Is vital exhaustion distinct? A meta-analytic investigation on the immediate nomological network of vital exhaustion

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Abstract

A multitude of studies have supported that vital exhaustion is an important predictor of physical and psychological well-being, especially in the aftermath of adverse medical events; however, some authors have expressed that vital exhaustion may be repetitive with other popular constructs, namely burnout, fatigue, and depression. We resolve this tension by performing a meta-analysis of 74 sources on the immediate nomological network of vital exhaustion. Our results support that the relations of vital exhaustion with emotional exhaustion ($\bar{r} = 0.71$, $\bar{\rho} = 0.82$, $k = 4$, $n = 1152$) and depression ($\bar{r} = 0.70$, $\bar{\rho} = 0.83$, $k = 59$, $n = 30,963$) approached the magnitude of its convergent validity correlation ($\bar{r} = 0.75$, $\bar{\rho} = 0.88$, $k = 4$, $n = 1445$), suggesting that these constructs share most of their variance. Researchers should reinvestigate whether vital exhaustion relates to outcomes when accounting for these two constructs.

For almost half a century, vital exhaustion has garnered the interest of medical and mental health professionals alike (Cohen et al., 2017; Frestad and Prescott, 2017; Garg et al., 2021; Saarinen et al., 2021). Conceptualized by Appels and colleagues (Appels, 1980, 1981; Appels et al., 1979; Falger and Appels, 1982), the authors considered vital exhaustion to be "characterized by feelings of tiredness, loss of vitality, helplessness and hopelessness, depression and hypochondriasis, exhaustion, sleep disturbances, and projection of the powerlessness upon the outer world" (Appels, 1981: 116). Initial studies were focused on testing the relation of vital exhaustion with heart disease

and myocardial infarction, which was repeatedly supported. In the intervening years, authors have refined the conceptualization of vital exhaustion to be more concisely characterized by excessive fatigue, loss of energy, increased irritability, and demoralization

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(Kudielka et al., 2006; Saarinen et al., 2021; Schneider et al., 2022), and these authors have expanded the scope of studied antecedents and outcomes. Vital exhaustion has now been shown to relate to health antecedents and outcomes more broadly (e.g. Type 2 Diabetes; Fieres et al., 2022; Strikwerda et al., 2021), and many authors have tested the efficacy of interventions to reduce feelings of vital exhaustion (Appels et al., 2006; Koertge et al., 2008; Škodová et al., 2011). Today, vital exhaustion continues to be widely studied, as it is a powerful predictor of poor physical well-being and an essential obstacle to resolve in recovery.

Despite these significant advancements, sizable uncertainty can be seen in the literature on vital exhaustion. Much is known about antecedents, outcomes, and interventions to reduce vital exhaustion, but the precise positioning of the construct in its broader nomological net is still unclear. Authors have associated vital exhaustion with a multitude of similar constructs, but divergent proposals have been made regarding which other constructs are most conceptually related to vital exhaustion. These disagreements hamper research and practice involving vital exhaustion, as it poses barriers to the identification of associated theoretical perspectives and interventions that may be useful in addressing vital exhaustion. Perhaps more importantly, authors have questioned the theoretical and empirical distinctness of vital exhaustion (Igna et al., 2013; Kop, 2012; Lindeberg et al., 2006; Rekenyi et al., 2023). Several authors have observed that burnout, fatigue, and depression have clear conceptual similarities and definitional overlap with vital exhaustion. These constructs also produce very strong interrelations, indicating that they share significant amounts of variance in empirical research. At the same time, other authors have maintained that vital exhaustion is a distinct construct, reflecting a clear divergence in the literature (Cohen et al., 2017; Frestad and Prescott, 2017; Garg et al., 2021; Saarinen et al., 2021).

Given these conflicting perspectives, extant research disagrees on the placement of vital exhaustion in its broader nomological network, and it is unclear whether the construct is more closely associated—or even repetitive—with burnout, fatigue, or depression. This uncertainty poses several barriers for research and practice. Regarding research, authors are continuously refining theory associated with vital exhaustion (Bianchi et al., 2017b; Heponiemi et al., 2005; Preckel et al., 2005), and identifying which constructs are most closely associated and may aid in identifying appropriate theory. For instance, if vital exhaustion is more closely associated with depression rather than burnout or fatigue, theories associated with depression may be applicable to understand vital exhaustion. Alternatively, if vital exhaustion is largely repetitive with burnout, fatigue, or depression, then the focus of modern research should be redirected to these more established constructs with a broader theoretical bases, serving as a course-correcting measure.

Regarding practice, many healthcare providers have sought methods to reduce vital exhaustion after a medical event, as vital exhaustion is known to delay recovery (Koertge et al., 2008; Rafael et al., 2014). Without knowing the exact nature of vital exhaustion, the efficacy of any intervention is limited, as researchers may be unable to target the specific mechanisms that both produce and sustain vital exhaustion. Perhaps more importantly, interventions developed to address closely associated constructs may be effective for reducing vital exhaustion—once these closely associated constructs are identified. Such an approach could reduce required resources to develop novel interventions to reduce vital exhaustion, as prior efforts could simply be adapted.

The current article resolves this tension in the literature by conducting a meta-analysis of 73 sources and 215 effect sizes. We calculate meta-analytic estimates between vital exhaustion and its most studied correlates, which are

constructs that are not decisively antecedents or outcomes of vital exhaustion. These correlates include burnout, fatigue, depression, and seven other constructs. These other constructs were included to ensure that all proximal correlates of vital exhaustion were identified. We compare the magnitude of our meta-analytic correlations to determine which constructs are most closely associated with vital exhaustion, providing benefits for researchers investigating how the construct relates to relevant theory. Then, we calculate a meta-analytic correlation of two vital exhaustion measures together (i.e. convergent validity). We use these results to test whether any meta-analytic correlations between vital exhaustion and its correlates approach the strength of the meta-analytic correlation between two vital exhaustion measures, which could indicate whether vital exhaustion is repetitive with any of these studied constructs. In turn, we provide inferences regarding the amount of variance shared between vital exhaustion and its correlates, providing researchers with the tools necessary to decide whether its unique variance is meaningful enough to include vital exhaustion as a predictor in analyses and models. In conducting our analyses, we do not investigate these research questions with a specific expectation for our results, enabling us to guide researchers on how to place vital exhaustion within its nomological net in an unbiased manner—whether it is distinct or repetitive.

By conducting our investigation, the current article provides several contributions to research and practice. First, our results direct researchers to theoretical perspectives that may be particularly apt for the study of vital exhaustion. For example, if fatigue is shown to be most closely related to vital exhaustion, this finding would suggest that theories associated with physical and psychological energies may be necessary to understand vital exhaustion, such as symptom-perception theory (Hockey, 2013; Watson and Pennebaker, 1989). Second, our meta-analytic findings can uncover which constructs merit

further investigation in conjunction with vital exhaustion. If a construct is shown to be strongly related but rarely studied with vital exhaustion, this would suggest that prior investigations may need to be reconducted when accounting for this alternative construct to determine whether it better accounts for variance in relevant outcomes. Third, our discussion highlights interventions that have been effective for addressing the correlates most similar to vital exhaustion. Researchers can adapt these interventions to more directly aid those who suffer from vital exhaustion, potentially improving physical outcomes after medical events—among other benefits. Fourth, our results may suggest that vital exhaustion is largely repetitive with another construct, or it may be shown to be the manifestation of a construct at high levels, such as extreme depression. If so, our results would be a significant contribution to the literature, as they would suggest that extant theory on the correlate could be applied to understand vital exhaustion. It would also suggest that these research domains should be considered one and the same, creating a more unified field of study.

Background

In the current article, we meta-analytically explore the nomological network of vital exhaustion. To ensure that we assess the most frequently studied correlates in this nomological network (and therefore the most likely to be closely related and/or theoretically relevant), we take a generative approach to identifying inclusive correlates, which is common in studying the nomological network of constructs via meta-analysis (Borenstein et al., 2021; Howard and Cogswell, 2023; Zettler et al., 2020). That is, we do not make an a priori list of correlates to include in our meta-analysis. Instead, we perform searches for all empirical studies of vital exhaustion, and we identify all correlates that have been included in a minimum number of studies to obtain reliable meta-analytic

estimates. For this reason, we do not discuss all correlates of vital exhaustion in our background section, and we instead only discuss three. Vital exhaustion has been argued to be potentially repetitive with burnout, fatigue, and depression, and therefore it is particularly important to draw similarities and differences between these correlates to frame both the current research and the potential nomological network of vital exhaustion.

In the International Classification of Diseases (ICD) 10, the World Health Organization (WHO, 1993) defined burnout as, "a state of vital exhaustion" (p. 1018), which has persisted in subsequent revisions of the ICD. This conceptualization may have encouraged the greater study of burnout in favor of vital exhaustion, which saw a significant growth in popularity in the early- to mid-1990s (Maslach and Goldberg, 1998; Maslach et al., 2001). This definition has also caused authors to consider burnout to be the most conceptually associated—if not repetitive—construct with virtual exhaustion (Bianchi et al., 2017a; Rozanski and Cohen, 2017; Wingenfeld et al., 2009). Similarities between the two constructs can also be seen in their most popular measures. For example, the Maastricht Questionnaire includes the item of, "Do you often feel tired?" (Appels and Mulder, 1989: 738), and the Copenhagen Burnout Inventory includes the item of, "How often do you feel tired?" (Kristensen et al., 2005: 200). Given the strong similarities of certain items, it should be questioned whether the constructs are repetitive.

While vital exhaustion and burnout share conceptual similarities, the constructs also have sizable differences. Burnout includes the dimensions of emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach and Goldberg, 1998; Maslach et al., 2001). Emotional exhaustion shares strong similarities to the representative dimensions of vital exhaustion, but the latter two dimensions do not. These less-relevant dimensions are cognitive and perceptual in nature,

and prior authors have argued these aspects are absent in vital exhaustion (Igna et al., 2011). Specifically, "cognitive aspects" have been argued to be missing from vital exhaustion, as the construct is instead "more focused on physiologic and mood aspects" (Igna et al., 2011: 366). Also, the aspects of irritability and demoralization within vital exhaustion are not apparent in burnout (Maslach and Goldberg, 1998; Maslach et al., 2001). No items appear in popular burnout measures that are notably similar to The Maastricht Questionnaire items of, "Do little things irritate you more lately than they used to do?" and "Do you sometimes wonder whether you will still be alive tomorrow?" Therefore, while the two constructs are similar, their differences suggest that they are not entirely conceptually repetitive.

Additionally, vital exhaustion is known to arise from physical ailments and medical events (Deter et al., 2021; Fieres et al., 2022; Shah et al., 2021). When people experience myocardial infarction, they often enter a state of vital exhaustion, which causes recovery from this medical event to be both a physical and psychological process (McGowan et al., 2004). Due to this habitual occurrence, authors have associated vital exhaustion with fatigue, which aligns with both constructs' focus on physiologic and mood aspects rather than cognitive and perceptual aspects (Igna et al., 2011). This association also corresponds to the definitional aspects of vital exhaustion, as contemporary authors consider fatigue to be a representative dimension and central characteristic of vital exhaustion (Cohen et al., 2017; Garg et al., 2021; Saarinen et al., 2021). The Maastricht Questionnaire even includes the item of, "Do you sometimes feel that your body is like a battery that is losing its power?" (Appels and Mulder, 1989: 738).

At the same time, fatigue is only one aspect of vital exhaustion, which includes several other elements. Namely, virtual exhaustion also includes the dimensions of loss of energy, increased irritability, and demoralization. For example, The Maastricht Questionnaire

includes items that are wholly independent from fatigue, such as, "Do you sometimes wonder whether you will still be alive tomorrow?" (Appels and Mulder, 1989: 738). While fatigue may be essential to understanding vital exhaustion, fatigue is only one aspect of the broader construct. Thus, vital exhaustion is conceptually distinct from fatigue to some extent, but it is unclear whether fatigue is the most conceptually related correlate to vital exhaustion.

Lastly, vital exhaustion is commonly studied alongside depression due to their clear similarities. Both constructs are multidimensional conceptualizations associated with poor psychological well-being, and they share several definitional characteristics and representative aspects (Bianchi et al., 2017b). Namely, both constructs include elements associated with fatigue, worry, and negative self-perceptions (den Hollander-Gijsman et al., 2012; Nitschke et al., 2001; Vrieze et al., 2014). These similarities can also be seen in items of relevant measures, such as the Maastricht Questionnaire including, "Do you often have difficulty falling asleep?" (Appels and Mulder, 1989: 738) and the Beck Depression Inventory including an item with the option of, "I don't sleep as well as I used to" (Beck et al., 1996). Studies have also supported that the two constructs are very strongly related. In some cases, these observed relations are strong enough to suggest that the two constructs may be conceptually and empirically repetitive, such as Janszky et al. (2005) who found a correlation of 0.80 between vital exhaustion and depression. Thus, depression may be the most closely associated construct to vital exhaustion, and the two constructs may also be largely repetitive with each other.

Other authors have argued, however, that the two constructs are distinct and should both be included within relevant models (Hanebuth et al., 2012; Herr et al., 2022; Rafael et al., 2014). These authors often point to the slight differences between dimensions such as the inclusion of lack of pleasure in depression but not vital exhaustion. Igna et al. (2011) summarized many of these arguments by stating, "Depression has some specific symptoms (e.g. guilt and loss of self-esteem) that differentiate it from vital exhaustion. Therefore, as vital exhaustion is missing the cognitive aspects specific for depression, it could be speculated that the vital exhaustion scale is more focused on physiologic and mood aspects (fatigue, sleep disturbances, and irritability)" (p. 366). This observation does have merit when observing the items of relevant measures. The Beck Depression Inventory includes items that gauge guilt and perceptions of physical appearance, whereas no such items are present in the Maastricht Questionnaire. Likewise, the Maastricht Questionnaire includes more items that reflect physical well-being than depression scales. Thus, while a significant amount of content in definitions and measures are similar between vital exhaustion and depression, it could be argued that some nuanced differences exist.

The current article investigates the relation of vital exhaustion with these three constructs. We assess which relation is the strongest, and we also assess whether any of these relations are stronger than the relation of two vital exhaustion measures together. By doing so, we identify which theoretical domain associated with these three constructs may be most informative for future research on vital exhaustion, and we provide inferences into whether vital exhaustion is empirically repetitive with any of these three constructs. It should also be highlighted that our results may find that vital exhaustion is very strongly related but not repetitive with burnout, fatigue, or depression, which would provide significant theoretical insights. Namely, our results would identify the amount of variance shared between vital exhaustion and the alternative construct, providing the tools necessary for researchers to determine whether vital exhaustion provides added benefit to relevant models and analyses. A very strong relation could also suggest that

vital exhaustion is a particular form of the alternative construct, such as severe levels of depression, suggesting that future researchers should conduct psychometric investigations that may substantively alter theory. Due to the importance of these implications, we conduct a meta-analysis on the relations of vital exhaustion with burnout, fatigue, depression, and other commonly studied correlates to identify the nomological net of the construct and advance theory.

Method

Because the current investigation is a meta-analysis that did not involve the collection of primary data from participants, approval from an Institutional Review Board was not sought.

Searches and coding

We followed the recommendations of prior guides, reviews, and other prominent sources (Borenstein et al., 2021; Card, 2015; Harrer et al., 2021; Hedges and Olkin, 2014; Hunter and Schmidt, 2004; Pigott, 2012; Schwarzer et al., 2015) to conduct our meta-analysis, which was separated into three primary phases: searches, coding, and analyses. We conducted two searches using six different databases in March of 2024. The first search included the phrase, "vital exhaustion." The second search included the phrase, "Maastricht Questionnaire," as this was the measure applied in almost all studies of vital exhaustion. We investigated alternative search terms, but the results produced by these terms were almost entirely repetitive with sources already included in our meta-analytic database. For this reason, it was determined that our 12 total searches were sufficient in identifying most all research on vital exhaustion.

The six databases were: CrossRef, EBSCO, Google Scholar, OpenAlex, PubMed, and Semantic Scholar. These databases were chosen because each catalogs a unique subset of literature, such that their utilization together could identify the vast majority of extant research on vital exhaustion. Some of these databases are very broad, and they return a diverse scope of search results. For instance, EBSCO results the aggregate results of 47 different databases, including MEDLINE, Health Source, and APA PsycInfo. Some of these included databases are relatively narrow, and they were selected because they provide results specifically relevant to the study of vital exhaustion. For example, vital exhaustion is often studied as a result of medical condition or event (e.g. myocardial infarction), and PubMed catalogs sources in the medical sciences that would be relevant to this domain of research. By utilizing both types of sources, we better ensure that our database is representative of extant research on vital exhaustion.

The first 200 or 1000 results were retained from each of these searches, which was determined based on the relevancy of these results. That is, we coded the search results until a large number of sequential articles were entirely irrelevant to our purposes, and then chose to end the searches at either 200 or 1000 results. We also performed forwards and backwards searches of relevant articles, which includes reviewing articles that cited and were cited by prominent sources in our meta-analytic database. No undiscovered sources were found via this process.

Figure 1 provides a PRISMA flowchart for our coding process. Our initial list of search results included 6302 sources. This list was reduced to 3738 after duplicates were removed, which were coded in a multi-phase process to identify relevant sources. Sources were coded in the first phase of the coding process for whether they reported an empirical study that included the measurement of vital exhaustion. Two coders coded subsets of 20 articles until the interrater agreement cutoff was met (Cohen's κ > 0.80), and the two coders proceeded to code these articles independently, conferring when needed. This reduced the list of sources from 3738 to 531. Sources were coded in the second
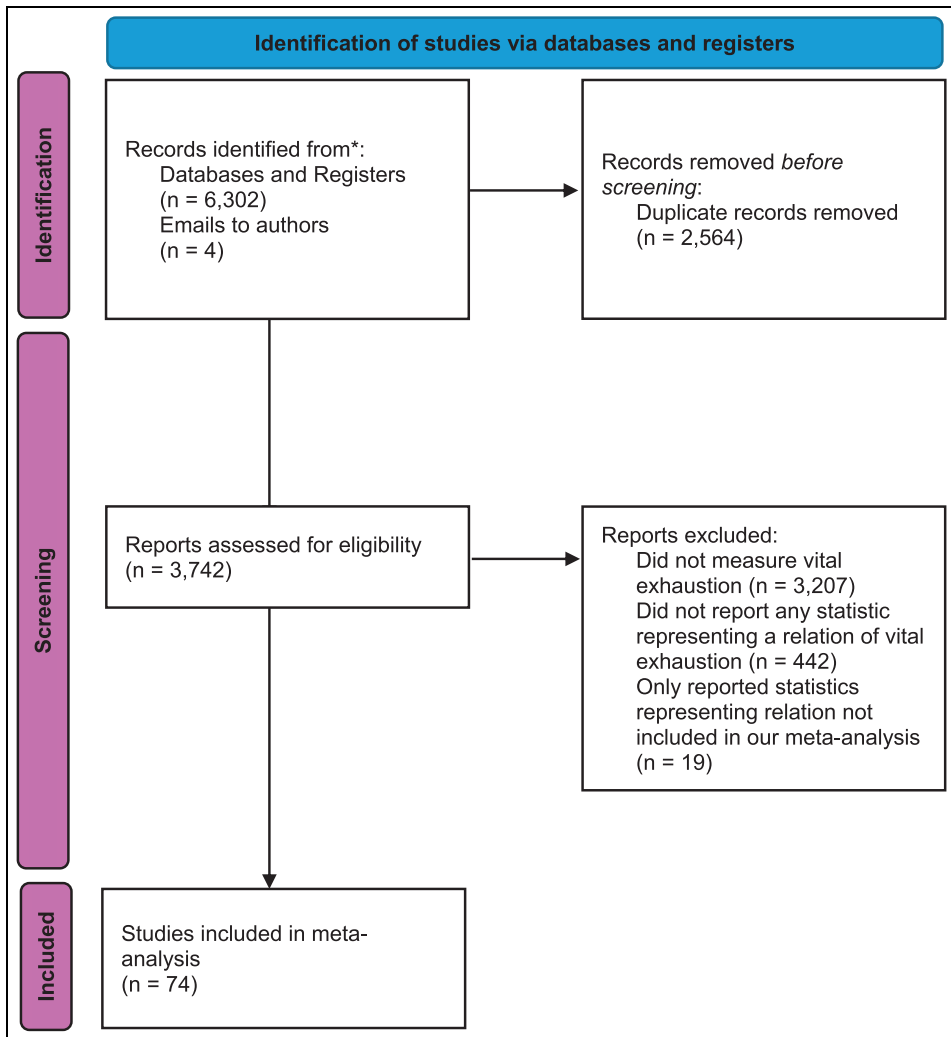
Figure 1. PRISMA flowchart of coding results.

phase for whether they reported any relation between vital exhaustion and a correlate, which was defined based on our description of these constructs above. This reduced the list of sources from 531 to 89. Effect sizes were recorded from these sources in the third phase of the coding process. Meta-analytic estimates were calculated for any relation represented by at least three studies; however, we only report the meta-analytic relations of vital exhaustion with constructs represented by four or more studies and the two dimensions of burnout represented by three studies, as most relations calculated with three studies involved constructs that were only moderately related to vital exhaustion and tangential to our focus (e.g. hostile affect and hopelessness). For this reason, this phase reduced our list of sources from 89 to 70, as some sources only studied relations not included in our meta-analytic estimates.

We emailed all contact authors for any additional sources not included within our final meta-analytic, whether published or unpublished. Many authors responded to indicate that no additional sources exist, but three did provide additional sources. This increased our meta-analytic database from 70 to 74 sources, which represents our final meta-analytic database. This number of sources is much larger than other meta-analyses on similar topics (Balog et al., 2017; Cohen et al., 2017; Frestad and Prescott, 2017; Strikwerda et al., 2021), supporting the robustness of our search and coding procedures. Supplemental Material A contains our final meta-analytic database, including all coding decisions for each source in our final meta-analytic database.

Analyses

Comprehensive Meta-Analysis V3 was used to convert all coded effect sizes into a common metric and calculate our primary meta-analytic estimates, which are reported as a sample-size weighted random effects correlation coefficient ($\bar{r}$). We chose a sample-size weighted random effects model because prior studies have supported that this approach better accounts for between-study variance, and it has subsequently been the recommended approach of many guides and reviews (Borenstein et al., 2010; Hedges and Vevea, 1998). We also corrected for unreliability using an artifact distribution method (Le et al., 2009; Schmidt et al., 2019; Wiernik and Dahlke, 2020). Using our final meta-analytic database, we coded the Cronbach's alpha of each construct, which was used to calculate their average Cronbach's alpha. This practice is recommended in contemporary guides and reviews (Le et al., 2009; Schmidt et al., 2019; Wiernik and Dahlke, 2020), indicating that we applied modern best-practices in correcting for unreliability. These figures were then used with the formula provided by Wiernik and Dahlke (2020) to correct for unreliability, and these corrected correlations are reported as $\bar{\rho}$.

We imputed the average effect size for the small number of studies that provided multiple effect sizes for the same relation. This approach is typical of most meta-analyses, but some authors have pointed out that it does not account for the non-independence of effects (Cheung, 2015; Jak, 2015). For this reason, Supplemental Material B reports sensitivity analyses using a three-level meta-analytic approach, which does not require effects to be averaged together and therefore accounts for any non-independence. All inferences were consistent between our primary analyses and these sensitivity analyses, supporting the robustness of our meta-analytic estimates. We report the more traditional sample-size weighted random effects results in the primary text due to their presence of reporting and ease of interpretation, and we report our alternative three-level meta-analytic analyses in the supplemental materials for readers who may be interested in this alternative meta-analytic approach.

Finally, we performed publication bias analyses. These were Begg and Mazumdar's rank correlation analysis using Kendall's τ with continuity correction, Egger's test, and the trim-and-fill method. Begg and Mazumdar's analysis and Egger's test estimates whether a relation exists between the magnitude of effects and their standard errors (Egger et al., 1997; Peters et al., 2006), wherein a significant relation suggests the presence of publication biases. The trim-and-fill method estimates whether undiscovered studies are likely to exist, and it also estimates the predicted meta-analytic estimates if those undiscovered studies were included (Duval, 2005; Duval and Tweedie, 2000). By performing multiple assessments of publication biases, we can better support the robustness of our estimates. We also calculated fail-safe k values, which estimate the number of undiscovered studies that would need to be discovered to notably sway the meta-analytic estimates. This statistic provides a numerical estimation

Table 1. Publication bias analyses.

Relation of Vital Exhaustion	# of sources	k	n	$\bar{\alpha}$	Fail-safe k	B&M	Egger's test		Trim-and-fill	
							β_0	t	Left of mean	Right of mean
1. Convergent validity	4	4	1445	0.85	1056	0.17	0.90	0.41	0	1
2. Emotional exhaustion	4	4	1152	0.89	799	−0.83	−0.53	2.81	0	1
3. Depression	48	59	30,963	0.84	>9999	−0.06	1.56	2.08*	0	6
4. Mental health	10	10	7812	0.87	7207	0.00	−1.76	1.41	1	0
5. Worry	5	5	785	0.91	224	0.00	2.95	4.88*	2	0
6. Stress	10	10	5229	0.72	3888	0.25	2.44	1.22	0	0
7. Sense of coherence	8	8	3858	0.77	2958	0.46	2.48	1.69	0	0
8. Anxiety	13	13	3983	0.78	4482	0.01	1.47	0.61	0	0
9. Self-esteem	6	6	4960	0.87	2329	0.00	−4.57	0.98	0	2
10. Fatigue	5	5	5991	0.88	2005	−0.10	6.81	1.15	0	1
11. Physical health	13	13	10,077	0.84	6525	−0.17	3.66	1.05	1	0
12. Depersonalization	3	3	1048	0.79	154	0.00	−8.90	1.42	0	0
13. Reduced personal accomplishment	3	3	1048	0.80	92	0.67	2.61	2.68	0	0

All statistical significance tests used two-tailed *p*-values.
*$p < .05$.

for the robustness of the meta-analytic results, and a larger fail-safe *k* is more supportive of the calculated estimates.

Results

From our procedures, we included 12 constructs in our meta-analysis. These were: emotional exhaustion, depression, mental health, worry, stress, sense of coherence, anxiety, self-esteem, fatigue, physical health, depersonalization, and reduced personal accomplishment. We also calculated a meta-analytic estimate for the relation of two vital exhaustion measures.

Assessment of publication biases

Table 1 provides the results of our publication bias analyses. Across the 13 estimated effects, the smallest fail-safe *k* value was 92. This suggests that a very large number of undiscovered studies would need to be identified to notably sway our interpretations, supporting the robustness of our findings. No Begg and Mazumdar's rank correlation analysis was statistically significant (all $p > 0.05$). Only two Egger's tests

were statistically significant (all $p < 0.05$), which were the relations of vital exhaustion with worry and depression. Only one trim-and-fill method suggested that a notable number of studies may be missing from our estimated effects (i.e. >2 studies), which was associated with the relation of depression. Given these findings, we provide meta-analytic estimates both with and without the estimated missing studies from the meta-analytic correlation of vital exhaustion and depression, which is calculated from the trim-and-fill method estimations. In this analysis, the missing studies were to the right of the mean, suggesting that authors were less likely to report relations of vital exhaustion and depression when they were stronger. This consideration is detailed further in our discussion section.

Primary results

Our primary meta-analytic results are provided in Table 2. The uncorrected correlations ranged from 0.71 to 0.33, whereas corrected correlations ranged from 0.83 to 0.40. Interestingly, the

Table 2. Meta-analytic results.

Relation of Vital Exhaustion	# of sources	k	n	$\bar{r}$	$\bar{\rho}$	95% CI	z-Value	p-Value	I^2
1. Convergent validity	4	4	1445	0.75	0.88	0.69, 0.80	15.21	<0.01	70.05
2. Emotional exhaustion	4	4	1152	0.71	0.82	0.68, 0.74	29.76	<0.01	0
3. Depression	48	59	30,963	0.70	0.83	0.67, 0.72	31.32	<0.01	93.85
4. Mental health	10	10	7812	−0.64	−0.74	−0.68, −0.60	−21.97	<0.01	82.69
5. Worry	5	5	785	0.61	0.69	0.43, 0.74	5.49	<0.01	78.87
6. Stress	10	10	5229	0.63	0.81	0.55, 0.71	10.77	<0.01	93.78
7. Sense of coherence	8	8	3858	−0.58	−0.72	−0.63, −0.53	−17.91	<0.01	75.56
8. Anxiety	13	13	3983	0.61	0.75	0.50, 0.69	9.32	<0.01	94.53
9. Self-esteem	6	6	4960	−0.53	−0.62	−0.59, −0.45	−12.03	<0.01	90.63
10. Fatigue	5	5	5991	0.53	0.61	0.39, 0.79	4.38	<0.01	98.72
11. Physical health	13	13	10,077	−0.44	−0.52	−0.53, −0.34	−7.49	<0.01	97.16
12. Depersonalization	3	3	1048	0.40	0.49	0.15, 0.60	3.02	<0.01	93.85
13. Reduced personal accomplishment	3	3	1048	0.33	0.40	0.28, 0.39	10.63	<0.01	5.68

Constructs listed in order of strength of meta-analytic relation with vital exhaustion. The effect of convergent validity reflects the removal of one outlier study.

strongest of these effects was a dimension of burnout, emotional exhaustion ($k = 5$, $n = 1287$, $\bar{r} = 0.71$, $\bar{\rho} = 0.82$; 95% CI [0.68, 0.73]), but the two weakest effects were also dimensions of burnout, depersonalization ($k = 3$, $n = 1048$, $\bar{r} = 0.40$, $\bar{\rho} = 0.49$; 95% CI [0.15, 0.60]) and reduced personal accomplishment ($k = 3$, $n = 1048$, $\bar{r} = 0.33$, $\bar{\rho} = 0.40$; 95% CI [0.28, 0.39]). Fatigue had only the ninth strongest relation with vital exhaustion of the 12 studied constructs ($k = 5$, $n = 5991$, $\bar{r} = 0.53$, $\bar{\rho} = 0.61$; 95% CI [0.39, 0.79]). Alternatively, depression had a very strong relation with vital exhaustion ($k = 58$, $n = 30,555$, $\bar{r} = 0.70$, $\bar{\rho} = 0.83$; 95% CI [0.67, 0.73]), and it was the second strongest relation of the 12 constructs. When corrected for potential publication biases, this relation became the strongest of the studied constructs ($k = 58$, $n = 30,555$, $\bar{r} = 0.72$, $\bar{\rho} = 0.85$; 95% CI [0.69, 0.75]). Thus, emotional exhaustion and depression are the two most related constructs to vital exhaustion.

Mental health ($k = 10$, $n = 7812$, $\bar{r} = -0.64$, $\bar{\rho} = -0.74$; 95% CI [−0.68, −0.60]), worry ($k = 5$, $n = 785$, $\bar{r} = 0.61$, $\bar{\rho} = 0.69$; 95% CI [0.43, 0.74]), stress ($k = 10$, $n = 5229$, $\bar{r} = 0.63$, $\bar{\rho} = 0.81$; 95% CI [0.55, 0.71]), and sense of coherence ($k = 8$, $n = 3858$, $\bar{r} = -0.58$, $\bar{\rho} = -0.72$; 95% CI [−0.63, −0.53]) produced similarly strong relations with vital exhaustion, each within a range of 0.05. Beyond these, anxiety ($k = 13$, $n = 3983$, $\bar{r} = 0.61$, $\bar{\rho} = 0.75$; 95% CI [0.50, 0.69]) and self-esteem ($k = 6$, $n = 4960$, $\bar{r} = -0.53$, $\bar{\rho} = -0.62$; 95% CI [−0.59, −0.45]) provided strong and only somewhat smaller relations, whereas the relation of physical health and vital exhaustion was notably smaller ($k = 13$, $n = 10,077$, $\bar{r} = 0.44$, $\bar{\rho} = 0.52$; 95% CI [0.53, 0.34]) and approached the weakest relations of the 12.

Lastly, the uncorrected correlation of two vital exhaustion measures together was 0.75 ($k = 4$, $n = 1445$, $\bar{r} = 0.75$, $\bar{\rho} = 0.88$; 95% CI [0.69, 0.80]). Difference tests comparing the correlations of vital exhaustion with emotional exhaustion ($p = 0.03$) and depression ($p < 0.01$) to this correlation were statistically significant, indicating that the relation of two vital exhaustion measures is stronger than the relation of vital exhaustion with either emotional exhaustion or depression; however, the magnitude of these effects are very similar.

Discussion

The primary goal of the current article was to meta-analytically assess the relation of vital exhaustion with its most proximal correlates, as the results of this analysis could better position vital exhaustion in its broader nomological network. Namely, authors have made differing proposals regarding whether vital exhaustion is most closely associated with burnout, fatigue, or depression (Bianchi et al., 2017a, 2017b; Rozanski and Cohen, 2017; Wingenfeld et al., 2009), causing uncertainty regarding how to position vital exhaustion in the contexts of relevant models, theories, and frameworks. By conducting an analysis that can provide robust insights into the nature of these relations, we bring much-needed clarity to the literature on vital exhaustion.

Via a meta-analysis of 73 sources and 215 effect sizes, we identified the immediate nomological network surrounding vital exhaustion. Our results demonstrated that the burnout dimension of emotional exhaustion was the most strongly related correlate to vital exhaustion, but the burnout dimensions of depersonalization and reduced personal accomplishment were the two weakest related correlates of the 12 studied constructs. While not enough studies reported the overall relation of burnout and vital exhaustion to meta-analyze, these three results together suggest that vital exhaustion is not strongly related to most aspects of burnout, and burnout as a whole is not a proximal correlate to vital exhaustion. Alternatively, the relation of vital exhaustion with depression was almost equally as strong as its relation with emotional exhaustion, indicating that depression is indeed a proximal correlate of vital exhaustion. Therefore, vital exhaustion should be recognized as most conceptually similar to emotional exhaustion and depression, better placing it within its nomological network of related constructs.

Additional analyses demonstrated that the relations of vital exhaustion with emotional exhaustion and depression were significantly weaker than the relation of two vital exhaustion measures together. This suggests that vital exhaustion is distinct from these two constructs, but it should nevertheless be recognized that the magnitudes of these effects were exceedingly similar. The unreliability corrected meta-analytic correlation of two vital exhaustion measures together was 0.88, indicating that 77% of their variance is shared (0.88^2). The unreliability corrected meta-analytic correlations of vital exhaustion with emotional exhaustion and depression were 0.82 and 0.83, respectively. The amount of variance shared between vital exhaustion and emotion exhaustion was 0.67 (0.82^2), and the amount of variance shared between vital exhaustion and depression was 0.69 (0.83^2). These results indicate that vital exhaustion shares 8%–10% of variance more with measures of itself than with measures of these two alternative constructs, which is a relatively modest amount of unique variance. While vital exhaustion is a distinct construct, the extensive variance shared with emotional exhaustion and depression likely causes most results on vital exhaustion to generalize to these two correlates—and vice versa. This also suggests that theory for one construct may inform the others, given their close empirical ties.

Additionally, constructs associated with psychological well-being or psychological strain were strongly related to vital exhaustion, but to a somewhat weaker extent than emotional exhaustion and depression. These constructs included mental health, worry, stress, sense of coherence, anxiety, and self-esteem. These results indicate that vital exhaustion is more conceptually associated with psychological states specifically associated with low energy, dejected affect, and negative self-perceptions (e.g. emotional exhaustion and depression), rather than constructs associated with either general psychological well-being (e.g. mental health, sense of coherence, self-esteem) or psychological strain (e.g. worry, stress, and

anxiety). It should also be recognized that these three studied psychological strain correlates are more associated with negative and high arousal, whereas emotional exhaustion and depression are more associated with negative and low arousal. As also discussed below, these differences may partially explain the pattern of results observed in our meta-analytic estimates.

Lastly, the two constructs associated with physical well-being, fatigue and physical health, produced among the weakest relations with vital exhaustion, as they produced the 9th and 10th strongest relations of the 12 studied correlates. Fatigue is a component of vital exhaustion, but the construct is more than fatigue alone. This finding also suggests that vital exhaustion is less related to correlates describing physical states alone (e.g. fatigue and physical health), although it is known to emerge from medical events. Vital exhaustion should be viewed as both a physiological and emotional phenomenon rather than a physical phenomenon alone.

Theoretical implications and future research directions

Vital exhaustion and burnout. Our findings provide a novel perspective regarding the relation of vital exhaustion and burnout. As mentioned, the WHO (1993) defines burnout as, "a state of vital exhaustion" (p. 1018); however, our results suggest that vital exhaustion and burnout are certainly not one and the same, as vital exhaustion was only moderately related to two dimensions of burnout. This definition of burnout should be altered to more accurately reflect the construct, namely a higher-order construct represented by emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach and Goldberg, 1998; Maslach et al., 2001; Rozanski and Cohen, 2017). Future researchers should perform comparative studies that explore the differences in relations of burnout and vital exhaustion, as prior authors may have assumed that these relations would

be almost entirely concordant based on these previous (mis)conceptualizations. Researchers should give special attention to outcomes that may be more closely associated with depersonalization and reduced personal accomplishment, as these are the aspects that would cause vital exhaustion and burnout to produce the most dissimilar relations. In doing so, evidence could be obtained for the relative distinctness of the two constructs. These studies are especially pertinent given that our searches found that not enough authors investigated the relation of vital exhaustion with the second-order construct of burnout to meta-analyze, which represents a clear gap in the literature.

Our findings also enable a more accurate interpretation of the association between vital exhaustion and burnout. Vital exhaustion was only moderately related to depersonalization and reduced personal accomplishment, but exhaustion shared a very strong relationship with emotional exhaustion that approached an indicator of convergent validity. This finding suggests that vital exhaustion may largely represent a dimension of burnout, rather than the construct in its entirety. As this finding runs counter to extant suggestions (Bianchi et al., 2017a; Rozanski and Cohen, 2017; Wingenfeld et al., 2009), further psychometric investigations are needed to parse these relations. Future researchers should investigate the simultaneous associations of vital exhaustion with all burnout dimensions together, such that it could be tested whether these relations still hold when assessing the shared variance of all the constructs at the same time. It is possible—if not likely—that the modest relations of vital exhaustion with depersonalization and reduced personal accomplishment are reduced to non-significant relations when accounting for the variance explained by emotional exhaustion.

If it is found that vital exhaustion does not provide predictive benefits beyond emotional exhaustion, this result would suggest that vital exhaustion is even less related to burnout as a whole, and it should even further be viewed as

only corresponding to a single portion of the broader construct. Researchers would then need to reconcile whether the two are repetitive enough to no longer study as independent constructs, and future research could then proceed in a more directed and unified manner. Specifically, researchers would need to consider the phenomenological nature of the constructs. While vital exhaustion is characterized by both "physiologic and mood aspects" (Igna et al., 2011: 366), emotional exhaustion is defined as a state of "physical and emotional depletion" (Wright and Cropanzano, 1998: 486), and both are known to emerge as a result from prolonged stress or emotional strain. These descriptions detail largely the same concepts, and future researchers must parse their differences if they intend to study them as separate phenomenon. In doing so, these researchers should also perform focused psychometric investigations to probe the dimensional differences between these two constructs, as the primary differences between these constructs may be the inclusion or exclusion of individual dimensions. Researchers should also test nonlinear relations to assess whether vital exhaustion is the manifestation of severe emotional exhaustion, as the former typically emerges after medical events and the latter is known to emerge from everyday stressors, like job strain.

It should also be recognized that vital exhaustion was much more strongly related to emotional exhaustion than fatigue, and the relations of vital exhaustion with fatigue and physical health were among the weakest observed effects. These results may be surprising to readers, as vital exhaustion is known to arise from certain physical ailments and medical events, such as myocardial infarction (Deter et al., 2021; Fieres et al., 2022; Shah et al., 2021). Although vital exhaustion may arise from these occurrences, it becomes a psychological state that is distinct from its physical origins. For this reason, theories solely focused on physical well-being may be relatively limited in understanding vital exhaustion, and instead theories

that can explicate the psychological mechanisms that arise from detrimental physical and mental states are more apt.

Vital exhaustion and depression. Depression produced the strongest unreliability-corrected meta-analytic correlation with vital exhaustion, suggesting that it is among the most conceptually related constructs to vital exhaustion. Due to their close association, theories used to understand depression may be particularly useful for understanding vital exhaustion. For instance, the cognitive theory of depression has been broadly supported to detail the occurrence and dynamics of depression (Haaga et al., 1991; Hards et al., 2020; Kwak et al., 2016). Among other proposals, the cognitive theory of depression suggests that people's systematic tendency to perceive, recall, and think about events in a particularly negative light causes them to be particularly vulnerable to stressors, which causes them to be more likely to experience depression when experiencing these events (Haaga et al., 1991; Hards et al., 2020; Kwak et al., 2016). Vital exhaustion may function in a similar manner. That is, not everyone may experience vital exhaustion from a medical occurrence, but a person who is predisposed to negative thoughts may be more likely to experience vital exhaustion in this circumstance. This cognitive association may also explain why vital exhaustion was more strongly related to psychological rather than physical correlates, but this possibility is only a suggestion without further studies. Future researchers should test the relation of vital exhaustion with individual differences associated with systematic ways of perceiving, recalling, and thinking. In doing so, the cognitive theory of depression could be supported to generalize to vital exhaustion, but researchers could also identify who may be particularly vulnerable to vital exhaustion— enabling the creation of upstream interventions.

In performing these studies, researchers should also replicate prior results on vital

exhaustion while accounting for depression. The importance of vital exhaustion in the recovery process, for example, becomes less evident with accounting for depression, as it may instead be depression that explains participant outcomes. While extant research has more often considered whether burnout needs to be accounted for in research on vital exhaustion, our results suggest that the focus should instead be shifted onto depression. In conducting these investigations, researchers should likewise test whether vital exhaustion and depression are too conceptually related to meaningfully differentiate. If the two are repetitive, then future research may seek to investigate the role of depression instead of vital exhaustion in the recovery process, as much more is known about depression that could be leveraged to develop more effective interventions.

Like emotional exhaustion, we also recommend that future researchers should consider the conceptual distinction of the two constructs. Igna et al. (2011) argued that the two constructs are sufficiently distinct, as depression includes cognitive aspects and vital exhaustion places a greater focus on physiologic and mood aspects. Psychometric investigations can provide further insights into whether the two constructs are distinct, but they can also assess whether these specifically referenced aspects indeed cause the two constructs to be distinct. In other words, researchers should test which dimensions of vital exhaustion and depression scales may cause the two constructs to be distinct. Also, researchers should test nonlinear relations between vital exhaustion and depression. Because the former is known to emerge in particularly dire circumstances, it may be an extreme version of the latter. Likewise, researchers should test the relation of vital exhaustion and specific types of severe depression, such as treatment-resistant depression (McIntyre et al., 2023). Many of these more extreme versions have only recently been differentiated as unique phenomenon, but they may be conceptually and empirically repetitive

with the construct known to emerge in extreme circumstances: vital exhaustion.

Vital exhaustion and other correlates. Our results indicate that future researchers should explore the broader nomological network between all studied constructs. As several had a very strong association with vital exhaustion, it is likely that they likewise have very strong associations with each other, which is not properly recognized in the current literature. Of note, our results suggest that emotional exhaustion and depression are also very strongly related with each other, implying that this aspect of burnout may also conceptually overlap with depression. While authors have repeatedly posed whether burnout as a whole is repetitive with depression, it may instead be that only this dimension is repetitive, which would bring clarity to ongoing debates on this topic (Bianchi et al., 2015; Chen and Meier, 2021; Koutsimani et al., 2019). Like vital exhaustion, researchers should perform dimensional assessments of burnout with depression to obtain a finer-grained assessment, perhaps even through a meta-analytic approach with sufficient primary studies.

Similarly, the constructs of mental health, worry, stress, sense of coherence, anxiety, and self-esteem each produced very strong relations with vital exhaustion, but these effects were weaker than those of emotional exhaustion and burnout. We suggest that the primary differences among these constructs may be their arousal (e.g. high or low), and associated theory on arousal may be effective in detailing the broader nomological network of vital exhaustion. For instance, generalizing pleasure-arousal theory may be able to effectively predict the magnitude of these relations, which suggests that the valence and arousal of emotions are primary determinants of their quality (Reisenzein, 1994). It may be that states associated with unpleasurable and low arousal are most related to vital exhaustion, whereas those associated with pleasurable and/or high arousal are least related. Future research should explore this

possibility. If supported, the findings would suggest that the broader proposals and prior findings associated with pleasure-arousal theory may likewise be effective in predicting the effect of vital exhaustion, leading to novel insights about antecedent effects and methods to reduce vital exhaustion.

Practical implications

Researchers have developed a number of interventions to reduce vital exhaustion that demonstrate a wide range of effectiveness. Some have been shown to have little to no influence on vital exhaustion despite the best intents of researchers, whereas others have been shown to greatly reduce vital exhaustion. Authors have yet to identify which characteristics differentiate these effective interventions from ineffective interventions. Based on the current findings, the effective interventions may have targeted the more central aspects of vital exhaustion, such as providing therapy to counteract core feelings of negative and low arousal; whereas the ineffective interventions may have targeted the more extraneous correlates of vital exhaustion, such as attempting to resolve feelings of reduced personal accomplishment. Future researchers and practitioners should use the current investigation as a lens to understand extant interventions to reduce vital exhaustion, and they should systematically assess whether this perspective can differentiate the (in)effective interventions from each other. Once discovered, researchers can then use this lens to develop more effective interventions that specifically target the aspects discovered to be particularly influential for reducing feelings of vital exhaustion.

Future researchers can also use the present investigation as justification to adapt prior interventions for addressing emotional exhaustion and depression. Namely, extant interventions on vital exhaustion often differ on whether psychological therapy is provided to participants, and when it is, these investigations also greatly differ regarding the nature and duration of the provided therapy. Now that vital exhaustion is known to be closely tied to emotional exhaustion and depression, prior therapy techniques (along with their duration and frequency) known to be effective to reduce emotional exhaustion and depression can be used for those experiencing vital exhaustion. Extensive scholarship has discussed the best approaches to cognitive-behavioral therapy in reducing emotional exhaustion and depression, which may likewise be effective in reducing vital exhaustion (Etzelmueller et al., 2020; Karyotaki et al., 2021). Adapting these interventions may provide sizable theoretical insights, but it may also provide immediate benefits to those recovering from medical experiences that are known to produce vital exhaustion.

Limitations and future research directions

As with any study, certain limitations should be noted. We believe that the meta-analysis methodology is most appropriate to investigate our research questions. We were interested in identifying which constructs are most conceptually related to vital exhaustion, and it is reasonable to assume that the most relevant constructs would be those most often studied in prior research; however, meta-analyses are indeed bound by the extant literature, and certain relations could not be studied due to their infrequency of study. Future researchers should replicate the current findings after additional studies on vital exhaustion have been conducted, as it is possible that novel relations could be tested after the completion of additional primary studies.

Meta-analyses are influenced by the decisions of the researchers, and we applied modern recommended practices in conducting our meta-analysis to help ensure the accuracy of our results. We underwent extensive search procedures to discover relevant sources; we required coders meet a sufficient level of interrater agreement to support the accuracy of our coding process; and we conducted a multitude

of sensitivity analyses to confirm that our results were not due to our analytical decisions. Nevertheless, some readers may prefer differing approaches to meta-analyses. For this reason, we recommend that readers utilize our Supplemental Material A to reconduct our analyses with alternative analytical decisions, such that readers can assess whether these alternative approaches indeed produce differing results. We believe that any replications of our analyses would produce consistent inferences, and any such analyses would further support the robustness of our findings as did our sensitivity analyses.

Conclusion

Extant research has demonstrated considerable uncertainty regarding the placement of vital exhaustion within its nomological network of correlates, with authors considering the construct more associated with either burnout, fatigue, or depression. Our results demonstrated that vital exhaustion is most associated with emotional exhaustion and depression, and it is less related to fatigue and the other dimensions of burnout. Vital exhaustion should be conceptualized alongside other constructs that reflect negative and low arousal states, thereby more firmly placing vital exhaustion in its nomological net of related constructs. With this insight, research can reliably progress in a more direct manner on vital exhaustion, as our meta-analysis provided robust insights via the aggregation of 73 sources and 215 effect sizes.

Data sharing statement

All data used for this review article are provided in the supplementary materials.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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