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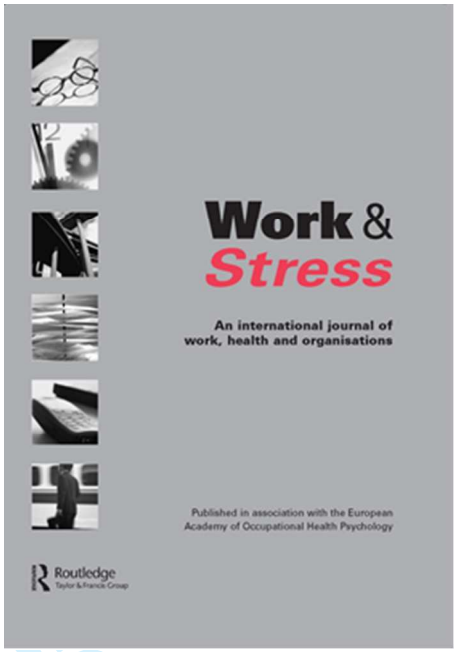

Out of Sight and Out of Mind? A Literature Review of Occupational Safety and Health Leadership and Management of Distributed Workers

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Abstract

Distributed workers - those who work autonomously and remotely from their organization's main locations for at least some of their work-time, are an important and growing proportion of the workforce that share common characteristics of temporal and spatial distance. Yet many leadership styles and management practices assume face-to-face interaction, potentially rendering them less helpful in trying to ensure good occupational safety and health (OSH) outcomes for distributed workers. We conducted a systematic literature review to examine the leadership and management of OSH for distributed workers. Twenty-three papers were identified. Eleven papers identified established leadership styles, including leader-member exchange, (safety-specific) transformational and considerate leadership. Twenty papers examined management. Findings from these 20 papers were interpreted as representing resources, deployed through management and utilized by managers to ensure OSH for distributed workers, including communication technologies, social support, and a good safety climate. Despite limited research in this area, findings indicate the importance of both leadership and management in ensuring OSH for distributed workers. Findings suggest a fertile area for future enquiry.

Keywords: distributed workers, leadership, management, resources, health, safety, wellbeing.

Introduction

In this paper, we present findings from a systematic literature review of current knowledge of leadership and management in respect of occupational safety and health (OSH) of workers who work autonomously and remotely from their organization's main locations or operations for at least a fraction of their work-time. We follow the precedent of Dix & Beale (1996) to apply the umbrella term of 'distributed workers' to describe these workers, irrespective of the nature of the work or ways in which it is undertaken. Distributed workers encompass white and blue-collar workers, regardless of locational, technological (e.g., presence or absence of the use of ICT) or organizational features. Examples of distributed workers include mobile maintenance engineers, construction workers, haulage workers, community nurses, police officers and homeworkers, amongst others. As such, distributed workers comprise a large and growing part of the workforce (First findings, Sixth European Working Conditions Survey, 2015; IDC, 2010).

Over the last 30 years, a substantial body of research has examined the topic of workers who undertake some or all of their work away from a conventional workplace, for example, teleworkers, virtual workers and mobile workers (e.g., Bailey & Kurland, 2002; Martins, Gilson & Maynard, 2004; Raghuram, Tuertscher & Garud, 2010). Research has tended to focus on varied aspects of the work, such as physical locations (e.g., Hislop & Axtell, 2007) and the extent of communications (e.g., Wellman et al, 1996); issues such as coordination (e.g., Montoya-Weiss, Massey & Song, 2001); and, challenges of distributed working (e.g., Allen, Golden & Shockley, 2015; Hislop & Axtell, 2007; Konradt, Schmook, & Malecke, 2000; Siha & Monroe, 2006). Furthermore, recent attention has focussed on OSH issues such as mental workload for multi-locational ICT enabled virtual working (e.g., Vartiainen & Hyrkkänen, 2010) and both negative (i.e. exhaustion) and positive (i.e. engagement) OSH outcomes of teleworking (Sardeshmukh, Sharma & Golden, 2012).

Although a heterogeneous group in some aspects, distributed workers share common work characteristics of temporal and spatial distance from co-workers, managers and leaders, by virtue of working away from a conventional location. These common characteristics raise questions as to how to ensure good OSH outcomes for workers who are out of sight. In this paper, we utilize the umbrella-term of distributed workers in order to focus on commonality of physical and temporal separation, rather than typological approaches focussed on operational characteristics as seen in prior research.

Ensuring OSH of distributed workers presents leadership and management challenges due to a lack of face-of-face contact between workers and managers, limited access to sources of organizational information about good safety and health procedures and a lack of control over the work settings that distributed workers encounter while away from the main location (e.g., Kurland & Bailey, 1999). Leadership and management are equally important in influencing OSH behaviour (Pilbeam, Doherty, Davidson & Denyer, 2016), but have not been reviewed systematically in respect of OSH across the broad category of distributed workers. Pilbeam et al. (2016) recommended that research attend to broader approaches to the study of OSH management and leadership and that more attention should be paid to lower and medium hazard occupations. We acknowledge this need by taking an encompassing approach to distributed workers and focusing on both leadership behaviours and enabling-management.

In our review, we examine leadership and management, as both may play a part in influencing and directing good OSH outcomes of distributed workers. Leadership comprises behaviours directed at facilitating and influencing followers in the achievement of desired outcomes or objectives, in this case good OSH outcomes (Yukl, Gordon & Taber, 2002). As such, leadership behaviours may be embodied by those holding formal leadership roles and/or managerial roles (Furnham, 2005). For example, the importance of managers'

leadership behaviours in ensuring employee safety (e.g., Barling, Loughlin & Kelloway, 2002; Zohar, 2002) and health (e.g., Kuoppala, Lamminpaa, Liira, & Vainio, 2008; Skakon, Nielsen, Borg, & Guzman, 2010) is well documented. Management comprises systems, practices and procedures put in place by those in charge of organizations in order to direct and facilitate what employees do (Mintzberg, 1989). In the case of OSH, this may include aspects put in place by those responsible for OSH of distributed workers, for example, senior managers and OSH professionals with functional responsibility within their organization. Management systems, practices and procedures may be important in ensuring OSH for distributed workers, by compensating for the lack of face-to-face interaction that makes influencing behaviours through leadership more challenging (Ashford, George & Blatt, 2007).

We conducted a systematic literature review of the past 20 years of empirical research to examine current knowledge of leadership and management in ensuring OSH of distributed workers. Numerous prior reviews have focused on types of distributed working in respect of OSH challenges (e.g., Allen et al., 2015; Hislop & Axtell, 2007; Konradt, Schmook, & Malecke, 2000; Siha & Monroe, 2006); leadership (e.g., Brunelle, 2013; Dahlstrom, 2013) and OSH outcomes (e.g., Hislop, Axtell & Daniels, 2008; Montreuil & Lippel, 2003; Quinlan & Bohle, 2008; Standen, Lamond & Daniels, 1999). What is missing from these previous reviews is a focus on how common characteristics and challenges across differing types of distributed working relate to concepts, such as OSH leadership and management. As a result, we do not yet know enough as to what organizations can do to influence OSH for these workers. Our study is, to the best of our knowledge, the first systematic literature review to examine leadership and management in respect of OSH for distributed workers.

Distributed working and the challenges for leadership and management in ensuring OSH

Distributed workers are in many ways a heterogeneous group, as they vary according to factors such as hours spent in different locations during work, the extent of communication with co-workers or clients, technologies used to conduct their work and communication, and the complexity of tasks and application of complex knowledge (Daniels et al., 2001; Hislop, Axtell & Daniels, 2008).

However, distributed workers also share common work characteristics of temporal and physical separation that pose several challenges for OSH leadership and management. First, there is a lack of physical proximity between those responsible for ensuring employees' OSH and distributed workers, which restricts the opportunity for face-to-face interaction that would otherwise facilitate leadership modelling and enable enhanced understanding of which OSH risks employees face. Similarly, lack of physical proximity presents a barrier to those responsible for OSH, who have little opportunity to observe whether working practices are undertaken to ensure workers' safety and health, directly identify OSH problems, or to offer immediate and direct advice to workers and/or their line managers. The lack of contact with colleagues for some distributed workers also reduces the opportunity for aspects linked to positive health and wellbeing outcomes, such as social support (House, 1981). Second, distributed workers tend to have less frequent opportunity for informal OSH related information exchange and in some cases, such as remote working, may be unable to communicate directly or seek advice. Therefore, those responsible for ensuring worker OSH are less able to rely on conventional sources of organizational information as a means of relaying important safety and health information to workers. Third, work settings present differing physical and psychological hazards and risks, and so precede employee health and wellbeing (Danna & Griffin, 1999) and present differing within- and between-locational wellbeing issues (Vartiainen & Hyrkkänen, 2010). Thus, differing work settings and multiple

work locations (IDC, 2010), provide both contextual OSH challenges and exacerbate the difficulties arising from lack of interaction.

The risks associated with distributed work have been subject to literature reviews (e.g., Raghuram et al., 2010). Work settings such as highways, roadsides, public and domestic spaces, construction or engineering sites may provide increased and less controllable risks when compared to fixed location or office workers. Furthermore, mobile distributed workers may be exposed to synergistic effects of multiple hazards if they switch locations (Danna & Griffin, 1999), in comparison to effects when exposed to single hazards in a single location. These OSH issues, when coupled with the challenges of distributed working underscore the vital importance of knowledge of leadership and management of good OSH outcomes for these workers, since both leadership and management are important in ensuring OSH - leadership through influencing others and management through directing and facilitating behaviour.

Leadership frameworks and models that ensure distributed worker safety and health

Kelloway and Barling (2010) suggest three important ways in which a leader informs OSH outcomes: by serving as a model for others, such as modelling safe working practices; by holding power to reward or encourage desired behaviours of others or minimize undesired behaviours; and, through decision making that may reduce worker stressors, such as reducing work demands. The question is then how can leaders influence OSH outcomes for distributed workers, given the problems of physical and temporal distance that may restrict opportunities for face-to-face interaction?

In the leadership literature, a wide range of established leadership concepts, also known as leadership styles, exist which define effective leadership behaviours (see Avolio, Walumbwa & Weber, 2009 for a review). However, leadership models and frameworks may

be limited in ensuring OSH for distributed workers in two ways. First, they have been developed primarily for performance management purposes (Avolio et al., 2009). Although systematic reviews have provided some evidence that common leadership frameworks are also related to positive outcomes in respect of worker safety and health (Kuoppala et al., 2008; Skakon et al., 2010), it is possible that the principles of "performing above and beyond the call of duty" as stipulated by the transformational leadership paradigm (Bass & Riggio, 2006) may over time exhaust workers, leading to ill-health (Nielsen & Daniels, 2016) or encourage workers to ignore safety procedures. Second, many leadership models and frameworks build upon assumptions of face-to-face interaction between the leader and worker (Avolio et al., 2009) and therefore may not be suited in distributed work contexts. For example, many of the ways in which leaders inform positive safety and health outcomes, such as modelling behaviours, assume some form of social interaction. To the best of our knowledge, there have not yet been any systematic reviews of the evidence of how effective these styles are in ensuring distributed workers' safety and health. Given the extensive literature on leadership frameworks (e.g., Avolio et al., 2009; Yukl, 2012), we formulated our first research question with an expansive approach to uncover OSH leadership frameworks, rather than focusing on specific frameworks or models.

> *Research Question 1. What current leadership models or frameworks are applied in the context of good OSH for distributed workers?*

Distributed working: Management systems, practices and procedures in ensuring OSH

Management is "*largely a facilitating activity"* (Mintzberg, 2004 p.12), so may complement leadership as an important means of ensuring OSH for distributed workers. Therefore, management can be considered as comprising differing resources that may be deployed, conserved or invested in by those responsible, to ensure OSH of distributed workers. Resources are defined as "*those objects, personal characteristics, conditions, or energies that*

serve as a means for attainment of these objects, personal characteristics, conditions" (Hobfoll, 1989 p. 516) – in this case, OSH of distributed workers. The notion of resources is a useful heuristic when considering how concepts at higher levels such as management, when utilized, may be linked to individual outcomes such as OSH (Day & Nielsen, 2017; Nielsen et al., 2017). We therefore, took an expansive approach and cast the net widely to explore management with respect to OSH of distributed workers by applying the management search term, rather than focussing on specific aspects of management. We reasoned that the systematic review methodology and generic search term would uncover a variety of relevant concepts.

Research Question 2. What management systems, practices and procedures, may be utilized to ensure OSH for distributed workers?

Methods

We conducted a systematic literature review of the past 20 years of empirical research to examine current knowledge of leadership and management in ensuring OSH of distributed workers. A systematic literature review methodology provides a critical exploration, evaluation and synthesis of studies salient to a particular topic or research question, with a view to identifying gaps in current knowledge (Mulrow, 1994; Suri & Clarke, 2009). We applied broad search criteria to unearth empirical studies where the central focus was on understanding the OSH outcomes of leadership and/or management in a distributed work context. The findings presented reflect the current state of evidence provided in the literature.

Inclusion criteria and search strategy

Our review comprised a search of PubMed, Psycinfo, Google Scholar and Web of Science databases. We applied the following parameters: empirical papers published in the English language, in peer reviewed journals, between 1995 and the date of the searches, February

2015. From our prior knowledge of this subject matter, we expected few studies specifically examining OSH leadership and management of distributed workers. We also recognized that different terms are applied to distributed workers, such as teleworkers, mobile workers and so on. Search terms were identified through discussion amongst the study team, liaison with subject matter experts, and prior knowledge of the subject area.

With respect of OSH, we searched terms related to health, safety and wellbeing. We adopted the guidance from the World Health Organization to define health as a state of complete physical, mental and social wellbeing. Therefore, we searched on psychological and physiological outcomes of wellbeing (Danna & Griffin, 1999) such as 'stress', 'burnout' 'anxiety', 'strain' and 'fatigue'. Occupational safety refers mainly to the prevention of accidents or mitigating the effects of accidents (Armstrong, 2001). We follow Halbesleben and Bellairs (2015) to view adverse safety outcomes broadly as physical harm to employees, which may have arisen due to accidents or similar events. Our search terms therefore, included 'safety', 'accident' and 'injury', as well as terms that represented antecedents, such as 'risk' and 'hazard'. Our central focus is on the two ways in which organizations can ensure OSH for distributed workers, irrespective of specific issues or risks. Therefore, we applied an expansive search rather than focusing on specific OSH issues, risks, or on specific challenges of distributed working, which have been subject to reviews before (e.g., Allen et al., 2015; Hislop & Axtell, 2007). With respect to distributed work, we searched terms such as 'telework', 'virtual work', 'lone work' and 'remote'; we also searched sectors where distributed workers might be prevalent, such as 'construction', 'oil and gas' and 'transport'. In line with our broad search approach, we applied 'leadership' and 'management' as generic search terms.

Papers selected from the title search were those empirical studies that met all the search criteria of a central focus of OSH and distributed workers and leadership or

management. This search therefore generated papers whose titles fulfilled the topic area of the study. More information on the search terms used and the selection of studies to be included can be obtained from the corresponding author.

Paper selection criteria

The title search identified 922 papers, once duplicates had been removed. We independently undertook a title-sift to select studies for inclusion in the abstract sift by applying the following criteria: OSH outcomes and distributed workers and leadership or management. We then cross checked selections and resolved any disagreement through discussion. This exercise left 408 papers selected for the abstract sift. We undertook two abstract sifts: first, we removed non-empirical papers, then papers that did not investigate distributed workers, OSH outcomes and leadership or management as the main focus. We conducted this exercise through independent examination, then discussion. Some 65 papers were selected for the full paper sift, which comprised a fine-grained examination of the studies' fulfilment of the selection criteria. A total of 23 papers were selected at this stage for inclusion in the full-paper analysis.

Analysis

Three authors independently extracted data from each paper comprising the type, or category of distributed worker, geographical location, methods, findings, concepts, OSH outcomes and sample size. Data extraction included descriptions of existing leadership models, which were identified using prior knowledge of the subject and agreed within the research team. We then examined and discussed each other's data extraction to arrive at an agreed interpretation of the selected studies. Disagreements were resolved through discussion and revision. We then re-examined the papers in detail in order to extract the main evidence from the studies in respect of the research questions in the present paper, through independent examination and discussion.

To address research question 1, we synthesized the findings from the papers that had examined leadership frameworks with respect to OSH of distributed workers. We then collated and synthesized findings according to each leadership framework studied.

For research question 2, analysis comprised a qualitative synthesis of findings, which is suited to a methodologically diverse range of studies around a similar topic (Suri & Clarke, 2009). To the best of our knowledge, there is no existing and comprehensive framework of classifying aspects of management for good OSH outcomes of distributed workers; therefore, we applied an inductive approach to group and categorize the findings of the studies. Our inquiry was directed at what may be utilized to ensure OSH for distributed workers and so enhance the impact of OSH leadership behaviours. Given the studies' methodological diversity and heterogeneous samples, we categorized the content into distinct groups (Krippendorf, 2004), which we agreed through discussion. Although there was a small selection of papers, we were still able to identify three management groupings that could be considered as resources in generating good OSH outcomes for distributed workers: communications, information and related technologies; the line manager's approach in managing distributed workers; and, safety climate. Our proposals progress the recent call by Halbesleben, Neveu, Paustian-Underdahl and Westman (2014) for a clearer explanation of resources in relation to specific goals such as positive OSH outcomes.

Results

Of the 23 papers analysed, ten studies were conducted in the USA, seven in Europe, one in Canada, three in Asia, one in Australia and one across several continents. Two studies included more than one industrial sector (Nurmi, 2011; Whitford & Moss, 2009). Fourteen studies used a quantitative survey approach, six papers used qualitative methods such as interviews, focus groups and quality circles and three papers employed a mixed method design. Most of the quantitative studies used scales that were not adapted to the distributed

worker context; Huang et al. (2013) and Huang et al. (2014) are exceptions as both studies applied scales tailored to truck drivers. Distributed worker categories studied include virtual workers (those who work interdependently in differing locations), teleworkers (those who work from home utilizing technologies), truck drivers, construction workers, oil workers, community and healthcare workers and police workers. Overall, the papers selected were dominated by cross-sectional studies with only one prospective study, therefore causal inferences cannot be reliably drawn. Qualitative studies tended to be descriptive in nature. Most of the studies were small scale and representative of limited groups of workers. No papers explored the role of comprehensive OSH management strategies encompassing resources and leadership, in ensuring distributed worker safety and health.

Current leadership models or frameworks applied in the context of good OSH for distributed workers

Five papers addressed leadership models or frameworks that might be applicable to the context of OSH leadership in distributed workers. In all, three leadership frameworks were examined: LMX (leader-member exchange), transformational leadership and considerate leadership. The papers are summarized in table 1.

Two studies (Golden & Veiga, 2008; Zohar, Huang, Lee & Robertson, 2014) explored leader-member-exchange (LMX, Graen & Uhl-Bien, 1995), whereby leaders adopt a differentiated style of interactional exchange with subordinates. Both studies found high quality exchange relationships between leaders and followers are important in generating positive OSH outcomes, when workers are distributed. Golden and Veiga (2008) found that LMX has a stronger relationship with job satisfaction of virtual workers, compared to non-virtual workers, while Zohar et al. (2014) found LMX was significantly related to truckers' safety climate at the organizational level and in turn, driving safely. Two studies (Conchie, 2013; Whitford & Moss, 2009) examined transformational leadership (Bass & Riggio, 2006),

whereby leaders inspire workers to transcend self-interest for the good of the organization. Both studies found transformational leadership behaviours, including those relating specifically to safety, important for motivating safe behaviours and wellbeing, specifically when the leader is trusted and/or when workers are motivated. Conchie (2013) found trust in the leader important for construction workers' safety voice behaviours, while Whitford and Moss (2009) found visionary leadership important for remote worker engagement, especially when the leader demonstrated personal recognition. Finally, one study (Mulki & Jaramillo, 2011) found that considerate leadership (House, 1971), was related to virtual workers' involvement in the workplace and satisfaction with the supervisor.

Overall, we found limited evidence of established leadership frameworks in ensuring OSH outcomes for distributed workers, suggesting a fertile area for future research.

[Insert Table 1 around here]

Management systems, practices and procedures, which may be utilized to ensure OSH for distributed workers

From the synthesis and analysis of the findings, we identified three categories of management resources deployed and utilized in ensuring OSH of distributed workers: structural resources, organizational safety climate and line managers – who could be considered as resources in their own right if integrated into formalized management practices and procedures. Summaries of the studies are presented in table 2.

Structural resources

We assigned the category label 'structural resources' to refer to means, such as communication and information that are utilized in ensuring OSH of distributed workers. These resources are especially important when natural face-to-face communication is difficult and/or information communication technologies have to be used instead (e.g., for

asynchronous working). Eight studies fell under the category of structural resources specific to the distributed worker context.

The ways in which structural resources such as information and communication are utilized is more important to OSH outcomes for distributed workers than frequency and quantity (Mulki & Jaramillo, 2011). Communication and communications technologies (ICTs), especially video-conferencing, may be important for facilitating communication and improving information flow (Konradt, Schmook, Wilm, & Hertel, 2000; Nurmi, 2011), yet are not always encouraged nor utilized by managers of distributed workers (Mihhailova, 2009). Where communicating via technology is utilized, managers' use of motivating language such as clear instructions, may lead to positive OSH outcomes such as satisfaction and commitment (Madlock, 2013). However, communication issues can cause problems that may lead to adverse wellbeing outcomes, such as role ambiguity, workload and stress from interruptions (Fonner & Roloff, 2012). Information regarding good OSH behaviours, role clarity and managerial advice are important resources in ensuring OSH for distributed workers. Yet managers either did not utilize information resources (Nurmi, 2011) or lacked knowledge of how to utilize them (McDonough et al., 2014). Lack of goal clarity, role clarity and unrealistic management expectations were all sources of stress for distributed workers (Nurmi, 2011; Weymouth et al., 2007).

[Insert table 2 about here]

The line manager/supervisor as a resource in their own right

Some studies found that the line manager's way of managing distributed workers has a direct impact on these workers' safety and health. Therefore, we suggest that the line manager/supervisor may be considered a resource in their own right, in ensuring good OSH for distributed workers; they do so, in three ways.

First, when managers are also distributed workers, there may be many benefits to their workers such as increased job satisfaction, feedback, personal development and empowerment (Golden & Fromen, 2011). These benefits may occur because of a better managerial understanding of distributed workers' context, such as work conditions, required support and information, and through promoting a good safety climate. Conversely, limited understanding of distributed work may lead to conflicting and unrealistic expectations of distributed workers, insufficient task related feedback (Mihhailova, Õun & Türk, 2011) and increased workload (Long, Kuang & Buzzanell, 2013).

Second, managers' exhibiting support and encouragement (i.e. knowledge seeking and sharing), was related to distributed workers' positive OSH behaviours of safety knowledge sharing and utilization (Nesheim & Gressgård, 2014). Managerial social support may reduce adverse OSH outcomes for distributed workers experiencing role conflict (Gray-Stanley et al., 2010) or stress (Nurmi, 2011). Conversely, a lack of instrumental support may lead to adverse OSH behaviours such as smoking and lack of physical activity (Chen, Wong & Yu, 2008) and adverse OSH outcomes such as stress and workplace frustration (Chen et al., 2008; Weymouth et al., 2007). Utilizing managerial or supervisory support to ensure OSH for distributed workers requires that managers and supervisors have skills and competencies (Yang, Yen & Chiang, 2012) to address the challenges presented by distributed working (Greer & Payne, 2014).

Third, the line manager/supervisor may generate positive OSH outcomes for distributed workers through their role in generating group-level safety climate. The line manager's enactment of policies and procedures and demonstration of commitment to ensure worker safety is an important facet of group-level safety climate (Zohar, 2008) and in turn, safety performance. Two studies found group-level safety climate was related to positive OSH performance such as safe driving (Huang et al., 2013), although employees' shared

perceptions of group level safety climate provided a better predictor than their supervisors' ratings (Huang et al., 2014).

Organizational-level safety climate as a resource

Organizational-level safety climate refers to employee perceptions about the institutional policies and procedures, together with top-management actions for the promotion of safety (Zohar, 2008). Three studies examined organizational-level safety climate. Huang et al. (2013) found organizational-level and group-level safety climate are two levels through which perceptions of safety climate are transferred to the individual worker, which in turn influence safety performance. Thus organizational level safety climate can be considered an utilizable resource in generating positive OSH outcomes for distributed workers. Perceptions of procedures and policies in place to manage safety were found to be significantly related to safety performance (Huang et al., 2013; Huang et al., 2014; Zohar et al., 2014). Furthermore, workers' perceptions of safety climate were found to be more accurate measures than supervisors' perceptions, in that they more strongly predicted safety outcomes. One study explored pre-conditions for organizations demonstrating good safety standards to workers, which included safety-related planning, roles, procedures and available resources (Törner & Pousette, 2009).

Surprisingly, we found no studies examined the role of OSH professionals in generating or enacting organizational level safety climate for distributed workers.

Discussion

In the present paper, we reviewed the current state-of-the art on how organizations may ensure the safety and health of distributed workers through appropriate management and leadership. We propose that, considering the common characteristics of distributed working, we do not know enough about how organizations can ensure OSH for distributed workers. In

our review, we focus on two ways in which this may be achieved. One way is through leadership as a means of influencing distributed workers' health, well-being and safety behaviour, the other is through management, comprising systems, procedures and practices, which can be considered as resources when utilized in ensuring OSH for distributed workers. In distributed work contexts both leadership and management are equally important.

The contribution of this paper is unique in three respects. First, we examine distributed work as a single category, given the common characteristics of temporal and spatial distance. This is different from previous reviews that have focussed on specific types of distributed working or challenges or risks. Second, we took an inclusive approach to how organizations may ensure OSH for distributed workers. We did so by examining two ways of influencing OSH of distributed workers, irrespective of the type of work, challenges or risks: leadership and management. Third, following a synthesis and classification of findings (Suri & Clarke, 2004) of management to ensure OSH of distributed workers, we suggest that the systems, practices and procedures that comprise management (Mintzberg, 1989) can be thought of as resources that may be deployed and utilized by those responsible, to ensure OSH for distributed workers. This suggestion responds to the call by Halbesleben et al. (2014) for clearer explanation of resources and their role in attainment of goals - such as OSH outcomes for distributed workers, as examined in the present study. Although our review was not centred on the Conservation of Resources Theory (Hobfoll, 1989), our synthesis of findings suggests that resources employed at higher levels may be linked to outcomes (i.e. OSH) of specific groups of workers (i.e. distributed workers).

Our starting point in formulating the topic for this review was to redress the fragmentation of the distributed worker literature to date, which has tended to focus on specific groups of workers, ways of working, or occupations. We did so by arguing that although heterogeneous in many ways, there are common characteristics of distributed

working that present common challenges, in turn rendering the topic of leadership and management of distributed workers worthy of examination. The broad perspective of distributed workers was necessary in order to unearth studies examining leadership. Our reasoning aligns with the recommendations of Pilbeam et al. (2016), who recently conducted a review of the literature on leadership of safety. The authors concluded that future research attend to broader approaches in both the range of hazard occupations examined and in encompassing both leadership and management. Our encompassing approach acknowledges this need. Likewise, rather than focus on specific OSH outcomes or OSH challenges for these workers, which have been addressed through numerous studies and literature reviews, we centred our review on the topic of management and leadership with respect to OSH outcomes. Following the same line of thinking, we also took an expansive approach when considering OSH by including safety, health and wellbeing, rather than focusing on specific outcomes.

In the leadership literature, there is a substantial body of work on leadership styles, some of which focus on OSH outcomes. In the present review, we found that the leadership of good safety and health outcomes for distributed workers is an understudied topic. Similarly, we found that literature on the management of distributed workers to ensure OSH is fragmented and understudied. We propose that there are aspects of management that can be considered as resources to be utilized by those responsible for OSH of distributed workers. As resources may be deployed at the organization-level, they could be considered organizational, in the sense that decisions of investment and deployment sit with those in charge of the organization. Viewing aspects of management as resources at higher levels is a useful organizing heuristic when examining specific outcomes at lower levels, such as OSH for distributed workers. Our review revealed a number of differing resources that may be utilized in ensuring good OSH outcomes; we were able to undertake a simple categorization

exercise from the evidence to date, which we categorized as structural resources, line manager practices and safety climate. We suggest that line managers' practices in ensuring OSH of distributed workers could be considered as resources as they could be for example, integrated into and deployed as part of into formal organizational practices (e.g., enhanced through management training and performance management systems that encourage certain management behaviours). However, the small number of studies indicates an underdeveloped research area. Given the proportion of the workforce engaged as distributed workers, we suggest that a holistic approach, such as the one we have taken in the present review, is a valuable lens for examination.

Implications for future research

Overall, our review has highlighted the limited amount of research examining OSH leadership and management of distributed workers. The papers identified in the present review examined behaviours that are especially important in respect of leading and managing positive OSH outcomes for distributed workers: for example, high levels of instrumental support, engendering trust, using motivating language and competent communications. However, the relatively small sample sizes, fragmented nature of the literature, lack of prospective studies and, in some cases, narrow range of workers examined, limit the conclusions that can be drawn on how organizations may ensure the safety and health of distributed workers. Rather the findings presented in this review may be best considered as indicators of promising lines of enquiry for future research to be extended and developed using more powerful conceptual frameworks and methods. Fundamentally, our review highlights that research has yet to engage with issues in common across distributed workers. Future research should expand by examining common issues across different types of distributed working.

Little is known as to relevant and effective leadership frameworks for OSH of distributed workers. Future research should examine leadership frameworks that are specific to OSH outcomes for distributed workers, and those that are applicable across a range of distributed work contexts. The utilization of structural management resources is under-explored and further research may lead to insights into how leadership may become more or less effective for distributed workers. Structural resources are a particularly important facet of the management of distributed workers, because the lack of physical proximity. In a recent review of safety leadership, Pilbeam et al. (2016) call for both a more pluralistic approach to examining to leadership and management and more attention to OSH leadership across a range of occupations.

The role of the OSH professional within organizations requires further attention. None of the studies identified in the present review focused on the role of the OSH professional in the safety and health of distributed workers, for example through the enactment of health or safety. This lack of attention is concerning, as OSH professionals may directly influence specific behaviours such as encouraging workers to follow procedures. They may also be instrumental in developing policies and procedures to ensure good safety and health or initiatives to promote safe and healthy working such non-smoking campaigns or driving safely. Although some studies explored the presence of structural resources, there were no studies that explored whether such resources had been developed as part of an explicit OSH strategy. As there was no research on OSH professionals, we found no research on the role of the line manager in enacting the OSH professionals' intended policies, practices and behaviours. No studies examined modelling behaviours between the OSH professional and the line manager/supervisor. The role of the line manager within this chain of leadership influence requires attention, in order to assist practice in determining the means by which OSH professionals ensure positive OSH outcomes for distributed workers. Allied to this, we

concur with Pilbeam et al. (2016) that future research should examine the means through which OSH leadership responsibilities and skills are distributed around the organization to reflect differing work contexts. This may include, for example, the processes or structures of shared influence for good OSH. We have touched upon some of these means by focusing on resources that enable, enhance or supplement leadership of good OSH outcomes. To our knowledge, research has yet to develop robust theoretical frameworks that accommodate leadership influence of good OSH for distributed workers. The development of frameworks is another area for future study.

Implications for practice

With regard to communication, our review suggests that organizations need to ensure structural resources are available, for example, access to ICTs (especially video-conferencing etc.) may be important for facilitating good communication. Furthermore, line managers and supervisors need in-depth knowledge on the conditions and the risks that distributed workers may face when away from the main location. Such knowledge may be obtained through line managers and supervisors taking on distributed working themselves, shadowing distributed workers in the field or through training using practice videos.

Our results also suggest that training leaders in enacting certain leadership behaviours such as transformational leadership and considerate leadership may promote the safety and health of distributed workers, in particular when training focuses on the safety issues faced by such workers. No studies focused on health specific transformational leadership, however it is possible that training focussed on such topics may be particularly effective. Finally, it is important that line managers and supervisors build a trusting relationship with their distributed workers. Such relationships may develop through regular face-to-face interaction and team-building activities.

Strengths and Limitations

The main strengths of the present literature review are threefold. First, in our unique approach of examining distributed workers as an umbrella term, based on the shared challenges associated with this type of work. Second, in our focus of how organizations may address these challenges through leadership and management. To gain an understanding of these issues we included qualitative and quantitative empirical research. Third, where we found no pre-existing frameworks through which to synthesize aspects of management that may ensure OSH for distributed workers, we developed a categorization of aspects of management that could be considered as utilizable resources. Overall, our review identified gaps where knowledge is still limited.

There are a number of weaknesses with regard to the review itself and the studies included in the review that must be considered when drawing conclusions based on the evidence presented here. First, we did not include unpublished and "grey" literature in the review. It can be argued that this is a limitation, however, it may also be considered as a strength, as we included only studies published in peer-review journals, so would have undergone rigorous review and been subjected to quality control. Second, the overall quality of the studies included was low. We identified relatively few studies (23 papers in total) that examined the OSH management and leadership of distributed workers. These studies comprised small sample sizes. The survey studies were cross-sectional and do not allow us to draw causal relationships between the OSH leadership and management of distributed workers and safety and health outcomes. The qualitative studies were primarily of a descriptive nature exploring the problems faced by distributed workers but provided less information about how OSH professionals and line managers may develop and implement coherent OSH management policies and procedures to ensure distributed worker safety and health. Very few studies focused on more than one type of distributed worker, few examined

established leadership frameworks and none of these discussed the transferability of existing frameworks to the distributed worker context. Most studies restricted their examination to one or two safety and health outcomes. As a result, the findings from our literature review provide no strong evidence. Therefore, future research should be more extensive in scope, comprising large samples and more rigorous designs such as longitudinal designs and/or multiple sources of data. A third limitation lies in the disparity of workers studied, which allied with the low evidence base make it difficult to draw any generalizable conclusions as to OSH leadership or indeed detailed examination of the types of resources.

Conclusion

There are four main contributions of this review. First, although many existing leadership frameworks have been developed for performance purposes and implicitly rely on face-to-face interaction, we found some support that existing leadership styles can successfully be employed to influence the health and safety of distributed workers. Second, upon reviewing the evidence, we found examples of aspects of management that could be considered as resources, which could be employed by organizations to ensure the safety and health of distributed workers. These resources primarily relate to line managers and supervisors and to a lesser extent senior management. The studies show consistently, that immediate line managers play an important role in the safety and health of distributed workers. Third, we extend the notion of aspects of management as resources by offering a simple classification: from the studies selected, we identified structural resources, line manager practices if codified and safety climate. Fourth, we identified several gaps in the literature. Distributed working comprises common characteristics (Dix and Beale, 1996) across a range of types of distributed work, yet despite the functional role of OSH professionals within organizations in ensuring distributed worker safety and health, no studies focused explicitly on these key players. Furthermore, no studies explored the role of comprehensive OSH management

strategies and policies in ensuring distributed worker health and safety. Overall, the fragmented nature of the literature suggests fertile ground for further research on how to ensure the safety and health of distributed workers. Furthermore, the research designs to date have tended to be weak, which suggests a fertile research area for stronger research methods.

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Table 1. Current leadership models or frameworks applied in the context of good OSH for distributed workers.

Leadership framework	Authors	Design / methods Country	Distributed worker sample	OSH Outcomes	Synopsis of key findings
Transformational leadership	Conchie (2013)	Cross-sectional, survey. UK	Study 1: 251 construction workers in 3 companies (engineers, electricians, plumbers, joiners). Study 2: 220 construction workers in 1 company across 4 sites (electricians, ground workers, pipefitters).	Safety behaviour (safety voice, safety compliance)	Study 1: Intrinsic motivation mediates the relationship between safety-specific transformational leadership and challenge citizenship behaviours. Study 2: Intrinsic motivation partially mediates the relationship between safety-specific transformational leadership and challenge citizenship behaviours. This relationship is moderated by trust.
Transformational leadership	Whitford & Moss (2009)	Cross-sectional, survey. Australia, USA, Europe, Asia, South Africa, South America	165 employees from small, medium, and larger organizations in both traditional and virtual environments.	Job satisfaction Work engagement	In virtual environments, visionary leadership (part of transformational leadership) is significantly related to job satisfaction only when there is a high focus on promotion and related to work engagement when employees are prevention focused.
Leader-member-exchange	Golden &Veiga (2008)	Cross-sectional, survey. USA	375 employees from a large high-tech corporation, who worked an average of 25% of the working week in virtual mode.	Job satisfaction Commitment	Leader-member-exchange (LMX) is important for job satisfaction, but especially important for job satisfaction of virtual workers. The link between LMX and job satisfaction is moderated by the degree of virtual working.
Leader-member-exchange	Zohar et al. (2014)	Prospective: survey, and safety data, collected over following 6 months. USA	3,207 long haul truck drivers from a large national haulage company.	Safety performance (driving)	Leader-member-exchange (LMX) was related to trucking safety climate. The relationship between LMX and driving safety was mediated by trucking safety climate.
Considerate leadership	Mulki & Jaramillo (2011)	Cross-sectional, survey. USA	344 field salespeople working for a subsidiary of a large multi-national pharmaceutical company.	Workplace isolation	Considerate leadership directly impacts satisfaction with supervisor. Satisfaction with supervisor mediates between workplace isolation and turnover intentions. The number of face-to-face meetings between supervisors and field salespersons and between salespersons doesn't significantly influence worker perceptions of workplace isolation. Those higher on self-efficacy and who believe considerate leadership actions are made by their supervisor experience lower workplace isolation.

Table 2. Management systems, practices and procedures, which may be utilized to ensure OSH for distributed workers

Category of management resource	Authors	Design / methods Country	Distributed worker sample	OSH Outcomes	Synopsis of key findings
Structural	Fonner & Roloff (2012)	Cross-sectional, survey. USA	100 office workers and 80 high intensity teleworkers.	Stress from interruptions	Teleworkers indicate that face-to-face communications, videoconferencing, instant messaging and email are related to higher levels of stress from interruptions.
Structural	Madlock (2013)	Cross-sectional, survey. USA	177 teleworkers from a variety of industries.	Job satisfaction Organizational commitment	Specific facets of managers' oral communication in providing motivating language were related to worker job satisfaction: direction-giving (instructions, guidance), and empathetic language (emotion focused - praise, criticism).
Structural	McDonough et al. (2014)	Cross-sectional, qualitative interviews. Canada	16 truck drivers and 10 managers from two haulage companies based in South Western Ontario.	Physical health and disease Stress and fatigue	Management recognize the importance of their roles, but were frustrated by lack of awareness of workplace health promotion resources, nor how to communicate in that respect with drivers - given shift and remote working.
Structural	Mihhailova (2009)	Case study - semi-structured interviews and focus groups. Estonia, Russia	58 virtual working employees from one Estonian and one Russian IT services company.	Satisfaction (with virtual working)	Top management were willing to be available to teleworking middle managers using ICT. However, top management applied classic management concepts more suited to office-based workers, rather than management concepts appropriate for virtual workers.
Structural	Mulki & Jaramillo (2011)	Cross-sectional, survey. USA	344 field salespeople from a multi-national pharmaceutical company.	Workplace isolation	The number of face-to-face meetings between supervisors and field salespersons and between salespersons does not significantly influence worker perceptions of workplace isolation.
Structural Line manager (support)	Nurmi (2011)	Multiple case study, qualitative. Finland	97 team leaders and employees from electronics, telecommunications, software, consultancy, pulp and paper, and banking industries.	Role ambiguity Role overload Burnout	Teams working in multiple time zones and extending working hours for synchronous communication experienced burnout. Team members who worked remotely from managers had the least access to informational and social support from their manager. Employees worked remotely from manager were more likely to experience role-overload, because the leader was not aware of their workload.
Structural Line manager (support)	Weymouth et al. (2007)	Cross-sectional, mixed methods. Australia	61 Remote area nurses in Australia. 26 ex-remote area nurses and 9 nursing executives with experience of distance management.	Management handling of OSH issues	According to remote nurses, managers are inaccessible and unsupportive with poor responsiveness to issues when communicated with. According to nursing executives, crisis management skills differentiated good leaders; but there was a lack of time to build rapport with nurses; high bureaucratic demands, high turnover, lack of communication; that quality leadership would enhance team cohesion.

Category of management resource	Authors	Design / methods Country	Distributed worker sample	OSH Outcomes	Synopsis of key findings
Structural Line manager (understanding of distributed working)	Konradt, Schmook, Wilm & Hertel. (2000)	Intervention study: health circle discussions. Germany	17 teleworking employees.	Work strain Workplace isolation	Lack of interruption from supervisors during daily work was a positive aspect of teleworking, as was supervisors demonstrating a good understanding of work-life balance issues and task-related discussions.
Line manager (support)	Chen et al. (2008)	Cross-sectional, survey. China	581 off shore oil company workers.	Stress	High levels of instrumental support from supervisors was related to lower risk of smoking and increased risk of physical inactivity and in turn, stress, after controlling for a range of factors.
Line manager (support)	Gray-Stanley et al. (2010)	Cross-sectional, survey. USA	323 direct support (care) workers from 5 community-based organizations.	Depression Role conflict	Work social support (supervisor and co-worker) was inversely related to depression. The effects of role conflict were moderated by supervisor support so that supervisory support moderates the negative effects of role conflict on depression (particularly for workers experiencing high stress levels).
Line manager (support)	Greer & Payne (2014)	Cross-sectional, survey: coded qualitative data from survey correlated with quantitative ratings. USA	86 high performing teleworkers as identified by 58 supervisor ratings.	Workplace isolation Work engagement	Supervisors indicated challenges with telework most frequently, such as lack of face-to-face communication, interdependency of telework and managing and monitoring performance. High performing teleworkers identified strategies to overcome challenges, such as use of advanced technologies and communication with co-workers/supervisors.
Line manager (support)	Nesheim & Gressgaard (2014)	Cross-sectional, survey. Norway	880 employees from oil operating firm and 1773 employees from subcontractors.	Safety knowledge utilization	Knowledge utilization, including items in relation to safety, is related to knowledge sharing, experience, training and management support.
Line manager (support)	Yang et al. (2012)	Cross-sectional, mixed methods. Taiwan	171 project leaders and workers from police departments.	Job satisfaction	Leadership competency (classified into 3 factors: emotional, managerial and intellectual competency) had a direct relationship with job satisfaction.

Category of management resource	Authors	Design / methods Country	Distributed worker sample	OSH Outcomes	Synopsis of key findings
Line manager (understanding of distributed working)	Golden & Fromen (2011)	Cross-sectional, survey. USA	11.059 professional-level employees in Fortune 500 company. No information on occupation or sector.	Job satisfaction	Findings suggest work mode of workers and managers should match: Employees with a teleworking manager reported a number of adverse outcomes such as lower job satisfaction, when compared to those with a traditional manager (face-to-face). Teleworkers (virtual workers) with a teleworking manager reported a number of positive outcomes such as higher job satisfaction, when compared to teleworkers with traditional managers.
Line manager (understanding of distributed working)	Long et al. (2013)	Cross-sectional, qualitative interviews. China	8 teleworkers.	Workload	Supervisors lack understanding of the nature of and processes of teleworking. Supervisors from other areas assign tasks to teleworkers, based on perceptions that teleworkers have less work to do.
Line manager (understanding of distributed working)	Mihhailova et al. (2011)	Cross-sectional, survey and qualitative interviews. Estonia	3,156 virtual working employees from 323 different service sector organizations.	Job satisfaction	Managers find virtual work suitable for routine tasks where no complex decision-making is involved, however, employees prefer managers to not intervene in work process, but grant autonomy to make decisions independently
Line manager (role in safety climate) Organizational-level safety climate	Huang et al. (2014)	Cross-sectional, survey. USA	A matched sample of 1831 long haul truck drivers and their supervisors (219) from four truck companies.	Safety performance (driving)	Supervisors' interpretations of organizational and group level safety climate were higher than truck drivers. Safety behaviours mediate between employee organization level safety climate and lost work days due to injury, but did not mediate between supervisors' interpretation of organizational level safety climate and lost work days due to injury.
Line manager (role in safety climate) Organizational-level safety climate	Huang at al. (2013)	Cross-sectional, mixed methods: development and test of industry specific safety climate scale USA	2421 remote workers from 2 large electric utilities.	Safety performance (driving)	Individual safety climate scores significantly predict worker safety behaviour; but individual safety climate scores did not significantly predict vehicle accidents. Work unit safety climate (shared perceptions) predicts individual safety behaviour. Organizational-level and group-level safety climate perceptions both predict workers near misses, accidents and lost days.
Organizational-level safety climate	Torner & Pousette, (2009)	Cross- sectional, qualitative. Sweden	19 line managers and 5 worker safety representatives, from a single large road tunnel construction project.	Safety performance	According to participants, the characteristics of high safety standards are organization and structures (planning, roles, procedures, resources); collective values norms and behaviours (climate, interaction, cooperation); and, individual competence and attitudes.

Category of management resource	Authors	Design / methods Country	Distributed worker sample	OSH Outcomes	Synopsis of key findings
Organizational-level safety climate	Zohar et al. (2014)	Prospective: survey and - hard braking safety data, collected over following 6 months. USA	3,207 long haul truck drivers from a large national haulage company.	Safety performance	Work ownership (Van Dyne & Pierce, 2004) and distant leadership are positively related to lone-worker psychological safety climate, which is in turn related to safety behaviour.