Burnout. *Annual Review of Psychology*, *52*, 397–422. https://doi.org/10.1146/annurev.psych.52.1.397.

McKinley, N., McCain, R. S., Convie, L., Clarke, M., Dempster, M., Campbell, W. J., & Kirk, S. J. (2020). Resilience, burnout and coping mechanisms in UK doctors: A cross-sectional study. *British Medical Journal Open*, *10*(1), e031765. https://doi.org/10.1136/bmjopen-2019-031765.

Morisawa, F., Nishizaki, Y., Irie, Y., Nojiri, S., Matsuo, T., Kobayashi, D., Daida, H., Minamino, T., & Takahashi, T. (2022). Association between physiotherapist burnout and working environment during the coronavirus disease 2019 pandemic in Japan: A multicenter observational study. *PloS One*. https://doi.org/10.1371/journal.pone.0275415. 17(9 September), Article e0275415.

Narayanan, L., Menon, S., & Spector, P. (1999). A cross-cultural comparison of job stressors and reactions among employees holding comparable jobs in two countries. *International Journal of Stress Management*, *6*(3), 197–212. https://doi.org/10.1023/A:1021986709317.

National Center for O*NET Development. O*NET OnLine. Retrieved October 12 (2023). from https://www.onetonline.org/.

National Heart Lung and Blood Institute (2021). Study Quality Assessment Tools. https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools.

National Academies of Sciences Engineering and Medicine. (2019). Taking action against clinician burnout: A systems approach to professional well-being. *The National Academies Press*. https://doi.org/10.17226/25521.

Paans, W., Wijkamp, I., Wiltens, E., & Wolfensberger, M. V. (2013). What constitutes an excellent allied health care professional? A multidisciplinary focus group study. *Journal of Multidisciplinary Healthcare*, *6*, 347–356. https://doi.org/10.2147/jmdh.S46784.

Painter, J., Akroyd, D., Elliot, S., & Adams, R. D. (2003). Burnout among occupational therapists. *Occupational Therapy in Health Care*, *17*(1), 63–78. https://doi.org/10.1300/J003v17n01_06.

Paris, M., & Hoge, M. A. (2010). Burnout in the mental health workforce: A review. *The Journal of Behavioral Health Services & Research*, *37*, 519–528.

Pavlakis, A., Raftopoulos, V., & Theodorou, M. (2010). Burnout syndrome in Cypriot physiotherapists: A national survey. *BMC Health Services Research*, *10*, 63–63. https://doi.org/10.1186/1472-6963-10-63.

Peterson, U., Demerouti, E., Bergström, G., Samuelsson, M., Åsberg, M., & Nygren, Å. (2008). Burnout and physical and mental health among Swedish healthcare workers. *Journal of Advanced Nursing*, *62*(1), 84–95. https://doi.org/10.1111/j.1365-2648.2007.04580.x.

Piedmont, R. L. (1993). A longitudinal analysis of burnout in the health care setting: The role of personal dispositions. *Journal of Personality Assessment*, *61*(3), 457–473. https://doi.org/10.1207/s15327752jpa6103_3.

Pniak, B., Leszczak, J., Adamczyk, M., Rusek, W., Matosz, P., & Guzik, A. (2021). Occupational burnout among active physiotherapists working in clinical hospitals during the COVID-19 pandemic in southeastern Poland. *Work (Reading, Mass.)*, *68*(2), 285–295. https://doi.org/10.3233/WOR-203375.

Pranger, T. (1993). Burnout: An issue for psychiatric occupational therapy personnel? *Occupational Therapy in Mental Health*, *12*(1), 77–92. https://doi.org/10.1300/J004v12n01_06.

Pustułka-Piwnik, U., Ryn, Z. J., Krzywoszański, Ł., & Stożek, J. (2014). Burnout syndrome in physical therapists– demographic and organizational factors. *Medycyna Pracy*, *65*(4), 453–462. https://doi.org/10.13075/mp.5893.00038.

Ramesh, M., & Wu, X. (2008). Realigning public and private health care in Southeast Asia. *The Pacific Review*, *21*(2), 171–187.

Reyes, R. C. D. (2018). Burnout among Filipino occupational therapists: A mixed methods analysis. *Open Journal of Occupational Therapy (OJOT)*, *6*(4), 1–13. https://doi.org/10.15453/2168-6408.1469.

Rodríguez-Nogueira, Ó., Leirós-Rodríguez, R., Pinto-Carral, A., Álvarez-Álvarez, M. J., Morera-Balaguer, J., & Moreno-Poyato, A. R. (2021). Examining the association between evidence-based practice and burnout among Spanish physical therapists: A cross-sectional study. *Journal of Personalized Medicine*, *11*(8). https://doi.org/10.3390/jpm11080805. Article 805.

Rodríguez-Nogueira, Ó., Leirós-Rodríguez, R., Pinto-Carral, A., Álvarez-Álvarez, M. J., Fernández-Martínez, E., & Moreno-Poyato, A. R. (2022a). The relationship between burnout and empathy in physiotherapists: A cross-sectional study. *Annals of Medicine*, *54*(1), 933–940. https://doi.org/10.1080/07853890.2022.2059102.

Rodríguez-Nogueira, Ó., Leirós-Rodríguez, R., Pinto-Carral, A., Álvarez-Álvarez, M. J., Morera-Balaguer, J., & Moreno-Poyato, A. R. (2022b). Relationship between competency for evidence-based practice and level of burnout of physical therapists with the establishment of the therapeutic relationship. *Physiotherapy Theory and Practice*. https://doi.org/10.1080/09593985.2022.2112638.

Rogers, J. C., & Dodson, S. C. (1988). Burnout in occupational therapists. *The American Journal of Occupational Therapy*, *42*(12), 787–792. https://doi.org/10.5014/ajot.42.12.787.

Rotenstein, L. S., Torre, M., Ramos, M. A., Guille, C., Sen, S., & Meta, D. A. (2018). Prevalence of burnout among physicians. *Journal of the American Medical Associaiton*, *320*(11), 1131–1150. https://doi.org/10.1001/jama.2018.12777.

Roundy, P. E., Stearns, Z. R., Willis, M. W., Blevins, J. J., Linton, T. A., Medlin, T. R., Winger, J. G., Dorfman, C. S., & Shelby, R. A. (2023). Relationships between burnout and resilience: Experiences of physical therapists and occupational therapists during the covid-19 pandemic. *Physical Therapy & Rehabilitation Journal*, *103*(5), 1–10. https://doi.org/10.1093/ptj/pzad022.

Rubin, B., Goldfarb, R., Satele, D., & Graham, L. (2021). Burnout and distress among allied health care professionals in a cardiovascular centre of a quaternary hospital network: A cross-sectional survey. *Canadian Medical Association Journal Open*, *9*(1), E29–E37. https://doi.org/10.9778/cmajo.20200059.

Sadeghi, Y., Hatamizadeh, N., Shahshahani, S., & Hosseinzadeh, S. (2023). Goal attainment scale (gas) administration workshop and its effects on job motivation and burnout of pediatric occupational therapists. *Iranian Rehabilitation Journal*, *21*(1), 49–56. https://doi.org/10.32598/irj.21.1.417.2.

Saura, A., Valóta, I., Silva, R. M. D., & Calache, A. (2022). Factors associated with burnout in a multidisciplinary team of an oncology hospital. *Revista Da Escola De Enfermagem Da USP*, *56*(spe), e20210448. https://doi.org/10.1590/1980-220X-REEUSP-2021-0448en.

Schaufeli, W. B. (2006). The balance of give and take: Toward a social exchange model of burnout. *Revue Internationale De Psychologie Sociale*, *19*(1), 75–119.

Schaufeli, W. B., & Greenglass, E. R. (2001). Introduction to special issue on burnout and health. *Psychology & Health*, *16*(5), 501–510. https://doi.org/10.1080/08870440108405523.

Schaufeli, W. B., Maassen, G. H., Bakker, A. B., & Sixma, H. J. (2011). Stability and change in burnout: A 10-year follow-up study among primary care physicians. *J Occup Organ Psychol*, *84*, 248–267. https://doi.org/10.1111/j.2044-8325.2010.02013.x.

Schlenz, K. C., Guthrie, M. R., & Dudgeon, B. (1995). Burnout in occupational therapists and physical therapists working in head injury rehabilitation. *American Journal of Occupational Therapy*, *49*(10), 986–993.

Scutter, S., & Goold, M. (1995). Burnout in recently qualified physiotherapists in South Australia. *Australian Journal of Physiotherapy*, *41*(2), 115–118.

Sheikh, K., Josyula, L. K., Zhang, X., Bigdeli, M., & Ahmed, S. M. (2017). Governing the mixed health workforce: Learning from Asian experiences. *BMJ Global Health*, 2(2), e000267.

Shi, Y., Gugiu, P. C., Crowe, R. P., & Way, D. P. (2019). A Rasch analysis validation of the Maslach Burnout inventory– student survey with preclinical medical students. *Teaching and Learning in Medicine*, *31*(2), 154–169. https://doi.org/10.1080/10401334.2018.1523010.

Shin, J., McCarthy, M., Schmidt, C., Zellner, J., Ellerman, K., & Britton, M. (2022). Prevalence and predictors of burnout among occupational therapy practitioners in the United States. *The American Journal of Occupational Therapy*, *76*(4). https://doi.org/10.5014/ajot.2022.048108.

Struwig, N., & van Stormbroek, K. (2023). Support, supervision, and job satisfaction: Promising directions for preventing burnout in South African community service occupational therapists. *South African Journal of Occupational Therapy*, *53*(1), 67–80. https://doi.org/10.17159/2310-3833/2023/vol53n1a8.

Sturgess, J., & Poulsen, A. (1983). The prevalence of burnout in occupational therapists. *Occupational Therapy in Mental Health*, *3*(4), 47–60.

Szwamel, K., Kaczorowska, A., Lepsy, E., Mroczek, A., Golachowska, M., Mazur, E., & Panczyk, M. (2022). Predictors of the occupational burnout of healthcare workers in Poland during the COVID-19 pandemic: A cross-sectional study. *International Journal of Environmental Research and Public Health*, *19*(6). https://doi.org/10.3390/ijerph19063634.

Tan, B. (2004). Irrational beliefs and job stress among occupational therapists in Singapore. *British Journal of Occupational Therapy*, *67*(7), 303–309. https://doi.org/10.1177/030802260406700704.

Teo, Y. H., Xu, J. T. K., Ho, C., Leong, J. M., Tan, B. K. J., Tan, E. K. H., Goh, W. A., Neo, E., Chua, J. Y. J., Ng, S. J. Y., Cheong, J. J. Y., Hwang, J. Y. F., Lim, S. M., Soo, T., Sng, J. G. K., & Yi, S. (2021). Factors associated with self-reported burnout level in allied healthcare professionals in a tertiary hospital in Singapore. *PloS One*, *16*(1). https://doi.org/10.1371/journal.pone.0244338.

Toellner, A., Balbadhur, R., Singapi, N., & van der Reyden, D. (2007). Burnout amongst occupational therapists in the Durban Metropolitan area. *South African Journal of Occupational Therapy*, *37*(2), 12–15.

Tragea, P., Damigos, D., Mavreas, V., & Gouva, M. (2012). Burn out among Greek physical therapists. *Interscientific Health Care*, *4*(2), 77–82.

Wandling, B. J., & Smith, B. S. (1997). Burnout in orthopaedic physical therapists [Article]. *Journal of Orthopaedic and Sports Physical Therapy*, *26*(3), 124–130. https://doi.org/10.2519/jospt.1997.26.3.124.

Welp, A., Meier, L. L., & Manser, T. (2015). Emotional exhaustion and workload predict clinician-rated and objective patient safety. *Frontiers in Psychology*, *5*, 1573. https://doi.org/10.3389/fpsyg.2014.01573.

West, C. P., Dyrbye, L. N., Erwin, P. J., & Shanafelt, T. D. (2016). Interventions to prevent and reduce physician burnout: A systematic review and meta-analysis. *The Lancet*, *388*(10057), 2272–2281.

Williams, S. P., & Zipp, G. P. (2014). Prevalence and associated risk factors of burnout among US doctors of Chiropractic. *Journal of Manipulative & Physiological Therapeutics*, *37*(3), 180–189. https://doi.org/10.1016/j.jmpt.2013.12.008.

Williams, S., Zipp, G. P., Cahill, T., & Parasher, R. K. (2013). Prevalence of burnout among doctors of Chiropractic in the northeastern United States. *Journal of Manipulative & Physiological Therapeutics*, *36*(6), 376–384. https://doi.org/10.1016/j.jmpt.2013.05.025.

Woo, T., Ho, R., Tang, A., & Tam, W. (2020). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, *123*, 9–20. https://doi.org/10.1016/j.jpsychires.2019.12.015.

World Health Organization (2019). Burn-out an occupational phenomenon: International Classification of Diseases. https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases.

World Health Organization. (2018). *The Decade for Health Workforce strengthening in the SEA region 2015–2024: Second review of progress, challenges, capacities and opportunities (no. SEA/RC71/9)*. World Health Organization. Regional Office for South-East Asia.).

Yousaf, M. A., Akram, S., Afzal, R., Abbas, A., Anwar, N., & Ahmad, A. (2021). Comparison of burnout syndrome among public and private sector physiotherapists. *Medical Forum Monthly*, *32*(8), 128–132.

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