

Review Article

Burnout among Military Personnel: A systematic Review

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Abstract

Objective: Burnout is a psychological symptom characterized by emotional exhaustion, depersonalization, and lack of personal accomplishment. Several systematic reviews have examined the prevalence of burnout in some communities, including the communities of physicians, nurses, students, and teachers. Risk factors, consequences of burnout, and related interventions have also been evaluated in several systematic review studies. The purpose of this systematic review was to investigate the prevalence, risk factors, consequences, and interventions associated with burnout among military personnel in all types of studies.

Method: Studies that quantitatively examined burnout in military personnel after 2000 were identified through systematic searches in PubMed, Scopus, Web of Knowledge, Embase, PsychInfo, and PsycArticles databases.

Results: A total of 43 studies met the criteria for inclusion in this systematic review. Of these, 34 were cross-sectional, 7 were longitudinal, 1 was case-control and 1 was experimental. Half of the studies had more than 350 samples. The studies were from 17 different countries, among which the United States had the largest number with 17 studies. 33 studies were measured with one version of Maslach Burnout Inventory (MBI). Totally, only 10 studies reported a prevalence of burnout and/or its subscales. The prevalence of high emotional exhaustion ranged from 0% to 49.7% (median 19%), the prevalence of high depersonalization ranged from 0% to 59.6% (median 14%) and the prevalence of low personal accomplishment ranged from 0% to 60% (median 6.4%). In this systematic review, work environment factors (such as workload, shift work), psychological factors (anxiety, depression, stress), and duration and quality of sleep were shown as risk factors of burnout or its subscales. Also, psychological distress was observed as the consequence of burnout in more than one study.

Conclusion: The studies investigated in this systematic review showed a relatively moderate prevalence of burnout. In fact, burnout was associated with work environment factors and psychological variables.

Key words: *Burnout; Military Personnel; Systematic Review*

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Article Information:

Received Date: 2022/05/06, Revised Date: 2022/07/30, Accepted Date: 2022/11/01



Burnout is a psychological syndrome that results from a persistent response to chronic interpersonal stressors at work (1). This syndrome is a consequence of constant and frequent job stress and is defined as lack of energy and vitality, such that the individual feels bored with his job. In other words, the person feels pressure due to internal and external factors in his work environment, and this pressure eventually turns into a feeling of burnout (2). Stress in the workplace may result from environmental and physical factors such as noise, work overload, and poor lighting; human factors such as conflicts with other people; and organizational factors such as workload and poor policy. If the individuals are not able to cope with such conditions, they will suffer from various physical, psychological and behavioral complications. Prolonged stress may lead to reduced job satisfaction and burnout, resulting in boredom, indifference, reduced effectiveness, fatigue, failure, and even discouragement. Burnout is associated with not only the individuals' mental health, but also their productivity (3). It is a psychological symptom including emotional fatigue (i.e., the presence of emotions in which the person has lost his emotional power and is unable to communicate with clients), depersonalization (violent and emotionless behaviors towards colleagues and clients, accompanied by a negative attitude towards them and perceiving people as inhuman objects), and low personal accomplishment (which is the personal performance of the people who have a negative perception of their job efforts and feel that they have not progressed in their job). Numerous questionnaires have so far been employed to assess burnout. One of the most widely used questionnaires in this field is Maslach Burnout Inventory (MBI), which has been widely re-evaluated and standardized for different populations (4, 5).

Burnout is one of the factors that endanger the performance of the employees and workers (6). The physical, psychological, and workplace consequences of burnout have been evaluated in a systematic review study (7). Numerous systematic reviews have investigated the predictive impact of psychological factors and work environment on burnout (8-11). On the other hand, a few systematic reviews have been conducted on intervention studies relevant to burnout (12, 13). Burnout has also been studied in various communities such as communities of health care providers (14-17), teachers (18), students (19, 20), etc. To the best of our knowledge, however, no quantitative systematic review has so far examined burnout among military personnel. The purpose of this systematic review is to evaluate and summarize the findings related to burnout (prevalence, mean, risk factors, consequences, and interventions) among military personnel in all types of studies. This systematic review intends to provide decision makers with evidence needed for reducing the burden of burnout on military personnel.

Materials and Methods

This systematic review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (21).

Inclusion and exclusion criteria

The current systematic review examined burnout among military personnel. All studies published in English from January 1, 2000 to September 30, 2020, which covered the analysis of a quantitative measure of burnout in military personnel, were included in this review. Therefore, the terms to be investigated in this study were burnout and military personnel. Military personnel were the employees working for the Army, the Navy, the Marine Corps, the Air Force, and the Coast Guard. Consequently, studies on civilians were excluded. Of course, studies that explicitly examined military personnel in a subgroup were also added to the study. Military police officers were also excluded from the study because they are identified under this title only in some countries, serving the same duties in other countries under the general title of police force. Moreover, military medical staffs (doctors, nurses and all health workers) as well as military firefighters were excluded from the study due to their different job descriptions as compared to other military personnel. The primary outcome of this study was burnout. Secondary outcomes of the study were the subscales of burnout (such as emotional exhaustion, depersonalization, and low personal accomplishment). All quantitative studies (including cross-sectional studies, case-control studies, cohort studies, interventional studies, etc.) were included in the systematic review. Review and systematic reviews, qualitative studies, case studies, studies with no quantitative findings, and studies published in languages other than English were excluded.

Information sources and the search strategy

In this study, PubMed, Scopus, Web of Knowledge, Embase, PsychInfo and PsycArticles were systematically searched for the data. Also, all the references of the entering studies were systematically reviewed manually (hand searching). To search the databases, the MeSH terms for "Burnout, Professional" or "Burnout, psychological" or "Compassion Fatigue" were combined with the MeSH term for "Military Personnel". The three authors of this study agreed upon the search strategy.

Study selection

In the identification stage, the records were obtained based on database searches and entered into the EndNote software. Duplicate records were removed from the review. In the screening stage, the titles and abstracts of the studies obtained from the databases were examined based on the inclusion and exclusion criteria. At this stage, studies that were irrelevant in terms of topic (burnout) and the target population (military personnel) were excluded based on their titles and abstracts. Also,

qualitative studies, case studies and review studies, as reflected so in their titles and abstracts, were excluded from the review. In the eligibility stage, two of the authors (SH and SMH) independently selected eligible studies based on the full texts. Contradictions between the two researchers were resolved with the concurrence of all authors. At this stage, the included records were examined and the studies that met the inclusion and exclusion criteria were added to the included records.

Data extraction

The two authors (SH and SMH) independently extracted the data from the included records. Contradictions were resolved with the concurrence of all authors. The following data were extracted for each record: the first author, the year of publication, the country, the type of study, the burnout measurement tool, the study population, the sample size, the sample characteristics (age and sex), the frequency (and percentage) and/or the mean (and standard deviation) of burnout and its subscales, and the main findings of the study. Moreover, the effect size (e.g., risk ratio, odds ratio, etc.), the effect size confidence interval, and the p-values were extracted if available.

Quality assessment

The methodological quality of the studies was assessed by Newcastle-Ottawa Scale (NOS) in cross-sectional, case-control and cohort studies and by the Cochrane Risk of Bias

Tool (CRBT) in clinical trial studies. NOS has 8 items (9 scores) in case-control and cohort studies and 7 items (8 scores) in cross-sectional studies. In case-control and cohort studies, scores 8 to 9, 6 to 7, 4 to 5, and 0 to 3 indicate very good, good, satisfactory and unsatisfactory studies, respectively. In cross-sectional studies, a score of 7 to 8 indicates a very good study, a score of 5 to 6 indicates a good study, a score of 4 indicates a satisfactory study, and a score of 0 to 3 indicates an unsatisfactory study. The two authors (SH and SMH) independently evaluated the methodological quality of the included studies. Disagreements were resolved with the consent of all authors.

Data synthesis

After extracting the data, the qualitative analysis of the results was conducted as follows. In order to integrate the studies in the best possible way, the extracted findings were considered in two main parts: the descriptive characteristics on burnout and the relationships between burnout and other variables. Regarding the descriptive characteristics on burnout, the results were integrated in two parts: the prevalence of burnout and its subscales, and the mean of burnout and its subscales. As for the relationships between burnout and other variables, the results were integrated based on the type of study (cross-sectional, longitudinal, case-control, experimental), type of data analysis (univariate analysis, multivariate analysis, structural equation modeling (SEM) analysis) and type of variable (predictor or outcome). The formal meta-analysis was

not performed due to the lack of consistency in the outcome and predictor variables, as well as the heterogeneity in their assessment and analytical approaches.

Results

Study characteristics

Based on the initial search of databases, 6083 studies were identified. Among them, the number of studies identified in Scopus, Web of Science, Embase, PubMed, Psycinfo and PsychArticle databases were 2985, 985, 850, 719, 488 and 56, respectively. Moreover, 2272 duplicated studies were eliminated, leaving 3811 studies for the screening stage (study selection based on title and abstract). At the screening stage, 3358 studies were excluded due to having no relevance to the subject of this systematic review or not meeting the study criteria, and 453 studies entered the eligibility stage. After reading the full text of the studies that entered the eligibility stage, studies that were not relevant to our systematic review, studies that were unrelated to the target population, books, review studies, qualitative studies, studies in languages other than English, and case studies were excluded. Accordingly, 417 studies were excluded in the eligibility stage and 36 studies were included in this systematic review. In the final stage, the references of the included studies were reviewed based on the inclusion and exclusion criteria and seven other studies (two articles, one conference paper, and four technical reports) were added to our systematic review. Finally, 43 studies (including 37 articles, one conference paper, and five technical reports) were considered in this systematic review (Figure 1). Among them, 34 were cross-sectional studies, seven were longitudinal studies, one was a case-control study, and one was an experimental study. A total of 35,991 people were surveyed in this systematic review. The minimum and maximum sample sizes in the initial studies were 20 and 6138, respectively. Also, half of the studies had more than 350 samples (Median, 354; Interquartile Range (IQR), 845). The studies had initially been conducted in the United States (with 19 studies); the Netherlands and Portugal (with three studies each); Iran, China, Israel, Serbia (with two studies each); and Belgium, Brazil, Cameroon, Canada, Egypt, Italy, Nigeria, Slovenia, Spain and the United Kingdom (with one study each). In the 21 studies that determined the mean age of participants, the smallest mean was 21.4 and the largest mean was 39.5. Also, the mean age of participants in half of the studies was greater than 30.4 (median, 30.4; IQR, 11.05). Of the 35 studies that identified sex distribution of the participants, four studies were conducted on men only, one study was conducted on women only, and most studies (30 studies) included both men and women. However, in half of the studies, more than 84% of the participants were male (median, 84.7; IQR, 21.5).

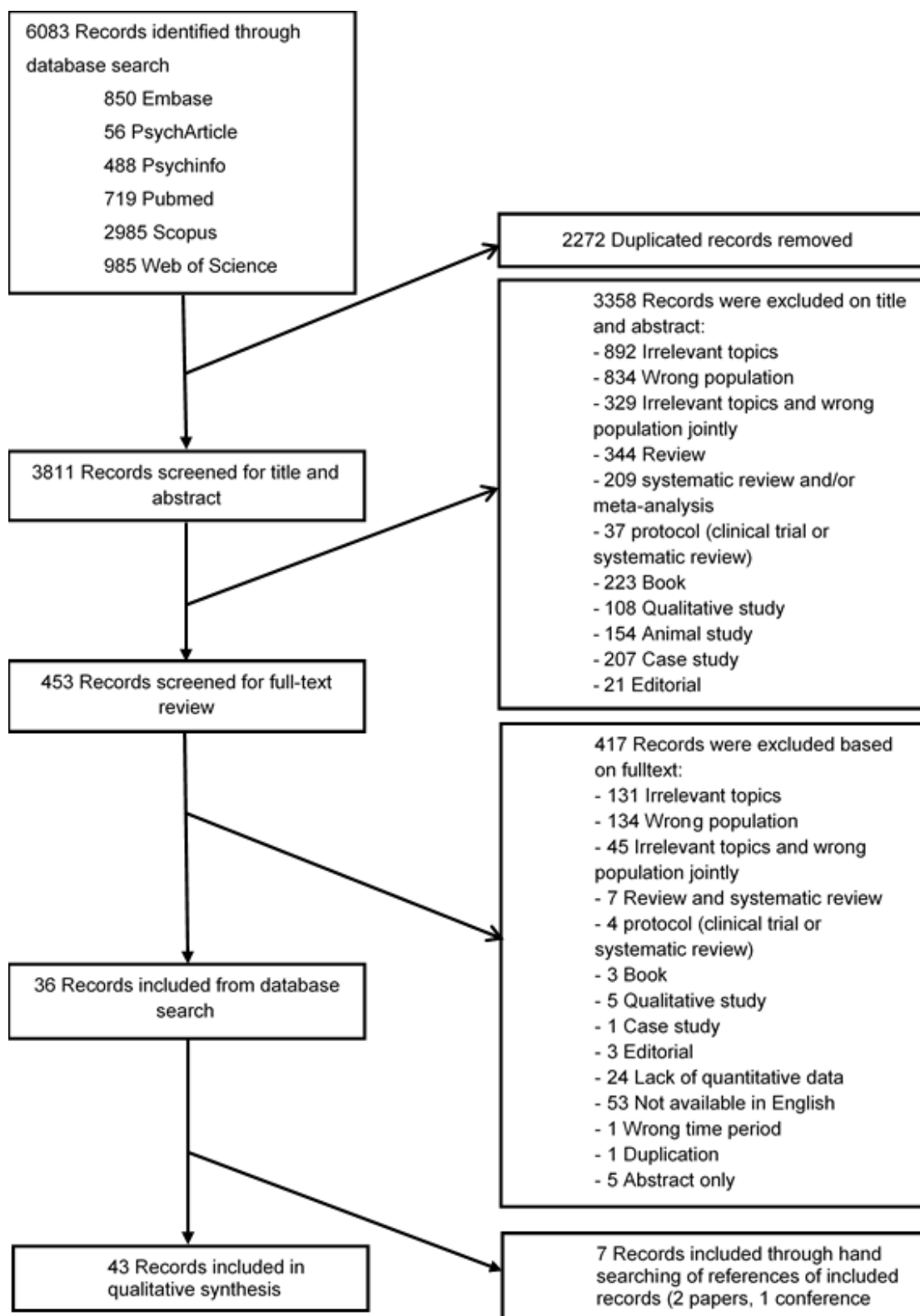


Figure 1. Flowchart of Systematic Literature Review

Quality assessment

The NOS quality assessment tool for evaluating cross-sectional, cohort and case-control studies has three sections including selection, comparability and outcome.

Out of 34 cross-sectional studies, only 44.1% of the samples were real representatives of the target population. Only 47.1% of the studies had a justified and satisfactory sample size. Only 17.6% of the studies

compared respondents and non-respondents. However, all the 34 studies measured independent variables using a validated or well-described tool. In the selection section (range: 0 to 4), half of the studies had a score of 2 or less. Only 58.8% out of the 34 cross-sectional studies controlled for confounding factors. Most cross-sectional studies (97.1%) measured response variables with valid tools and 70.6% of the studies used appropriate statistical analyses. In the outcome section (range: 0 to 2), 67.6% of the studies obtained a score of 2. The mean score of quality assessment in cross-sectional studies (range: 0 to 8) was equal to 4.94 and half of the studies scored 5 or more (mean = 4.94; standard deviation = 1.6; median = 5; IQR = 2). In these studies, seven (20.6%) were considered unsatisfactory, five (14.7%) were satisfactory, 14 (41.2%) were good, and eight (23.5%) were evaluated as very good. Out of the seven longitudinal studies, the exposure groups in only two of them were real representatives of the population. In all the seven studies, samples of non-exposure groups were taken from the same population as the exposure group. In all the seven studies, independent variables were measured with valid instruments. In six studies, the desired outcome was also measured at the beginning of the study. In the selection section (range, 0 to 4), six studies scored 3 or 4. All the seven longitudinal studies controlled for confounding factors. Also, all the seven studies measured the response variable with valid instruments. In five studies, the follow-up period was long enough for the response variable to occur. Also, in only two studies, the number of people who were lost to follow up was high or no explanation was provided about the percentage of lost to follow-up people. In the outcome section (range, 0 to 3), one study received a score of 1, two studies received a score of 2, and four studies received a score of 3. The mean score of quality assessment in longitudinal studies (range, 0 to 9) was equal to 7.29, and half of the studies obtained a score of 7 or more (mean = 7.29; standard deviation = 1.7; median = 7; IQR = 2). In these studies, one study was satisfactory, two were good, and three were evaluated as very good. Details of the quality assessment of studies are provided in table 1.

Instruments used to measure burnout

Out of 43 studies, 33 studies (76.7%) used one of the versions of MBI. Of these 33 studies, 19 studies used MBI-General Survey (MBI-GS) or its adapted versions, nine studies used MBI-Human Services Survey (MBI-HSS), two studies used Utrecht Burnout Scale (UBOS), and one study used the Chinese Maslach Burnout Inventory (CMBI). Two studies did not specify which version of MBI they had used. Of the 10 studies which did not use MBI, two studies used Shirom-Melamed Burnout Measure (CMBM) and three studies used only one question to measure burnout or one of its subscales. Pines-Aronson-Kafry Burnout Measure (BM-Rep), Professional Quality of Life Scale (ProQOL), Oldenburg Burnout Inventory (OBI), Cuestionario Breve de

Burnout (CBB) and Cynical Attitudes Toward College Scale (CATCS) questionnaires were each used once in these 10 studies. From the 43 studies, 30 studies (69.8%) had concentrated on the total burnout score or the total burnout score along with its subscales. Five studies (11.6%) had worked only on the emotional exhaustion (EE) subscale, one study (2.3%) had worked only on Cynicism (Cy) and seven studies (16.3%) had concentrated on EE and Cy. The tools for measuring burnout are summarized in table 2.

Descriptive characteristics on burnout and its subscales

Totally, 10 studies reported a high prevalence of burnout and/or its subscales. The design of all the 10 studies was cross-sectional. Out of a total of 10 studies, seven studies used MBI-GS or its adapted versions, two studies used MBI-HSS, and one study used CMBI. The prevalence of general burnout was reported in three studies (including six different military groups). The range of prevalence of high burnout was from 0.9% (1 in 114 people) to 40% (8 out of 20 people). The high prevalence of burnout subscales was reported in nine studies (including 20 different military groups). The prevalence of high emotional exhaustion ranged from 0% (0 out of 55 people) to 49.7% (176 out of 354 people). In half of the 20 different military groups in these nine studies, the prevalence of high emotional exhaustion was less than 19% (median = 19.05; IQR = 14.05). The prevalence of high depersonalization ranged from 0% (0 out of 55 people) to 59.6% (211 out of 354 people). In half of the 20 different military groups in these nine studies, the prevalence of high depersonalization was less than 14% (median = 14.25; IQR = 10.53). The prevalence of low personal accomplishment ranged from 0% (0 out of 221 people) to 60% (12 out of 20 people). In half of these 20 different military groups, the prevalence of low personal accomplishment was less than 6.4% (median = 6.40; IQR = 2.43).

In a total of 28 studies, the mean and standard deviation of burnout and/or its subscales were reported. The design for 24 studies was cross-sectional and four were longitudinal studies. Out of these 28 studies, 14 studies used MBI-GS or its adapted versions, four studies used MBI-HSS, and two studies used UBOS. Each of the CMBI, SMBM, BM-Rep, ProQOL, OBI, CBB, CATCS questionnaires were used once in these 28 studies. Also, one of these 28 studies used MBI but with no mention of its version. In seven studies (covering eight different military groups), the mean and standard deviation of general burnout was reported. Due to the fact that these seven studies used seven different questionnaires and the scoring method of these seven studies was completely different, it was not possible to compare them with each other. In 23 studies (33 different military groups), mean and standard deviation of the emotional exhaustion subscale were reported. Of these, 13 studies used the MBI-GS questionnaire or one of its adapted versions. In only eight studies (17 different military groups), the

method of scoring the exhaustion subscale was exactly the same (the nominal range of exhaustion in these eight studies ranged from 0 to 30). The minimum and maximum mean exhaustion scores in these 17 different military groups were 7.70 and 15.85, respectively. The mean in half of them was less than 11.32 (median = 11.32; IQR = 3.85). 12 studies (30 different military groups) had investigated the depersonalization (or cynicism) subscale. Of these, 11 studies used the MBI-GS questionnaire or its adapted versions, of which in only eight studies (17 different military groups) the scoring method for cynicism was exactly the same (the nominal range of cynicism in these eight studies was 0-30). The minimum and maximum mean values of depersonalization in these 17 different military groups were 7.18 and 12.40, respectively. The mean in half of them was less than 9.50 (median = 9.50; IQR = 2.70). In 14 studies (24 different military groups), the subscale of low personal accomplishment (or professional efficacy) was investigated. Of these, eight studies used the MBI-GS questionnaire or its adapted versions. Of these studies, seven (16 different military groups) had employed exactly the same scoring method for professional efficacy (the nominal range of professional efficacy (PE) in these seven studies was 0-36). In the other studies, the method of scoring this subscale was different. The lowest and highest mean scores of professional efficacy in these 16 different military groups were 23.80 and 28.80, respectively. The mean in half of them was more than 25.60 (Median = 25.60; mid-quarter range = 1.85). Table 3 presents the descriptive details on burnout and its subscales.

Relationships between burnout or its subscales and other variables

Out of 34 cross-sectional studies, 12 studies investigated the correlation between burnout or its subscales and other variables by univariable analyses. In four multivariable studies, the effect of burnout or its subscales on the response variable was measured. In 10 multivariable studies, burnout or its subscales were considered as a response variable, and in seven studies, the relationship between burnout or its subscales and other variables was examined in a conceptual model using methods such as SEM.

In 12 studies which used only a univariable analysis, the relationships between burnout or its subscales and psychological variables (such as anxiety, depression, stress, etc.), work environment variables (workload, difficult working conditions, etc.), and the variables of sleep duration and quality, performance, and defense mechanisms were examined. Also, different military groups were compared in terms of burnout or its subscales in some studies. These studies are less robust due to lack of control over other variables in the model. The information regarding the univariable correlations and univariable comparison of military groups with each other is given in Table 3.

In four studies (out of 34 cross-sectional studies), the multivariate analysis was employed to study the effect of burnout or its subscales on four separate response variables (work commitment, secondary trauma, psychological distress, and suicidal ideation). In a study on US Air Force personnel (N = 828), the effect of emotional exhaustion on work commitment was examined. In this study, transformational leadership consensus and laissez-faire leadership consensus were found to have a moderating role on the relationship between emotional exhaustion and work commitment (25). In another study on Chinese soldiers (N = 102), it was observed that based on stepwise regression, burnout was the only variable that could predict secondary trauma (31). A multivariate study on US Air Force personnel (N = 3138) showed that exhaustion, cynicism, and professional efficacy were not predictors of psychological distress (53). Another study on Air Force personnel (N = 3513) revealed that in the presence of demographic variables and occupational variables, and in the presence of the psychological distress variable, only the risk of rare (versus never) suicidal ideation was higher in people with high cynicism than that in others, and the risk of sometimes to always (versus never) ideating about suicide was higher in individuals with low professional efficacy as compared with others (55).

In 10 studies (out of 34 cross-sectional studies), burnout or its subscales were considered as response variables in a multivariate approach. In several studies, the relationship between work environment factors and burnout or its subscales was investigated. For example, a 2009 study of US remote-controlled aircraft personnel (N = 66) showed that there was a significant relationship between emotional exhaustion and the variable of crew position. However, there was no significant relationship between emotional exhaustion and work shift (27). A 2014 study on Air Force personnel (N = 1094) revealed that work environment variables predicted high exhaustion and high cynicism (42). In another study on US Air Force personnel (N = 2029) in 2019, it was found that working hours exceeding 51 hours per week, shift work, and more than 25 months of work experience were predictors of high exhaustion. On the other hand, shift work and more than 25 months of work experience were predictors of high cynicism. The frequency of work shift rotation also predicted high exhaustion and high cynicism (58). A 2019 investigation (N = 285) demonstrated that from among the various Toxic Leadership variables, only the self-assessment (SP) toxic leadership style was a predictor of high cynicism (59). In several studies, the relationship between psychological factors and burnout or its subscales was investigated. A study on International Security and Assistance Forces (N = 171) in 2013 showed that, based on a multivariate analysis, hardiness had a negative relationship with emotional exhaustion and cynicism (39). In a 2014 study (N = 256), a significantly negative relationship was found between emotional intelligence, self-efficacy,

organization-based self-esteem, and optimism on the one hand and burnout and the subscales of emotional exhaustion and depersonalization on the other. However, a significantly positive relationship was found between the mentioned variables and personal accomplishment (43). In a 2015 study on Air Force personnel (N = 194), the variable of post-traumatic stress was significantly and positively associated with emotional exhaustion and depersonalization. Also, the variable of depression had a significant positive relationship only with emotional exhaustion (44). In a study on Chinese soldiers (N = 820) in 2015, a relationship between neuroendocrine indicators and burnout was evaluated in which heat shock protein levels, cortisol levels, and adrenocorticotropic hormone (ACTH) levels were significantly associated with burnout (48).

In seven studies, the relationships between burnout or its subscales and other variables were investigated in a conceptual model with methods such as SEM. A study on Slovenian Armed Forces soldiers (N = 390) demonstrated that emotional exhaustion was positively associated with neuroticism and emotion-based coping behaviors. Also, depersonalization had a significant positive relationship with psychoticism. Finally, personal accomplishment had a significant positive relationship with extraversion and problem-based coping behaviors and a significant negative relationship with neuroticism and emotion-centered coping behaviors (38). A 2015 study on Portuguese soldiers (N = 1045) showed that autonomous motivation played a mediating role in the effect of perceived organizational support and leader-member exchange on burnout (45). In a 2015 study on Iranian military personnel (N = 215), it was observed that burnout had direct and indirect effects (through depression) on self-destructive behaviors (47). A study conducted on US military personnel stationed in war zones (N = 338) revealed that ethical leadership had a negative direct (moderated by conscientiousness) and an indirect (mediated by team cohesion) effect on emotional exhaustion. On the other hand, a significant negative relationship between team correlation and emotional exhaustion was moderated by the variable of conscientiousness (49). A 2018 study on Portuguese Marine Corps (N = 175) demonstrated that work-family conflict was a predictor of burnout. Work-family conflict also mediated the relationship between job demands and burnout and the relationship between supervisor support and burnout, but did not mediate the relationship between job autonomy and burnout (54). A 2018 study on Canadian Armed Forces personnel (N = 3500) showed that work overload, work-family conflict, and job stress were predictors of burnout. It was also revealed that burnout was a predictor of psychological distress and turnover intentions (56). In a study on a subsample of the United States Armed Forces (N = 1912), it was found that perceived inclusion had a direct negative effect on burnout. Also, burnout mediated the effect of perceived inclusion on the intent to leave (60).

Out of seven longitudinal studies, the effect of burnout on the response variable had been measured using a multivariate analysis in two studies, in one study, burnout was considered as a response variable in a multivariate analysis, and in four studies, the relationship between burnout or its subscales and other variables was examined in a conceptual model using methods such as SEM.

A 2008 study on Israeli military women (N = 2019) demonstrated that burnout, along with other variables such as body mass index, blood iron levels, and ferritin, affected stress fractures (26). Another study on Active Duty US marine Corps personnel (N = 32) showed that the professional efficacy subscale, in the presence of variables such as the level of education, cynicism, and the baseline Groton Maze Learning Test, had a significant negative relationship with Grouton-Maze learning test errors in all the three phases of Enemy Evasion, Captivity/Interrogation, and Escape/Release (33). An investigation of burnout among Dutch Armed Forces (N = 164) showed that in individuals with low family support and high exposure to threats, high self-efficacy led to low burnout, and in those with low family support and low exposure to threats, high self-efficacy resulted in high burnout (50). A 2009 study on US Air Force personnel (N = 1009) revealed that perceived health in the baseline had a significant negative effect on burnout at the end of follow-up. There was also a significant negative association between burnout and perceived health at the end of follow-up. Another study conducted on the same data in 2011 showed that deployment to the theater of war had a significant negative relationship with baseline burnout and that exposure to trauma had a significant positive relationship with baseline burnout. Also, post-traumatic stress and lack of resources at the end of follow-up had significant positive effects on burnout at the end of follow-up (28, 35). A 2010 study on Portuguese soldiers (N = 387) demonstrated that during the mission, psychological contract breach increased burnout, and at the end of the mission, it had no effect on burnout (29). A 2018 study on Italian military instructors (N = 363) showed that self-efficacy beliefs in managing negative emotions at work (EFN-W) were significantly inversely related to burnout over time, and at the same time they played a mediating role in the relationship between emotional stability and burnout (52).

The purpose of a match case-control study conducted in 2017, in which the case group consisted of military professionals working in the Air Traffic Controllers department and the control group consisted of civilian or military personnel in other departments, was to find suitable predictors of participants that could be grouped together in terms of listening skills, health-related factors, etc. Based on the univariable analysis, burnout was significantly higher in the case group than in the control group, but according to the multivariable

analysis, burnout was not a significant predictor of belonging to the groups (51).

A two-way factorial design study on Dutch soldiers (N = 101) demonstrated that cynicism and professional efficacy (but not exhaustion) were crossed over from person to person. A moderation of the crossover of cynicism was seen when the sender and receiver were of the same degree (24). Detailed information on the findings of the preliminary studies is provided in the last column of Table 3.

Discussion

In this systematic review, 43 studies (34 cross-sectional studies, seven longitudinal studies, one case-control study, and one experimental study) were reviewed. In some studies, the effect of other variables on burnout or its subscales was measured. Also, in some studies, the effect of burnout or its subscales on the response variable was measured. Some studies were analyzed as univariate and others as multivariate. In several studies, the relationship between burnout and other variables was investigated using a conceptual model. In most studies, one version of MBI was used to measure burnout. Out of 43 studies, the prevalence of burnout was reported in only 10 studies, while the mean and standard deviation of burnout or its subscales were reported in 28 studies. In three studies (six different military groups) in which the prevalence of general burnout had been reported, the prevalence of high burnout ranged from 0.9% to 40%. In nine studies (20 different military groups), in which the prevalence of the high subscales of burnout had been reported, the prevalence of high emotional exhaustion ranged from 0% to 49.7%. In half of the different military groups involved in these nine studies, the prevalence of high emotional exhaustion was less than 19%. The prevalence of high depersonalization ranged from 0% to 59.6%, and in half of the various military groups in these nine studies, the prevalence of high depersonalization was less than 14%. The prevalence of low personal accomplishment was from 0% to 60%, and in half of these 20 different military groups, the prevalence of low personal accomplishment was less than 6.4%.

Due to differences in the type of studies (cross-sectional, longitudinal, case-control and experimental) and differences in the nature of univariate and multivariate analyses, the results were presented separately according to the type of the study and the type of analysis. However, the review revealed that several common factors in the initial studies were associated with burnout or its subscales. Several earlier studies have examined the relationship between work components (such as the duration of work, workload, swing or night shift, and work experience) and burnout. In this review, it was observed that in military personnel, duration of work, rotational shift or night shift, and work experience had a positive relationship with burnout. This result was consistent with systematic reviews on burnout in other

communities (10, 14, 16, 17). In two studies, the relationship between sleep duration and sleep quality on the one hand and emotional exhaustion on the other was studied and it was observed that these two had a significant negative relationship with emotional exhaustion. Also, the relationship of anxiety, depression and stress with burnout was studied showing that there was a significant positive relationship between them. These results were in agreement with reviews of other communities (10, 11). One study (47) showed that burnout had a direct impact on depression, which was consistent with a study by Salvagioni *et al.* (7). In three studies, the relationship between burnout and psychological distress was measured. In two studies (23, 56), burnout and psychological distress had a significant positive relationship and in one study (55), the relationship between burnout and suicidal ideation was measured in the presence and absence of psychological distress. In three earlier studies, the relationship between self-efficacy and burnout was investigated. In two studies (43, 52), which were consistent with the article by Alarcon *et al.* (65), it was observed that self-efficacy was significantly inversely related to burnout. In one study (50), however, it was observed that in terms of the effect on burnout, there was interaction among the three variables of "exposure to threat," "family support," and "self-efficacy." Work-family conflict (54) and post-traumatic stress (44) were also predictors of burnout. Burnout also predicted the intent to leave in two studies (56, 60). Self-promotion toxic leadership style (59), ethical leadership (49), and leader-member exchange (45) predicted cynicism (positive relationship), exhaustion (direct and indirect negative relationship), and burnout (indirect negative relationship), respectively. In one study (25), transformational leadership and laissez-faire leadership moderated the relationship between burnout and work commitment.

Table 1. Quality Assessment based on Modified Newcastle-Ottawa Scale and Modified Cochrane Risk of Bias Tool

1 st author; year	Study type	1	2	3	4	5	6	7	Selection	Comparability	outcome	Score	Qualitative score
Morgan; 2002				*	*		*		**	-	*	3	US
Shirom; 2003				*	*		*	*	**	-	**	4	S
Cole; 2007		*	*	*	*		*	*	****	-	**	6	G
Tvaryanas; 2009					*	**	*	*	*	**	**	5	G
Boxmeer; 2011			*	*	*	**	*	*	***	**	**	7	VG
Chang; 2011					*	**	*	*	*	**	**	5	G
Mohammad; 2012					*		*		*	-	*	2	US
Serec; 2012		*		*	*		*	*	***	-	**	5	G
Bue; 2013					*	**	*	*	*	**	**	5	G
Salimi; 2013		*	*		*		*		***	-	*	4	S
Chappelle; 2014	Cross-sectional	*	*		*	**	*	*	***	**	**	7	VG
Ojedokn; 2014					*	**	*	*	*	**	**	5	G
Ouma; 2011		*			*		*		**	-	*	3	US
Smith; 2015					*	**	*	*	*	**	**	5	G
Chambel; 2015		*	*		*	**	*	*	***	**	**	7	VG
Matthew; 2015					*		*		*	-	*	2	US
Taghva; 2015					*		*	*	*	-	**	3	US
Tao; 2015		*			*	**	*	*	**	**	**	6	G
Zheng; 2015					*	**	*	*	*	**	**	5	G
Bryan; 2018		*	*	*	*	**	*	*	****	**	**	8	VG
Carvalho; 2018					*	**	*	*	*	**	**	5	G

Ivey; 2018	*	*		*	**	*	*		***	**	**	7	VG
Topa; 2018				*	**	*	*		*	**	**	5	G
Chappelle; 2019	*	*		*	**	*	*		***	**	**	7	VG
Dobbs; 2019				*	**	*	*		*	**	**	5	G
Merlini; 2019	*	*		*	**	*	*		***	**	**	7	VG
Sipos; 2019		*		*	**		*		**	**	*	5	G
Vojvodić; 2019		*		*		*			**	-	*	3	US
Ndongo; 2020				*	**	*	*		*	**	**	5	G
Vojvodic; 2020		*		*		*			**	-	*	3	US
Chappelle; 2011	*	*		*		*			***	-	*	4	S
Prince; 2012	*	*		*		*			***	-	*	4	S
Chappelle; 2013	*	*		*		*			***	-	*	4	S
Goodman; 2018	*	*		*	**	*	*		***	**	**	7	VG
1 st author; year	1	2	3	4	5	6	7	8	Selection	Comparability	outcome	Score	Qualitative score
Moran; 2008		*	*	*	**	*	*		***	**	**	7	G
Vinokur; 2009	*	*	*	*	**	*	*	*	****	**	***	9	VG
Chambel; 2010		*	*	*	*	*	*	*	***	*	***	7	G
Morgan; 2011				*	*	*	*	*	***	**	***	8	VG
Vinokur; 2011	*	*	*	*	**	*	*	*	****	**	***	9	VG
Delahajj; 2016		*	*		*	*			**	*	*	4	S
Alessandri; 2018		*	*	*	**	*	*	*	***	**	**	7	G
1 st author; year	1	2	3	4	5	6	7	8	Selection	Comparability	outcome	Score	Qualitative score

Longitudinal

Villar; 2017	Case-Control	*		*	*	**		*		***	**	*	6	G
1 st author; year		1	2	3	4	5	6	7						
Bakker; 2007	Experimental	UC	H	UC	L	H	UC	L						

Qualitative score: US, Unsatisfactory; S, Satisfactory; G, Good; VG, Very Good. Risk of Bias Assessment abbreviation: UC, Unclear; L, Low; H, High

Table 2. Measure Assessments of Burnout

		No. of studies	Percent
1	MBI-GS	19	44.2
2	MBI-HSS	9	20.9
3	Burnout measured on 1-item scale	3	7.0
4	MBI (version not specified)	2	4.7
5	SMBM	2	4.7
6	UBOS	2	4.7
7	BM-Rep	1	2.3
8	ProQOL	1	2.3
9	CMBI	1	2.3
10	OBI	1	2.3
11	CBB	1	2.3
12	CATCS	1	2.3

Table 3. Characteristics of the Studies on Burnout among Military Personnel

First author; Year; Country	Type of Study; Burnout Instrument	Study Population; Sample Size	Age and Sex (Men, No. (%))	Reported Burnout	Main findings
Morgan; 2002; United States [22]	Cross-sectional; MBI	Mixed; (N = 41)	Age: NR Sex: NR	OB: 31 ± 13 EE: 14 ± 7.3 DP: 7 ± 4.5 PA: 37 ± 7	Soldiers with higher burnout reported at baseline showed significantly less performance gain (more errors, slower swim times, and poorer underwater navigation ability).
Shirom; 2003; Israel [23]	Cross-sectional; 16-Item BM-Rep	Army; (N = 707)	Age: Mean, 38 Sex: NR	OB: 2.2 ± 0.6	In the questionnaire with BM items and all other strain items, four dimensions (anxiety, depression, worn out, and lack of vigor) were measured. Burnout and anxiety (r = 0.51) and burnout and depression (r = 0.83) were found to be significantly correlated.
Bakker; 2007; Netherlands [24]	Two-way factorial design; 16-Item MBI-GS	Army; (N = 101)	Age: Mean, 21.6 (SD, 3.9) Sex: 85 (84.2)	Not Reported	The crossover of cynicism and the level of professional efficacy (but not exhaustion) were observed from one individual to another. A moderation of the crossover of cynicism was seen when the sender and the receiver were similar, taking place only for those with the same degree.
Cole; 2007; United States [25]	Cross-sectional; 9-Item EE Subscale of MBI-HSS	Air Force; (N = 828)	Age: NR Sex: NR	EE: 3.3 ± 1.1	The relationship between emotional exhaustion and work commitment was moderated by transformational leadership-consensus (TLC) and laissez-faire leadership consensus (LFLC). In case of high (low) TLC and low (high) LFLC, there was a negative (weak) association between emotional exhaustion and work commitment.
Moran; 2008; Israel [26]	Longitudinal; subjective assessment of burnout on a scale of 1 to 7	Army; (N = 219).	Age: Range, 18-19 Sex: 0 (0)	OB among females with stress fracture: 3.9 ± 0.8, without stress fracture: 3.4 ± 1.1	In the final model, the variables predicting stress fracture included height, iron blood level, burnout, BMI and Ferritin. The probability of having stress fracture was higher in females with higher burnout scores (adjusted OR = 1.59; 95% CI: 1.05-2.42).
Tvaryanas; 2009; United States [27]	Cross-sectional; MBI (version not specified) for EE subscale only	Air Force; (N = 66)	Age: Mean, 34.9 (SD, 8.7) Sex: 61 (92.4)	Not Reported	EE was associated with gender (female relative to male: β = 9.45, SE = 1.91, p < 0.01) and crew position (sensor operators relative to pilots: β = 7.67, SE = 2.7, p < 0.01).

Vinokur; 2009; United States [28]	Longitudinal Study; Subset of 9 of the 12 items of the SMBM	Air Force; (N = 1009)	Age: Mean, 38.2, ≤ 30 yr: 27.2%, 31-40: 31.9, > 40 yr: 40.9 Sex: 506 (50.1)	Baseline [†] : OB: 2.9 ± 1.2 PF: 3.7 ± 1.4 EE: 2.9 ± 1.6 CW: 2.4 ± 1.3 Follow-up [†] : OB: 3 ± 1.2 PE: 3.7 ± 1.4 EE: 2.9 ± 1.5 CW: 2.5 ± 1.2	There was a negative association between perceived health and job burnout (Baseline: $r = -0.33$, $p < 0.001$, Follow-up: $r = -0.2$, $p < 0.001$). Perceived health and job burnout in the baseline could predict a decline of job burnout and diminished perceived health in the follow-up, respectively. The predicted impact of perceived health on job burnout was found to be significantly greater than that of burnout on health.
Chambel; 2010; Portugal [29]	Longitudinal Study (T1: Baseline, T2: During the Mission, T3: End of the Mission); EE and CY subscales from Portuguese version of MBI-GS	Army; (N = 387)	Age: Mean, 25.2 Sex: 373 (96.4)	T1 [†] : Ex: 1.6 ± 1.2 Cy: 1.6 ± 0.8 T2 [†] : Ex: 1.6 ± 1.2 Cy: 1.7 ± 0.9 T3 [†] : Ex: 1.7 ± 1.1 Cy: 1.9 ± 1.1	In T2, psychological contract breach increased burnout ($\beta = 0.24$, $p < 0.001$) and decreased engagement ($\beta = -0.23$, $p < 0.001$). In T3, while psychological contract breach decreased engagement ($\beta = -0.28$, $p < 0.001$), it had no impact on burnout ($\beta = 0.08$, NS). Psychological contract breach in T2 had no impact on burnout and engagement of soldiers in T3.
Boxmeer; 2011; Netherlands [30]	Cross-sectional; 8-Item UBOS for EE and Cy subscales	International Security Assistance Force (ISAF); (N = 3004)	Age: Mean, 28.5 (SD, 9.1) Sex: 2554 (85)	EE: 1.9 ± 0.9 Cy: 2.3 ± 1.1	Not Reported
Chang; 2011; China [31]	Cross-sectional; 10-Item burnout subscale of ProQOL	Army; (N = 102)	Age: Mean, 22.7 (SD, 4.9) Sex: 102 (100)	OB [†] : 1.9 ± 0.7	The multivariable analysis revealed that among satisfaction, resilience and burnout, only burnout could predict secondary trauma, explaining only 30% of the variance.
Chappelle; 2011; United States [32]	Cross-sectional; 16-Item MBI-GS	Air Force: Predator/Reaper Operators (PRO, 40.98%), Global Hawk Operators (GHO, 18.04%), Noncombatant Airmen (NCA, 40.98%); (N = 1464)	Age (18-30, 31-39, ≥ 40 yr; No, %): PRO: (307, 51.8), (118, 19.9), (168, 28.3) GHO: (192, 72.7), (32, 12.1), (40, 15.2) NCA: (402, 67.2), (89, 14.9), (107, 17.9) Sex: PRO: 509 (84.8) GHO: 197 (74.6) NCA: 534 (89)	PRO: Ex: 12.3 ± 7.7 Cy: 9.5 ± 7.9 PE: 26.5 ± 6.3 GHO: Ex: 14.9 ± 8.4 Cy: 12.4 ± 7.9 PE: 25 ± 6.9 NCA: Ex: 10.5 ± 7.8 Cy: 10.9 ± 8.1 PE: 25.6 ± 7.5	Comparisons of means for Ex between PRO and GHO ($t = -4.43$, $p < 0.01$) and between PRO and NCA ($t = 4.06$, $p < 0.01$) showed that the differences were significant. Comparisons of means for Cy were significant between PRO and GHO ($t = -4.88$, $p < 0.01$), PRO and NCA ($t = -2.96$, $p < 0.01$), and GHO and NCA ($t = 2.50$, $p < 0.01$). As for the mean comparisons of PE, it was revealed that they were significant between PRO and NCA ($t = 2.29$, $p < 0.01$) as well as PRO and GHO ($t = 3.18$, $p < 0.05$). High stress, shift work, supervisory position, and poor quality of sleep were associated with high Ex.

Morgan; 2011; United States [33]	Longitudinal; 16-Item MBI-GS	Marine Corps; (N = 32)	Age: Mean, 24.1 (SD, 3.3), Range, 18-32 Sex: 32 (100)	Ex: 6.8 ± 4.7 Cy: 4.2 ± 3.7 PE: 31.5 ± 4.1 Compared to norms: Ex > 4.6: 37.5% Cy > 3.5: 56.2% PE < 3.6: 0%	PE scores were negatively associated with GMLT errors during all three field-based phases of training using the repeated-measures ANCOVA in the presence of education, Cy and GMLT at baseline, with stronger negative associations in phase 3 as compared with phases 1 and 2. In phase 2, this association was stronger than in phase 1.
Ouma; 2011; United States [34]	Cross-sectional; 16-Item MBI-GS	Air Force: Active Duty participants (69.5%) and National Guard/Reserve (NG/R) participants (30.5%); (N = 426)	Age (18-30, 31-40, > 40 yr; No, %): Active Duty: (178, 60.1), (57, 19.3), (56, 18.9) NG/R: (27, 20.8), (35, 26.9), (66, 50.8) Sex: Active Duty: 266 (90.8) NG/R: 123 (94.6)	Active Duty: Ex: 13.6 ± 8.1 Cy: 10.6 ± 8.3 PE: 26.4 ± 6.6 NG/R: Ex: 10.5 ± 6.6 Cy: 7.9 ± 6.3 PE: 27 ± 5.7	When compared to NG/R operators (OR = 2.2, p < 0.01), Active Duty operators were 2.2 times more likely to report high levels of Ex. Also, these operators were 2.62 times more likely to report high levels of Cy when compared to NG/R operators (OR = 2.62, p < 0.01). In terms of PE, no significant difference was observed between Active Duty operators and NG/R operators.
Vinokur; 2011; United States [35]	Longitudinal Study; 12-Item of the SMBM	Air Force; (N = 1009)	Age: Mean, 38.2 Sex: 506 (50.1)	Baseline*: OB: 2.9 ± 1.2 Follow-up*: OB: 2.8 ± 1.1	Lower levels of job burnout at baseline ($\beta = -0.09$; p < 0.01) could be predicted by deployment to the theater of war. Exposure to trauma predicted an impact on job burnout at baseline ($\beta = 0.20$, p < 0.001) and follow-up ($\beta_s = 0.19$, p < 0.01). A decrease (increase) in follow-up job burnout could be predicted by baseline (follow-up) PTS symptoms and loss of resources. Members of the Active Duty Force experienced significantly higher job burnout scores ($\beta = 0.17$, p < 0.001) as compared with the Reserve Force members.
Mohammad; 2012; Egypt [36]	Cross-sectional; 22-Item MBI-HSS	Mixed; (N = 20)	Age: Mean, 39.5 (SD, 13) Sex: 8 (40)	severe OB: 40% high EE (≥ 27): 40% high DP (≥ 13): 40% low PA (≤ 31): 60%	EE, DP and PA were found to be associated with sex (p = 0.02, p = 0.02, p < 0.001, respectively), marital status (p = 0.03, p = 0.03, p = 0.01, respectively) and duration of work (p = 0.001, p = 0.001, p < 0.001, respectively). Also, DHEA-S and cortisone levels as well as the ratio between them were significantly and negatively correlated with burnout syndrome (p = 0.001, 0.009, 0.002, respectively).

Prince; 2012; United states [37]	Cross-sectional; 16-Item MBI-GS	Air Force: distributed common ground system (DCGS) intelligence exploitation Personnel (IEP, 53.87%), DCGS Support/System Sustainment Personnel (SSP, 19.92%), Noncombatant Airmen (NCA, 26.21%); (N = 763)	Age (18-30, 31-39, ≥ 40 yr; No, %): IEP: (279, 68.6), (92, 22.6), (36, 8.8) SSP: (91, 61.1), (37, 24.8), (21, 14.1) NCA: (107, 54.3), (69, 35), (21, 10.7) Sex: IEP: 277 (67.4) SSP: 118 (77.6) NCA: 153 (76.5)	IEP: Ex: 13.4 ± 8.1 Cy: 11.4 ± 8.3 PE: 24.4 ± 7.9 SSP: Ex: 8.7 ± 7.5 Cy: 8.1 ± 7.8 PE: 25.6 ± 8 NCA: Ex: 9 ± 7 Cy: 8.1 ± 6.9 PE: 24.6 ± 8.6	Comparisons of means for Ex and Cy (but not PE) showed significant differences between IEP and SSP and between IEP and NCA. Night shift workers were 2 (3.2) times more likely to be at the risk of high emotional exhaustion (cynicism). Those with chronically long work hours (50 hours or more per week), those who slept an average of 4 hours or less prior to work and those experiencing high vicarious combat exposure were 2 (95% CI: 1.2-3.15), 4 (95% CI: 2.15-10.73) and 5.48 (95% CI: 1.3-6.4) times more likely to report high emotional exhaustion, respectively.
Serec; 2012; Slovenia [38]	Cross-sectional; 22-Item MBI-HSS	Army; (N = 390)	Age: Mean, 30.7 (SD, 7.6) Sex: 342 (88)	EE: 16.5 ± 11.7 DP: 8.7 ± 6.2 PA: 30.4 ± 7.6	Emotional exhaustion (personal accomplishment) was lower (higher) in the soldiers compared to US norms. There was a positive (negative) association between emotional exhaustion (depersonalization) and neuroticism on one hand, and emotion-oriented coping on the other. Positive associations were found between depersonalization and psychoticism, and between personal accomplishment and extraversion and problem-oriented coping.
Bue; 2013; Belgium [39]	Cross-sectional; EE and Cy subscales of 20- Item UBOS	International Security and Assistance Force (ISAF); (N = 171)	Age: Mean, 29.9 (SD, 7.5), Range, 20-51 Sex: 166 (97.1)	EE: 5 ± 4.1 Cy: 5.8 ± 4.1	Hardiness was negatively associated with Cy (univariable: $r = -0.56$, $p < 0.001$; multivariable: $\beta = -$ 0.56 , $p < 0.001$) and EE (univariable: $r = -0.45$, $p <$ 0.001 ; multivariable: $\beta = -0.48$, $p < 0.001$). The relationship between vigor and EE (but not between dedication and Cy) was moderated by hardiness (Interaction: $\beta = 0.66$, $p < 0.001$).
Chappelle; 2013; United States [40]	Cross-sectional; 16-Item MBI-GS	Air Force: Active-Duty Cyber Warfare Operators (ADCW, 28.33%), Civilian/Contract Cyber Warfare Operators (CCW, 11.76%), active duty noncyber control group (ADNC, 59.91%); (N = 1327)	Age (18-30, 31-39, ≥ 40 yr; No, %): ADCW: (207, 55.5), (140, 37.5), (26, 7) CCW: (24, 15.6), (24, 15.6), (106, 68.8) ADNC: (596, 75.3), (169, 21.3), (27, 3.4) Sex: ADCW: 303 (81.7) CCW: 127 (82.5) ADNC: 684 (86.5)	ADCW: Ex: 13.4 ± 7.8 Cy: 10.7 ± 7.8 PE: 23.8 ± 7.5 CCW: Ex: 10.3 ± 7.6 Cy: 8.3 ± 7.1 PE: 26.2 ± 8.0 ADNC: Ex: 10.1 ± 7.7 Cy: 10.3 ± 7.9 PE: 25.4 ± 7.8	Comparisons of means for Ex showed significant differences between ADCW and CCW ($t = 3.11$, $p <$ 0.01) and between ADCW and ADNC ($t = 3.34$, $p <$ 0.01). Comparisons of means for Cy showed significant differences between ADCW and CCW ($t =$ 2.34 , $p < 0.01$), and CCW and ADNC ($t = 1.94$, $p <$ 0.01). As for the mean comparisons of PE, it was revealed that there were significant differences between ADCW and CCW ($t = -2.43$, $p < 0.01$) and ADCW and ADNC ($t = -1.58$, $p < 0.01$).

Salimi; 2013; Iran [41]	Cross-sectional; 22-Item MBI-HSS	Mixed; (N = 250)	Age: Mean, 33.7 (SD, 5.5); Range, 25-55 Sex: NR	Not Reported	Significant associations were found between mental health and the frequency aspect of burnout subscales (EE: $r = 0.237$, $p < 0.001$, DP: $r = 0.154$, $p = 0.002$, PA: $r = 0.289$, $p < 0.001$), the intensity aspect of EE ($r = 0.279$, $p < 0.001$) and PA ($r = 0.258$, $p < 0.001$), but not DP ($r = 0.265$, $p = 0.280$).
Chappelle; 2014; United States [42]	Cross-sectional; 16-Item MBI-GS	Air Force: Air Combat Command (ACC, 66.8%), Air National Guard (ANG, 20.2%), Air Force Special Operations Command (AFSOC, 13%); (N = 1094)	Age (18-30, 31-39, ≥ 40 yr; No, %): ACC: (448, 61.3), (207, 28.3), (74, 10.1) ANG: (64, 29), (75, 33.9), (82, 37.1) AFSOC: (77, 54.2), (53, 37.3), (12, 8.5) Sex: ACC: 653 (89.3) ANG: 192 (86.9) AFSOC: 120 (84.5)	ACC: Ex: 12 ± 7.4 Cy: 9.1 ± 7.2 PE: 26.1 ± 6.6 ANG: Ex: 11.3 ± 6.8 Cy: 7.7 ± 6.7 PE: 26.9 ± 5.9 AFSOC: Ex: 15.9 ± 7.8 Cy: 10.6 ± 7.5 PE: 24.7 ± 6.5	ANCOVA revealed that AFSOC was associated with higher levels of Ex and Cy than ANG ($d = 0.62$, 0.42 , $p < 0.01$, $p < 0.01$, respectively) and ACC ($d = 0.51$, 0.21 , $p < 0.01$, $p < 0.05$, respectively) operators. Based on multiple logistic regression, working swing or night shifts (OR = 1.82), working 51 or more hours a week (OR = 2.05), serving in current duty position for 25 months or longer (OR = 1.89), duty status as an officer-pilot (OR = 1.43), and classification as an AFSOC drone operator (OR = 1.54) were identified as variables which were predictors of high Ex. This analysis also showed that the variables of age (OR = 2.34), 25 months or longer periods of working in the current duty position (OR = 1.62), and officer status (OR = 1.59) could predict high Cy.
Ojedokun; 2014; Nigeria [43]	Cross-sectional; 22-Item MBI-HSS	Mixed; (N = 256)	Age: Mean, 35 (SD, 8.5), Range, 19-65 Sex: 136 (53.1)	Not Reported	There was a significant negative relationship between emotional intelligence, self-efficacy, organization-based self-esteem, and optimism on the one hand and total burnout, EE and DP on the other. PA was found to have a positive association with emotional intelligence, self-efficacy, organization-based self-esteem, and optimism.
Smith; 2015; United States [44]	Cross-sectional; 22-Item MBI-HSS	Air Force: Active-Duty (72.2%) and NG/R (27.8%); (N = 194)	Age: Mean, 30.4 (SD, 6), Range, 21-48 Sex: 194 (100)	EE: 18.4 ± 9.8 DP: 11.9 ± 5.8 PA: 39.4 ± 8.2 Active duty: EE: 19 ± 8.9 DP: 11.4 ± 5.6 PA: 39.4 ± 8.2 NG/R: EE: 19.5 ± 10.5 DP: 13.4 ± 5.9 PA: 39.5 ± 8.1	There was an association between depression (Univariable: $r_s = 0.36$, Multivariable: $B = 1.098$, $SE = 0.392$, $\beta = 0.286$, $p = 0.004$) and posttraumatic stress (Univariable: $r_s = 0.34$, Multivariable: $B = 0.320$, $SE = 0.171$, $b = 0.194$, $p = 0.053$) on the one hand, and higher levels of EE on the other. Posttraumatic stress was associated with higher levels of DP (Univariable: $r_s = 0.41$, Multivariable: $B = 0.316$, $SE = 0.088$, $b = 0.353$, $p < 0.001$). Moreover, depersonalization was significantly higher among NG/R personnel as compared with Active Duty personnel ($B = 2.287$, $SE = 1.035$, $\beta = 0.203$, $p = 0.029$).

Chambel; 2015; Portugal [45]	Cross-sectional; 10-Item Portuguese version MBI-GS for Ex (5 Items) and Cy (5 Items) subscales	Army; (N = 1045)	Age: Mean, 23.7 (SD, 4), Range, 19-56 Sex: 956 (91.5)	Ex: 4.1 ± 1.4 Cy: 3.8 ± 1.3	In the univariable analysis, autonomous work motivation associated negatively with soldiers' Ex ($r = -0.21$, $p < 0.01$) and Cy ($r = -0.26$, $p < 0.01$). Controlled work motivation was positively related to soldiers' Ex ($r = 0.21$, $p < 0.01$) and Cy ($r = 0.15$, $p < 0.01$). Based on structural equation modeling, a significantly negative association was found between autonomous work motivation and burnout ($\beta = 0.26$, $p < 0.01$). A partially mediating role was found for autonomous work motivation in the impacts of perceived organizational support (and leader-member exchange) on burnout.
Matthew; 2015; United Kingdom [46]	Cross-sectional; 16-Item MBI-GS	Mixed: Permanent Resistance Instructors (PRI, 42.5%) and External Resistance Instructors (ERI, 57.5%), Mixed; (N = 40)	Age: NR Sex: NR	All RI: Ex: 7.7 ± 7.5 Cy: 7.2 ± 7.5 PE: 28.8 ± 7.4 PRI: Ex: 5.7 ± 5.2 Cy: 5.2 ± 5.6 PE: 29.8 ± 6.8 (22, 55%) ERI: Ex: 9.2 ± 8.6 Cy: 8.6 ± 8.5 PE: 28 ± 7.8	As compared to permanent RIs, external RIs reported higher levels of Cy and Ex as well as a lower level of PE. Nevertheless, no statistical difference was found between the responses of permanent and external RIs.
Taghva; 2015; Iran [47]	Cross-sectional; 22-Item MBI-HSS	Army; (N = 215)	Age: Mean, 31.1 (SD, 4.7) Sex: 215 (100)	Not Reported	Burnout ($\beta = 0.24$, $P < 0.01$) and depression ($\beta = 0.56$, $P < 0.01$) directly affected self-destructive behavior. Burnout had an indirect ($\beta = 0.35$) and total ($\beta = 0.59$) effect on self-destructive behavior.
Tao; 2015; China [48]	Cross-sectional; 15-Item CMBI	Army: Soldiers stationed in the arid desert region of Xinjiang (AD, 30%) and in an urban area of Xinjiang (UA, 70%); (N = 820)	Age: Mean, 21.4 (SD, 3.3), Range, 16-44 Sex: NR	AD: OB: 43.9 ± 14.6 EE: 15.3 ± 7.9 DP: 10.2 ± 5.6 PA: 19.6 ± 7.9 UA: OB: 41.2 ± 15.1 EE: 13.6 ± 7.1 DP: 9.6 ± 5.2 PA: 19.0 ± 8.2	Comparing the arid desert group with the urban group, it was found that the degree of OB ($p < 0.001$), EE ($p < 0.001$) and PA ($p = 0.001$) were significantly higher in the former group. The multivariable analysis revealed that being an only child (OR = 0.394, $p = 0.025$), heat shock protein (HSP-70) levels (OR = 1.740, $p = 0.022$), cortisol levels (OR = 1.124, $p = 0.041$), and adrenocorticotrophic hormone (ACTH) levels (OR = 1.316, $p = 0.033$) were independently associated with job burnout. Weak correlations were found between HSP-70 levels and OB ($r = 0.078$, $p = 0.011$), cortisol levels and PA ($r = 0.123$, $p = 0.002$), and ACTH levels and PA ($r = 0.126$, $p = 0.001$).

Zheng; 2015; United States [49]	Cross-sectional; 5-Item revised MBI-GS for Ex only	Mixed; (N = 338)	Age (No, %): < 20 yr: (47, 13.9) 20-25 yr: (157, 46.4) 26-30 yr: (87, 25.7) 31-40 yr: (41, 12.1) > 40 yr: (6, 1.8) Sex: 271 (80.2)	Ex: 3.0 ± 1.0	There was a negative relationship between ethical leadership ($r = -0.35, p < 0.01$) and team cohesion ($r = -0.31, p < 0.01$) on the one hand and Ex on the other. Ethical leadership had both direct ($\beta = -0.19, p = 0.002$) and indirect (99%CI: (-0.15, -0.04)) effects on Ex via team cohesion. Therefore, the relationship between ethical leadership and Ex was partially mediated by team cohesion. Conscientiousness moderated the direct effect of ethical leadership and team cohesion on Ex.
Delahaij; 2016; Netherlands [50]	Longitudinal study; 8-Item MBI-GS (adapted for the Dutch military) for Ex and Cy subscales	International Security and Assistance Force (ASAF): Police Training Group (PTG, 75%), Air Task Force (ATF, 25%); (N = 164)s	Age: PTG: Mean, 32 ATF: Mean, 37 Sex: PTG: 121 (98.4) ATF: 39 (95.1)	OB: 1 ± 0.75	The univariable analysis showed a positive correlation between burnout and work engagement ($r = 0.61, p < 0.01$). Based on the findings of the multiple regression analysis on burnout, a three-way interaction was observed among self-efficacy, family support, and threat exposure ($b = 0.12, p < 0.05$).
Villar; 2017; Brazil [51]	Case-Control; One question worded: "Do you feel tired and/or exhausted?"	Air Force: military professional servants in the function of Air Traffic Controllers (Study group: SG, 50%) and Other civil or military servants (Control Group: CG, 50%); (N = 60)	The groups were paired according to age and gender Age: Range, 21-44 SG: Mean, 26.9 CG: Mean, 26.9 Sex: SG: 16 (53.3) CG: 16 (53.3)	Sometimes, usually or always fatigue and/or exhausted, No., %: SG: 26, 86.7% CG: 18, 60%	Their univariable analysis revealed that burnout in the SG group was statistically higher than that in the CG group ($p = 0.004$). However, burnout was not found to be a significant predictor based on multiple logistic regression.
Alessandri; 2018; Italy [52]	Longitudinal study; 10-Item MBI-GS for Ex and Cy subscales and 7- Item ISW for IS subscale	Mixed; (N = 363)	Age: Mean, 22.9 (SD, 9.3), Range, 19-32 Sex: 250 (68.9)	Not Reported	The individuals' higher scores in the variable of self-efficacy beliefs in managing negative emotions at work (EFN-W) were a significant predictor of their lower levels of burnout over time ($\beta = -0.13, p = 0.041$). The relationship between emotional stability and burnout over time (indirect effect = -0.064, 95%CI = (-0.001, -0.163)) was significantly mediated by EFN-W. Moreover, higher EFN-W predicted higher scores of individuals in emotional stability over time ($\beta = 0.18, p = 0.003$).

Bryan; 2018; United States [53]	Cross-sectional; 16-Item MBI-GS	Air Force; (N = 6138)	Age (No, %): 17-25 yr: (1494, 24.5) 26-30 yr: (1743, 28.5) 31-35 yr: (1395, 22.8) 36-40 yr: (841, 13.7) > 40 yr: (645, 10.5) Sex: 4858 (79.6)	Ex: 13.4 ± 8.3 Cy: 11.7 ± 8.3 PE: 24.4 ± 7.3	Based on the employed univariable analysis, Ex, Cy and PE in high psychological distress (13.4 ± 8.4, 11.8 ± 8.2 and 24.4 ± 7.3) were not significantly different from Ex in low psychological distress (13.4 ± 8.3, 11.6 ± 8.3 and 24.4 ± 7.3). According to their multivariable analysis, Ex (OR = 0.99, p = 0.419), Cy (OR = 1, p = 0.684) and PE (OR = 1, p = 0.633) were not predictors of psychological distress.
Carvalho; 2018; Portugal [54]	Cross-sectional; 10-Item Portuguese version MBI-GS for Ex and Cy subscales	Marine Corps; (N = 175)	Age: NR Sex: 155 (88.6)	Ex: 2.5 ± 1.6 Cy: 1.9 ± 1.6	In their univariable analysis, Work–Family Conflict (WFC) on the one hand, and Ex and Cy on the other were found to be positively correlated (r = 0.44, p < 0.01; r = 0.42, p < 0.01, respectively). The structural equation modeling approach also confirmed this association. Therefore, burnout was predicted by WFC (β = 0.62, p < 0.001). Yet, the relationship between job demands (or supervisor support but not job autonomy) and burnout were mediated by WFC. According to the univariable and multivariable (in the absence of psychological distress in the model) analyses, the risk ratios which were significant were those of Rarely (vs Never) suicide ideation in high Ex group, high Cy group, and low PE group (vs others: Univariable: RR = 3.26, 3.53, 2.38; Multivariable: RR = 2.02, 2.04, 1.80, respectively). The other significant risk ratios belonged to Sometimes to Always (vs Never) suicide ideation in the high Ex group, high Cy group, and low PE group (vs Others: Univariable: RR = 4.54, 5.32, 5.00; Multivariable: RR = 2.62, 2.61, 3.25, respectively). However, in the presence of psychological distress in the model, the only significant risk ratios were those of Rarely (vs Never) suicide ideation in high Cy group and Sometimes to Always (vs Never) suicide ideation in low PE group (vs Others: RR = 1.58, 2.67, respectively).
Goodman; 2018; United States [55]	Cross-sectional; 16-Item MBI-GS	Air Force; (N = 3513)	Age: 18-30 yr: (1844, 52.6) 31-40 yr: (1297, 37.1) > 40 yr: (362, 10.3) Sex: 2777 (79.6)	Not Reported	Workload overload, work-family conflict, and job stress positively predicted job burnout. Moreover, job burnout positively predicted psychological distress and turnover intentions.
Ivey; 2018; Canada [56]	Cross-sectional; 8-Item OBI	Mixed; (N = 3500)	Age: NR Sex: NR	OB: 2.4 ± 0.8	

Topa; 2018; Spain [57]	Cross-sectional; 6-Item CBB for EE subscale	Army: professional soldiers (PS, 41.8%), and prison officers (PO, 58.2%); (N = 184)	Age: PS: Mean, 28.4 (SD, 7.9) PO: Mean, 38.3 (SD, 7.2) Sex: NR	PS: EE: 2.9 ± 0.8 PO: EE: 3.2 ± 0.8	The univariable analysis showed a negative correlation between EE and workday among professional soldiers and a positive correlation between EE and psychological contract breach among prison officers ($r = -0.3, 0.41$). The multivariable analysis showed that EE could be positively predicted by psychological contract breach among soldiers ($b = 0.33, p < 0.05$) and prison officers ($b = 0.52, p < 0.001$).
Chappelle; 2019; United states [58]	Cross-sectional; 16-Item MBI-GS	Air Force: Active duty (84.62%), Air National Guard (ANG, 6.85%), Reserve (8.53%); (N = 2029)	Age (No., %): Active duty: 18-25 yr: (536, 31.3) 26-35 yr: (915, 53.4) ≥ 36 yr: (264, 15.4) ANG: 18-25 yr: (11, 7.9) 26-35 yr: (54, 38.9) ≥ 36 yr: (74, 53.2) Reserve: 18-25 yr: (15, 8.7) 26-35 yr: (76, 44.2) ≥ 36 yr: (81, 47.1) Sex: Active duty: 1221 (71.4) ANG: 113 (83.1) Reserve: 105 (61.4)	High Ex ≥ 20, High Cy ≥ 20, Low PE ≤ 12, (No., %) Active duty (n = 1436): OB: (38, 2.7) Ex: (410, 28.6) Cy: (337, 23.5) PE: (101, 7) ANG (n = 114): OB: (1, 0.9) Ex: (28, 24.6) Cy: (12, 10.5) PE: (8, 7) Reserve (n = 120): OB: (2, 1.7) Ex: (17, 14.2) Cy: (11, 9.2) PE: (6, 5)	The multivariable analysis showed that high Ex was significantly higher in females (RR = 1.32), those working in current duties for > 24 months (RR = 1.32), the shift work group (RR = 1.67), and those working > 51 hours at week (RR = 1.63) as compared to the other groups. As the multivariable analysis revealed, high Cy was significantly higher in > 36 age range group (RR = 2.07), the single group (RR = 1.51), the respondents with no children and dependents living at home (RR = 1.42), the Enlisted rank group (RR = 1.47), those with > 24 months in current duties (RR = 1.44), Not a supervisor group (RR = 1.27) and the shift work group (RR = 1.91) than the other groups. This analysis also showed that low PE was significantly higher in females (RR = 1.69) and the non-supervisor group (RR = 1.42) as compared with the other groups. Another predictor for high Ex and high Cy (but Not low PE) was the shift rotation frequency.
Dobbs; 2019; United States [59]	Cross-sectional; 4-Item CATCS for organizational Cy subscale only	Air Force; (N = 285)	Age: NR Sex: 193 (67.7)	Cy: 2.1 ± 0.8	Organizational cynicism and several dimensions of toxic leadership were found to be correlated (ranging from $r = 0.26$ to $r = 0.38$). The multivariable analysis showed that the only significant predictor of organizational cynicism ($\beta = 0.33, SE = 0.05, p < 0.001$) was the self-promotion (SP) toxic leadership style.
Merlini; 2019; United States [60]	Cross-sectional; 3-Item MBI-GS for Ex subscales only	Mixed; (N = 1912)	Age: NR Sex: 1415 (74)	Ex: 2.4 ± 0.8 (N = 1790)	Burnout mediated the prediction of intent to leave by perceived inclusion; since, inclusion negatively and directly affected burnout (effect = -0.42, $p < 0.01$). Burnout also positively and directly affected the intent to leave (effect = 0.49, $p < 0.01$). Lastly, evidence of an indirect effect of inclusion on the intent to leave was observed through burnout (indirect effect = -0.20, 95%CI = (-0.27, -0.14)).

Sipos; 2019; United States [61]	Cross-sectional; Burnout measured on 1-item scale	Army; (N = 737)	Age (No., %): 18-24 yr: (411, 55.8) 25-29 yr: (205, 27.8) ≥ 30 yr: (119, 16.1) Sex: 536 (72.7)	(No., %) High burnout: (320, 43.4)	Based on multiple logistic regression, burnout was significantly higher in the age category of 25-29 years of age than in 18-24-year-olds (OR = 2.07). Besides, it was found that the odds of burnout increased as a result of increasing classroom hours (OR = 1.4) and military duty hours (OR = 1.21) but decreased by enhancing the time management score (OR = 0.98) and the classroom climate score (OR = 0.96).
Vojvodić; 2019; Serbia [62]	Cross-sectional; 22-Item MBI-HSS	Army; (N = 55)	Age: Range, 25-55, (No., %) ≤ 30 yr: (41, 74.5) > 30 yr: (11, 25.5) Sex: 48 (87.3)	No. (%) of low, moderate and high, respectively EE: 49 (89.1), 6 (10.9), 0 (0) DP: 48 (87.3), 7 (12.7), 0 (0) PA: 36 (65.5), 7 (12.7), 12 (21.8) (No., %) moderate or high OB: (302, 85.3)	EE and DP were associated with anxiety and physical health. Burnout was also correlated with part of defense mechanism (DM). With regard to the DP categories, humor DM and acting out DM were significantly different. Regarding the PA categories, humor DM, altruism DM, rationalization DM, and devaluation DM were found to be significantly different.
Ndongo; 2020; Cameroon [63]	Cross-sectional; 16-Item MBI-GS	Army; (N = 354)	Age: Mean, 33 (SD, 8) Sex: 319 (90.1)	Low, Moderate and High Ex: (104, 29.4), (74, 20.9), (176, 49.7) Cy: (27, 7.6), (116, 32.8), (211, 59.6) PE: (85, 24), (95, 26.8), (174, 49.2)	The significant presence of high Cy (P < 0.001) in the army (59.6%), as compared to other occupations, was confirmed.
Vojvodic; 2020; Serbia [64]	Cross-sectional; 22-Item MBI-HSS	Army; (N = 311)	Age: (No., %) 23-30 yr: (98, 31.5) 31-39 yr: (140, 45) 40-53 yr: (73, 23.5) Sex: 284 (91.3)	EE: 8.8 ± 7.5 DP: 3.2 ± 4.2 PA: 40.5 ± 7.8	Age groups significantly differed only on the EE subscale (23-30: 9.37 ± 7.16, 31-39: 8.26 ± 6.94, 40-53: 8.97 ± 8.78, p = 0.016). Increasing anxiety led to an increase of EE and DP but decreased PA.

MBI = Maslach Burnout Inventory; BM-Rep = subset of 16 items of the Pines-Aronson-Kafry Burnout Measure; MBI-GS = Maslach Burnout Inventory- General Survey; MBI-HSS = Maslach Burnout Inventory- Human Services Survey; SMBM = Shirom-Melamed Burnout Measure; ProQOL = Professional Quality of Life Scale; UBOS = Utrecht Burnout Scale (Dutch adaptation of the MBI); CMBI = Chinese Maslach Burnout Inventory; OBI = Oldenburg Burnout Inventory; CBB = Cuestionario Breve de Burnout (the Brief Burnout Questionnaire); CATCS = Cynical Attitudes Toward College Scale; OB = Overall Burnout; EE = Emotional Exhaustion; DP = Depersonalization; PA = Personal Accomplishment; PE = professional efficacy; Cy = Cynicism; Ex = Exhaustion; PF = Physical fatigue; CW = Cognitive weariness; yr = Year.

Limitation

In the initial studies of this systematic review, 12 different tools were used to measure burnout or its subscales. In some of these studies, the validity and reliability of the instruments were not reported. Also, many of these studies did not report how burnout was measured. On the other hand, the types of studies and the target populations varied in different studies. In very few studies was the prevalence of burnout (three studies) or its subscales (nine studies) reported. Therefore, due to measurements conducted via different tools and the different contexts of the studies, comparing them was a serious challenge. Also, most of the studies were from North America (20 studies) and Europe (13 studies). There were few studies from Asia (six studies), South America (one study), and Africa (three studies). This can restrict the comprehensiveness of the review. It also implies the need to study burnout in military personnel in other countries. On the other hand, although a number of plausible studies have examined the effect of work environment factors on burnout, most of these studies have reached their conclusions using univariable analyses. Therefore, it is necessary to study the effect of work environment factors on burnout by controlling the confounding variables as well. Although psychological factors have been examined using almost appropriate analyses, the need for further study of these factors in different populations is felt.

Conclusion

Based on the findings of this systematic review, which examined burnout in military personnel, although the prevalence of burnout was somewhat lower than that in communities such as medical and nursing communities, burnout was associated with work environment factors (such as workload, shift work), psychological factors (such as anxiety, depression, stress, etc.), sleep factors and the like, as is the case in many other communities. However, due to the cross-sectional nature of many initial studies and the limitations of quality assessment, examining burnout in higher quality studies is warranted.

Acknowledgment

We would like to thank Dr. Saeed Ghanbari Chahanjiri, who assisted the research team with his advices.

Conflict of Interest

None.

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