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Work engagement interventions can be effective: A systematic review

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Abstract

Work engagement is associated with important individual and organisational outcomes (e.g., employee health and well-being, performance). This narrative systematic review aims to synthesise the increasing number of work engagement interventions and inform future research by exploring: (1) the specific intervention foci, delivery methods and content of engagement interventions; (2) intervention effectiveness; and (3) underlying mediators and moderators. A systematic search for interventions employing a validated engagement measure revealed 40 studies. Five were personal resource building, twelve job resource building, three leadership training, eighteen health promotion, and two job and personal resource building. Twenty (50%) studies observed significant positive effects on work engagement, two (5%) had a negative effect, and eighteen (45%) had no effect. Job and personal resources, job demands and well-being were important mediators. Moderators included the specific intervention focus and delivery method, employee participation, manager support, and intervention level (top-down vs bottom-up). Bottom-up interventions, and job crafting and mindfulness interventions particularly, were most successful. Implementation difficulties were common, including poor response and attrition rates, and adverse factors (e.g. organisational restructuring, redundancy, economic downturn). We highlight implications for research and practice and stress the need to test underlying theories to build knowledge around how, why, and when interventions work.

Keywords: work engagement interventions; job demands-resources; wellbeing; intervention implementation; systematic review

Introduction

Work engagement is commonly viewed in academic literature as a positive, psychological state consisting of vigour, dedication and absorption in work tasks (Schaufeli, Salanova, Gonzalez-Roma, and Bakker, 2002). The interest in engagement continues to thrive, with both academics and practitioners actively investing in the concept (e.g. Bailey, Madden, Alfes & Fletcher, 2015; MacLeod & Clarke, 2009), driven by the importance of work engagement for key individual and organisational outcomes, such as health and well-being, performance, and safety (e.g. Bailey, et al., 2015; Halbesleben, 2010; Nahrgang, Morgeson & Hofmann, 2010). Increasing work engagement has therefore become an important consideration for many organisations, and within the last decade, the field has advanced towards developing and evaluating interventions.

A recent meta-analysis of 20 work engagement interventions found that interventions, and particularly group interventions, are effective (Knight, Patterson & Dawson, 2017a). No moderation effects were found for the type of intervention or whether the organisation involved was privately owned or publically funded. There were also no significant differences in effect size between randomised and non-randomised studies or studies adjusted for age and gender and those not. Another review narratively synthesised the engagement literature as a whole and found that amongst nine work engagement interventions, six demonstrated an effect, one demonstrated no effect, and two highlighted 'complexities and ambiguities associated with interventions' (Bailey et al., 2017, p.39).

The present systematic review substantially builds on these findings by incorporating recent interventions, reflecting the rapidly increasing evidence-base in this field, and contributes

new, in-depth insights and knowledge around the characteristics of engagement interventions, how and why they work, and the difficulties faced during their implementation. We provide a more detailed synthesis of the specific intervention foci, delivery methods and content of interventions, their quality (a term we use here to refer to study design & associated factors such as sample sizes & type of control group), degree of successful implementation and effectiveness. These factors are, as yet, underexplored in the literature. This knowledge is important for guiding the efficient deployment of resources towards interventions appropriate for specific contexts and participants and which are most likely to yield positive results. This review responds to a call by Bailey, et al. (2015) to further knowledge around which engagement interventions are most effective and under which conditions.

The literature clearly demonstrates the benefit of a qualitative exploration of how and why interventions work, which can allow, for instance, a more detailed exploration of study quality and degree of intervention implementation. Nielsen and Miraglia (2017) highlight how qualitative evaluations prevent erroneous conclusions from purely statistical evaluations, guide analysis of underlying mediators and moderators, and can investigate what kinds of intervention components work in different contexts, and why. For example, need satisfaction could be a mediator (Deci & Ryan, 2001), employee participation could be a moderator (Nielsen, Randall, Holten & Gonzalex, 2010), and intervention components could include group programmes, psycho-education, or goal-setting (e.g. Knight et al., 2017). These could be more or less effective for different groups of people, such as employees or managers. Further, context may impact the effectiveness of different components, with hospitals, offices and factories, for instance, all presenting very different environments which may require particular intervention designs.

This review goes beyond a statistical assessment of whether interventions *do* work, to investigate *how*, *why* and *when* they work (Nielsen & Miraglia, 2017). In so doing, we incorporate a wider range of study designs than is possible when meta-analysis is the end goal, and thus capture the evidence-base more broadly. The heterogeneity of the studies included renders meta-analysis inappropriate (Snape, Meads, Bagnall, Tregaskis & Mansfield, 2016). We therefore capitalise on our systematic, narrative review method for providing in-depth analysis. For example, we include studies without control or comparison groups and which may not have published all the data necessary to enable meta-analysis. These studies may offer much in terms of contextual factors and mediators and moderators which may underlie intervention effectiveness but would remain unexplored if a pure meta-analytic analysis was undertaken (Nielsen & Miraglia, 2017). A particular contribution of this review is therefore in its inclusivity of work engagement interventions and its exploration of intervention design, effectiveness and mediators and moderators.

To build on current knowledge and the findings of Knight and colleagues (2017a), we use the intervention typology developed by these authors as a framework to analyse our considerably expanded set of studies. In particular, we aim to: (1) explore the specific intervention foci, delivery methods, and content of work engagement interventions; (2) review the effectiveness of work engagement interventions; and (3) explore mediators and moderators underlying work engagement interventions. Our focus on intervention mediators and moderators goes considerably beyond the scope of previous reviews. The only previous review on engagement interventions focused on effectiveness and a limited number of moderators (Knight et al., 2017a). This review goes beyond effectiveness to explore how and why they work, unpacking a number of mediators and moderators in the process and highlighting avenues for

future research. We begin by briefly reviewing work engagement theory and the literature on work engagement interventions.

Work engagement theory

Kahn (1990) originally conceptualised engagement in terms of employees being physically, cognitively and emotionally involved in their work roles. Since then, Schaufeli and colleagues' definition of work engagement as comprising vigour (energy and mental resilience in work), dedication (high involvement and enthusiasm in work) and absorption (full concentration in work) has arguably become the most prevalent (Hakanan & Roodt, 2010). The job demands-resources (JD-R) model (Bakker & Demerouti, 2007) underlies this conceptualisation and proposes that job resources, psycho-social work characteristics such as autonomy, social support, and job feedback, activate a motivational pathway leading to work engagement and better well-being. Personal resources also activate this pathway; they are individual characteristics such as self-efficacy, resilience, and optimism, which individuals can draw on to overcome work challenges and stay engaged. Job demands include workload, time pressure, and emotional demands and can activate a health impairment pathway leading to poor well-being, engagement, and performance. Evidence for these relationships is increasing (e.g. Halbesleben, 2010; Christian, Garza & Slaughter, 2011). Accumulating evidence also suggests that high levels of job and personal resources buffer against the negative effects of high job demands (e.g. Hakanan, Bakker & Demerouti, 2005; Bakker, Hakanan, Demerouti & Xanthopoulou, 2007). In summary, the JD-R model suggests that job and personal resources are positive antecedents of work engagement while job demands is a negative antecedent. Over recent years the field has turned towards the design and implementation of interventions to harness the positive power of work engagement and it is to these which we now turn.

Work engagement interventions

Knight and colleagues (2017a) identified four 'types' of work engagement interventions in their meta-analysis: (1) personal resource building, which focus on increasing individual strengths such as self-efficacy, resiliency, and optimism; (2) job resource building, which aim to develop positive aspects of the work environment such as autonomy, social support, feedback, and developmental opportunities; (3) leadership training, which develop managers' leadership skills through education and practical exercises such as practising goal-setting and problem-solving in groups; and (4) health promotion, which focus on increasing the health and well-being of individuals and reducing stress, often by encouraging individuals to take part in onsite mindfulness, stress management or exercise / relaxation programmes. Job demands-resources (JD-R; Bakker & Demerouti, 2007; 2008) theory generally underlies these interventions. This theory predicts that through increasing job and / or personal resources, and decreasing job demands, work engagement can be improved and is associated with other positive outcomes such as well-being and job performance (Bakker & Demerouti, 2007).

Overall, the meta-analysis revealed a positive effect on work engagement interventions, however, the results of individual studies were mixed and a moderator effect of intervention 'type' was not observed (Knight et al., 2017a). One reason for this could be heterogeneity within each category in terms of intervention content. For example, personal resource interventions included individual strategies to develop one's strengths, such as self-efficacy and gratitude (Ouweneel, Le Blanc & Schaufeli, 2013), and group workshops involving active learning, role playing and social modelling (Vuori, Toppinen-Tanner & Mutanen, 2012). A moderator effect was observed for 'intervention style', with group interventions

particularly effective. Knight et al. (2017a) used the term 'intervention style' to refer to whether interventions were carried out in groups, individually, online, or using a mixture of group and individual methods (Knight et al., 2017a). This term could be confused with 'intervention type', therefore, we refer to 'intervention delivery method' instead of 'intervention style' throughout the rest of this paper. The term 'intervention type' may also be confused with other terms, such as delivery method, therefore, from now on we refer to 'specific intervention focus' instead of 'intervention type'. We believe that 'specific intervention focus' better reflects the intended strategy of the intervention for improving work engagement, for example, through health promotion, leadership training, or building job or personal resources. The first aim of this paper is therefore to explore further the specific intervention foci, delivery methods, and content of interventions.

We aim to meet the second aim of this paper by exploring whether an effect on engagement, or one of its subcomponents, is observed by each study. Engagement as a construct comprising vigour, dedication and absorption, and the associated Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002), is commonly understood to be the most researched and established conceptualisation (Bailey et al, 2015; Hakanan & Roodt, 2010). We therefore expect most studies will have adopted this approach, as was found by Knight et al (2017a). However, we acknowledge that a number of other definitions and scales exist (e.g. Job Engagement Scale; Rich, Le Pine & Crawford, 2010; Shirom-Melamed Vigor Measure; Shirom, 2011). We intend to include all possible engagement interventions by incorporating results from interventions using these other scales as long as our other inclusion criteria are met.

Mediators and moderators underlying work engagement interventions

The third aim of this paper is to elaborate existing knowledge about how, why, and when effective work engagement interventions work. We use current evidence and theory to briefly review what is already known on this topic, first discussing potential mediators and then potential moderators. Figure 1 summarises current evidence around the relationships between interventions, mediators, moderators, and engagement. Mediators are variables which are either fully or partially needed for a predictor variable to have an effect on an outcome variable (Aguinis, Edwards & Bradley, 2017). For our purposes, mediators are therefore intervening causal variables between interventions and engagement. We have already noted that JD-R theory proposes that job and personal resources are motivational and drive engagement (Bakker & Demerouti, 2007; 2008), and there is mounting evidence to this effect (for a review, see Bailey et al., 2017). We therefore expect that increases in job and personal resources will mediate between interventions and increases in work engagement.

In addition, we expect that interventions will enable individuals to meet work-related needs for autonomy (choice and freedom), competence (meeting challenging goals) and relatedness (a sense of belonging with a team, department or organisation), in accordance with self-determination theory (Deci & Ryan, 2001). JD-R model supposes that resources and demands enable individuals to satisfy their work-related needs leading to engagement. Therefore, we expect support for the satisfaction of work-related needs as mediators to emerge from our review where included studies assess work-related needs. In particular, interventions which increase the amount of control individuals perceive they have over their work and how they carry it out are likely to satisfy the need for autonomy (Van den Broeck, Vansteenkiste, De Witte, & Lens (2008). Interventions which are developmental, offer training, or improve reward and recognition systems are likely to increase individuals' sense of self-efficacy and competence, while a focus on increasing colleague and supervisor support and social support

generally is likely to meet the need for relatedness (Van den Broeck et al., 2008). The satisfaction of these needs is motivational, promoting the meeting of work goals and encouraging work engagement. In support, Knight and colleagues (2017b) found that satisfaction of work-related needs mediated between their intervention and work engagement.

We also postulate that some aspects of well-being may mediate between interventions and engagement. Well-being may be defined as 'the overall quality of an employee's experience and functioning at work' (Grant, Christianson & Price, 2007, p. 52). According to this definition, well-being could include any number of indicators, such as positive affect, optimism, burnout, depression, anxiety, as well as engagement. As our focus is on this latter concept specifically, we refer to 'well-being' as encompassing all other indicators of the quality of employees' experience and functioning at work besides engagement. The JD-R model also adopts this approach and does not specify a causal order between engagement and other indicators of well-being, though a strong association is predicted (Bakker & Demerouti, 2007). The wider literature is not clear how engagement may relate to other indicators of well-being (Rothmann, 2006; Schaufeli et al., 2008), or indeed, whether the term is confounded with other well-being constructs such as positive affect (e.g. Macey & Schneider, 2008). Nevertheless, some isolated intervention studies suggest that certain aspects of well-being may lead to engagement. For example, Imamura et al. (2015) found that a positive change in depression mediated between an online cognitive-behaviour therapy (CBT) intervention and work engagement and Meyers et al. (2007) found that positive affect mediated between a strengths-based intervention and engagement. Broaden-and-build theory (Fredrickson, 2001) may help explain the relationship between positive affect and work engagement. This theory proposes that the positive emotions associated with engagement allows individuals to fully invest themselves in their work roles and broaden their repertoire

of potential actions which come to mind (Bakker & Demerouti, 2007). This can lead to a 'gain spiral' of resources and increased performance (Bakker & Demerouti, 2007). Some indicators of well-being may therefore emerge as mediators in work engagement interventions.

Moderators are variables which change the strength or nature of the effect of a predictor variable on an outcome (Aguinis et al., 2017). In this review, we are interested in moderators impacting the effect of interventions on engagement. We expect that employee participation will emerge as a moderator, in accordance with other intervention research (e.g. Knight et al., 2017; Kompier, Geurts, Grundemann, Vink & Smulders, 1998; Nielsen & Randall, 2012). More recently, Knight et al. (2017) noted how a participatory action intervention was effective for increasing engagement particularly. Participation may improve colleague social support due to increased interaction with others through problem-solving and decision-making (Nielsen & Randall, 2012). It may also improve satisfaction with work-related needs for autonomy and competence whilst also increasing sense of belonging with work colleagues (Knight et al., 2017).

We also expect that intervention level, that is, whether interventions are top-down or bottom-up, will impact effectiveness. Top down interventions are initiated and driven by organisations and senior managers and applied across whole teams, departments, or organisations (Hornung, Russeau, Glaser, Angerer and Weigl, 2010). Such interventions may include leadership training, increases in staffing, or improved communication and feedback systems. In contrast, bottom-up interventions are driven by individuals themselves, and therefore involve employees themselves initiating and making changes (Hornung et al., 2010). This may take the form of job crafting, where employees change the boundaries,

conditions and meaning of their own job tasks and job relationships (Wrzesnieski & Dutton, 2001). Examples include proactively taking on a challenging new work project, learning a new skill, or brainstorming with a colleague to problem-solve. Importantly, bottom-up changes have effects which are local to the individual and their work environment rather than being organisation-wide. Debate still surrounds whether top-down or bottom-up interventions are most effective (see Briner & Reynolds, 1999; Richardson & Rothstein, 2008; Semmer, 2006;), with some scholars concluding that interventions which combine both strategies (e.g. idiosyncratic deals, or i-deals, which are employee-manager negotiated) are most likely to be effective (e.g. Hornung, et al. 2010). We contribute to this debate and determine whether intervention level is a moderator of work engagement interventions.

Intervention implementation is also likely to impact, or moderate, intervention success. Interventions which report high fidelity (i.e. carried out according to plan), employee compliance, and low attrition rates alongside high response rates, are likely to be most effective. Several researchers note that erroneous conclusions can be drawn if null results are not placed in the context of intervention implementation; that is, interventions may fail due to poor implementation as opposed to an incorrectly specified programme theory (e.g. Nielsen & Miraglia, 2017; Briner & Reynolds, 1999). Wider factors such as organisational and national factors are likely to also moderate intervention effectiveness. If several changes are being implemented in an organisation at the same time (e.g. a flexible working policy, job redesign, company mergers), internal validity of a work engagement intervention will be compromised, preventing the evaluation of cause and effect (e.g. Knight et al., 2017b). Changes must also align with current organisational systems, such as feedback, communication and reward systems, else interventions are likely to fail (e.g. Morgeson, Johnson, Campion, Medsker & Mumford, 2006). Moreover, any intervention requires the

strong endorsement of senior managers to help drive the intervention and encourage employee attendance and compliance (Nielsen et al., 2010). Knight and colleagues (2017b) found that poor senior manager support may have hindered participation, impacting subsequent intervention effects. Changes to the economic or political backdrop may also have an effect, with job insecurity and high unemployment particularly likely to impede intervention success. For example, one study reported redundancy and poor attendance at training sessions which is likely to have impeded intervention success (Hengel, Joling, Proper, Blatter & Bongers, 2012).

Please insert Figure 1 about here

Method

Search strategy

We adopted standard systematic review methodology (Shamseer et al., 2015; Snape, Meads, Bagnall, Tregaski & Mansfield, 2016) and updated Knight and colleagues' (2017a) search using similar search terms, including 'work engagement', 'intervention', 'group', 'individual', 'online', and 'web' (Supplementary Material). Our initial search was conducted in December 2016 and was updated in 2018 to include additional studies from 2017. We searched the subject specific databases, Web of Science, Scopus, and Medline for published studies only. These databases were also used by Knight et al. (2017). The considerable increase in published intervention studies over the past few years suggested sufficient data within quality-controlled, peer-reviewed research to answer our research questions and is in keeping with previous reviews (e.g. Daniels, Gedikli, Watson, Semkina & Vaughn, 2017). Authors were contacted for access / further information where necessary.

Criteria for inclusion

We used standard PICO terminology (Population, Intervention, Comparators, Outcomes; Liberati et al., 2009), to inform our inclusion criteria. We included interventions conducted with working age employees, of any type (e.g. job resource building, health promotion) and style (e.g. face-to-face, online, or group). Pre-test only designs or post-test designs lacking a control or comparison group were excluded. Studies recording post-intervention results for both an intervention and control or comparison group were included to capture as many studies as possible whilst maintaining the quality of the review. Our outcomes were work, employee or job engagement and / or any of its subcomponents, such as vigour, dedication or absorption (for an example of our search strategy, see Supplementary Material).

We included studies that had utilised a measure of engagement validated in the academic literature, to maintain the quality of the evidence. Psychometric validation ensures that measurement scales capture the construct under study and demonstrate appropriate convergent and divergent validity with associated constructs. Where psychometrics are unknown, measures may not actually assess the intended construct and could lead to erroneous conclusions. The initial search placed no constraints on the year conducted, setting or location. Non-English studies were excluded due to the capacity of the review team. Following the search, references were amalgamated using the referencing manager software, EndNote Web. Duplicates were removed and titles and abstracts screened by the first author for inclusion. Full texts of studies passing this screening process were retrieved and further scrutinised for inclusion. We ensured that all previously identified studies by Knight and colleagues' meta-analysis (2017) were re-identified, as well as capturing new studies. Extensive discussion and cross-checking of papers occurred with the other authors

throughout the screening process to ensure consistency and agreement around included and excluded papers[1].

Study coding and analysis

Study characteristics were coded according to an in-depth coding guide which was adapted and developed from Knight and colleagues (2017a). Information extracted included demographics such as location and industry type, study design particulars such as presence of randomisation, control groups, and number of measurement time points, intervention duration, and intervention components such as workshops, coaching, or homework. We extracted 'specific intervention focus' details followed the same four category typology of work engagement interventions developed by Knight et al., (2017a) and described in the introduction, namely, i) job resource building; ii) personal resource building; iii) leadership training; and iv) health promotion. Following the coding process, we added a fifth category, 'job and personal resources building' interventions to capture interventions which focused equally on developing job and personal resources. In practice, this category involved two interventions grounded in job demands-resources theory that used job crafting principles to increase both job and personal resources. Interventions that adopted job crafting to improve job resources only were classified under the category. 'job resources building' intervention.

Intervention delivery method was captured using three categories: 'group' referring to studies where participants all met together for a particular intervention, 'individual' studies involved one-to-one sessions such as coaching, and activities carried out alone, including online; and 'group and individual' studies involved studies comprising both a substantial individual and

[1] Following the review process an independent researcher with expertise in the field double-screened a portion (38%) of the records obtained from the database search. Agreement was 100% following the extraction of full papers, meaning that no new studies met our inclusion criteria and only studies already included were found.

group component, for example, an intervention where individuals take part in weekly sessions as well as substantive homework. Following discussion, we collapsed the two separate categories identified in Knight et al. (2017a), 'individual' and 'online and individual', classifying them under one category ('individual'), as we found that studies within these categories had used a range of different methods focused on the individual, including online information and exercises, e-coaching and face-to-face coaching. During the coding process, we identified one study which did not clearly fit into any of our three delivery method categories (Van Steenbergen, Van der Ven, Peeters & Taris, 2017). This study described a top-down, management led, organisation-wide intervention involving changes to working procedures and policies. We created a fourth category to accommodate this intervention, called 'systemic' interventions.

We acknowledge the inherent overlap in our categories yet consider them more parsimonious and interpretable than other configurations, and particularly offer a useful comparison between interventions combining substantive group and individual methods of delivery and those adopting either a group or individually focused method of delivery. Importantly, no study was placed in more than one category at a time to facilitate ease of interpretation. Intervention-level was assessed using Hornung and colleagues' (2010) definition of top-down and bottom-up interventions. Interventions which were judged to be initiated and led by managers, with wide-scale impact on organisations or departments, were therefore considered top-down. Interventions which involved encouraging individuals to proactively make changes themselves were considered bottom-up. We also recorded the engagement measure used, the engagement subcomponents measured (e.g. vigour, dedication, absorption), other variables measured, and results and conclusions. Other variables included job and personal resources, job crafting, and well-being and were intended to inform our discussion of mediators and moderators.

The Risk of Bias Tool was adopted to extract information from studies related to evidence for bias that is likely to substantially impact the results or conclusions of a study (Higgins, Altman & Sterne, 2011). Five criteria are considered: 1) selection bias, whether there are systematic differences between intervention and control / comparison groups (e.g. determined by the presence / absence of randomisation and allocation concealment); 2) performance bias, whether systematic differences exist between participants in exposure to the intervention (e.g. were participants aware of which intervention they received?); 3) detection bias, whether systematic differences exist between groups in determining outcomes (e.g. knowledge of which intervention was received may impact outcome responses); 4) attrition bias, systematic differences between those who did and did not complete interventions; and 5) reporting bias, systematic differences between reported and unreported findings (e.g. were all outcomes reported, even if not statistically significant?). Studies are considered 'high risk' if there is evidence of bias which is likely to substantially affect the results or conclusions drawn, such as non-randomisation, very small sample sizes, or systematic differences between intervention and control groups. Studies are considered 'low risk' if there is no indication of bias which is likely to impact conclusions, and these studies are characterised by randomisation, good sample sizes, and little attrition, for example. Studies rated as 'unclear risk' lack the information necessary to make a judgement, for example, by omitting method details such as how randomisation was carried out, failing to describe whether groups were tested for systematic differences, and omitting response and attrition rates. A study rated as high risk in at least one of the five areas is considered high risk overall. Due to the nature of organisational interventions, where it is often impractical to randomise participants, blinding may be impossible, and attrition can be high, all of our studies were rated as high risk overall.

We also captured other characteristics of study quality, such as whether interventions were carried out according to plan (fidelity), and implementation factors such as adverse events occurring during the intervention. Such events include mergers, redundancies, economic downturn, degree of participant compliance with intervention components, and attrition and response rates. These factors are crucial to understanding the intervention context and how much confidence can be placed in conclusions drawn (Briner & Walshe, 2015; Nielsen, et al., 2010). In accordance with current recommendations (e.g. Daniels et al., 2018; Snape et al., 2016), we did not create overall ratings of quality for each of our individual studies. We instead used the information collected from the Risk of Bias Tool and the fidelity and implementation factors to inform the development and quality ratings of overall evidence statements, described shortly.

An independent coder (a researcher working in a related field) double coded 33% of the studies (k=13) to ensure consistency and rigour. According to Cohen's kappa (Cohen, 1960), all agreement rates were greater than .60 over and above that expected by chance, except one (.44, intervention delivery method), indicating good agreement (Orwin, 1994). Many were >.75 and approached 100%. Following discussion and consultation with a third expert, another author, all initial disagreements were resolved and consensus reached.

Following data extraction, we created harvest plots, adapted from previous systematic reviews of complex interventions (e.g. Daniels et al, 2017; Crowther, Avenell, MacLennan & Mowatt, 2011; Ogilvie et al., 2011), to aid data synthesis,). These plots summarise the evidence for the effectiveness of each type of intervention (Figures 2-4). Based on these harvest plots and the extracted data, summary evidence statements were developed (Table 2) according to the GRADE (Grading of Recommendations Assessment, Development and

Evaluation) approach outlined by Snape and colleagues (2016). This approach is suitable for evaluating evidence from quantitative studies. Each overall finding, or evidence statement, was placed into one of four categories according to the weight of evidence underlying each finding (Snape et al., 2016): 1) 'Strong evidence' when there was good confidence in the results, for example when data was obtained from randomised controlled studies; 2) 'Promising evidence' when future research could impact confidence in results, such as when data was based on non-randomised studies; 3) 'Initial evidence' when results were based on observational or uncontrolled studies; and 4) 'Inconclusive evidence' when there was minimal confidence in conclusions, for example due to data from observational studies which reported severe implementation issues such as lack of attendance or attrition.

According to GRADE (Guyatt et al., 2011), five factors can cause the quality of evidence to be downgraded: i) study limitations such as lack of group allocation concealment, lack of blinding, low response rates, or high attrition rates; ii) inconsistent results across studies, for example where some studies reporting positive effects, some negative effects, and others no effect; iii) indirectness of evidence, for example, where the intervention sample differs from the control or comparison group substantially, or where two interventions are compared to a control but not to each other; iv) imprecision, when sample sizes are small and variance in the estimate of effect is large; v) publication bias, which may be indicated by studies funded by industry, or when most published studies seem to indicate positive effects, as this can suggest reporting bias. In addition, three factors can increase the quality of evidence: i) when evidence from weaker study designs such as observational studies report large and consistent effects; ii) when there is evidence of a dose-response gradient, that is, when effects increase as intervention exposure increases; iii) in situations when confounding would decrease the size of the effect yet an effect is still observed. We assessed the evidence for each of our

statements using to these criteria and applied a quality grading to our evidence statements accordingly (Table 2).

Results

This section is organised in three parts according to our review aims. A descriptive analysis precedes these results and provides an overview of the study characteristics (see also Table 1).

Systematic search results

Our initial and supplementary systematic search revealed 2,065 hits overall, which was reduced to 1038 once duplicates were removed. Titles and abstracts were screened for inclusion and full-texts were obtained for further scrutiny where necessary. Following this process, 40 records were included in the systematic review (Figure 2). All 13 published studies included in Knight and colleagues' (2017a) review were also captured by our search and included. Studies were conducted across 19 different countries, including The Netherlands (k=15), the rest of Europe (k=14), the USA (k=4), Japan (k=4), and Australia (k=2). The organisations involved varied considerably and included health and welfare (k=15), education (k=7), finance (k=3), and manufacturing (k=2).

Please insert Figure 2 about here

Please insert Table 1 about here

Specific intervention focus, delivery method, and content

Five of the studies were personal resource building interventions, twelve were job resource building, three involved leadership training, and 18 involved health promotion. Two interventions explicitly focused on developing both personal and job resources (Van

Wingerden, Bakker & Derks, 2016; 2017a), forming the fifth group. This extends and develops the taxonomy previously identified (Knight et al., 2017a). Thirteen studies were conducted in groups, eight individually, seventeen involved both a substantial group and individual element, and one was a top-down 'systemic' job redesign.

The duration of the interventions varied between overnight implementation (Van Steenbergen et al., 2017), half a day (Meyers & Van Woerkom, 2017) and 12 months (Schelvis et al., 2017; White, Butterworth & Wells, 2017), with seven conducted over 0-4 weeks, 15 over 5-8 weeks, nine over 2-6 months, and four over 6-12 months. The duration of one study was unclear (Coo & Salanova, 2017). Study sample size varied enormously, between 16 (Ng, 2013) and 1236 (Imamura et al., 2017) participants.

The effectiveness of work engagement interventions

Twenty studies (50%) had a statistically significant positive effect on work engagement or one of its sub-components, two (5%) had a statistically significant negative effect and 18 (45%) had no effect (Figures 2-4). More specifically, seventeen studies found positive, significant effects on overall work engagement (46% of those measuring overall work engagement, k=37), one (3%) found a significant negative effect on overall engagement (Ng, 2013), and 19 (51%) found no effect. Amongst subcomponents, seven studies reported positive significant effects on vigour (33% of those measuring vigour; k=18), one (5%) reported a negative effect (Ng, 2013), and ten (56%) reported no effect. Four studies reported positive significant effects on dedication (25% of those measuring dedication, k=16), and eleven (69%) reported no effect. Three studies reported positive significant effects on absorption (20% of those measuring absorption, k=15), one (7%) reported a negative effect (Schelvis et al., 2017), and ten (67%) reported no effect. Some studies conducted subgroup

analyses, which we discuss in the results section on moderators. The inconsistent but promising results led to the development of our first evidence statement:

> *Evidence statement 1: There is initial evidence that work engagement interventions are effective, with the strongest evidence for overall work engagement*

Mediators of work engagement interventions

Two studies reported a positive significant effect on both job resources, such as autonomy and social support, and engagement or one of its subcomponents, six reported the same for both personal resources, such as self-efficacy and resilience, and engagement, and one for both job demands, such as workload and emotional demands, and engagement. This is consistent with Watson, Tregaskis, Gedliki, Vaughn & Semkina's, (2018) recent review which indicated strong evidence for the effectiveness of personal resource building interventions on well-being. Four of the five job crafting interventions observed a significant positive effect on job crafting as well as engagement, with Van Wingerden and colleagues (2017a) observing partial mediation between job crafting, work engagement and in-role performance. These job crafting interventions were predicated on JD-R theory and specifically aimed to increase resources and reduce hindrance demands. Another study did not observe statistical mediation between the job crafting intervention, job or personal resources, and work engagement, though it did between the intervention, increasing structural resources, and performance (Van Wingerden, Bakker and Derks, 2017b). Further, Van Wingerden and colleagues (2017a) found that work engagement mediated between improved psychological capital, comprising the personal resources self-efficacy, resilience, optimism and hope, and in-role performance. In addition, two studies observed that work-related needs mediated between interventions and work engagement, supporting SDT as the underlying

theory of the JD-R model (Van Wingerden, Bakker and Derks, 2017c; Knight et al., 2017b). These results led to the development of evidence statement 2:

> *Evidence statement 2: There is initial evidence that positive changes in job resources (especially autonomy & social support), job demands (especially workload), personal resources (especially self-efficacy & resilience), and work-related needs, mediate between work engagement interventions and work engagement (including subcomponents), with the strongest evidence for job crafting interventions*

There was considerable support for the association between well-being and work engagement proposed by JD-R theory (Bakker & Demerouti, 2007). Overall, 17 studies reported positive, significant effects on well-being variables, with ten also reporting a positive, significant effect on engagement. The JD-R model (Bakker & Demerouti, 2007) does not state a causal relationship between well-being and engagement, however, some studies observed such a relationship statistically. Imamura et al. (2015) found that positive change in depression partially mediated between a psychoeducational online intervention and work engagement at both three and six months post-intervention and Meyers and Van Woerkom (2017) found that positive affect mediated between personal resource building and work engagement as well as life satisfaction and reduced burnout. One study also observed that improved daily vigour mediated between a daily respite intervention and post-intervention vigour (Steidle, Gonzalez-Morales, Hoppe, Michel, & O'Shea, 2017). Daily vigour in this study referred to the work engagement sub-component and was viewed as an element of well-being due to its association with positive energy and the absence of fatigue. In addition, five of the nine mindfulness interventions observed a significant positive effect on engagement, with two also measuring and demonstrating a positive impact on mindfulness. The effectiveness of mindfulness is consistent with a recent review of mindfulness interventions which found positive effects on well-being indicators (Donaldson-Feilder, Lewis & Yarker, 2018). In sum,

three studies observed statistical mediation relationships between the intervention, well-being, and work engagement, with seven further studies observing positive, significant effects of on both well-being and engagement. Based on our results, we developed the following evidence statement:

> *Evidence statement 3: There is initial evidence that improved well-being mediates between interventions and work engagement, with the strongest evidence for mindfulness interventions.*

Moderators of work engagement interventions

Our findings revealed seven potential moderators of work engagement interventions: 1) specific intervention focus; 2) intervention delivery method; 3) employee participation alongside strong manager support; 4) level of the intervention (bottom-up vs top-down); 5) need for the intervention (i.e. whether or not the initial level of work engagement was low); 6) success of intervention implementation; and 7) organisational (e.g. restructuring, concurrent projects, job changes) and national (e.g. economic) factors. These are discussed in turn.

Amongst the effective interventions, the largest proportion, (45%) and highest quality (see Figure 5), were health promotion studies. Four of these were mindfulness interventions. Both job and personal resource building interventions were also successful, and comprised two of the four effective job crafting interventions. In comparison, eight of the studies showing no effect on work engagement were health promotion (44% of studies with no effect, Figure 5), and five of these were mindfulness-based. Only one non-effective study (in terms of work engagement) involved job crafting. Taken together, the results are inconsistent but tentatively

suggest initial evidence for the effectiveness of health promotion interventions, and mindfulness in particular, as well as job crafting.

> *Evidence statement 4: There is initial evidence to suggest that the specific intervention focus moderates the effectiveness of work engagement interventions, with the strongest evidence for job crafting and health promotion interventions, including Mindfulness.*

Two-thirds of studies (67%) with positive, significant effects incorporated both a substantial group and individual component. This compares to 38% of interventions containing just a group or just an individual component. There did not appear to be a clear pattern indicating whether one type of intervention was more effective than another type. This evidence was supported by three randomised studies and seven non-randomised but controlled studies, suggesting stronger designs and greater confidence in the results.

> *Evidence statement 5: There is promising evidence that intervention delivery method moderates the effectiveness of work engagement interventions, with the strongest evidence for interventions including both a substantial group and individual component.*

85% (k=17) of the 20 studies with positive, significant effects on work engagement, that is, all the group and joint group and individual interventions, were characterised by employee participation. This compared to 72% (k=13) of studies showing no effect, and 100% of studies indicating significant, negative effects (k=2), indicating inconsistency in the results. Fourteen of the 17 effective studies involved group training with both education and practice elements, such as leadership, job crafting, or mindfulness training. Other forms of participation included a reflection and support group (Bishop, 2013), employees themselves addressing work issues and designing interventions through collaborative discussion and problem-solving (e.g. White et al., 2017), and participation in an exercise programme (e.g.

Strijk, Proper, Van Mechelen & Van der Beek, 2013). The need for strong manager support alongside participation was evident in three studies which cited poor manager support that impeded intervention success (Coffeng et al., 2014; Knight et al., 2017b; Imamura et al., 2015).

Evidence statement 6: There is initial evidence that employee participation alongside strong manager support positively moderates the effectiveness of work engagement interventions

70% of the successful interventions were bottom-up (k=14), compared to 50% (k=9) of interventions with no effect on engagement suggesting that the level of the intervention moderates intervention effectiveness. Job crafting and mindfulness interventions formed the largest proportion of bottom-up interventions with positive effects.

Evidence statement 7: There is promising evidence that bottom-up interventions are more effective than top-down interventions for increasing work engagement

Subgroup analyses also yielded some insights. Both Ouweneel et al. (2013) and Imamura et al. (2017) reported a significant effect for those initially low in engagement, suggesting the benefit of targeting interventions towards this group. The success of intervention implementation also appeared important. Six studies provided detailed analyses on the topic, with three publishing separate 'process evaluations' (Coffeng et al., 2013; Strijk, Proper, Van der Beek and Van Mechelen, 2011; Van Berkel, Boot, Proper, Bongers & Van der Beek, 2013). These process evaluations discussed how many people the intervention impacted or reached, compliance, indicated via attendance and degree of use of intervention materials, fidelity, or whether the intervention was delivered according to protocol, participant satisfaction with the intervention, and contextual issues such as wider physical, social and political barriers and facilitators. All three studies reported variable success: Coffeng et al (2013) found better implementation at the team leader than employee level and found that a

combined physical and social intervention was better received; Strijk et al. (2011) reported good implementation and participant satisfaction; and Van Berkel et al. (2013) found good implementation for a mindfulness component but not for e-coaching or homework aspects. They also noted a significant increase in vigour for those who were highly compliant with a yoga group. These results suggest the importance of successful implementation for intervention effectiveness. Amongst these three studies, Strijk and colleagues (2014) also found a positive effect on engagement.

Other studies briefly discussed some implementation aspects. Considering all studies together, attrition varied between 0% (Cifre, Salanova, & Rodriguez-Sanchez, 2011; Verweij et al., 2013; Van Wingerden et al., 2016) and 83% (Ouweneel et al., 2013). Reasons for attrition were cited by 15 studies and most commonly included lack of time / high workload, sickness absence, low motivation, low management support, holiday absence, and redundancy. In terms of fidelity, issues concerned fewer workshops than planned being conducted (Hengel et al., 2012; Knight, 2017b), failure to strongly indicate the rationale for interventions to participants (Hengel et al., 2012), and differing degrees of adherence to protocols (e.g. Van Berkel et al., 2014). None of the studies reporting these fidelity issues described positive engagement effects. In terms of compliance, nine studies detailing health promotion interventions reported attendance / compliance which was above 75% on at least one component, four of which also reported a positive effect on engagement (Klatt, Steinberg, & Duchemin, 2015; Steinberg, Klatt & Duchemin, 2017; Strijk et al., 2013; and Van Gordon et al., 2017). Two studies reported poor attendance / compliance, both of which experienced no effect on engagement (Hengel et al., 2012; Knight, 2017b). Five studies reported 'good' satisfaction with interventions – three of which reported positive effects on engagement - and one reported variable rates depending on the intervention component, and

did not report a positive engagement effect (Van Berkel et al., 2014). Based on these observations, we developed the following two evidence statements:

Evidence statement 8: There is inconclusive evidence that interventions targeted at employees low in engagement will be most effective

Evidence statement 9: There is promising evidence that intervention implementation, particularly in terms of fidelity, compliance, and participant satisfaction, moderates the effectiveness of interventions on work engagement

Four studies reported organisational factors which may have impacted study implementation (Hengel et al., 2012; Knight, 2017b; Van Berkel et al., 2014; White et al,, 2017), one of which also reported a positive effect on engagement (White et al., 2017). Factors included organisational restructuring (Van Berkel et al., 2014), concurrent projects which affected the ability to draw causal conclusions, ward closure and a hospital being assigned 'special measure' status[2] (Knight, 2017b), and participants changing location / teams (Van Berkel et al, 2014). In terms of national factors, an economic downturn was cited by two studies, neither of which had positive effects on engagement (Hengel et al., 2010; White et al., 2017). Our final evidence statement is as follows:

Evidence statement 10: There is initial evidence that national (e.g. economic) and organisational (e.g. restructuring, concurrent projects, job role changes) factors moderate the effectiveness of interventions on engagement

Please insert Table 2 about here

Please insert Figures 3-5 about here

Discussion

[2] 'Special measures' refers to when there are concerns surrounding hospital patient quality of care, and are designed to offer hospitals extra support to enable standards of care to be improved.

In accordance with Knight and colleagues (2017a) findings, our results revealed that work engagement interventions can be effective. Going beyond Knight and colleagues' (2017a) research, we explicitly addressed whether mediators of engagement interventions could be identified and suggest three: 1) job resources; 2) personal resources; and 3) well-being. We also suggest seven key moderators, expanding on those tested in Knight and colleagues' (2017a) meta-analysis: 1) specific intervention focus; 2) intervention delivery method 3) employee participation alongside strong manager support; 4) intervention level; 5) need for the intervention; 6) success of intervention implementation; and 7) organisational and national factors. Our results deviate from the meta-analysis in that we conclude health promotion interventions – and mindfulness in particular - and job crafting interventions to be most effective (no moderator effect for the specific intervention focus, or 'type', was observed in the previous meta-analysis).

Our interventions were heterogeneous and complex. In acknowledgment of this, we use the specific intervention focus as a framework for integrating our discussion to consider in depth how the specific intervention foci, delivery methods and content of interventions (research aim 1) impacts their effectiveness (research aim 2) through different mediators and moderators (research question 3). We end our discussion with an exploration of potential avenues for future research and practice.

Mediators of work engagement interventions

Job resources are motivational as they allow individuals to effectively meet work goals. Environments rich in resources such as autonomy, social support, job feedback, and opportunities for development are intrinsically motivational, enabling individuals to thrive and satisfy work-related needs for a sense of choice, competence, and belonging (Bakker &

Demerouti, 2007). Resource rich environments are also extrinsically motivating as they foster willingness to invest effort at work. In both cases, work engagement is achieved as individuals have the resources needed to practically carry out their jobs, the negative effects of job demands are mitigated, and personal growth and fulfilment is stimulated (Bakker & Demerouti, 2007). Our results revealed that building job resources through job crafting was particularly effective. As a bottom-up strategy, job crafting allows individuals themselves to change the amount of resources in the environment which are particularly pertinent to their work role and work goals. Individual ownership of the intervention in this way is highly motivational as individuals understand that the time and effort they invest into changing particular resources will benefit them directly. This may not be so apparent in top-down interventions where senior managers may not always convey the purpose and benefit of interventions adequately. Evidence for the importance of senior management support and leadership is growing in the literature (Nielsen et al., 2010; Stouten, Rousseau & Cremer, 2018).

Interventions which build personal resources foster engagement as individual self-evaluations become more positive. These positive self-evaluations have been theoretically linked to resiliency, with resilient individuals believing they are able to meet work demands and achieve their goals in spite of adversity (Bakker & Demerouti, 2007). They have a greater sense of self-efficacy and optimism allowing them to persevere and continue to invest themselves in work in order to achieve their goals. As such, these interventions build on a rich heritage including Bandura's social cognitive theory (SCT; Bandura, 1997), positive psychology (Luthans, 2002; Seligman, Steen, Park & Peterson, 2005) and broaden-and-build theory (Fredrickson, 2001). Thus, these interventions focused on increasing self-efficacy, resilience, and positive emotions; one study focused on increasing individuals' awareness of

their strengths and using them in the work context to elicit positive emotions and well-being, and thereby work engagement (e.g. Meyers & Ver Woerkom, 2017); a second focused on developing happiness through acts of kindness and revisiting positive work memories, as well as goal setting (Ouweneel et al., 2013); and a final intervention in a nursing context focused on appreciating one another through sharing nursing stories (Bishop, 2013).

We noted that two studies, both effective, used job crafting to increase both job and personal resources, and formed a fifth category (Van Wingerden et al., 2016; Van Wingerden et al., 2017a). Job crafting is receiving increasing interest in the literature, with a recent meta-analysis involving 122 independent samples finding that job crafting behaviours were strongly related to work engagement, as well as other variables such as proactive personality and promotion regulatory focus (Rudolph, Katz, Lavigne & Zacher, 2017). We predict that work engagement interventions focusing on increasing both personal and job resources from a job crafting perspective are likely to increase. It may be that this two-pronged approach to increasing work engagement is more effective than singularly increasing either personal or job resources. In support, while Van Wingerden et al. (2017a) found that both a job crafting intervention to increase personal resources and a combined job crafting intervention to increase both job and personal resources were effective for increasing work engagement, only the combined intervention was effective for increasing performance. Moreover, they found that work engagement partially mediated the relationship between personal resources and in-role performance.

Interventions which positively impact well-being may also improve work engagement. Health promotion interventions tended to be of the highest quality and were found to be particularly effective. For example, five of nine mindfulness-based studies adopted a

standardised approach and were conducted by a trained professional (e.g. Steinberg et al., 2017; Van Gordon et al., 2017). Mindfulness may be defined in terms of present-centered attention and awareness (Good et al., 2015) and the evidence base for their effectiveness is perhaps stronger than for some of the other, less established, strategies that work engagement interventions adopted (e.g. leadership training, job resource building). For example, Mindfulness has already proved successful for increasing well-being, by reducing symptoms such as stress, anxiety, and depression (for a good meta-analysis see Khoury et al., 2013). Individuals reporting higher well-being also report higher work engagement (e.g. Halbesleben, 2010), in accordance with the JD-R model (Bakker & Demerouti, 2007; 2008), hence it is theoretically plausible that mindfulness should be effective for increasing work engagement. Leroy et al. (2013) tested causal relationships and demonstrated that authentic functioning mediated the relationship between mindfulness and engagement,, suggesting that by improving self-awareness and one's ability to self-regulate (i.e. authentic functioning), individuals can make a conscious decision to invest their 'true selves' in work, therefore increasing engagement.

A recent review on mindfulness (Good et al., 2015) indicated that mindfulness may foster workplace well-being by increasing the personal resource, resilience. Through mindfulness, individuals may cognitively reinterpret work situations and thus experience negative events in the workplace differently. Therefore, aspects in the work environment previously appraised as stressors may be reappraised as challenges, motivating individuals and enabling them to increase engagement in work tasks. Future, longitudinal research is needed to confirm these findings.

Two of the nine effective health promotion studies utilised cognitive-behavioural therapy (CBT) strategies to improve individuals' abilities to manage stress (Imamura et al., 2015; Imamura et al., 2016). CBT has previously been found effective in intervention research. For example, Khoury et al (2013) found that both Mindfulness and CBT were equally effective for relieving symptoms of depression and anxiety. The effectiveness of CBT in our studies suggests that such strategies may be effective for improving work engagement also. In particular, Imamura et al (2015) found that an improvement in depression scores partially mediated the relationship between the online CBT intervention and work engagement. This could work through improved mental health freeing cognitive and emotional resources to be focused on the job, allowing individuals to experience increased engagement. The authors speculate that more broadly, self-efficacy and positive perception may be improved by the intervention and contribute to work engagement. This may be explained by the intervention's focus on improving problem-solving skills, and cognitive restructuring and relaxation. Imamura et al. (2016) found that a CBT intervention was particularly effective for those low in baseline work engagement, however, this study did not report scores for personal resources or mental health. A logical next step would be to test whether an improvement in personal resources and / or mental health mediates between the intervention and work engagement.

Moderators of work engagement interventions

Interventions which contained both a substantial group and individual component were more often successful than interventions which included only a group, or only an individual, component. This is consistent with research suggesting the benefit of multi-modal interventions in related fields such as work-related stress (e,g, Egan, Bambra, Thomas, Petticrew, Whitehead & Thomson, 2007; Van der Klink, Blonk, Schene and Van Dijk, 2001). Many of our multi-style interventions involved learning mindfulness, relaxation, or job

crafting techniques in groups which were then practised or carried out individually, potentially allowing participants to consolidate their learning. A recent review suggests that learning is central to well-being, and noted that online learning interventions were less effective than more extensive learning interventions (Watson et al., 2018). This supports our findings and could reflect the high degree of commitment and individual motivation needed to sustain participation in self-conducted interventions (Warson et al., 2018). It is possible that group interventions are more motivating due to their participative nature, which is discussed next. Future studies could systematically compare the effectiveness of group, individual and multi-style interventions from a learning perspective to confirm our findings and unpack mediators and moderators.

Employee participation is a particular feature of group designs, and was a frequent component of successful interventions, which is consistent with our expectations and previous research (e.g. Knight et al., 2017a; Nielsen & Miraglia, 2017; Nielsen et al., 2010). Participative designs allow individuals to develop relationships with colleagues and contribute to decision-making. Positive colleague relationships can help build social support at work and a sense of belonging, providing the resources needed to complete work tasks or manage demands (Nielsen et al., 2010), as well as meeting the work-related need for relatedness (Van den Broeck et al., 2008). In an intervention context, Knight et al. (2017b) found that belonging mediated between social support and work engagement, and Van Wingerden and colleagues (2017c) observed that work-related needs mediated between a job crafting intervention, which included building social resources, and work engagement. In a group retreat for nurses which encouraged the sharing of stories and experiences, increasing social support as well as positive colleague feedback was theorised to underlie the intervention (Bishop, 2013).

Participation may also take other guises, such as in training programmes, which were popular in our included studies. The goal-setting, problem-solving and feedback processes involved in many kinds of training, such as job crafting or leadership training, may be the important ingredients driving the success of such interventions. For example, Holman and Axtell (2016) reported that positive changes in perceptions of job control and feedback mediated between a participatory intervention with call centre staff and well-being and performance. Involving employees in developing interventions was theorised to promote their direct impact on work issues of relevance to them. This is particularly motivational as employees can change working conditions to enable their work-related needs to be met, in keeping with self-determination theory (Deci & Ryan, 2001). As an element of well-being, work engagement might also be improved by such an intervention, supported by the positive effects observed using goal-setting in job crafting interventions (e.g. Van Wingerden et al., 2016; 2017a; 2017b). Job crafting training may work in a similar way, albeit the focus is on meeting individual needs as opposed to collective brainstorming and meeting group, team, or department needs.

In terms of intervention level, our finding that bottom-up interventions are more successful than top-down interventions supports previous research indicating that top-down interventions may have few or mixed effects. Briner & Reynolds (1999) suggest that top-down interventions may have unintended, negative side-effects due to impacting individuals and organizations in ways that were not planned or considered. For example, Wall, Kemp, Jackson and Clegg (1986) described an intervention to create autonomous work groups in a manufacturing organisation. They found that while some factors such as job satisfaction increased, other factors, such as motivation and organisational commitment did not, and yet

others were negatively affected, such as turnover and absenteeism. Semmer (2006) also concluded that top-down interventions have inconsistent effects and suggested the utility of combining top-down and bottom-up approaches. Amongst the effective bottom-up strategies, job crafting was particularly common. This may indicate the importance of active employee participation in structured training, goal-setting, and practice (all of which typically occur in job crafting interventions) alongside a bottom-up approach. In terms of job crafting, the ability of the individual to self-set goals is likely to be especially motivational, as the benefit of the intervention is clearly apparent. This is in accordance with goal-setting theory (Locke & Latham, 1990). Utilising goal-setting as a means of proactively taking control of one's work environment through job crafting is likely to encourage a sense of self-efficacy and competence alongside actual changes to job resources. Outcomes may include an improved fit between an individual's needs and interests and the actual job, more enjoyable work, and improved well-being, all of which can stimulate work engagement (Tims & Bakker, 2010).

Sub-group analyses revealed the importance of targeting those in need of interventions, consistent with previous research (e.g. Briner & Walshe, 2015) and suggesting a potentially cost-efficient, effective strategy for directing organisational resources to increase engagement. In terms of implementation, high compliance with an intervention programme was a predictor of success (e.g. Van Berkel et al., 2014). It is possible that other studies may have observed more effects if they had also considered the degree of effective intervention implementation through sub-group analyses. Issues highlighted by the six studies which considered implementation factors included: poor manager support for interventions (e.g. Strijk et al., 2013); potential cross-over effects between intervention and control groups (Imamura et al., 2015, Vuori, Topinen-Tanner & Mutanen 2012); organisational restructuring (Van Berkel et al., 2014); and concurrent projects preventing causal conclusions (e.g. Knight

et al., 2017b). In terms of national factors, economic downturn and job insecurity may have impacted motivation to participate in some interventions (Hengel et al., 2012; White et al., 2017). Taken together, these findings suggest that where intervention implementation is poor, or organisational and national factors interfere with internal validity, causal conclusions cannot be ascertained. At worst, erroneous conclusions can be drawn such as ascribing failure of an intervention to incorrect program theory as opposed to poor intervention implementation. We argue that intervention evaluations should discuss intervention implementation alongside statistical conclusions as a matter of course.

It is important to note that 18 studies (45%) showed no effect on engagement (Figure 4). These were characterised by a larger proportion of top-down interventions than those that were effective, as well as a larger proportion of randomised designs, with several (k=4) randomised at unit or department levels. Several of these studies noted the severe implementation issues discussed above (e.g. Hengel et al., 2012; Knight et al., 2017). Top-down interventions may be more prone to implementation issues due to organisational variables which are beyond the control of individuals.

Finally, our results revealed that all studies except one measured work engagement using the UWES. This echoes previous observations (Bailey et al., 2015; Knight et al., 2017a) and reflects the dominance of Schaufeli and colleagues' (2002) conceptualisation of work engagement. Caution should be applied here, however, as this suggests academic consensus over the meaning and measurement of engagement when in fact this does not yet exist (see Macey & Schneider, 2008; Newman & Harrison, 2008). Other measures exist, grounded in different definitions and theories (for an overview, see Bailey et al., 2015).

Strengths and limitations

To our knowledge, this is the first narrative, systematic review of work engagement interventions, and the first with a particular focus on underlying mediators and moderators. Strengths include our substantive focus on mediators and moderators, and our rigorous approach. Our narrative approach enabled us to tease apart some of the mediators and moderators which may underlie effective interventions and highlighted several directions for future research, outlined below. In so doing, we go beyond the boundaries of other reviews and significantly contribute towards work engagement intervention theory.

We acknowledge that the dominance of the UWES as a measure of work engagement in our review may be viewed as both a strength and a limitation; on the one hand, results obtained using the same scale are standardised thus enabling easier and more meaningful comparison, whereas on the other there is the danger of inferring that the number of studies adopting the UWES indicates its superiority in terms of reliability and validity. Alongside the dominance of the UWES is the dominance of the JD-R model as the underlying framework yet evidence for this model is also mixed (for a discussion see Schaufeli & Taris, 2014).

We acknowledge that the search terms adopted may have limited the results, and thus some studies may not have been captured. We hope we mitigated this limitation by developing our final terms following considerable experimentation and consultation with experts and previous reviews. In addition, we concentrated on peer-reviewed, published literature due to the growing body of relevant studies which was sufficient to explore our research questions, and the greater quality and rigour of such literature. Following Bailey and colleagues' (2015), we excluded studies which used very broad definitions and measures of engagement that were not underpinned by peer-reviewed research and thus were lacking evidence of validity

and robustness (e.g. the Gallup Q^{12}; Harter, Schmidt & Hayes, 2002). Although this prevented some studies from being included, we believe this was necessary to maintain the quality and usefulness of our review. Due to our focus on published studies, there may be the possibility of publication bias, however, research suggests that such a bias is unlikely and does not pose a serious threat to validity (Dalton, Aguinis, Dalton, Bosco & Pierce, 2012). It is also possible that misclassification of studies occurred, particularly in terms of type, with some interventions potentially fitting into more than one category. Double-coding, with all discrepancies discussed until consensus was reached, mitigated this possibility.

Directions for future research

Our focus on mediators and moderators underlying work engagement interventions revealed several directions for future research. Crucially, few of our studies statistically assessed mediation relationships yet this is key to understanding how and why interventions work. Moreover, a limited number of job and personal resources, job demands and other potential mediators were actually measured by our studies, hence we know little about which other resources (i.e. besides autonomy, social support, self-efficacy & resilience), demands (besides workload) and wider factors (besides work-related needs & well-being) might drive intervention effectiveness. Other mediators could include attention in mindfulness interventions and cognitive reappraisal in CBT interventions.

Assessing the balance between job resources and job demands is also important, given that JD-R theory espouses that it is when job demands are high and job resources are low that poor outcomes are particularly salient (Bakker & Demerouti, 2007). This interaction effect has been elusive (Wall, Jackson, Mullarkey & Parker, 1996), yet an intervention design, which is a stronger test of theory than other research designs (e.g. cross-sectional, non-

intervention research) due to the ability to manipulate changes and assess causality, may help unpack these relationships and explain why some interventions did not observe expected effects. In addition, our observation that well-being drives engagement is not specifically predicted by the JD-R model. Multi-wave longitudinal studies which investigate this relationship in more detail are needed. These could explore the existence of reciprocal relationships between well-being and engagement, and positive gain spirals, where improved well-being leads to increased engagement which increases well-being further, and so on. Some evidence for reciprocal relationships between resources and engagement exists (Xanthopoulou, Bakker, Demerouti & Schaufeli, 2009), yet little is known about how well-being might fit into these relationships.

We continue to know little about the effect of leaders on employees' work engagement. Our leadership training interventions were few in number and ineffective for increasing work engagement. This could reflect the distal measurement of engagement, with managers undergoing training and work engagement being assessed in their employees. Multilevel studies which capture leaders' perceptions as well as that of their followers would be more informative and help to tease out the extent to which leaders are able to influence followers. Research has also suggested that transformational leadership influences employee job and personal resources (e.g. Breevart, Bakker, Hetland, Demerouti, Olsen & Espevik, 2014; Tims, Bakker & Xanthopoulou, 2011), yet it is not yet known *how* this might impact employees' engagement.

Further, investigating the transfer of learning to the job might offer a potential avenue for unpacking how leaders might influence their followers following leadership training. Massenberg, Schulte and Kauffeld (2017) found that pre-training motivation to learn and

self-efficacy beliefs were particularly important for transferring training to the workplace. A recent review of employee soft skills training, which are intra- and inter-personal skills such as managing oneself and one's interactions with others, found that autonomy, colleague and supervisor support, workload, and the organisational learning climate were particularly influential in enabling the transfer of learning to the job (Botke, Jansen, Khapova & Tims, 2018). More research is needed to unpack whether and how these factors might also be important for the success of leadership training, which may involve the development of soft skills to improve leader-subordinate interactions, to improve followers' engagement.

Moderators of work engagement interventions are currently under-explored. We identified seven but other moderators are likely, for example, personality. A recent meta-analysis found that positive affectivity, proactive personality, conscientiousness and extraversion were the strongest personality predictors of engagement (Young, Glerum, Wang & Joseph, 2018). Young et al. (2018) argue that these personality traits enable individuals to manage their energy more effectively, meaning they are more able to invest energy in work and so experience increased engagement. Proactive personality may be another moderator of engagement interventions, with proactive individuals tending to actively change their circumstances and environment to meet goals (Bateman & Crant, 1993). Individuals with proactive personalities might therefore respond well to engagement interventions as they are motivated to improve their current circumstances (Crant, 2000). Further, some research shows that it is possible to facilitate, or train, proactivity through other kinds of training and development programmes such as problem-focused interventions, where aspects of the current work environment are changed, or vision-focused interventions, where individuals work towards future work goals (e.g. Strauss and Parker, 2018). Further research is needed to understand which personality types are best suited to which interventions. It may then be

possible to target certain interventions towards people with certain personality traits for optimum success.

Our results also raised context as a potential moderator. For example, a health promotion intervention might be more appropriate when individuals' well-being is poor, whereas a job resource building intervention may be more effective if job resources are particularly low. Further, a bottom-up approach such as job crafting may be more successful in work environments characterised by instability and change, such as mergers, reorganisations, multiple concurrent projects, and complex or unclear feedback and communication systems. This is because it can be difficult to successfully implement organisation wide interventions in times of change due to necessary resource and support systems already being overstretched.

Furthermore, if necessary policies, practices and procedures needed to support interventions are not in place or aligned with the intervention, the intervention may be condemmed to failure (Saks, 2017). Moreover, applying blanket changes across whole organisations may not meet individual needs and thus such approaches risk benefitting only some employees (Hornung et al., 2010) and being cost-inefficient. In such situations, bottom-up interventions like job crafting may be more appropriate. These are only likely to be successful, however, if workers have at least some ability to take control and modify their own jobs (Hornung et al., 2010). On the other hand, some researchers argue that organization-wide changes are needed in order to positively impact the many drivers of engagement and create a culture of engagement (Saks, 2017). It may be that a combination of bottom-up and top-down interventions is more effective. More work is clearly needed to understand exactly which interventions are effective for whom in which circumstances.

We also know very little about the multilevel effects of interventions. Do top-down interventions impact team as well as individual work engagement? Likewise, might bottom-up interventions affect team, unit or department engagement? The most effective interventions in our review appeared to be bottom-up, however, this may have been due to ease of implementation. None of our studies measured effects at levels other than the individual, yet understanding the role of teams and departments in developing work engagement at both individual and team levels could help increase effectiveness. In addition, little is known about the timespans over which interventions are most effective. Multi-wave interventions which assess the aetiology and sustainability of interventions is needed to drive the development of effective interventions.

As yet, we also still know very little about the relative importance of different intervention components and delivery methods, or which components and delivery methods are essential for interventions to have their desired effects. Carroll and colleagues (2007) stress the need to conduct a 'component analysis' in order to determine the 'active ingredients' of interventions. Beyond simply understanding the specific intervention foci of interventions which are effective (e.g. job crafting, health promotion), component analysis can inform a more nuanced understanding of the relative importance of aspects such as training, goal-setting, or homework. This type of analysis needs to be applied to work engagement interventions in order to uncover the most effective strategies.

Practical implications

From a practical perspective, this review suggests that interventions to improve work engagement can be effective for some people, in some contexts. Practitioners can promote

effectiveness by assessing the need for interventions prior to implementing them. This involves not only assessing whether work engagement is low, but also assessing the *drivers* of work engagement. Much like a doctor might look for the causes of pain in a patient before prescribing treatment, a work engagement intervention is only likely to be effective if there is a proper diagnosis of the causes of poor engagement. In accordance with work engagement theory, strategies can then be adopted, for example, to remedy the low level of particular resources or the high level of particular demands. In addition, building strong support from senior managers is essential for interventions, including ensuring that managers communicate their support clearly to participants. Participants may be reluctant to give up working time to take part in an intervention which they are not sure is endorsed by their manager. These recommendations concur with those of other researchers (e.g. Briner and Walshe, 2015; Nielsen and Randall, 2013; Stouten, Rousseau and Cremer, 2018).

Conclusion

Contemporary organisations need employees who are engaged in order to remain competitive. This review set out to narratively investigate the specific intervention foci, delivery methods, and content of work engagement interventions, their effectiveness, and mediators and moderators underlying them. We revealed that interventions can be effective, and highlighted several potential mediators and moderators. There is a paucity of knowledge, however, on which components of interventions are most effective, and who these interventions are most effective for. We hope our review stimulates research and discussion on the topic, contributing to knowledge around how best to design and implement work engagement interventions.

Disclosure statement

The authors report no conflict of interest.

References

*References marked with an asterisk indicate studies included in the systematic review (K=40).

Aguinis, H., Edwards, J. R., & Bradley, K. J. (2017). Improving our understanding of moderation and mediation in strategic management research. *Organizational Research Methods*, *20*(4), 665-685.

*Aikens, K. A., Astin, J., Pelletier, K. R., Levanovich, K., Baase, C. M., Park, Y. Y., & Bodnar, C. M. (2014). Mindfulness Goes to Work Impact of an Online Workplace Intervention. *Journal of Occupational and Environmental Medicine, 56*(7), 721-731. doi: 10.1097/jom.0000000000000209

*Angelo, R. P., & Chambel, M. J. (2013). An intervention with firefighters to promote psychological occupational health according to the Job Demands-Resources Model. *Revista De Psicologia Social, 28*(2), 197-210.

Bailey, C., Madden, A., Alfes, K., & Fletcher, L. (2015). The meaning, antecedents and outcomes of employee engagement: A narrative synthesis. *International Journal of Management Reviews, 00,* 1–23. doi: 10.1111/ijmr.12077

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology, 2*2(3), 309-328.

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International, 13*(3), 209-223.

Bakker, A.B., Hakanen, J.J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement, particularly when job demands are high. *Journal of Educational Psychology*, *99*, 274–284.

Bandura, A., & Wessels, S. (1997). *Self-efficacy*. W.H. Freeman & Company.

Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior: A measure and correlates. *Journal of Organizational Behavior*, *14*(2), 103–118. https://doi.org/10.1002/job.4030140202

*Biggs, A., Brough, P., & Barbour, J. P. (2014). Enhancing work-related attitudes and work engagement: A quasi-experimental study of the impact of an organizational intervention. *International Journal of Stress Management, 21*(1), 43-68. doi: 10.1037/a0034508

*Bishop, M. (2013). Work engagement of older registered nurses: the impact of a caring-based intervention. *Journal of Nursing Management, 21*(7), 941-949. doi: 10.1111/jonm.12182

Botke, J. A., Jansen, P. G., Khapova, S. N., & Tims, M. (2018). Work factors influencing the transfer stages of soft skills training: A literature review. *Educational Research Review*, *24*, 130-147.

Breevaart, K., Bakker, A.B., Hetland, J., Demerouti, E., Olsen, O.K. and Espevik, R. (2014), "Daily transactional and transformational leadership and daily employee engagement", Journal of Occupational and Organizational Psychology, Vol. 87 No. 1, pp. 138-157.Crant, J. M. 2000. Proactive behavior in organizations. *Journal of Management*, 26: 435-462.

Briner, R. B., & Reynolds, S. (1999). The costs, benefits, and limitations of organizational level stress interventions. *Journal of Organizational Behavior*, *20*(5), 647-664.

Briner, R. B., & Walshe, N. D. (2015). An evidence-based approach to improving the quality of resource-oriented well-being interventions at work. *Journal of Occupational and Organizational Psychology, 88,* 563–586. http://doi.org/10.1111/joop.12133

Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science, 2*(1), 40.

*Chen, S. S., Westman, M., & Eden, D. (2009). Impact of Enhanced Resources on Anticipatory Stress and Adjustment to New Information Technology: A Field-Experimental Test of Conservation of Resources Theory. *Journal of Occupational Health Psychology, 14*(3), 219-230. doi: 10.1037/a0015282

Christian, M. S., Garza, A. S., & Slaughter, J. E. (2011). Work engagement: A quantitative review and test of its relations with task and contextual performance. *Personnel Psychology, 64*(1), 89-136. doi: 10.1111/j.1744-6570.2010.01203.x

*Cifre, E., Salanova, M., & Rodriguez-Sanchez, A. M. (2011). Dancing between Theory and Practice: Enhancing Work Engagement through Work Stress Intervention. *Human Factors and Ergonomics in Manufacturing & Service Industries, 21*(3), 269-286. doi: 10.1002/hfm.20232

*Coffeng, J. K., Hendriksen, I. J., Duijts, S. F., Twisk, J. W., Van Mechelen, W., & Boot, C. R. (2014). Effectiveness of a Combined Social and Physical Environmental Intervention on Presenteeism, Absenteeism, Work Performance, and Work Engagement in Office Employees. *Journal of Occupational and Environmental Medicine, 56*(3), 258-265.

Coffeng, J. K., Hendriksen, I. J. M., van Mechelen, W., & Boot, C. R. L. (2013). Process Evaluation of a Worksite Social and Physical Environmental Intervention. *Journal of Occupational and Environmental Medicine, 55*(12), 1409-1420. doi: 10.1097/JOM.0b013e3182a50053

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20,* 37–46.

*Coo, C., & Salanova, M. (2018). Mindfulness Can Make You Happy-and-Productive: A Mindfulness Controlled Trial and Its Effects on Happiness, Work Engagement and Performance. *Journal of Happiness Studies*, *19*(6), 1691-1711.

Crant, J. M. 2000. Proactive behavior in organizations. *Journal of Management*, 26: 435-462.

Crowther, M., Avenell, A., MacLennan, G., & Mowatt, G. (2011). A further use for the harvest plot: a novel method for the presentation of data synthesis. *Research synthesis methods*, *2*(2), 79-83.

Dalton, D. R., Aguinis, H., Dalton, C. M., Bosco, F. A., & Pierce, C. A. (2012). Revisiting the file drawer problem in meta-analysis: An assessment of published and nonpublished correlation matrices. *Personnel Psychology*, *65*(2), 221-249.

Daniels, K., Gedikli, C., Watson, D., Semkina, A., & Vaughn, O. (2017). Job design, employment practices and well-being: A systematic review of intervention studies. *Ergonomics*, *60*(9), 1177-1196.

Deci, E. L., & Ryan, R. M. (2000). The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological inquiry*, *11*(4), 227-268.

Donaldson-Feilder, E., Lewis, R., & Yarker, J. (2018). What outcomes have mindfulness and meditation interventions for managers and leaders achieved? A systematic review. *European Journal of Work and Organizational Psychology*, 1-19.

*Ebert, D. D., Lehr, D., Heber, E., Riper, H., Cuijpers, P., & Berking, M. (2016). Internet- and mobile-based stress management for employees with adherence-focused guidance: efficacy and mechanism of change. *Scandinavian Journal of Work, Environment & Health, 42*(5), 382-394.

Egan, M., Bambra, C., Thomas, S., Petticrew, M., Whitehead, M., & Thomson, H. (2007). The psychosocial and health effects of workplace reorganisation. 1. A systematic

review of organisational-level interventions that aim to increase employee control. *Journal of Epidemiology & Community Health*, *61*(11), 945-954.

Fredrickson, B. L. (2001), "The role of positive emotions in positive psychology: the broaden-and-build theory of positive emotions", American Psychologist, Vol. 56, pp. 218-26.

Fuller, B., & Marler, L. E. (2009). Change driven by nature: A meta-analytic review of the proactive personality literature. *Journal of Vocational Behavior*, *75*(3), 329–345. https://doi.org/10.1016/j.jvb.2009.05.008

Grant, A. M., Christianson, M. K., & Price, R. H. (2007). Happiness, health, or relationships? Managerial practices and employee well-being tradeoffs. *Academy of management perspectives*, *21*(3), 51-63.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., ... & Lazar, S. W. (2016). Contemplating mindfulness at work: An integrative review. *Journal of Management*, *42*(1), 114-142.

Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., & Schünemann, H. J. (2008). GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ (Clinical research ed.)*, *336*(7650), 924-926.

Halbesleben, J. B. (2010). A meta-analysis of work engagement: relationships with burnout, demands, resources, and consequences. In A. B. Bakker & M. P. Leiter (Eds.), *Work Engagement: A Handbook of Essential Theory and Research.* Psychology Press, pp. 102-117.

Hakanen, J. J., Bakker, A. B., & Demerouti, E. (2005). How dentists cope with their job demands and stay engaged: The moderating role of job resources. European Journal of Oral Sciences, 113(6), 479–487. doi: 10.1111/j.1600-0722.2005.00250.x.

Hakanan, J. J., & Roodt, G. (2010). Using the job demands-resources model to predict engagement: Analysing a conceptual model. In A. B. Bakker, & M. P. Leiter (Eds.), Work engagement: A handbook of essential theory and practice (pp. 85–101).

Harter, J., Schmidt, F. and Hayes, T. (2002). Business unit level relationship between employee satisfaction, employee engagement and business outcomes: a meta-analysis. *Journal of Applied Psychology*, *87*, 268–279.

*Hengel, K. M. O., Joling, C. I., Proper, K. I., Blatter, B. M., & Bongers, P. M. (2010). A worksite prevention program for construction workers: design of a randomized controlled trial. *BMC Public Health, 10*. doi: 10.1186/1471-2458-10-336.

*Hernaus, T., Vujčić, M. T., & Aleksić, A. (2017). Changing Work Engagement: The Longitudinal Effect of a Job Redesign Intervention Among Public Sector Employees. *Strategic management*, *22*(2), 3-8.

Higgins, J. P. T., Altman, D. G., & Sterne, J. A. C. (2011). Chapter 8: Assessing risk of bias in included studies. In J. P. T. Higgins, & S. Green (Eds), Cochrane handbook for systematic reviews of interventions. Version 5.1.0 (updated March 2011). Available from www.cochrane-handbook.org.: The Cochrane Collaboration.

Holman, D., & Axtell, C. (2016). Can Job Redesign Interventions Influence a Broad Range of Employee Outcomes by Changing Multiple Job Characteristics? A Quasi-Experimental Study. *Journal of Occupational Health Psychology, 21*(3), 284-295.

Hornung, S., Rousseau, D. M., Glaser, J., Angerer, P., & Weigl, M. (2010). Beyond top-down and bottom-up work redesign: Customizing job content through idiosyncratic deals. *Journal of Organizational Behavior*, *31*(2-3), 187-215.

*Imamura, K., Kawakami, N., Furukawa, T. A., Matsuyama, Y., Shimazu, A., Umanodan, R., ... & Kasai, K. (2015). Effects of an Internet-Based Cognitive Behavioral Therapy Intervention on Improving Work Engagement and Other Work-Related Outcomes: An

Analysis of Secondary Outcomes of a Randomized Controlled Trial. *Journal of Occupational and Environmental Medicine, 57*(5), 578-584.

*Imamura, K., Kawakami, N., Tsuno, K., Tsuchiya, M., Shimada, K., Namba, K., & Shimazu, A. (2016). Effects of web-based stress and depression literacy intervention on improving work engagement among workers with low work engagement: An analysis of secondary outcome of a randomized controlled trial. *Journal of Occupational Health,* 16-0187.

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *The Academy of Management Journal, 33*(4), 692-724.

Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, T., Bouchard, V., … & Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review, 33*(6), 763–771. http://doi.org/10.1016/j.cpr.2013.05.005

*Klatt, M., Norre, C., Reader, B., Yodice, L., & White, S. (2017). Mindfulness in motion: a mindfulness-based intervention to reduce stress and enhance quality of sleep in Scandinavian employees. *Mindfulness*, *8*(2), 481-488.

*Klatt, M., Steinberg, B., & Duchemin, A. M. (2015). Mindfulness in Motion (MIM): An Onsite Mindfulness Based Intervention (MBI) for Chronically High Stress Work Environments to Increase Resiliency and Work Engagement. *Journal of Visualized Experiments, 101.* doi:10.3791/52359

Knight, C., Patterson, M., & Dawson, J. (2017a). Building work engagement: A systematic review and meta-analysis investigating the effectiveness of work engagement interventions. *Journal of Organizational Behavior. 38*(6), 792-812.

*Knight, C., Patterson, M., Dawson, J., & Brown, J. (2017b). Building and sustaining work engagement–a participatory action intervention to increase work engagement in

nursing staff. *European Journal of Work and Organizational Psychology*, *26*(5), 634-649.

*Koolhaas, W., Brouwer, S., Groothoff, J. W., & Van der Klink, J. J. L. (2010). Enhancing a sustainable healthy working life: design of a clustered randomized controlled trial. *BMC Public Health, 10.* doi: 461 10.1186/1471-2458-10-461.

Kompier, M. A., Geurts, S. A., Gründemann, R. W., Vink, P., & Smulders, P. G. (1998). Cases in stress prevention: the success of a participative and stepwise approach. *Stress medicine*, *14*(3), 155-168.

*Lases, S. S., Lombarts, M., Slootweg, I. A., Arah, O. A., Pierik, E., & Heineman, E. (2016). Evaluating Mind Fitness Training and Its Potential Effects on Surgical Residents' Well-Being: A Mixed Methods Pilot Study. *World Journal of Surgery, 40*(1), 29-37. doi:10.1007/s00268-015-3278-z

*Leroy, H., Anseel, F., Dimitrova, N. G., & Sels, L. (2013). Mindfulness, authentic functioning, and work engagement: A growth modeling approach. *Journal of Vocational Behavior, 82*(3), 238-247.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., ... & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS medicine*, *6*(7), e1000100.

Locke, E. A., & Latham, G. P. (1990). A theory of goal setting & task performance. Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior*, 695-706.

Macey, W. H., & Schneider, B. (2008). The meaning of employee engagement. *Industrial and Organizational Psychology, 1*(1), 3-30.

MacLeod, D., & Clarke, N. (2009). *Engaging for Success: Enhancing performance through employee engagement: a report to government.* London: Department for Business, Innovation and Skills, UK.

*Martinussen, M., Adolfsen, F., Lauritzen, C., & Richardsen, A. M. (2012). Improving interprofessional collaboration in a community setting: Relationships with burnout, engagement and service quality. *Journal of Interprofessional Care, 26*(3), 219-225. doi: 10.3109/13561820.2011.647125

Massenberg, A. C., Schulte, E. M., & Kauffeld, S. (2017). Never too early: Learning transfer system factors affecting motivation to transfer before and after training programs. *Human Resource Development Quarterly*, *28*(1), 55-85.

*Meyers, M. C., & Van Woerkom, M. (2017). Effects of a strengths intervention on general and work-related well-being: The mediating role of positive affect. *Journal of Happiness Studies*, *18*(3), 671-689.

Morgeson, F. P., Johnson, M. D., Campion, M. A., Medsker, G. J., & Mumford, T. V. (2006). Understanding reactions to job redesign: A quasi-experimental investigation of the moderating effects of organizational context on perceptions of performance behavior. *Personnel psychology*, *59*(2), 333-363.

Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, *96*(1), 71-94. doi: 10.1037/a0021484

*Naruse, T., Taguchi, A., Kuwahara, Y., Nagata, S., Sakai, M., Watai, I., & Murashima, S. (2014). The effect of skill mix in non-nursing assistants on work engagements among home visiting nurses in Japan. *Journal of Nursing Management.* doi: 10.1111/jonm.12167

Newman, D. A., & Harrison, D. A. (2008). Been there, bottled that: Are state and behavioral work engagement new and useful construct "wines"? *Industrial and Organisational Psychology - Perspectives on Science and Practice, 1*(1), 31-35. doi: 10.1111/j.1754-9434.2007.00003.x

Nielsen, K., & Miraglia, M. (2017). What works for whom in which circumstances? On the need to move beyond the 'what works?' question in organizational intervention research. *Human Relations*, *70*(1), 40-62.

Nielsen, K., & Randall, R. (2012). The importance of employee participation and perceptions of changes in procedures in a teamworking intervention. *Work & Stress*, *26*(2), 91-111.

Nielsen, K., & Randall, R. (2013). Opening the black box: Presenting a model for evaluating organizational-level interventions. *European Journal of Work and Organizational Psychology*, *22*(5), 601-617.

Nielsen, K., Randall, R., Holten, A.-L., & González, E. R. (2010). Conducting organizational-level occupational health interventions: What works? *Work & Stress, 24*(3), 234–259. http://doi.org/10.1080/02678373.2010.515393

*Ng, S. M. (2014). Is brief daily body–mind–spirit practice desirable for staff who provide services for elderly people? Two pilot studies with care and professional workers. *Asia Pacific Journal of Social Work and Development, 24*(4), 227-237.

Ogilvie, D., Fayter, D., Petticrew, M., Sowden, A., Thomas, S., Whitehead, M., & Worthy, G. (2008). The harvest plot: a method for synthesising evidence about the differential effects of interventions. *BMC Medical Research Methodology*, *8*(1), 8.

Orwin, R. G. (1994). Evaluating coding decisions. In H. Cooper, & L. V. Hedges (Eds.), *The handbook of research synthesis.* New York: Russell Sage Foundation.

*Ouweneel, E., Le Blanc, P. M., & Schaufeli, W. B. (2013). Do-it-yourself: An online positive psychology intervention to promote positive emotions, self-efficacy, and engagement at work. *Career Development International, 18*(2), 173-195. doi: 10.1108/CDI-10-2012-0102

Rich, B. L., LePine, J. A., & Crawford, E. R. (2010). Job engagement: Antecedents and effects on job performance. *Academy of Management Journal, 53*(3), 617-635.

Richardson, K. M., & Rothstein, H. R. (2008). Effects of occupational stress management intervention programs: a meta-analysis. *Journal of occupational health psychology*, *13*(1), 69.

*Rickard, G., Lenthall, S., Dollard, M., Opie, T., Knight, S., Dunn, S., … Brewster-Webb, D. (2012). Organisational intervention to reduce occupational stress and turnover in hospital nurses in the Northern Territory, Australia. *Collegian, 19*(4), 211–221 http://doi.org/10.1016/j.colegn.2012.07.001

Rothmann, S. (2008). Job satisfaction, occupational stress, burnout and work engagement as components of work-related wellbeing. *SA journal of industrial psychology*, *34*(3), 11-16.

Rudolph, C. W., Katz, I. M., Lavigne, K. N., & Zacher, H. (2017). Job crafting: A meta-analysis of relationships with individual differences, job characteristics, and work outcomes. *Journal of Vocational Behavior*, *102*, 112-138.

Saks, A. M. (2006). Antecedents and consequences of employee engagement. Journal of Managerial Psychology, 21(7), 600–619. doi: 10.1108/02683940610690169

*Sakuraya, A., Shimazu, A., Imamura, K., Namba, K., & Kawakami, N. (2016). Effects of a job crafting intervention program on work engagement among Japanese employees: a pretest-posttest study. *BMC Psychology, 4*(1), 49.

Schaufeli, W. B., Salanova, M., Gonzalez-Roma, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies, 3,* 71-92.

Schaufeli, W. B., & Taris, T. W. (2014). *A critical review of the job demands-resources model: Implications for improving work and health.* Bridging Occupational, Organisational and Public Health (pp. 43-68): Springer.

Schaufeli, W. B., Taris, T. W., & Van Rhenen, W. (2008). Workaholism, burnout, and work engagement: Three of a kind or three different kinds of employee well-being?. *Applied psychology*, *57*(2), 173-203.

*Schelvis, R. M., Wiezer, N. M., Van Der Beek, A. J., Twisk, J. W., Bohlmeijer, E. T., & Hengel, K. M. O. (2017). The effect of an organizational level participatory intervention in secondary vocational education on work-related health outcomes: results of a controlled trial. *BMC public health*, *17*(1), 141.

Seligman, M. E. P., Steen, T. A., Park, N. & Peterson, C. (2005). Positive psychology progress: empirical validation of interventions. *American Psychologist*, *60*(5) 410-421.

Semmer, N. K. (2006). Job stress interventions and the organization of work. *Scandinavian Journal of Work, Environment & Health*, 515-527.

Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... & Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *British Medical Journal*, *349*.

Shirom, A. (2003). Feeling vigorous at work? The construct of vigor and the study of positive affect in organizations. In *Emotional and physiological processes and positive intervention strategies* (pp. 135-164). Emerald Group Publishing Limited.

Snape, D., Meads, C., Bagnall, A. M., Tregaskis, O., & Mansfield, L. (2016). What works well-being: A guide to our evidence review methods. What works for well-being centre. https://whatworkswellbeing.files.wordpress.com/2016/02/whatworks-wellbeing-methods-guide-july-2016.pdf

*Steidle, A., Gonzalez-Morales, M. G., Hoppe, A., Michel, A., & O'Shea, D. (2017). Energizing respites from work: a randomized controlled study on respite interventions. *European Journal of Work and Organizational Psychology*, *26*(5), 650-662.

*Steinberg, B. A., Klatt, M., & Duchemin, A. M. (2017). Feasibility of a mindfulness-based intervention for surgical intensive care unit personnel. *American Journal of Critical Care*, *26*(1), 10-18.

Stouten, J., Rousseau, D. M., & De Cremer, D. (2018). Successful Organizational Change: Integrating the Management Practice and Scholarly Literatures. *Academy of Management Annals*, *12*(2), 752-788.

Strauss, K., & Parker, S. K. (2018). Intervening to enhance proactivity in organizations: Improving the present or changing the future. *Journal of Management*, *44*(3), 1250-1278.

Strijk, J. E., Proper, K. I., Van der Beek, A. J., & Van Mechelen, W. (2011). A process evaluation of a worksite vitality intervention among ageing hospital workers. *International Journal of Behavioural Nutrition and Physical Activity, 8*(1), 58.

*Strijk, J. E., Proper, K. I., Van Mechelen, W., & Van der Beek, A. J. (2013). Effectiveness of a worksite lifestyle intervention on vitality, work engagement, productivity, and sick leave: results of a randomized controlled trial. *Scandinavian Journal of Work, Environment and Health, 39*(1), 66-75.

Tims, M., & Bakker, A. B. (2010). Job crafting: Towards a new model of individual job redesign. *SA Journal of Industrial Psychology*, *36*(2), 1-9.

Tims, M., Bakker, A.B. and Xanthopoulou, D. (2011). Do transformational leaders enhance their followers' daily work engagement?, *The Leadership Quarterly*, *22*(1), 121-131.

Van Berkel, J., Boot, C. R., Proper, K. I., Bongers, P. M., & Van der Beek, A. J. (2013). Process evaluation of a workplace health promotion intervention aimed at improving work engagement and energy balance. *Journal of Occupational and Environmental Medicine*, *55*(1), 19-26.

*Van Berkel, J., Boot, C. R. L., Proper, K. I., Bongers, P. M., & Van der Beek, A. J. (2014). Effectiveness of a worksite mindfulness-based multi-component intervention on lifestyle behaviors. *International Journal of Behavioral Nutrition and Physical Activity, 11*. doi: 10.1186/1479-5868-11-9

Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress*, *22*(3), 277-294.

Van der Klink, J. J., Blonk, R. W., Schene, A. H., & Van Dijk, F. J. (2001). The benefits of interventions for work-related stress. *American journal of public health*, *91*(2), 270.

Van der Ven, C., Peeters, M. C., & Taris, T. W. (2017). Transitioning Towards New Ways of Working: Do Job Demands, Job Resources, Burnout, and Engagement Change? *Psychological Reports*, 0033294117740134.

*Van Gordon, W., Shonin, E., Dunn, T. J., Garcia-Campayo, J., Demarzo, M. M., & Griffiths, M. D. (2017). Meditation awareness training for the treatment of workaholism: A controlled trial. *Journal of Behavioral Addictions*, *6*(2), 212-220.

*Van Steenbergen, E. F., van der Ven, C., Peeters, M. C., & Taris, T. W. (2017). Transitioning Towards New Ways of Working: Do Job Demands, Job Resources, Burnout, and Engagement Change? *Psychological Reports*, 0033294117740134.

*Van Wingerden, J., Bakker, A. B., & Derks, D. (2016). A test of a job demands-resources intervention. *Journal of Managerial Psychology, 31*(3), 686-701. doi:10.1108/jmp-03-2014-0086

*Van Wingerden, J., Derks, D., & Bakker, A. B. (2017a). The impact of personal resources and job crafting interventions on work engagement and performance. *Human Resource Management*, *56*(1), 51-67.

*Van Wingerden, J., Bakker, A. B., & Derks, D. (2017b). The longitudinal impact of a job crafting intervention. *European Journal of Work and Organizational Psychology*, *26*(1), 107-119.

*Van Wingerden, J., Bakker, A. B., & Derks, D. (2017c). Fostering employee well-being via a job crafting intervention. *Journal of Vocational Behavior*, *100*, 164-174.

*Verweij, H., Waumans, R. C., Smeijers, D., Lucassen, P., Donders, A. R. T., Van der Horst, H. E., & Speckens, A. E. M. (2016). Mindfulness-based stress reduction for GPs: results of a controlled mixed methods pilot study in Dutch primary care. *British Journal of General Practice, 66*(643), E99-E105. doi:10.3399/bjgp16X683497

*Vuori, J., Toppinen-Tanner, S., & Mutanen, P. (2012). Effects of Resource-Building Group Intervention on Career Management and Mental Health in Work Organizations: Randomized Controlled Field Trial. *Journal of Applied Psychology, 97*(2), 273-286. doi: 10.1037/a0025584

Wall, T. D., Jackson, P. R., Mullarkey, S., & Parker, S. K. (1996). The demands—control model of job strain: A more specific test. *journal of Occupational and Organizational Psychology*, *69*(2), 153-166.

Wall, T. D., Kemp, N. J., Jackson, P. R., & Clegg, C. W. (1986). Outcomes of autonomous workgroups: A long-term field experiment. *Academy of Management journal*, *29*(2), 280-304.

Watson, D., Tregaskis, O., Gedikli, C., Vaughn, O., & Semkina, A. (2018). Well-being through learning: a systematic review of learning interventions in the workplace and their impact on well-being. *European Journal of Work and Organizational Psychology*, *27*(2), 247-268.

*White, M., Butterworth, T., & Wells, J. S. (2017). Healthcare Quality Improvement and 'work engagement'; concluding results from a national, longitudinal, cross-sectional study of the 'Productive Ward-Releasing Time to Care' Programme. *BMC Health Services Research*, *17*(1), 510.

Wrzesniewski, A., & Dutton, J.E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review, 26,* 179–201.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Work engagement and financial returns: A diary study on the role of job and personal resources. Journal of Occupational and Organizational Psychology, 82(1), 183–200. doi: 10.1348/096317908x285633

Young, H. R., Glerum, D. R., Wang, W., & Joseph, D. L. (2018). Who are the most engaged at work? A meta-analysis of personality and employee engagement. *Journal of Organizational Behavior*.

Appendices

Table 1: Key study characteristics (K=40)

	Author	Setting (Country, organisation)	Type[a], subtype[b] & style	Design[c]	Study duration[d]	Intervention details	Effect on WE[e]	Summary effects on other variables[f]
1	Aikens et al., 2014	USA; Chemical Company	HP; M; Group & individual	RCT; 3	6 months (7 weeks)	**AIM:** To test whether a shortened version of the standard MBSR programme is effective for stress reduction and increasing WE **DETAIL:** Virtual mindfulness sessions over 7 weeks; Homework; Progress tracking survey; E-coaching	WE: +	M: + PR: + WB: +
2	Angelo & Chambel, 2013	Portugal; Fire service	LT; Group	CR; 2	4 months	**AIM:** Stress management interventions to increase firefighters' social support psychological well-being (burnout and engagement)	WE: +	JR: + JD: - WB: 0

						DETAIL: 3 day stress management workshop for supervisors involving psycho-education; problem-solving teams created to design and implement action plans		
3	Biggs et al., 2014	Australia; Police service	LT; Group & individual	NRC; 2	7 months	**AIM:** To enhance upstream organisational resources via a leadership development programme **DETAIL**: initial 360 degree review; action-learning workshops over 5 days, including education on leadership styles & communication; practical project	WE: +	JR: + JD: - WB: + OTHER: Mediation between the intervention, subordinates' perceptions of work-culture support & strategic

								alignment, and job satisfaction & WE
4	Bishop, 2013	USA; Community nursing	PR; Group	NRNC; 2	60 days (30 days)	**AIM:** To assess the effect of a caring-based programme for older nurses (45-65 years) **DETAILS:** Appreciative inquiry approach; Three 8 hour day retreats; off-site; reflection and sharing of experiences; reaffirmation of core values, purpose and commitment to nursing	WE: + VIG: + ABS: +	None assessed
	Chen et al., 2009	Israel; 'Public' organisation	PR; Group & individual	CR; 3	10 weeks (2 weeks)	**AIM:** To increase psychological resources **DETAIL:** 5 days of computer training; resources workshop involving films and active learning methods	VIG: 0	PR: + WB: -

6	Cifre et al., 2011	Spain; Enamel manufacturing	JR; Individual	NRC; 3	9 months (6 months)	**AIM:** To assess the effectiveness of a work stress intervention (Team Redesign) for increasing job and personal resources, reduce job strain, increase psychosocial well-being and engagement **DETAIL:** Action-Research approach; Supervisor role-redesign based on a one-to-one interview; Senior management increased employee awareness of job training they'd received; Increasing job training	VIG: 0 DED: 0	JR: + PR: +
7	Coffeng et al., 2014	Finland, Financial sector	JR; Group	RMP; 3	12 months (6 months)	**AIM:** To investigate the effect of a combined social and physical environmental intervention, as well as the effect of each one separately	WE: 0 VIG: 0 DED: 0 ABS: 0	PERF: Mixed

						DETAIL: The social environmental condition involved group motivational interviewing (GMI) by trained team leaders (3 x 90 minute sessions) to stimulate physical activity and relaxation and enhance self-regulation of behaviour; The physical environmental condition involved the creation of Vitality in Practice zones (e.g. coffee zones, meeting zones)		
8	Coo & Salanova, 2017	Spain; Hospital	HP; M; Group & individual	NRC; 2	3 sessions (unreported timespan)	**AIM:** To promote the psychosocial health of workers **DETAIL:** 3 x 150 min group sessions involving 60 mins teaching, 60 mins discussion & 30mins meditation / midfulness; homework involved guided	WE: +	M: + WB: + PERF: +

						meditation using a CD, reading 7 worksheets		
9	Ebert et al., 2014	Germany; Large Health Insurance firm	HP; Individual	RCT; 3	6 months (7 weeks)	**AIM:** To investigate the acceptability and cost effectiveness of minimal guided and unguided internet and mobile based stress management interventions (iSMI) in employees with high levels of perceived stress **DETAIL:** Problem solving and emotion regulation components; psycho-education; 8 45-60 minute sessions plus 8 further, optional sessions (e.g. time management, worrying, rumination, sleeping, social support); Sessions included texts, exercises, testimonials, audio and video clips; Daily online stress diary	WE: 0	PR: + WB: Positive

						encouraged; homework; voluntary e-coach		
10	Hengel et al., 2012	The Netherlands; Construction sites	HP; Group & individual	CR; 4 time points	12 months (3 months)	**AIM:** To improve the health and ability to work ability of construction workers **DETAIL:** Individual training sessions to lower physical workload; Rest-break tool; Group empowerment sessions	WE: 0 VIG: 0 DED: 0 ABS: 0	JR: 0 JD: - WB: 0
11	Herneaus et al., 2017	Croatia; Public sector	LT; M; Group & individual	NRC; 4	16 weeks (6 weeks)	**AIM:** To explore the effect of a non-participative, managerial job redesign intervention on public sector employees **DETAIL:** Training workshops for 20 direct supervisors in job redesign; supervisors decided and implemented job design changes for employees	WE: +	JR: Mixed JD: +

12	Imamura et al., 2015	Japan; 2 Information Technology companies	HP; Individual	RCT; 3	6 months (6 weeks)	**AIM:** To improve sub-threshold depressive symptoms among healthy workers **DETAIL:** Web-based; Based on a Manga (Japanese comic) story; Weekly 30 minute training sessions in CBT-based stress management skills for 6 weeks; Involved self-monitoring, cognitive restructuring, relaxation, assertiveness, problem solving; homework	WE: +	WB: + PERF: 0 OTHER: Change in depression partially mediated between the intervention & WE
13	Imamura et al., 2017	Japan; Web survey company	HP; Individual	RCT; 3	4 months	**AIM:** To assess whether regularly accessing a psycho-educational website providing mental health literacy and CBT improved stress, depression and WE.	WE: + (for those low in WE at baseline)	WB: Mixed

						DETAIL: Online; 90 webpages; Psycho-education (e.g. on depression, stress); 6 step CBT programme (e.g. on cognitive restructuring, assertiveness, and problem-solving skills); Voluntary skills practice between sessions, with self-help worksheets provided.		
14	Klatt et al., 2015	United States; Hospital intensive care units	HP; M; Group	RCT; 3	10 weeks (8 weeks)	**AIM:** To determine the feasibility / efficacy of a Mindfulness in Motion (MIM) intervention to increase work engagement & resilience and decrease respiration rates **DETAIL:** 8 week programme (1 hour per week); Relaxing background music; Contemplation and sharing of thoughts; 15 min presentation each week (e.g. on stress, relaxation, yoga,	WE: + VIG: + DED: + ABS: +	PR: +

						meditation); mind-body relaxation; Homework		
15	Klatt et al., 2017	Denmark; Bank	HP; M; Group & individual	RCT; 3	17 weeks (8 weeks)	**AIM:** To examine the effectiveness of MIM in a Danish population for reducing stress and enhancing sleep quality and WE **DETAIL:** 8 sessions, incorporated mindfulness, music, yoga, mindful eating & sleeping & reflection; Homework to practise using recordings	WE: +	WB: +
16	Knight, 2017	UK; Hospital	JR; Group	NRC; 2	12 months (9 months)	**AIM:** To evaluate the effectiveness of a participatory action intervention with nursing staff on acute elderly NHS wards **DETAIL:** Participatory action research; 5 core workshops of 2 or 3 days duration; Emphasis on	WE: 0	JR: 0 PR: Mixed JD: 0

						collaboration, sharing, problem-solving, reflecting, and learning about leadership, team working, and the characteristics of wards which demonstrate high quality care; representatives from each ward invited to core workshops; delivered by experienced academic practitioners		
17	Koolhaas et al., 2010	The Netherlands; 2 locations: University Medical Centre of Groningen & The University of Groningen	HP; Individual	NRC; 3	12 months (3 months)	**AIM:** To enhance the work participation and sustainable healthy working life of employees aged >45 years **DETAIL:** Increasing awareness of responsibility & behaviour in creating a healthy and motivating work environment; improving supervisor support & use of HR professionals/	WE: 0 VIG: 0 DED: 0 ABS: 0	JR: + PR: + WB: - PERF: 0

						occupational health tools; Supervisors trained to deliver workshops (two, 2 weeks apart) in problem-solving strategies and supportive techniques; Workbooks completed by workers to identify problems to working sustainably & create an action plan; review of initial plan		
18	Lases et al., 2016	The Netherlands; Teaching hospitals	HP; M Group	NRC; 2	3 months	**AIM:** To assess the influence of Mind Fitness Training (MFT; in this case, Mindfulness) on care-related well-being outcomes **DETAIL:** Off-site 3 month training programme; 5 sessions; Meditation; Self-awareness; Discussion; Skills practice encouraged	WE: 0	PR: + WB: +

19	Leroy et al., 2013	The Netherlands, 6 companies: Tele-communication; Consulting; Architecture; Parliamentary services; Public services; Health insurance	HP; M; Group	RCT (2 sites); NR (4 sites); 3	6 months (8 weeks)	**AIM:** To assess whether authentic functioning (being aware of oneself and regulating oneself) mediates the relationship between a mindfulness programme and work engagement **DETAIL:** 8 week, 3 hour Mindfulness Based Stress Reduction (MBSR) programme; Communication with others revolved around sharing experiences of meditation only; Formal meditation (mindful body scan, yoga, breathing); Informal meditation (e.g. mindful coffee / lunch breaks, work conversations etc); Homework	WE: +	M: + PR: +
20	Martinussen et al., 2012	Norway;	JR; Group & individual	NRC; 1	3 years	**AIM:** To examine if inter- professional collaboration collaboration can predict burnout, engagement & service quality	WE: +	JR: + JD: Unclear WB: Unclear

		Children and adolescent welfare services				among human service professionals working with children and adolescents **DETAIL:** Nine specific courses offered by course providers; inter-professional teams created to assess and co-ordinate treatment programmes		PERF: -
21	Meyers et al., 2017	The Netherlands; Diverse sectors (e.g. business, government, healthcare)	PR; Group & individual	NRC; 3	6 weeks (Half day)	**AIM:** To determine if participation in a strengths intervention increased personal resources & well-being **DETAIL:** Half day intervention; homework to use and develop individual strengths with the support of a partner to check on progress	WE: 0	PR: + WB: +
22	Naruse et al., 2014	Japan, Community nursing	JR; Individual	NRC; 2	6 months	**AIM:** To evaluate the effect of a skill-mix programme on WE in home visiting nurses	WE: 0	None assessed

						DETAIL: Home visiting nurses offered an assistant on community visits		
23	Ng, 2013	Hong Kong; Elderly care services	HP; Group	NRNC; 3	2 months (1 month)	**AIM:** A pilot study to assess the effect of a daily body-mind-spirit practice programme on burnout, daily spiritual experience, & work engagement **DETAIL:** Daily 'Body-spirit-mind Afternoon Tea' programme (relaxation programme); 15 minute daily small-group meeting involving slowing down (bringing concentration to the here and now), golden sentence sharing (positive sentence chosen for reflection and discussion, & a group ending ritual (e.g. singing, movement, hugging) to stimulate positive emotions	WE: - VIG: -	PR: Mixed WB: Mixed

24	Ouweneel, et al., 2013	The Netherlands; Various	PR; Individual	NRC; 3	16 weeks (8 weeks)	**AIM:** To assess the effects of a positive psychology intervention on positive emotions, self-efficacy and work engagement **DETAILS:** Online; initial feedback report; 3 or 4 assignments each week focused on increasing positive experiences at work, goal setting, and resource building	WE: + (for those low at baseline)	PR: + WB: +
25	Rickard et al., 2012	Australia; Hospital	JR; Individual	NRNC; 2	2 years	**AIM:** To evaluate an intervention to reduce occupational stress and turnover in hospital nurses **DETAIL:** Nursing workload tool implemented to facilitate workload assessment & roster audits; Increased staff numbers, supervision & access to	WE: 0	JD: + WB: +

						development and training opportunities; recruitment campaign		
26	Sakuraya et al., 2016	Japan; Manufacturingcompany & a psychiatric hospital	JR; JC; Group	NRNC; 3	1 month (2 weeks)	**AIM:** To examine the effectiveness of a job crafting intervention on work engagement and psychological distress **DETAIL:** Task, human relation and cognitive crafting addressed in two 2 hour workshops; job crafting plans created and reviewed	WE: +	JC: + WB: +
27	Schelvis et al., 2017	The Netherlands; Vocational & Educational Training Schools	JR; Group	NRC; 2	24 months (12 months)	**AIM:** To investigate the effect of an organizational level participatory intervention on employees' health **DETAIL:** Heurtistic Method (HM) adopted. First 12 months involved needs assessment (interviews, survey, group sessions) and creation of an	WE: 0 VIG: 0 DED: 0 ABS: -	JR: Mixed PR: 0 WB: 0 PERF: 0

						action plan; second 12 months involved implementing the strategies suggested by employees under supervision of an HM facilitator (e.g. goal-setting, workload policy changes, defining organisational goals).		
28	Steidle et al., 2017	Germany; Administration & knowledge workers	HP; M; Group & individual	RCT; 2	4 weeks	**AIM:** To investigate the energizing potential of a respite intervention **DETAIL:** A progressive muscle relaxation group was compared to a savouring nature group & a control. Both interventions included mindfulness. Initial group training was followed by individual completion of the interventions.	VIG: +	WB: +

29	Steinberg et al., 2017	USA; Surgical Intensive Care Unit	HP; M; Group & individual	RCT; 2	2 months (8 weeks)	**AIM:** Pilot study to evaluate the feasibility of an intervention to increase resilience to stress **DETAIL:** Weekly 1 hour sessions during work time involving discussion, mindfulness, yoga, music. Homework comprised 20 minute practice sessions 5 x week, facilitated by recordings.	WE: + VIG: + DED: 0 ABS: 0	WB: 0 PERF: 0
30	Strijk, et al., 2013 (P)	The Netherlands; 2 academic hospitals (Amsterdam & Leiden)	HP; Group & individual	RCT; 3	12 months (6 months)	**AIM:** To evaluate the effectiveness of a worksite health intervention on vitality, WE, productivity & sick leave **DETAIL:** Personal Vitality Coach; Vitality exercise programme (yoga & aerobics); Free fruit; Homework involved physical activity	WE: 0 VIG: +	WB: +

31	Van Berkel, et al., 2014 (P)	The Netherlands; 2 Research Institutes	HP; M Group & individual	RCT; 3	6 months (8 weeks)	**AIM:** To improve self-regulation, WE and health **DETAIL:** 8 week group mindfulness training; Goal-setting homework; individual e-coaching; Free fruit and vegetable snacks; Buddy system; Supporting materials (e.g. web page, logbook)	WE: 0 VIG: 0 DED: 0 ABS: 0	M: 0 WB: 0
32	Van Gordon et al., 2017	UK; Diverse employee populations	HP; M; Group & individual	NRC; 3	5 months (8 weeks)	**AIM:** To investigate the effect of meditation awareness training (MAT) on workaholism DETAIL: A second generation mindfulness-based interventions, MAT involves sitting, walking & working meditation sessions lasting 2 hours (45 mins taught; 45 mins discussion; 35 mins guided meditation); 50 min 1:1	WE: +	WB: + PERF: 0

						support support sessions in weeks 3 & 8.		
33	Van Steenbergen et al., 2017	The Netherlands; Financial services	JR; Systemic	NRNC;	1 year, 1 month (instant)	**AIM:** To investigate a transition to New Ways of Working on employees' job & personal resources, demands, and well-being **DETAIL:** Top-down changes involved the introduction of flexible working, 'hot desking', new activity-related workspaces, & new technology (e.g. laptops, smart phones).	WE: 0	JR: Mixed PR: 0 JD: + WB: 0
34	Van Wingerden et al., 2016	The Netherlands; Hearing impairment healthcare	JPR; JC; Group & individual	NRC; 3	1 year (9 weeks)	**AIM:** To examine the impact of a JD-R intervention on psychological capital, job crafting, work engagement, and performance **DETAIL:** Exercises aimed at increasing personal resources, job	WE: +	JC: + PR: + PERF: +

						resources and challenging job demands; 3 training sessions		
35	Van Wingerden et al., 2017a	The Netherlands; Primary school	PJR; JC; Group & individual	NRC; 2	9 or 15 weeks (6 weeks or 12 weeks)	**AIM:** To investigate the effectiveness of a combined personal and job resource building job crafting intervention compared to separate job resource and personal resource building interventions. **DETAIL: 6 week p**ersonal resource intervention involved learning to accept the past, appreciate the present and look to future opportunities. Job crafting involved job analysis (Michigan Job Crafting Exercise) to understand their job tasks, & their strengths and weaknesses. Action plan created with goals. Combined	WE: + (personal resources intervention) VIG: 0 DED: 0 ABS: 0	JC: + PR: + PERF: Mixed OTHER: WE mediated between PSYCAP & PERF; WE partially mediated between JC & PERF

						intervention involved personal resource building followed by job crafting.		
36	Van Wingerden et al., 2017b	The Netherlands; Primary School	JR; JC; Group & individual	NRC; 3	1 year, 9 weeks (5 weeks)	**AIM:** To investigate the impact of a job crafting intervention based on job demands-resources theory **DETAIL:** 1st training session: Michigan Job Crafting Exercise completed to facilitate job analysis. Action plans were created involving proactive goal-setting aimed at improving each of the four facets of job crafting. 2nd session 4 weeks later to review and reflect on progress.	WE: 0	JC: Mixed JD: 0 PR: Mixed PERF: Mixed OTHER: Indirect effects between the intervention, job crafting and job resources; indirect between the intervention, job crafting & performance

37	Van Wingerden et al., 2017c	The Netherlands; School	JR; JC; Group & individual	NRC; 2	10 weeks (6 weeks)	**AIM:** To investigate the impact of a job crafting intervention based on job demands-resources theory **DETAIL:** 3 x training sessions (1 & 2 on Day 1, 3rd 4 weeks later). The Michigan Job Crafting Exercise was conducted. Exercises and goal-setting was aimed at all JC components except decreasing hindering demands due to previous findings that this type is unrelated / negatively related to WE. Evaluation occurred in session 3.	WE: +	JC: + PR: + PERF: Mixed OTHER: WRBN mediated between the intervention & WE
38	White et al., 2017	Ireland; Hospital	JR; Group	NRC; 2	12 months	**AIM:** A ward-based quality improvement initiative (Productive Ward) was introduced to help ward teams improve the safety, quality and delivery of care	WE: + VIG: + DED: + ABS: +	Not assessed

						DETAILS: Uses lean improvement techniques to streamline and redesign work and empower workers. Developed by the UK's National Health Service Institute. Intervention particulars not clear.		
39	Verweij et al., 2016 (P)	The Netherlands; 2 University Medical Centres	HP; M; Group & individual	NRC; 2	8 weeks	**AIM:** To assess the feasibility and effectiveness of MBSR on burnout, empathy, and well-being **DETAILS:** At one site, an 8 weekly, 2.5 hour MBSR programme occurred in the evenings and weekends, plus a 1 day silent retreat; Themes discussed included sensations, feelings, thoughts, burnout, conflict; At the other site two full training days occurred with 4 evening sessions & a 1 day silent	WE: 0 VIG: 0 DED: + ABS: 0	M: + WB: +

						weekend retreat; Homework involved mindfulness practice		
40	Vuori et al., 2012 (P)	Finland; Various	PR; Group	RCT; 3	7 months 1 week	**AIM:** To increase career management self-efficacy and preparation against setbacks (career management preparedness) **DETAIL:** Workshops comprised active learning, role playing, social modelling, and gradual exposure; delivered by trainers over five 4 hour sessions or 3 full days	WE: 0	PR: 0 WB: 0

[a]PR=Personal resource building; JR=Job resource building; LT=Leadership training; HP = Health promotion; PJC=Personal & job resource building

[b]JC=Job crafting; M=Mindfulness

[c]RCT=Randomised controlled trial; C=Cluster randomised; RMP=Randomised matched pairs; NR=Non-randomised; NRC=Non-randomised, controlled; NRNC=Non-randomised, non-controlled; number refers to number of measurement time points; 1=post-intervention measurement

[d]Information in parentheses refers to the length of the intervention; information not in parentheses refers to the length of the total study including all measurement time points

[e]WE=Work engagement sumscore; VIG=Vigour; DED=Dedication; ABS=Absorption; [f]M=Mindfulness; JC=Job crafting; JR=Job resources; PR=Personal resources; JD=Job demands; PERF=Performance; WRBN=Work-related basic needs

NB: + =positive effect; - =negative effect; 0=no effect; Mixed=some positive, negative and / or no effects

Table 2: Summary of GRADE evidence statements

	Evidence statement	**Summary rating**	**Summary supporting statement**
1	There is initial evidence that work engagement interventions are effective, with the strongest evidence for overall work engagement	Initial	50% of all studies had a positive effect on work engagement or a sub-component, including 6 randomised studies and 11 non-randomised but controlled studies, suggesting higher quality designs. Inconsistent results across the whole body of studies prevents stronger conclusions.
2	There is initial evidence that positive changes in job resources (especially autonomy & social support), job demands (especially workload), personal resources (especially self-efficacy & resilience), and work-related needs, mediate between work engagement interventions and work engagement (including	Initial	Two studies reported significant effects on job resources and engagement, six studies reported the same for personal resources and engagement and one for job demands and engagement. Four studies observed a positive effect on job crafting and engagement and work-

	Evidence statement	Summary rating	Summary supporting statement
	subcomponents), with the strongest evidence for job crafting interventions		related needs mediated between the intervention and engagement in two studies.
3	There is initial evidence that improved well-being mediates between interventions and work engagement, with the strongest evidence for mindfulness interventions	Initial	17 studies reported positive effects on well-being variables, ten of which also reported increased engagement. Three studies (Imamura et al., 2015; Meyers et al., 2017; Steidle et al., 2017) tested mediation relationships between interventions, well-being and engagement. Four studies also noted a statistical increase in mindfulness and engagement.
4	There is initial evidence to suggest that the specific intervention focus moderates the effectiveness of work engagement interventions, with the strongest evidence for job crafting and health promotion	Initial	Six of the nine effective health promotion interventions were randomised and controlled, with large sample sizes in several studies. However, results were inconsistent across the whole body of

	Evidence statement	Summary rating	Summary supporting statement
	interventions, including Mindfulness.		health promotion studies and implementation issues may have obscured true effects in some cases. Four of five job crafting interventions were effective. More evidence is needed to confirm these results.
5	There is promising evidence that intervention delivery method moderates the effectiveness of work engagement interventions, with the strongest evidence for interventions including both a substantial group and individual component	Promising	67% of group and individual interventions reported positive effects, three of which were randomised and controlled. Seven further studies were controlled, suggesting higher quality designs.
6	There is initial evidence that employee participation alongside strong manager support positively moderates the effectiveness of work engagement interventions	Initial	85% of effective studies involved participation of some sort, including training, reflection and support groups, collaborative discussion and problem-solving, and group exercise. Three studies

	Evidence statement	Summary rating	Summary supporting statement
			reported poor manager support which hindered success.
7	There is promising evidence that bottom-up interventions are more effective than top-down interventions for increasing work engagement	Promising	75% of successful interventions were bottom-up with all but two studies containing control groups, suggesting better quality evidence. 50% of bottom-up studies showed no effect.
8	There is inconclusive evidence that interventions targeted at employees low in engagement will be most effective	Inconclusive	Two studies with relatively large sample sizes found a significant, positive effect for those initially low in work engagement (Ouweneel et al., 2013; Imamura et al., 2017).
9	There is promising evidence that poor intervention implementation, particularly in terms of poor fidelity, compliance, and participant satisfaction, negatively moderates the effectiveness of	Promising	Six studies discussed implementation in relative detail, with three publishing separate papers on the topic. Several other studies briefly commented on some issues. Taken together, it is possible that implementation issues

	Evidence statement	Summary rating	Summary supporting statement
	interventions on work engagement		may have hindered intervention effectiveness
10	There is initial evidence that national and organisational factors moderate the effectiveness of interventions on engagement	Initial	Factors included organisational restructuring, concurrent projects, cross-contamination between groups, and economic downturn. Inconsistent results were reported by studies, preventing conclusions regarding the degree to which these factors may have hindered success and masked true effects.

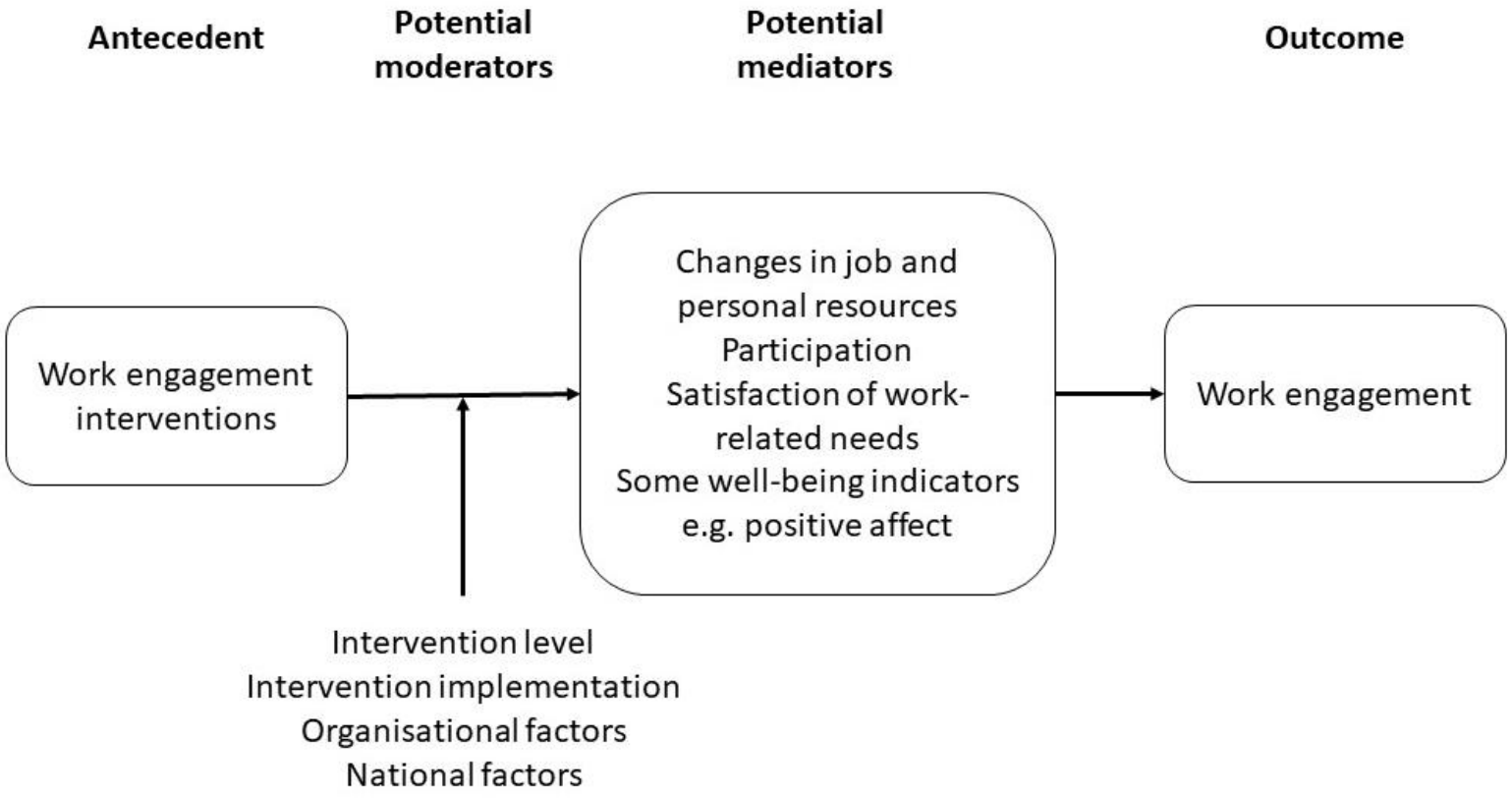

Figure 1: A diagram indicating potential relationships between interventions, mediators, moderators, and work engagement

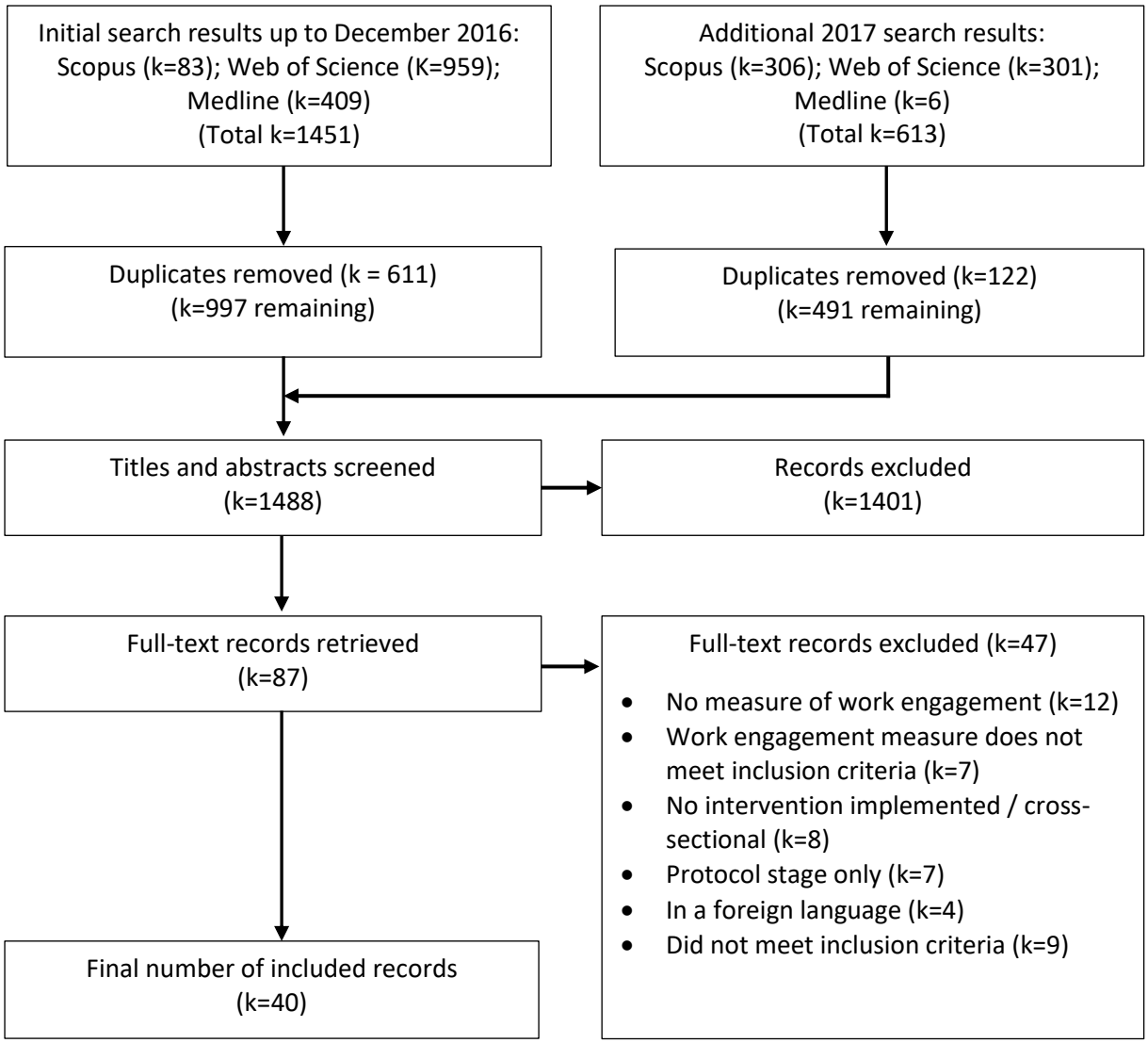

Figure 2: A PRISMA flow diagram (Liberati et al., 2009) displaying the results of the systematic literature search and indicating why records were excluded at each stage of the process

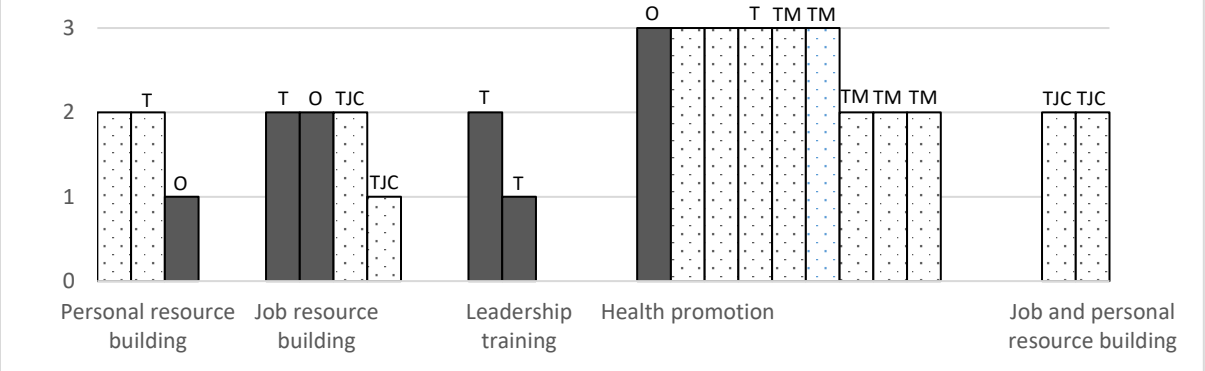

Figure 3: A harvest plot indicating the nature of the evidence for interventions with at least one positive effect on work engagement or one of its sub-components (k=20); NB: Each bar represents one study; the height of the bar indicates study design (3=randomised; 2=non-randomised, controlled; 1=uncontrolled); solidly shaded bars indicate top-down interventions; textured (dotted) bars indicate bottom-up interventions; T=interventions involving a training component; O=interventions involving other kinds of participation (e.g. participative action research, group reflection); JC=Job crafting intervention; M=Mindfulness-based intervention

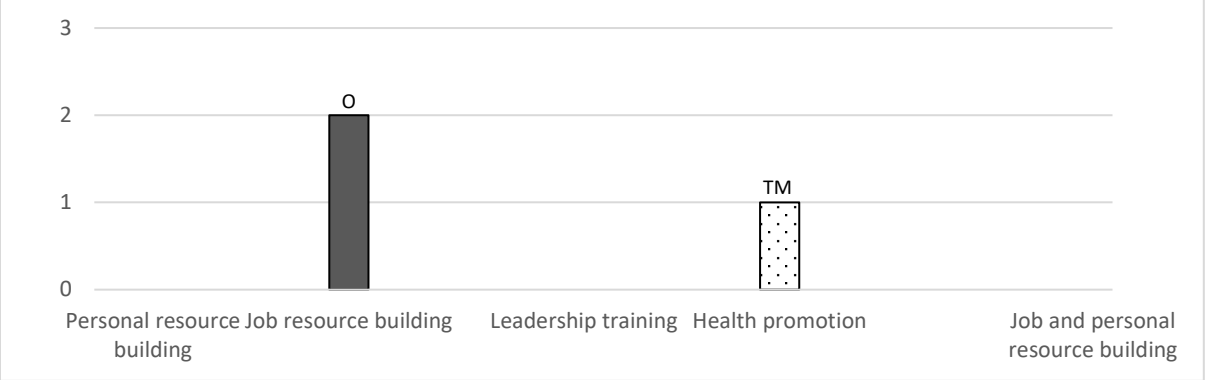

Figure 4: A harvest plot indicating the nature of the evidence for interventions with at least one negative effect on work engagement one of its sub-components (k=2); NB: Each bar represents one study; the height of the bar indicates study design (3=randomised; 2=non-randomised, controlled; 1=uncontrolled); solidly shaded bars indicate top-down interventions; textured (dotted) bars indicate bottom-up interventions; T=interventions involving a training component; O=interventions involving other kinds of participation (e.g. participative action research, group reflection); JC=Job crafting intervention; M=Mindfulness-based intervention

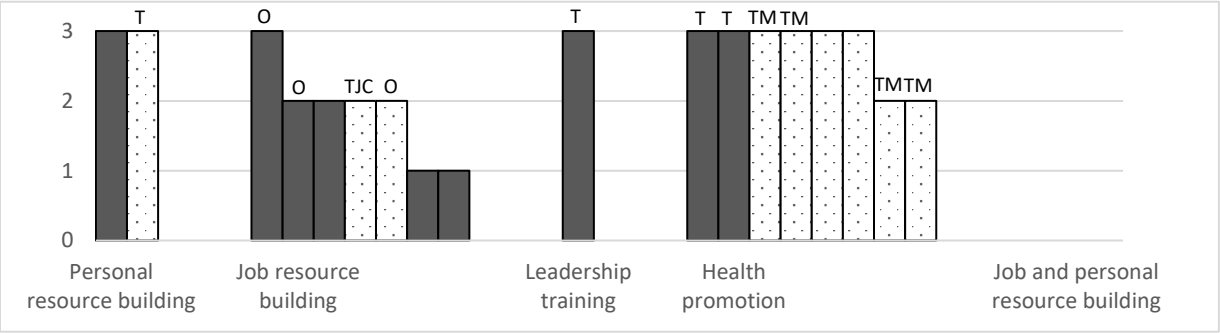

Figure 5: A harvest plot indicating the nature of the evidence for interventions with no effect on work engagement or one of its sub=components (k=18); NB: Each bar represents one study; the height of the bar indicates study design (3=randomised; 2=non-randomised, controlled; 1=uncontrolled); solidly shaded bars indicate top-down interventions; textured (dotted) bars indicate bottom-up interventions; T=interventions involving a training component; O=interventions involving other kinds of participation (e.g. participative action research, group reflection); JC=Job crafting intervention; M=Mindfulness-based intervention