

Author's Accepted Manuscript

CURRENT PSYCHOLOGY

Physical and psychological health relations to engagement and vigor at work: A prisma-compliant systematic review

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<https://doi.org/10.1007/s12144-021-01450-y>

Cite this article as:

Cortés-Denia, D., Lopez-Zafra, E., & Pulido-Martos, M. (2023). Physical and psychological health relations to engagement and vigor at work: A prisma-compliant systematic review. *Current Psychology*, 42, 765-780. <https://doi.org/10.1007/s12144-021-01450-y>

**Physical and psychological health relations to engagement and
vigor at work: A PRISMA-compliant systematic review**

Running Head: **Work** engagement and vigor at work

ACCEPTED MANUSCRIPT

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Abstract

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Positive occupational health psychology emphasizes the need to analyze variables that promote workers' health. From this perspective, work engagement is a positive emotional-motivational state in employees, and vigor at work is a positive affective response to continuous interactions among different elements of the work environment. Despite the relation of both constructs to health implications, the ways in which they are related to different health categories (psychological health, psychological disorder symptoms, physical health, health-related behavior and overall health) may vary. Given that they are different constructs, they could affect health in different ways. Thus, we undertake a PRISMA-compliance systematic review to analyze the possible differing impact of work engagement and vigor at work on workers' health. The search, drawn from four electronic databases, was refined and 70 papers on work engagement and 9 papers on vigor at work were finally analyzed. The results show that both constructs are relevant in health, implying improvements in all categories, except for the psychological disorder symptom in which no vigor studies were found. However, the influence of both constructs is different. Specifically, vigor at work has greater involvement in physical health, leading to lower high-sensitivity C-reactive protein levels, fibrinogen levels, hyperlipidemia risk, diabetes mortality risk and physical symptoms, as well as health-related behavior, leading to less insomnia, more physical activity and more physical exercise. Work engagement is mostly related to psychological health, leading to improved well-being and life satisfaction as well as a lower risk of suffering from stress, anxiety, depression, fatigue and psychological tension.

Key terms: Work engagement, health, systematic review, vigor at work.

Introduction

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The study of occupational health originally focused on identifying, evaluating and preventing different diseases and/or accidents within the work environment (Sauter, Murphy, & Hurrell, 1990; Wright & Cropanzano, 2000). However, this approach provided a very limited vision, focusing exclusively on negative aspects, thus excluding different positive mechanisms that could be involved in fostering optimum well-being among workers (Bakker & Rodríguez-Muñoz, 2012). Therefore, occupational health psychology focuses on factors that can improve the physical and mental health of workers, which, along with well-being and positive factors (such as strengths and personal resources) (Cleary, Schafer, McLean, & Visentin, 2020; Macik-Frey, Quick, Quick, & Nelson, 2009; Verbeek et al., 2019), has led a new paradigm, i.e., positive occupational health psychology (POHP). POHP focuses on the study of affective management and optimal individual and group functioning within organizations. The objective of POHP research is to provide insight into potential positive and health-promoting factors that can enhance well-being at work without paying exclusive attention to the negative aspects (e.g., labor demands, risk factors, burnout) (Bakker & Derks, 2010; Bakker & van Woerkom, 2018; Christensen, Saksvik, & Karanika-Murray, 2017; Fullagar & Kelloway, 2012). For all these reasons, research has tried to unify both streams, developing models or integral theories that could include both the negative and positive organizational aspects that may have implications for one's health and well-being at work. The Job Demands-Resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) can explain how the interaction of labor demands (e.g., physical and/or psychological workload) and labor resources (such as social support, development opportunity and worker growth) can lead to direct and indirect effects on the health of workers. Despite the fact that the JD-R model suggests that health impairment and motivational processes are independent, Schaufeli and Taris (2014) suggest that they may represent two sides of the same coin, indicating that when there is a deterioration in health, motivation is reduced and vice versa. With a similar structure and objectives, the Conservation of Resources (COR) theory (Hobfoll, 1989) explains how people strive to obtain, maintain, protect and promote different resources (material/economic, social or energetic) that would be highly valued by the individual and fundamental in the protection of health. Vigor at work (Shirom, 2004) stems from this model and may be a fundamental affective variable in the promotion and protection of resources, thereby providing and increasing the health of employees (Adrian, Adler, & Metzler, 2018).

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Based on these integrative perspectives, work engagement (Schaufeli, Salanova, González-Romá, & Bakker, 2002) and vigor at work (Shirom, 2004) are relevant constructs for their contributions to occupational health. Originally, these two constructs were derived from Kahn's conceptualization of engagement, defined as "the harnessing of organization members' selves in their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performance" (Kahn, 1990, p. 694) and comprising cognitive, physical and emotional dimensions that are linked to work. Vigor (Shirom, 2004) maintained a more faithful approach.

Advances in research on engagement have led to new meanings, such as that contributed by Schaufeli et al. (2002), in which work engagement was defined as a positive and persistent emotional-motivational state in employees, characterized by vigor (i.e., energy levels, will effort and resilience at work); dedication (feelings of enthusiasm, challenge and pride); and absorption (state of concentration and immersion in the task, with the perception that time passes very quickly). The main instrument to measure engagement is the Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2002), which measures the three dimensions of engagement. Regarding research, various studies have found a positive relation between work engagement and perceived health (Hakanen, Bakker, & Schaufeli, 2006; Langseth-Eide, 2019; Panthee, Shimazu, & Kawakami, 2014; Schaufeli & Bakker, 2004; Schaufeli, Taris, & van Rhenen, 2008). Moreover, another study indicated that work engagement enhances the resources that serve to cushion the negative effects of demands on health (Bakker & Demerouti, 2017). Despite these results, from its development until now, several modifications have been addressed, and the validity of the construct has been widely investigated (Schaufeli, Martínez, Pinto, Salanova, & Barker, 2002; Schaufeli et al., 2002; Schaufeli, Shimazu, Hakanen, Salanova, & De Witte, 2019) due to the criticism of this construct as it emerges as the opposite extreme of burnout (Maslach, 1998; Maslach, Schaufeli, & Leiter, 2001). Specifically, Tetrick (2002) argued that the mechanisms underlying poor health (i.e., burnout) are unlikely to be part of the optimal health status of workers. Moreover, Shirom (2004) described drawbacks in the conception of the measure and in its relationship with other psychological constructs, such as motivation and resilience, suggesting that work engagement may be confused with high levels of vigor and considering it a repackaging of similar constructs (Macey & Schneider, 2008).

Considering the limitations of the research on work engagement, Shirom (2004) describes vigor at work as a positive affective response to the continuous interactions of different significant elements in the work environment, which clearly differs from the vigor dimension of work engagement, as people can

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experience vigor at work regardless of their psychological recovery capability to cope with adverse events (resilience and motivation). Within this approach, vigor is composed of three interconnected components: physical strength (an individual's physical abilities), emotional energy, (ability to show or express empathy, sympathy and compassion for others) and cognitive liveliness (mental agility and ability to contribute new ideas), such that if one of these components increases, it often results in the increase of the others. Subsequently, Shirom (2011) proposes a theoretical mediational model that identified and hypothesized antecedents and consequents implied. The possible antecedents include organizational, group and individual resources, whereas possible consequences include satisfaction at work, physical and mental health, performance and organizational efficiency, always taking into account various moderators (i.e., genetic, psychological and personality factors) that may be present in this moderating relationship. The Shirom-Melamed Vigor Measure (SMVM; Shirom, 2004) measures vigor and evaluates the three dimensions. Since its development, several studies have shed light on the possible connections between vigor and different components of workers' health, finding that high levels of vigor have been related to better self-rated health (Shirom, Toker, Berliner, Shapira, & Melamed, 2008), a lower risk of diabetes (Shirom, Toker, Jacobson, & Balicer, 2010) and lower insomnia problems (Armon, Melamed, & Vinokur, 2014).

Despite the theoretical discrepancies, it seems clear that **work** engagement and vigor at work emerge as concepts to explain different positive and healthy results within organizations. However, in accordance with the World Health Organization (WHO; 1946), health is “a state of complete physical, mental, and social well-being, and not just the absence of conditions or diseases” (p. 1). Thus, considering this complete and complex definition of health, it seems interesting to operationalize this concept. In this vein, Testa and Simonson (1996) took into account two evaluations, namely, one objective measure of the state or functioning of health and another subjective measure of the physical, psychological and social areas of health. Based on this approach, Ford, Cerasoli, Higgins and Decesare (2011) operationalized, in detail, the concept of health in different categories, such as psychological health (as psychological well-being, life satisfaction, depressive symptoms, anxiety and fatigue), psychological disorder symptoms (as psychological pathologies), physical health (in relation to somatic symptoms, blood pressure and obesity), health-related behavior (physical activity, consumption of different substances and sleep), and overall health (related to general health and well-being). **Despite work engagement and vigor at work have**

health implications, the relevance and implications of each of them in these different health categories are not clear.

Research question and objective

Given that they are different constructs, they might influence health in a different way. In fact, presenting high levels of work engagement or vigor at work could lead to positive consequences on the health of workers, as these constructs may act as an antecedent, a moderating-mediating variable, or a buffer variable. However, there is no other review about these two similar but different approaches, this study could help scientists better capture their essence. Thus, it is necessary to conduct an updated systematic review to offer a clear theoretical and practical understanding of work engagement and vigor, along with their implications for the different health categories, which could help and encourage researchers and professionals to develop and implement intervention programs aimed at improving different organizational outcomes involved in promoting optimum health of workers. Our starting hypothesis, from our knowledge, could be that vigor at work may have a greater implication on physical health, the workers who experience high levels of vigor could produce an increase in their energy strength, promoting a proactive and healthy behavior, whereas work engagement may influence psychological health, directing their efforts towards achieving goals and to obtain results within the organization, improving their well-being at work. However, this should be tested and analyzed in depth. Systematic reviews are an adequate method to identify, appraise and synthesize all available research that is relevant to this review question.

In sum, the general purpose of this systematic review was to analyze the relationships of work engagement and vigor at work separately in the different categories of health proposed by Ford et al. (2011) at work (psychological health, psychological disorder symptoms, physical health, health-related behavior and overall health) and their implications for workers. Moreover, addressing the differences and/or overlapping areas of these two approaches could help to clarify the implications of following one specific approach.

Method

Search strategy

In the absence of a review protocol in the Prospective Register of Ongoing Systematic Reviews (PROSPERO) about vigor and work engagement and health in workers, a systematic review of all published articles was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, Altman, & Group, 2009) (pending registration response in PROSPERO). The PubMed, PSYCArticles and PSYCInfo specialized databases were searched, and the Google Scholar database was searched for gray literature.

Selection of studies for inclusion

The keywords were vigor and work engagement, along with terms related to work (work, job and workplace), health (psychological, physical and overall), and symptoms of psychological diseases and health-related behavior (Ford et al., 2011) (see Table 1). The criteria for inclusion in the selection of papers was that they had to be empirical studies, be published before May 2020, be written in English or Spanish, use the UWES or SMVM as a measuring instrument and include samples composed of workers (or equivalent) completing a work activity (i.e., trainees). For the search of the keywords in the databases, the criterion was that they had to be in any field except full text. Based on these criteria, the eligibility of the potential studies was checked by three researchers (screening by two reviewers, and a third as a tiebreaker to assure methodological quality assessment). Finally, studies were included by consensus.

INSERT TABLE 1

Results

The search yielded a total of 14,021 studies (13,186 about work engagement; 835 vigor). After duplicates were eliminated using the bibliographic manager Mendeley, 7,570 studies related to work engagement were retained, and 375 studies related to vigor were retained (see Figure 1). Subsequently, titles and abstracts of these studies were screened, after which 7,225 studies about work engagement and 342 studies about vigor were excluded, as they did not meet the inclusion criteria for the selection of the articles. Once the full texts of the remaining studies were reviewed, 275 work engagement papers and 24 vigor papers did not meet the inclusion criteria and thus were excluded. Overall, the final sample was composed of 70 articles about work engagement (49 cross-sectional studies, 18 longitudinal studies and 3 diary studies) and 9 articles about vigor (8 longitudinal studies and 1 cross-sectional study). Based on the objective of the review, the included studies are characterized by analyzing the effects of

vigor/engagement on health or examining the correlations among the variables without indicating directionality between them.

INSERT FIGURE 1

In Table 2, the studies analyzing the implications for work engagement are displayed, whereas Table 3 shows studies focused on vigor. The tables show the references and locations of the studies, the sample and work reported (N), the temporal measure, the design, the health category (Ford et al., 2011) and the results obtained.

INSERT TABLE 2

INSERT TABLE 3

Studies about work engagement and vigor in health categories

Figure 2 shows the proportional percentage of the prevalence in each category for engagement and vigor. For studies related to work engagement, the most commonly studied health category was psychological health (69.3%), followed by physical health (14.1%), overall health (6.4%), symptoms of psychological disorders (5.1%) and health-related behaviors (5.1%), whereas for vigor, the most commonly studied health category was physical health (46%), followed by health-related behaviors (31%), psychological health (15%), and overall health (8%). These percentages help us understand the importance given to each category, as each paper could include more than one category. In the following, we analyze the areas examined by the included studies.

INSERT FIGURE 2

Psychological health

In this category, research mainly focuses on the study of psychological well-being, life satisfaction, depressive symptoms, anxiety and fatigue. In sum, work engagement has been shown to be negatively related to depression or depression symptoms (Agarwal & Karpouzian, 2016; Bakhshi & Gupta, 2016; Hakanen & Schaufeli, 2012; Hakanen, Schaufeli, & Ahola, 2008; Salmela-Aro & Upadaya, 2018; Schaufeli et al., 2019; Schaufeli et al., 2008; Shimazu et al., 2008; Torp, Grimsmo,

1 Hagen, Duran, & Gudbergsson, 2012; Upadyaya, Vartiainen, & Salmela-Aro, 2016; Wang, Yip, & Chan,
2 2016), anxiety (Bakhshi & Gupta, 2016), fatigue symptoms (Boermans, Kamphuis, Delahaij, van den
3 Berg, & Euwema, 2014; Burić & Macuka, 2018; Shimazu et al., 2008), emotional symptoms (anxiety,
4 depression, and hostility) (Dugan & Barnes-Farrell, 2018), perceived stress (Fong & Ng, 2012; Ng, 2013;
5 Ravalier, 2018; Teoh, Hassard, & Cox, 2020) and psychological strain or job tension (De Carlo et al.,
6 2014; Hansen, Byrne, & Kiersch, 2014; Mäkikangas et al., 2014; Shimazu et al., 2008). Specifically, in
7 their diary study, Mäkikangas et al. (2014) found that employees who remained constantly vigorous
8 (measured with the vigor dimension of work engagement) recovered well from work stress during the
9 work week. In a similar vein, employees with common mental disorders who had higher levels of work
10 engagement were more likely to be in the fast recovery group (low anxiety and depressive symptoms)
11 (Arends et al., 2019). However, other studies indicated the absence of a relationship with anxiety
12 (Schaufeli et al., 2008), stress (Russo et al., 2014) and traumatic stress (Selye & Argentero, 2014). For that
13 reason, stress has been operationalized and analyzed based on different types and models of stress. Thus,
14 Selye (1974) differentiated between two types of stress: eustress, or positive stress, and distress, or
15 negative and unpleasant stress. From this perspective, different studies have found a negative relationship
16 between work engagement and distress (Oshio, Inoue, & Tsutsumi, 2018; Panthee et al., 2014; Sakuraya
17 et al., 2017; Schaufeli et al., 2019; Schaufeli et al., 2008; Shimazu & Schaufeli, 2009; Shimazu,
18 Schaufeli, Kamiyama, & Kawakami, 2015; Shimazu, Schaufeli, Kubota, & Kawakami, 2012; Wojdylo,
19 Baumann, & Kuhl, 2017). However, Shimazu, Schaufeli, Kubota, Watanabe and Kawakami (2018) found
20 a U-shaped curvilinear relation between work engagement and psychological distress. Specifically, low
21 levels of work engagement had a negative relationship with psychological distress, but at intermediate
22 levels, this relationship faded, while at higher levels, it had a positive relationship with psychological
23 distress. On the other hand, the study by Mason et al. (2014) indicated a lack of relationship with moral
24 distress; although their average moral distress score was high, no significant correlation was found. Work
25 engagement has also been positively related to well-being (Ananthram, Xerri, Teo, & Connell, 2018;
26 Vecina, Chacón, Marzana, & Marta, 2013; Yang, Feng, Meng, & Qiu, 2019), affective well-being
27 (Balducci, Fraccaroli, & Schaufeli, 2010), life satisfaction (Ariza-Montes, Leal-Rodríguez, Ramírez-
28 Sobrino, & Molina-Sánchez, 2019; Chughtai, 2018; Corso-de-Zúñiga, Moreno-Jiménez, Garrosa, Blanco-
29 Donoso, & Carmona-Cobo, 2017; De Simone, Cicotto, Pinna, & Giustiniano, 2016; Dugan & Barnes-
30 Farrell, 2018; Duran, Extremera, Montalbán, & Rey, 2005; Eldor, Harpaz, & Westman, 2016; Extremera,
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1 Durán, & Rey, 2005; Hakanen & Schaufeli, 2012; Karatepe & Karadas, 2015; Liu, Zeng, Chen, & Lan,
 2 2019; Salmela-Aro & Upadyaya, 2018; Sharma & Sharma, 2015; Shimazu & Schaufeli, 2009; Shimazu et
 3 al., 2015, 2012; Upadyaya et al., 2016; Williams, Wissing, Rothmann, & Temane, 2010) and mental
 4 health (Choi, Dabelko-Schoeny, Lee, & Bunger, 2020; Leijten et al., 2015; Parzefall & Hakanen, 2010;
 5 Simbula, 2010; Simbula & Guglielmi, 2013; Tisu, Lupşa, Virgă, & Rusu, 2020).
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10 In a similar vein, the construct of vigor formulated by Shirom (2004) presents some positive
 11 consequences on psychological health. Specifically, vigor has been related to a decrease in depression
 12 symptoms (Adrian et al., 2018), less experienced stress and emotional symptoms (anxiety, depression,
 13 and hostility) as well as greater life satisfaction (Dugan & Barnes-Farrell, 2018).
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20 *Psychological disorder symptoms*

21 This category includes the study of psychopathological variables and symptoms. In this category,
 22 we only found studies under the work engagement approach. Inamura et al. (2016) found a U-shaped
 23 association between the risk of a major depressive episode and work engagement. Specifically,
 24 participants who had low and high levels of work engagement showed a higher risk of having a major
 25 depressive episode. This adverse effect on health in participants who presented high levels of work
 26 engagement could be due to an addiction to work. Moreover, high levels of work engagement have been
 27 negatively related to phobic anxiety in the workplace (Vignoli, Muschalla, & Mariani, 2017) and suicidal
 28 ideation (Wang et al., 2016) and positively related to the absence of minor psychiatric symptoms
 29 (Mazzetti, Vignoli, Petruzzello, & Palareti, 2019).
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42 *Physical health*

43 Studies under this category focus on health variables related to somatic symptoms, blood
 44 pressure and obesity. Work engagement has been shown to be positively related to physical health
 45 (Leijten et al., 2015) and negatively related to somatic and physical symptoms (Bakhshi & Gupta, 2016;
 46 Dugan & Barnes-Farrell, 2018), systolic blood pressure and heart rate reactivity (Black, Balanos, &
 47 Whittaker, 2017), symptoms of risk of repetitive strain injury (visual fatigue, muscle stiffness, discomfort
 48 in the neck, shoulders and/or upper back) (Schultz, Mostert, & Rothmann, 2012), and high-sensitivity C-
 49 reactive protein levels (hs-CRP; increased levels of this protein in the blood would lead to inflammation).
 50 Specifically, participants who presented higher levels of labor engagement showed lower odds ratios of
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having high hs-CRP levels (Eguchi et al., 2015). However, no significant relationships have been found between work engagement and the stress biomarkers of cortisol, alpha-amylase levels and diastolic blood pressure (Black et al., 2017; Nislin et al., 2016). In another study, a negative correlation was found between work engagement and heart rate; nevertheless, linear regression analysis revealed that this finding was not statistically significant, but there was a significant positive effect on the high-frequency power of heart rate variability (i.e., parasympathetic activity). This result suggests that work engagement is associated with particularly increased parasympathetic activity (Seppälä et al., 2012). In this regard, work engagement has been negatively related to different health problems (including headaches, cardiovascular problems, and stomach ache) (Schaufeli & Bakker, 2004). However, there are discrepancies with health complaints. Some studies indicate that work engagement has negative effects on physical health (Schaufeli & Bakker, 2004; Shimazu et al., 2008), whereas Schaufeli et al. (2008) found a positive relationship between the two constructs, specifically with the dimensions of vigor and dedication. Nonetheless, the correlations between work engagement and perceived ill-health were negative, suggesting that this positive result was a statistical artifact that should not be further interpreted (Schaufeli et al., 2008).

In the case of vigor, negative relations have been found for hyperlipidemia, diabetes and inflammation markers (Shirom, Toker, Jacobson, et al., 2010; Shirom, Toker, Melamed, Berliner, & Shapira, 2013, 2010). In a 20-year longitudinal study, it was found that feeling vigorous at work was related to a 17% increase in protection against diabetes, and the risk of mortality was reduced by 26% (Shirom, Toker, Jacobson, et al., 2010). Changes in the level of vigor have also been associated with changes in the levels of hyperlipidemia and inflammation, such that higher levels of vigor lead to a lower risk of hyperlipidemia (Shirom et al., 2013). Moreover, Shirom, Toker, Melamed, et al. (2010) suggest that high levels of vigor may be involved in a decrease in hs-CRP and fibrinogen, which is a coagulator of vascular lesions (high levels of fibrinogen increase the risk of thrombus formation due to the ease of coagulation). Furthermore, higher levels of vigor have been positively related to better overall physical health (Adrian et al., 2018) and negatively related to physical symptoms (e.g., nausea or upset stomach, pains in heart or chest) (Dugan & Barnes-Farrell, 2018). In the same vein, Shirom, Melamed, Berliner and Shapira (2012) wanted to explore the relationship between changes in vigor and body weight over time but found no longitudinal effects, although higher levels of vigor predicted elevated levels of obesity

measures at the same time point. Similarly, a positive correlation between vigor and BMI (body mass index) has also been found (Shirom et al., 2013).

Health-related behavior

Health-related behaviors encompass behavioral variables related to physical activity, the consumption of different substances and sleep. Work engagement has been shown to be negatively related to insomnia (Bakhshi & Gupta, 2016; Gu, Wang, & You, 2020) and positively related to sleep quality (Kubota et al., 2011), a pattern of healthy drink and regular exercise, but it was not related to quitting smoking (Amano, Fukuda, & Kawachi, 2020).

From the vigor at work approach, longitudinal effects on sleep quality have also been found (Armon et al., 2014). Higher levels of vigor are related to less insomnia, and conversely, greater insomnia decreases the level of vigor. On the other hand, vigor has been positively related to more self-care behaviors (Dugan & Barnes-Farrell, 2018) and moderate to vigorous physical activity (Isoard-Gauthier, Scotto-di-Luzio, Ginoux, & Sarrazin, 2018) or physical exercise, but it was not related to the smoking index (Shirom et al., 2013).

Overall health

The few studies that have analyzed general health from these two approaches have found positive relationships between work engagement and perceived/self-rated general health (Hakanen et al., 2006; Langseth-Eide, 2019; Panthee et al., 2014) and from a salutogenic perspective (Bakken & Torp, 2012). Furthermore, Rongen, Robroek, Schaufeli and Burdorf (2014) found that employees who had low levels of work engagement were more likely to report long-term sick leave, but they found no significant relation with self-perceived health.

Vigor has been related to self-rated health, indicating that the higher the levels of vigor are, the better the self-rated health (Shirom et al., 2008).

Discussion and conclusion

In this systematic review, the objective was to analyze the relationships of work engagement and vigor at work separately in different categories of health (psychological health, psychological disorder

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symptoms, physical health, health-related behavior and overall health) and their implications for workers. Moreover, addressing the differences and/or overlapping areas of these two approaches could help clarify the implications of following one specific approach, and, in this vein, to be able to verify if they could affect health in different ways. After all the obtained articles were reviewed, the results revealed the importance of work engagement and vigor in the workplace as relevant variables, antecedents and even mediating variables in the occupational health of workers. The results also facilitated the analysis of its different applications due to the operationalization of health in various categories (Figure 2).

Although work engagement has been studied in numerous studies around the world, these studies have mostly been cross-sectional in nature. In contrast, vigor has been mainly studied in Israel and the United States. Studies of vigor have been characterized by being longitudinal in nature (thanks mainly to the connection with the Center for Periodic Health Exams at the Sourasky Medical Center in Tel Aviv, Israel), thus having the advantage of being able to establish causal relationships.

Studies focused on vigor in the workplace have shown that vigor has an influence on the level of health of workers, specifically pertaining to psychological health, physical health, health-related behavior and overall health. Moreover, it has a proportionally greater involvement in physical health, with lower levels of hs-CRP, fibrinogen, hyperlipidemia, diabetes and mortality risk (Shirom, Toker, Jacobson, et al., 2010; Shirom et al., 2013; Shirom, Toker, Melamed, et al., 2010) and better general physical health (Adrian et al., 2018) and health-related behaviors, including less insomnia, more physical activity and more physical exercise. Our analysis suggests that these findings may be due to high sleep quality (Armon et al., 2014) and an active lifestyle, including moderate to vigorous physical activity (Isoard-Gauthier et al., 2018), which would decrease the negative effect of experienced stress (Dugan & Barnes-Farrell, 2018) and lead to a reduction in depressive symptoms (Adrian et al., 2018), thus enabling workers to have better physical health. This is related to the heuristic model of vigor at work proposed by Shirom (2004), which shows the direct effects of vigor on the physical health of workers, and through COR theory (Hobfoll, 1989) where experiencing a personal resource, such as vigor at work, could promote different resources related to energy (i.e. physical activity) that can be valued by the individual and fundamental in the protection of health. On the other hand, although work engagement (Schaufeli et al., 2002) has been shown to be related to all the health categories (psychological health, psychological disorder symptoms, physical health, health-related behavior and overall health), most of the relevant studies focus on psychological health, showing that the higher the levels of work engagement are, the

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lower the symptoms of depression, anxiety, tension, fatigue and stress and the higher the levels of well-being and life satisfaction. In this vein, workers with high levels of work engagement within the organization would benefit from having better psychological health and a lower risk of suffering from psychological problems. Thus, Schaufeli and Taris's (2014), suggestion about the JD-R model is validated; when motivation levels decrease, health deterioration may occur, and vice versa. However, some studies point out that high levels of work engagement may produce an adverse effect on health (Imamura et al., 2016; Shimazu et al., 2018); this result may be due to an addiction to work (workaholism). For instance, the longitudinal study of Shimazu et al. (2015) revealed a weak but positive relationship between work addiction and work engagement, with workaholism being related to negative implications for health and life satisfaction. Thus, addiction to work should be controlled or prevented while also maintaining high levels of labor engagement to produce all its advantages in relation to psychological health.

In summary, work engagement and vigor at work may improve the health of workers but in different categories of health. Therefore, it should be taken into account which objectives are intended to be optimized in an intervention in relation to health within the workplace. The results obtained, in relation to work engagement, are consistent with those obtained by Leitgen (2015), in which the relation between work engagement and mental health was stronger than with physical health. This could be due to source bias, where the construction of work engagement may be more similar to mental health than to physical health, whereas vigor, due to its relationship with feeling energetic, would lead to thoughts that would prompt the individual to participate in health behaviors, thereby enhancing physical health (Fredrickson, 1998). Moreover, these results highlight the difference between the constructs of vigor and work engagement, which were established by Shirom (2004), who found that employees who present high levels of work engagement have more psychological hardiness (Bue, Taverniers, Mylle, & Euwema, 2013) and more psychological recovery and thus better mental health. In this sense, both constructions could be used within the same model, without the existence of overlaps, as suggested by Dugan and Barnes-Farrell (2018).

Based on this review, implementing POHP-based interventions that focus on increasing work engagement levels would ensure the maintenance and/or promotion of workers' psychological health, whereas interventions focusing on vigor would ensure higher or optimal levels of physical health and of health-related behaviors.

The main contribution of this study is providing the differential health aspects in which each construct is related to a greater extent. This research review indicates that high levels of vigor at work may increase the energy strength in workers, promoting a proactive and healthy behavior, thus, vigor at work has a higher implication in physical health and health-related behaviors categories, whereas work engagement may mainly impact on psychological health category, directing the workers efforts towards achieving goals and to obtain results within the organization, thus improving their well-being at work.

This contribution has several implications for professionals and researchers. They could be able to specify research lines and intervention programs fitted to the health category they plan to promote in workers. Moreover, this could help policymakers to invest in organizational health policies in which these affective variables could help to improve the health and well-being of workers.

Limitations and future research

It should be considered that the limited number of studies focused on vigor at work in relation to health compared to the large number of studies on work engagement could be due to the extensive number of research adapting the UWES to different languages and countries, thus promoting its usefulness and diffusion. Moreover, although these are studies in different countries around the world included in this systematic review, they had to be published in English or Spanish, and thus, there could be other interesting studies in other languages that were not included herein. Furthermore, we have only focused on two evaluation instruments linked to the original theoretical proposals, but there are more instruments to evaluate, such as the concept of work engagement.

For future research, it would be of interest for organizations to analyze and test the implications of both vigor at work and work engagement in general health and psychological disorders, given the limited research in this area of study. Moreover, we recommend an increase in the number of longitudinal studies on work engagement and diary studies on vigor to address a comparison of results considering the designs due to their implications for occupational health. Additionally, it would be interesting to carry out analyses differentiated by dimensions, given that work engagement is related to health in several aspects, mainly due to the dimensions of vigor and dedication. In addition, it would be advisable to develop specific intervention programs for both constructs, where the benefits of each intervention can be evaluated in the specific health related categories considered in this study.

Compliance with Ethical Standards

Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Data availability

The articles reviewed in this systematic analysis are included in references with an asterisk.

Ethical statement

This systematic review is part of a research about “Proposal for a relationship model between emotional intelligence and transformational leadership and its impact on work results” (PSI2015-65241-R).

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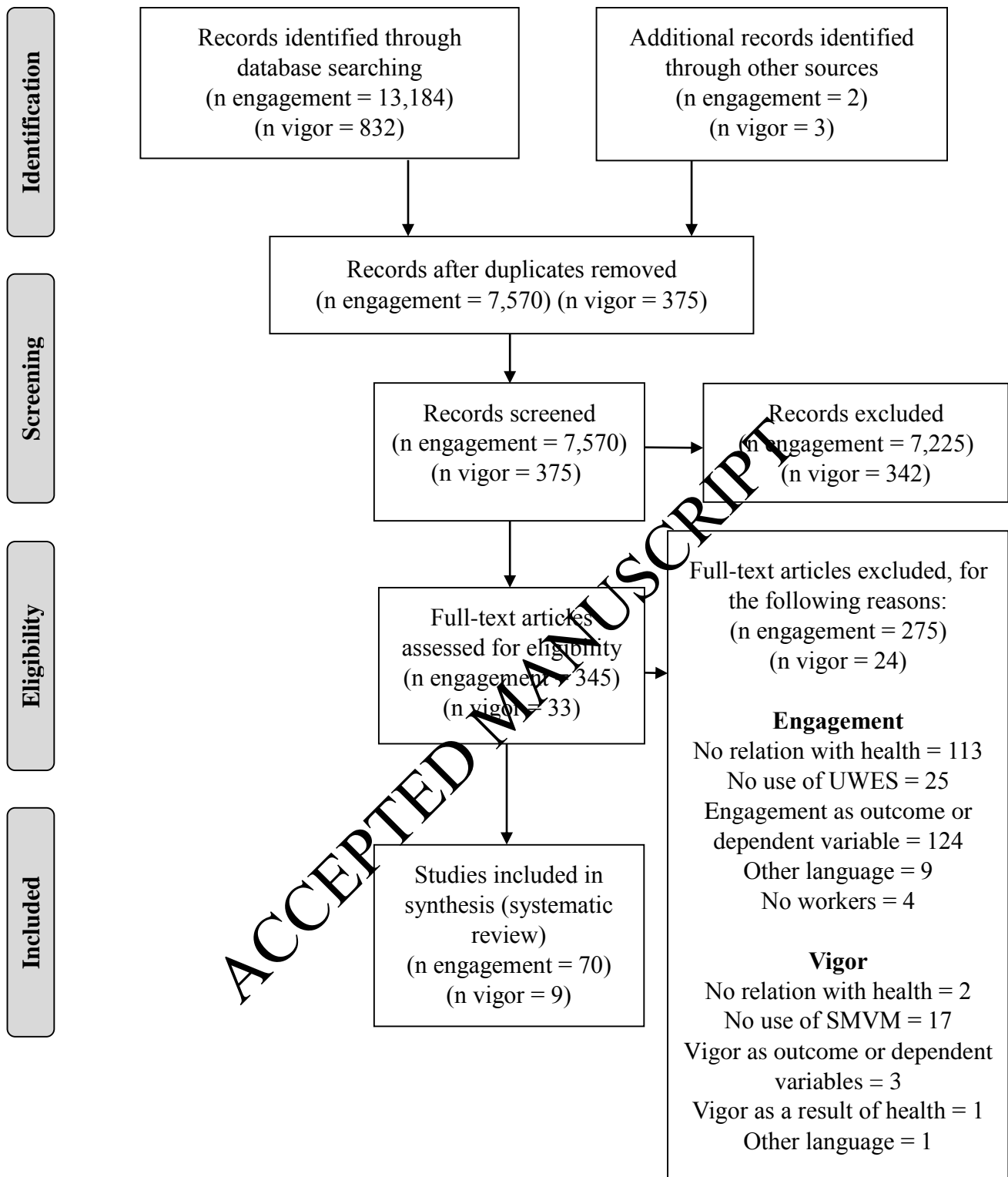


Figure 1. PRISMA 2009 Flow diagram of engagement and vigor at work

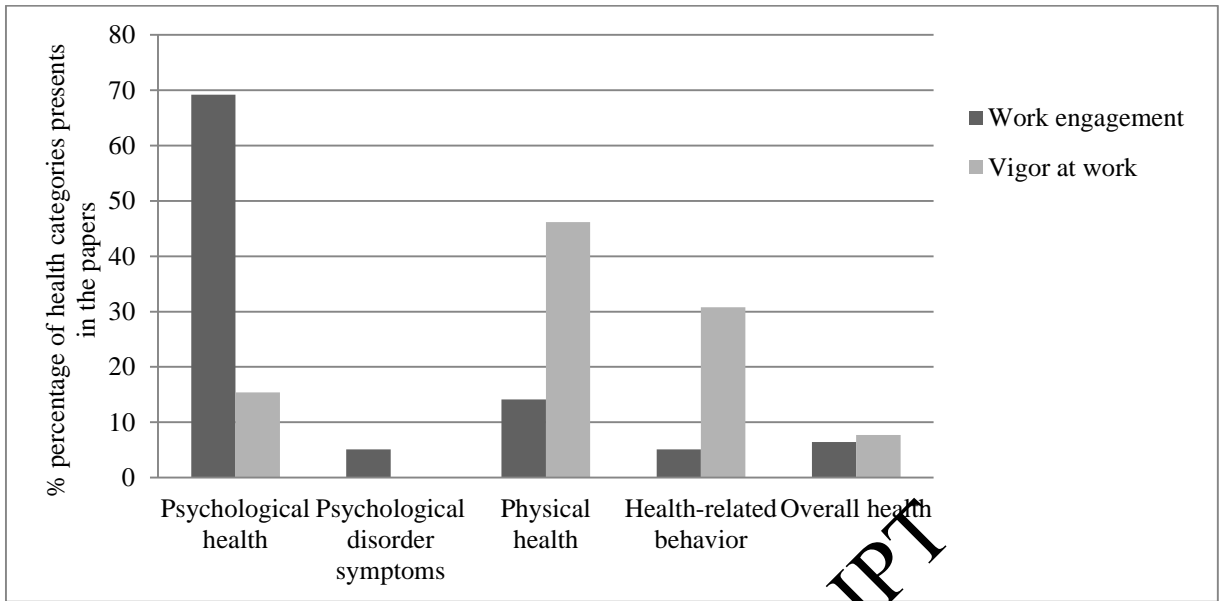


Figure 2. Distribution of health categories in selected studies about of engagement and vigor at work.

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Table 1. *Search terms related to work and health for engagement and vigor at work*

Category	Search terms
Psychological health	Vigor/engagement AND (work OR job OR workplace) AND (“psychological health” OR “psychological well-being” OR “mental health” OR “mental ill-health” OR “emotional well-being” OR “affective well-being” OR “composite of mental health dimensions” OR morale) Vigor/engagement AND (work OR job OR workplace) AND (anxiety OR distress OR “psychological strain” OR “lack of comfort” OR tension OR “perceived stress”) Vigor/engagement AND (work OR job OR workplace) AND (depression OR “depressive symptoms” OR “lack of pleasure” OR sadness) Vigor/engagement AND (work OR job OR workplace) AND (fatigue OR “loss of energy” OR “lack of vigour”) Vigor/engagement AND (work OR job OR workplace) AND “life satisfaction”
Psychological disorder symptoms	Vigor/engagement AND (work OR job OR workplace) AND (“Psychological disorder symptoms” OR paranoia OR hypochondriasis OR hypomania OR “hysteria psychastenia” OR schizophrenia OR “posttraumatic stress disorder” OR “adolescent conduct disorder” OR “psychoneurotic disorder” OR “personality disorder”)
Physical health	Vigor/engagement AND (work OR job OR workplace) AND (“physical health” OR “somatic complaints” OR “somatic symptoms” OR “gastrointestinal problems” OR “physical symptoms” OR “somatic symptoms” OR “psychosomatic symptoms” OR “physical strain” OR “ill-health” OR headaches OR “respiratory infections” OR “visual health” OR “chronic pain”) Vigor/engagement AND (work OR job OR workplace) AND (obesity OR “blood pressure” OR “BMI” OR “overweight status” OR “diastolic pressure” OR “systolic pressure” OR hypertension)
Health-related behaviour	Vigor/engagement AND (work OR job OR workplace) AND (“health-related behaviour” OR “alcohol use” OR “alcohol consumption” OR “alcohol abuse” OR “alcohol problems” OR “problem drinking” OR “drinking frequency” OR “drunk frequency”) Vigor/engagement AND (work OR job OR workplace) AND (“health behaviour” OR “wellness behaviour” OR jogging OR “physical activity” OR “health practices” OR “wellness practices” OR “health habits” OR “health lifestyle”) Vigor/engagement AND (work OR job OR workplace) AND (“sleep problems” OR “Obstructive sleep apnoea symptoms” OR “sleep quality” OR sleepiness) Vigor/engagement AND (work OR job OR workplace) AND (smoking OR “smoking frequency” OR “smoker vs. non-smoker”)
Overall health	Vigor/engagement AND (work OR job OR workplace) AND (“overall health” OR “well-being” OR “health claims”)

Table 2. *Engagement and health studies*

Reference and location	N	Time measures	Design	Health category	Results related to engagement
Agarwal & Karpouzian (2016) (Illinois, United States)	53 psychiatry residents	1	Cross-sectional	Psychological health	Depression*
Amano, Fukuda, & Kawachi (2020) (-, Japan)	8,050 Japanese workers (77.4% M)	2 times (interval 1 year)	Longitudinal	Health-related behavior	Drinking moderation Regular exercise Smoking cessation**
Ananthram, Xerri, Teo, & Connell (2018) (Mumbai and Delhi, India)	250 call centre employees (79.6% M)	1	Cross-sectional	Psychological health	Psychological well-being
Arends et al. (2019) (-, Netherlands)	158 employed with common mental disorders (41% M)	4 times (baseline and 3, 6 and 12 months follow-up)	Longitudinal	Psychological health	Fast recovery (low anxiety and depressive symptoms)
Ariza-Montes, Leal-Rodríguez, Ramírez-Sobrino, & Molina-Sánchez (2019) (-, Spain)	142 religious workers	1	Cross-sectional	Psychological health	Life satisfaction
Bakhshi & Gupta (2016) (Jammu, India)	109 banks employees (72 M; 37 F)	1	Cross-sectional	Psychological health Physical health Health-related behavior	Depression * Anxiety* Somatic Symptoms* Insomnia*
Bakken & Torp (2012) (-, Norway)	121 employees in a Norwegian industrial company	1	Cross-sectional	Overall health	Salutogenic health
Balducci, Fraccaroli, & Schaufeli (2010) (-,Italy; and Holland, Netherlands)	668 Italian employees (48.7% F) and 2,213 Dutch employees (54.2% F)	1	Cross-sectional	Psychological health	Affective well-Being
Black, Balanos, & Whittaker (2017) (-,United Kingdom)	31 workers from 20 organisations and industries (18 M; 13 F)	1	Cross-sectional	Physical health	Systolic blood pressure* Heart rate reactivity* Diastolic blood pressure** Cortisol**
Boermans, Kamphuis, Delahaij, van	971 Dutch peacekeepers (93% M)	2 times (with an	Longitudinal	Psychological health	Fatigue Symptoms*

den Berg, & Euwema (2014) (Holland, Netherlands)		interval of 6 months)				
Burić & Macuka (2018) (-, Croatia)	941 teachers from various state schools (157M.; 777 F; and 7 did not indicate their gender)	2 times (interval of 6 months)	Longitudinal	Psychological health	Fatigue*	
Choi, Dabelko-Schoeny, Lee, & Bunker (2020) (-, U.S.)	508 workers (35.9% M ;64.1% F)	1	Cross-sectional	Psychological health	Mental health	
Chughtai (2018) (-,Pakistan)	160 employees who were working in a tractor manufacturing company (97% M)	1	Cross-sectional	Psychological health	Life satisfaction	
Corso-de-Zúñiga, Moreno-Jiménez, Garrosa, Blanco-Donoso, & Carmona-Cobo (2017) (Lima and Arequipa, Peru)	430 teachers (67% F)	1	Cross-sectional	Psychological health	Life satisfaction	
De Carlo et al. (2014) (-, Italy)	320 employees from an organization (233 M; 87 F)	1	Cross-sectional	Psychological health	Psychological strain*	
De Simone, Cicotto, Pinna, & Giustiniano (2016) (-, Italy)	137 inspectors of the administration (57 M; 80 F)	1 (Study 1)	Cross-sectional	Psychological health	Life satisfaction	
Dugan & Barnes-Farrell (2018) (-, U.S.)	440 working mothers	1	Cross-sectional	Psychological health Physical health	Life satisfaction Emotional symptoms* Physical symptoms*	
Duran, Extremera, Montalbán, & Rey (2005) (Huelva, Spain)	265 teachers (46% M; 53.6% F)	1	Cross-sectional	Psychological health	Life satisfaction	
Eguchi et al. (2015) (-, Japan)	2,514 workers from two manufacturing sites (1,857 M; 657 F)	2 times (with an interval of 1 year)	Longitudinal	Physical health	hs-CRP*	
Eldor, Harpaz, & Westman (2016) (-, Israel)	554 employees in public and business sector organizations (37% F)	1	Cross-sectional	Psychological health	Life satisfaction	
Extremera, Durán, & Rey (2005) (Málaga, Spain)	112 (42 M; 69 F; 1 missing value) healthcare staff	1	Cross-sectional	Psychological health	Life satisfaction	

Fong & Ng (2012) (Hong Kong, China)	992 service sector staff (16.5% M; 83.5% F)	1	Cross-sectional	Psychological health	Perceived stress*
Gu, Wang, & You (2020) (Zhengzhou, China)	298 preschool teachers	2 times (interval 1 year)	Longitudinal	Health-related behavior	Insomnia symptoms*
Hakanen, Bakker, & Schaufeli (2006) (Helsinki, Finland)	2,038 teachers (79% F)	1	Cross-sectional	Overall health	Self-rated health
Hakanen & Schaufeli (2012) (-, Finland)	1,964 dentists (24% M; 76% F)	3 times (interval T1-T2, 3 years; T2-T3, 4 years)	Longitudinal	Psychological health	Depression symptoms* Life satisfaction
Hakanen, Schaufeli, & Ahola (2008) (-, Finland)	2,555 dentists	2 times (interval 3 years)	Longitudinal	Psychological health	Depression*
Hansen, Byrne, & Kiersch (2014) (-, USA; and -, Canada)	451 employees at an international firm (58% M)	1	Cross-sectional	Psychological health	Job tension*
Imamura et al. (2016) (-, Japan)	929 workers of business company (baseline respondents) (721 M; 208 F) at three year follow up 479	4 times (1 baseline and 3 follow-ups; interval of 1 year per time)	Longitudinal	Psychological disorder symptoms	Risk of major depressive episode (U-shaped association)
Karatepe & Karadas (2015) (-, Romania)	282 hotel industry employees (142 M; 140 F)	1	Cross-sectional	Psychological health	Life satisfaction
Kubota et al. (2011) (-, Japan)	447 nurses (19 M; 428 F)	1	Cross-sectional	Health-related behavior	Sleep quality
Langseth-Eide (2019) (-, Norway)	12,170 employees at Norwegian universities and university colleges (46.4% M; 53.6% F)	1	Cross-sectional	Overall health	Perceived work-related health.
Leijten et al. (2015) (-, Netherlands)	8,837 older employees (43.9% F)	2 times (interval of 1 year)	Longitudinal	Psychological health Physical health	Physical and mental health
Liu, Zeng, Chen, & Lan (2019) (Jiangxi Province, China)	714 police officers (549 M; 165 F)	1	Cross-sectional	Psychological health	Life satisfaction

Mäkikangas et al. (2014) (-, Finland)	256 employees from two Finnish labor unions (90% F)	Five consecutive workdays	Diary study	Psychological health	Work strain*
Mason et al. (2014) (-, -)	26 nurses	1	Cross-sectional	Psychological health	Moral distress**
Mazzetti, Vignoli, Petruzzello, & Palareti (2019) (-, Italy)	58 employees in an Italian company (52.9% F)	1	Cross-sectional	Psychological disorder symptoms	Absence of minor psychiatric symptoms
Ng (2013) (Hong Kong, China)	992 elderly service workers (16.5% M; 83.5% F)	1	Cross-sectional	Psychological health	Perceived stress*
Nislin et al. (2016) (Helsinki, Finland)	89 early childhood professionals (1 M; 88 F)	1	Cross-sectional	Physical health	Salivary Cortisol ** Alpha-amylase**
Oshio, Inoue, & Tsutsumi (2018) (-, Japan)	7,843 employees	4 times (interval of 1 year)	Longitudinal	Psychological health	Psychological distress*
Panthee, Shimazu, & Kawakami (2014) (Kathmandu, Nepal)	438 F nurses	1	Cross-sectional	Overall health Psychological health	Overall health Psychological distress*
Parzefall & Hakanen (2010) (-, Finland)	178 employees (79,6% F)	1	Cross-sectional	Psychological health	Mental health
Ravalier (2018) (England, United Kingdom)	1,049 social workers (79% F)	1	Cross-sectional	Psychological health	Perceived stress*
Rongen, Robroek, Schaufeli, & Burdorf (2014) (-, -)	733 employees of a plastics manufacturer and a paint manufacturer (73.9% M)	2 times (interval of 6 months)	Longitudinal	Overall health	Sickness absence* Self-perceived health**
Russo et al. (2014) (-, Italy)	176 physicians (89 M; 84 F; 3 not specified)	1	Cross-sectional	Psychological health	Perceived stress**
Sakuraya et al. (2017) (-, Japan)	894 employees of a manufacturing company (84% M; 16% F)	1	Cross-sectional	Psychological health	Psychological distress*
Salmela-Aro & Upadyaya (2018) (-, -)	1,415 employees from three large organizations (586 M; 829 F)	1	Cross-sectional	Psychological health	Life satisfaction Depressive symptoms*
Schaufeli & Bakker (2004) (-, Netherlands)	1,698 employees from four different Dutch service organizations	1	Cross-sectional	Physical health	Health problems (health complaints, such as headaches,

						cardiovascular problems, and stomach ache)*
Schaufeli, Shimazu, Hakanen, Salanova, & De Witte (2019) (Finland, Japan, the Netherlands, Belgium/Flanders, and Spain)	Employees from Finland (22,117; 69.7% F), Japan (1,968; 48.4% F), the Netherlands (38,278; 29.9% F), Belgium/Flanders (5,062; 46.9% F), and Spain (10,040; 43.4% F)	1		Cross-sectional	Psychological health	Depression* Psychological distress*
Schaufeli, Taris, & van Rhenen (2008) (-, Netherlands)	587 middle managers and executives of a Dutch telecom company (78% M)	1		Cross-sectional	Psychological health Physical health	Distress* Depression* Anxiety** Psychosomatic complaints
Schultz, Mostert, & Rothmann (2012) (Nine provinces. The majority being represented by Gauteng, North West and Mpumalanga, Africa)	15,663 employees (61.9% M; 38.1% F)	1		Cross-sectional	Physical health	Repetitive strain injury*
Seppälä et al. (2012) (-, Finland)	30 F cleaning workers	3 nights and 2 working days for ECG		Diary study	Physical health	Heart rate** High-frequency power
Setti & Argentero (2014) (-, Italy)	176 M firefighters	1		Cross-sectional	Psychological health	Traumatic Stress**
Sharma & Sharma (2015) (-, India)	373 managers (271 M; 102 F)	1		Cross-sectional	Psychological health	Life satisfaction
Shimazu & Schaufeli (2009) (-, Japan)	776 employees of a construction machinery (728 M; 48 F)	1		Cross-sectional	Psychological health	Psychological distress* Life satisfaction
Shimazu, Schaufeli, Kamiyama, & Kawakami (2015) (Tokyo, Japan)	1,196 employees of an industrial machinery (84% M)	2 times (interval of 2 years)		Longitudinal	Psychological health	Psychological distress* Life satisfaction
Shimazu, Schaufeli, Kubota, Watanabe, & Kawakami (2018) (-, Japan)	1,967 Japanese employees	2 times (interval of 7 months)		Longitudinal	Psychological health	Psychological distress (U-shaped curvilinear relation)
Shimazu et al. (2008) (Hiroshima, Tokyo, and Aichi, Japan)	2,324 engineers and nurses (31% M; 61% F; the rest missing data)	1		Cross-sectional	Physical health Psychological health	Physical Complaints* Strain*

						Fatigue* Depressive symptoms*
Shimazu, Schaufeli, Kubota, & Kawakami (2012) (-, Japan)	1,967 employees from various occupations (51.2% M)	2 times (interval of 7 months)	Longitudinal	Psychological health		Psychological distress* Life satisfaction
Simbula (2010) (-, Italy)	61 public schoolteachers (7 M ;54 F)	5 consecutive work-days at the end of each day	Diary study	Psychological health		General mental health
Simbula & Guglielmi (2013) (-, Italy)	157 public schoolteachers (88.5% F)	2 times (interval of 5 months)	Longitudinal	Psychological health		Mental health Problems*
Teoh, Hassard, & Cox (2020), (England, United Kingdom)	14,066 hospital-based doctors	1	Cross-sectional	Psychological health		Perceived stress*
Tisu, Lupşa, Virgă, & Rusu (2020) (-, Romania)	365 Romanian workers (65% F)	1	Cross-sectional	Psychological health		Mental health
Torp, Grimsmo, Hagen, Duran, & Gudbergsson (2012) (-, Norway)	605 general working population (46% M)	1	Cross-sectional	Psychological health		Depression*
Upadyaya, Vartiainen, & Salmela-Aro (2016) (-, -)	1,415 employees (586 M; 829 F)	2 times (interval 1 year)	Longitudinal	Psychological health		Depressive Symptoms* Life satisfaction
Vecina, Chacón, Marzana, & Marta (2013) (-, Spain)	232 volunteers currently working in social or environmental fields (30% M; 70% F)		Cross-sectional	Psychological health		Psychological well-being
Vignoli, Muschalla, & Mariani (2017) (-, Italy)	739 workers from a retail company (62.4% F)	1	Cross-sectional	Psychological disorder symptoms		Workplace phobic anxiety*
Wang, Yip, & Chan (2016) (Beichuan, China)	70 local relief workers (49% M; 18 F)	1	Cross-sectional	Psychological disorder symptoms Psychological health		Suicidal ideation* Depression*
Williams, Wissing, Rothmann, & Temane (2010) (North West, Africa)	459 public sector employees (151 M; 273 F)	1	Cross-sectional	Psychological health		Life satisfaction

Wojdylo, Baumann, & Kuhl (2017) (-, Poland; and -, Germany)	272 employees (114 M; 158 F) of various Polish companies	1 (Study 2)	Cross-sectional	Psychological health	Symptoms of psychological distress*
Yang, Feng, Meng, & Qiu (2019) (-, China)	338 employees (72.2% M)	3 times (interval of 3 months)	Longitudinal	Psychological health	Well-being

Note. F = Female; M = Male; hs-CRP = high-sensitivity C-reactive protein.

* Negative relation; ** Absence of relation; - = Unspecified

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Table 3. *Vigor at work and health studies.*

Reference and location	N	Time measures	Design	Health category	Results related to Vigor
Adrian, Adler, & Metzler (2018) (-, United States)	627 active duty soldiers	2 times (interval of 3 months)	Longitudinal	Physical health Psychological health	Physical health Depression symptoms*
Armon, Melamed, & Vinokur (2014) (Tel Aviv, Israel)	1,414 workers of multi-occupational (70% M)	3 times (interval T1-T2, 17 months; T2-T3, 18 months)	Longitudinal	Health-related behavior	Insomnia*
Dugan & Barnes-Farrell (2018) (-, U.S.)	440 working mothers	1	Cross-sectional	Health-related behavior Psychological health Physical health	Self-Care behaviors Experienced stress* Emotional symptoms* Life satisfaction Physical symptoms*
Isoard-Gauthier, Scotto-di-Luzio, Ginoux, & Sarrazin (2018) (-, -)	128 workers (60% F)	2 times (interval of 2 months)	Longitudinal	Health-related behavior	Moderate to vigorous physical activity
Shirom, Melamed, Berliner, & Shapira (2012) (Tel Aviv, Israel)	1,876 M; 931 F employees	2 times (interval of 24 months)	Longitudinal	Physical health	Obesity (Body weight)**
Shirom, Toker, Berliner, Shapira, & Melamed (2008) (Tel Aviv, Israel)	779 employees (567 M; 250 F)	2 times (interval of 18 months)	Longitudinal	Overall health	Self-rated health
Shirom, Toker, Jacobson, & Balicer (2010) (-, Israel)	968 employees (33% F)	Periodic exams for 20 years	Longitudinal	Physical health	Diabetes* Mortality risk*
Shirom, Toker, Melamed, Berliner, & Shapira (2010) (Tel Aviv, Israel)	741 employees (538 M; 203 F)	2 times (interval of 3 years)	Longitudinal	Physical health	hs-CRP* Fibrinogen*
Shirom, Toker, Melamed, Berliner, & Shapira (2013) (Tel Aviv, Israel)	3,337 employees (2,214 M; 1,123 F)	2 times (mean interval of 27 months)	Longitudinal	Physical health Health-related behavior	Hyperlipidemia* Body Mass Index Physical Exercise Index Smoking Index**

Note. F = Female; M = Male; hs-CRP = high-sensitivity C-reactive protein.

* Negative relation; ** Absence of relation; - = Unspecified

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