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Salutogenic Workplace Design: A Conceptual Framework for Supporting Sense of Coherence through Environmental Resources

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Abstract

Purpose: The purpose of this paper is to identify and discuss opportunities for health promotion through the workplace environment, adopting a 'salutogenic' perspective of health which more explicitly focuses on factors that support human health and wellbeing, as opposed to factors which cause disease.

Design/Methodology/Approach: In the introduction, the salutogenic model of health and the Environmental Demands-Resources model are discussed, providing a conceptual framework to represent the workplace environment as a composite of pathogenic 'demands' and salutogenic 'resources'. Subsequently, a narrative review is performed to discuss the existing literature from the perspective of this novel framework, identifying environmental resources which might strengthen the three components of an employee's 'sense of coherence' (comprehensibility, manageability, and meaningfulness), an individual orientation associated with more positive health outcomes.

Findings: Comprehensibility can be supported by effectively implementing a clear set of rules governing the use of the workplace. Manageability can be supported through biophilic design solutions, and through design which supports social cohesion and physical activity. Meaningfulness can be supported by recognising the importance of personal identity expression and through design which reinforces the employees' sense of purpose.

Originality/Value: The salutogenic perspective is a potentially valuable but relatively under-considered paradigm in workplace practice. The key contribution of this paper is to encourage researchers and practitioners to recognise the crucial role that an individual's sense of coherence plays in supporting higher levels of physical and mental health, so that they increase their ability to provide truly 'healthy' workplaces, capable of promoting health as well as minimising the risk of disease.

The emerging healthy workplaces movement is primarily concerned with the *pathogenic* (harm-causing) potential of the office environment. The quality of the indoor workplace environment may contain numerous contributors towards ill health (see Al Horr *et al.*, 2016, for review), partly as a result of the cost reduction paradigm which pervades workplace practice, in which space efficiency is prioritised above occupant requirements (Haynes, 2007a). As such, recent certification schemes for optimising health and wellbeing in the built environment (e.g., the WELL Building Standard; International WELL Building Institute, 2018) largely focus on improving indoor environmental quality through strategies such as the minimisation of airborne pollutants and by reducing various sources of environmental discomfort.

In this paper, we will argue that the mitigation of pathogenic environmental components is a necessary but not sufficient step towards the goal of providing truly healthy workplaces. We suggest that it is equally important to consider *salutogenic* (health-promoting) aspects of the workplace environment, in order to more suitably answer calls for more enabling paradigms in workplace practice (Haynes, 2007a). The distinction between harm-causing and health-promoting factors echoes the World Health Organisation's (1948) definition of health as a "state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity", and also has parallels with the distinction between 'languishing' (the presence of mental illness) and 'flourishing' (the presence of positive emotions) in the positive psychology movement (Keyes, 2002).

In recognition of the fact that the majority of workplace research has tended to be largely atheoretical and segmented by discipline (Sander *et al.*, 2018), we believe future research and practice should be more explicitly designed in accordance with relevant conceptual frameworks. Accordingly, in this paper we explicate two conceptual frameworks to support understanding of the salutogenic potential of the workplace environment. First, we discuss the salutogenic model of health (Antonovsky, 1987), which has received good empirical support in healthcare disciplines. Second, we present the Environmental Demands-Resources (ED-R) model as a way of illustrating the pathogenic and salutogenic aspects of the workplace environment, and how they can be determined through the dynamic employee-workplace relationship.

Salutogenic approach to healthcare

According to the salutogenic model, the state of health is a continual process in which the individual is placed somewhere on the "*dis-ease versus health-ease*" continuum. Movement along the continuum occurs as a result of competing forces. Ubiquitous and unavoidable everyday stressors and hardships (termed *generalised resistance deficits*) contain the pathogenic potential to drive us towards ill health and disease. However, we are also able to draw upon resources at the individual or group level which enable us to effectively cope with or avoid these hardships (termed *generalised resistance resources*), preventing tension

from being transformed into stress and thus containing the salutogenic potential to promote more positive health outcomes (Antonovsky, 1987).

To account for why some people are able to remain healthy even in the face of extreme hardships and major stressors, Antonovsky (1987) identified the ‘sense of coherence’ (SOC) as the major individual difference factor which determines the extent to which resistance resources are effectively deployed in response to resistance deficits. The SOC is a global orientation reflecting the individual’s perceptions regarding the extent to which the events occurring around them are structured, predictable, and explicable (*comprehensibility*); the extent to which the individual perceives sufficient resources to meet the challenges posed by these demands (*manageability*); and the extent to which the events are perceived as challenges worthy of investment and engagement (*meaningfulness*). These concepts are illustrated in Figure 1.

INSERT FIGURE 1 HERE

There is good evidence in the research literature to suggest that a stronger SOC (i.e., the perception that events are comprehensible, manageable, and meaningful) is associated with greater resilience to stressors, more positive health behaviours, and better overall health across the lifespan (see Braun-Lewensohn *et al.*, 2015; Koelen *et al.*, 2015; and Idan *et al.*, 2015, for reviews), meaning that individuals with a strong SOC have a lower all-cause mortality risk (Super *et al.*, 2013). From a mental health perspective in particular, individuals with a strong SOC tend to exhibit lower levels of depression, anxiety, and hopelessness, and higher levels of optimism, resilience, and overall quality of life (Eriksson and Lindström, 2006, 2007).

Within the context of the built environment, researchers working within healthcare architecture have explicitly adopted the salutogenic paradigm and considered architectural strategies for strengthening patients’ SOC (e.g., Golembiewski, 2010). However, salutogenesis has received relatively limited attention in the workplace literature, and existing discussions (e.g., Dilani, 2009; Ruohomäki, *et al.*, 2015) have adopted a more general approach and have not specifically considered how different workplace interventions might affect an individual’s SOC. As such, the main aim of this paper is to address this gap in the knowledge base by identifying opportunities to improve comprehensibility, manageability, and meaningfulness through the physical workplace. In the next section, we introduce a workplace-specific conceptual framework to guide this discussion, which illustrates the competing pathogenic and salutogenic aspects of the workplace environment.

The Environmental Demands-Resources Model

The Environmental Demands-Resources (ED-R) model (Figure 2) is a domain-specific extension of the Job Demands-Resources model from the organisational psychology tradition (Bakker and Demerouti, 2007a, 2007b). A key advantage of this framework in the present context is that it draws the same distinction as is made in salutogenic theory, between pathogenic (‘demands’) and salutogenic (‘resources’) forces which affect health.

Additionally, we present the ED-R framework separately here to address two major limitations in the workplace environment literature. First, whilst the majority of workplace environment research is atheoretical and limited to specific components of the environment (Sander *et al.*, 2018), the ED-R model is capable of conceptually representing the workplace environment in its entirety. Although some models representing the entire workplace environment do exist (Haynes, 2007b; Vischer, 2008), these are limited in that the authors acknowledge the reciprocal nature of the relationship between employee and workplace but do not illustrate in their models the process by which this reciprocity occurs. As such, the second limitation addressed by the ED-R model is the explicit representation of the dynamic employee-workplace relationship.

Briefly, the ED-R model posits that the workplace environment is a complex psychophysical system encompassing not only the objective physical stimuli within the workplace but also the ways in which these stimuli are subjectively perceived by the individual occupants. These stimuli can be broadly separated into ‘environmental demands’ and ‘environmental resources’, depending on how they affect the employee.

Environmental demands are the pathogenic aspects of the workplace environment, which cause physiological and/or psychological ‘strain’ and impede an individual’s progress towards his/her goals. In the face of environmental demands, additional effort must be exerted to achieve the same outcome, leading to lower overall job performance. Environmental demands can be likened to Herzberg’s (1966) ‘hygiene factors’, in that their presence causes stress and dissatisfaction but their absence does not necessarily support the highest levels of functioning.

Conversely, environmental resources are the salutogenic components of the workplace environment, which enable the individual to cope with the demands (environmental or otherwise) experienced throughout the working day. The presence of environmental resources improves psychological comfort by supporting fundamental psychological needs (Sander *et al.*, 2018; Vischer, 2008), and has a positive impact on overall job performance by aiding recovery from stress, stimulating engagement, and/or improving motivation. These are similar to Herzberg’s (1966) motivators, in that the absence of these features does not directly cause stress, but their presence is necessary to support high levels of motivation.

The presence of environmental demands and resources within a workplace is not static, and can be significantly altered by ‘environmental crafting’ behaviours. This term refers to any action performed by the individual with the explicit aim of improving the workplace environment (i.e., by minimising demands and/or increasing resources). Organisational policies regarding location of work (e.g., through policies relating to desk assignment and teleworking) and office protocols (through policies relating to desk personalisation and personal comfort devices) can either facilitate or impede the process of environmental crafting. In this way, the reciprocal nature of the employee-workplace relationship is illustrated, recognising that employees are not simply passive recipients of environmental conditions.

Importantly, it should be noted that specific features are not *inherently* demanding or resourceful but are rather perceived as such at the level of individual, relative to the effect on goal-directed behaviour. Depending on the task being performed and the individual’s personal characteristics, the same aspect of the environment might exert a very different effect. This element of inter-individual non-uniformity is represented in the model through

the concept of *employee-workplace alignment*, which refers to the extent to which the characteristics of the workplace environment are aligned to the needs of the individual (i.e., the relative presence of environmental demands and environmental resources). This reflects growing recognition amongst workplace researchers regarding the importance of need-supply fit (Gerdenitsch *et al.*, 2018; Haynes, 2008; Vischer, 2008).

Overall, the ED-R model predicts that job performance will be highest when the workplace environment is free of demands and abundant in resources, relative to the needs of the individual occupant. Thus, effective workplace interventions are those which lead to an overall reduction in demands and/or increase in resources. In this paper, we focus in particular on the role of environmental resources.

INSERT FIGURE 2 HERE

Aims and Purpose

Drawing upon the two conceptual frameworks presented, the main aim of this paper is to identify opportunities for salutogenesis in the workplace environment. Specifically, we perform a narrative review to identify potential interventions for strengthening employees': (a) comprehensibility; (b) manageability; and (c) meaningfulness, through targeted interventions in the workplace environment. We do not intend to provide an exhaustive list of all the workplace interventions that might affect an individual's SOC, but rather we aim to re-interpret the existing research within the promising yet relatively under-considered salutogenic paradigm, to encourage researchers and practitioners to consider opportunities for improving the workplace beyond just the mitigation of pathogenic aspects of the environment.

Methodology

As a first step, we carried out a search of the literature in Google Scholar using a combination of the keywords: salutogenic design, salutogenic workplace, salutogenic architecture, sense of coherence, comprehensibility, manageability, and meaningfulness. The results were then reviewed to identify previous studies which adopted a salutogenic approach to workplace practice. However, only two relevant papers (Dilani, 2009; Ruohomäki *et al.*, 2015) were identified in this manner. Whilst these were valuable from a conceptual perspective, they did not support the primary aim of this paper in relating specific workplace interventions to different components of the individual's SOC.

As such, we performed a subsequent search of the literature in Google Scholar, in which the scope was widened to any studies concerning the effects of the workplace environment on employee wellbeing and productivity. A variety of keywords were used, including: indoor air quality, thermal comfort, luminous environment, natural light, acoustic environment, background speech, noise, office layout, workplace strategy, biophilic design, workplace wellbeing, and productivity. Where suitable articles were identified, the reference list was scanned to identify additional research studies relevant to the topic which may have been missed during the primary search process.

The significantly broader scope meant that more than 500 primary research articles were identified. We reviewed the abstracts for each paper, and passed the papers for further analysis if the content was judged to be in accordance with the themes of salutogenesis, comprehensibility, manageability, and meaningfulness (even if the researchers did not explicitly use these terms). Given that the majority of workplace research has focused solely on pathogenic factors, the majority of papers were excluded at this stage, leaving approximately 75 papers to be analysed in more depth. The papers were divided into the separate themes of comprehensibility, manageability, and meaningfulness, and then further sub-divided into different types of interventions within each area.

The narrative review that follows is the result of this endeavour. It was not our intention to provide a systematic analysis of each paper that was identified, but rather to adopt an exploratory approach and creatively re-interpret the existing research from the salutogenic perspective, in order to provide a state-of-the-art summary of the role of salutogenic resources in the workplace environment.

Results

Comprehensibility.

Comprehensibility concerns the individual's ability to understand and make sense of external events. In a highly comprehensible office, the stimuli within the workplace environment are ordered, predictable, and explicable.

Workplaces lose their sense of comprehensibility when there is a mismatch between the employee's expectations for the workplace and the way in which the workplace is actually used. When aspects of the workplace environment are difficult to predict or control, they become even more demanding. For example, background speech is a common concern in open-plan offices, and has been found to be especially disruptive if it is unpredictable or judged to be inappropriate for the context. (Emberson *et al.*, 2010; Glass and Singer, 1972; Graeven, 1975). The inability to control such events leads to a motivational deficit termed 'learned helplessness', where the employee simply succumbs to the demands of the environment and stops trying to craft effective responses, resulting in depressive symptoms and low productivity (Evans and Stecker, 2004).

Possibly, the development of clear and explicit workplace rules could mitigate such issues. This would provide employees with unambiguous information about the types of environmental stimuli which can be reasonably expected at their workstation, allowing them to develop appropriate crafting strategies if the conditions are judged to be unsuitable. Indeed, recent case studies exploring the transition to 'activity-based' workplaces, where employees are not given assigned desks but are instead encouraged to move flexibly between different functional zones within the workplace to complete different types of activities (Wohlers and Hertel, 2017), have highlighted the rule-development process as a key determinant of the eventual workplace effectiveness.

Certain steps need to be taken to ensure these rules are effectively implemented, as employees often resist new workplace concepts (Appel-Meulenbroek *et al.*, 2011; Babapour, Karlsson and Osvalder, 2018; Rolfö *et al.*, 2017). It has been demonstrated that employees derive the greatest benefits from their workplace when they perceive a high level of 'fit' with their own working style (Gerdenitsch *et al.*, 2018). As such, to reduce the risk of resistance it

is crucial to actively involve the workplace users in the development of rules governing the use of the workplace. Indeed, in one case study it was demonstrated that non-compliance with rules occurred as a result of their ambiguity, but subsequently involving users in the design process and making the co-created rules more explicit resulted in increased acceptance of the new working style and higher compliance with the rules, and lower levels of demands experienced in the new workplace (Babapour and Rolfö, 2018; Rolfö, 2018).

Finally, it is also crucial to recognise the role of ‘place attachment’ during any change management procedures. Employees automatically form emotional bonds with the physical workplace as a result of the routinised interactions that occur there (Inalhan and Finch, 2004), and the workplace can even come to form part of the employee’s personal identity (Inalhan, 2009). During workplace re-location or renovation, disruption to place attachment can occur, prompting the loss of psychological comfort and increasing the likelihood of resistance to change. To mitigate this disruption, Inalhan (2009) also highlighted the crucial importance of occupant engagement prior to and during the move. If the intervention involves a change to working style (e.g., from fixed-location to location-independent), it can also be useful for change managers to explicitly help employees to forge new working identities which are more aligned to the new style (Skogland, 2017).

Manageability.

Manageability concerns the extent to which individuals perceive sufficient resources to deal with demands. When the office is highly manageable, the employee has developed the personal competencies and/or crafting strategies to effectively cope with the various demands (environmental and non-environmental) that they experience at work. Concerning psychosocial factors, there is good evidence to suggest that the deployment of job resources effectively buffers the impact of job demands on strain (Bakker and Demerouti, 2007a, 2007b). Whilst this pathway has not been explicitly explored from the perspective of the ED-R model, past research has yielded several examples in which environmental resources can act in a similar manner.

First, there is significant evidence to suggest that ‘biophilic design’ solutions (e.g., the direct physical presence of nature in the workplace, the indirect evocation of nature through biomorphic forms and patterns, or design which mimics the spatial configurations found in nature; Ryan *et al.*, 2014) enable employees to more effectively cope with workplace stressors. For example, demonstrated benefits of biophilic design have included fewer reported health ailments, higher satisfaction with the workplace environment, improved attentiveness, improved information management and processing, greater attention capacity, higher self-rated productivity, and reduced stress (Lohr *et al.*, 1996; Kaplan, 1993; Nieuwenhuis *et al.*, 2014; Raanas *et al.*, 2011; Smith and Pitt, 2005).

To account for such findings, it has been suggested that the benefits of nature arise due to the inherent stress-reduction properties of natural features (Ulrich *et al.*, 1991), and that the ‘softly fascinating’ properties of nature engender micro-restorative experiences which enable the depleted cognitive resource for directed attention to recover (Kaplan, 1993, 1995). The benefits of nature also extend to non-stressed and non-depleted individuals, termed an “instorative” effect (Beute and de Kort, 2014). Thus, there is good evidence to conclude that biophilic design functions as a salutogenic resource, enabling the individual to more effectively cope with and recover from stressors in the workplace environment.

A second way in which the workplace environment can enhance employee's resources for coping with demands is through design strategies which promote social cohesion. Social support helps employees to effectively mitigate workplace stress (Viswesvaran *et al.*, 1999), and workplaces with strong perceived social support are associated with higher job satisfaction, higher morale, lower absenteeism, and reduced turnover intentions (Lowe *et al.*, 2003). As such, social support has been identified as a key resource which can be supported (or restricted) through the workplace environment (Morrison and Macky, 2017).

Architectural configurations which promote proximity (e.g., removal of interior walls, removal of partitions between workstations) tend to facilitate higher levels of work-related and social interactions (Appel-Meulenbroek, 2014). However, this may come at a cost, as higher-density workplaces are also associated with increased distractions, increased physical discomfort, increased perceptions of crowding, and lower overall environmental dissatisfaction, (Aries *et al.*, 2010; Duval *et al.*, 2002; May *et al.*, 2005). Indeed, this 'privacy-communication trade-off' has been highlighted as a key issue in modern open-plan offices (Kim and de Dear, 2013).

Again, the solution to the problem might be found through the activity-based working office concept. Rather than trying to balance requirements for communication and privacy at a single workspace, employees in activity-based workplaces are able to craft the environment that is appropriate for their needs at the time (i.e., by choosing to work in a collaborative area or a private area). Support for social cohesion can be further enhanced through the provision of spaces which are purposefully designed for social activity (e.g., shared lunch areas, games rooms) and organisational policies which encourage employees to take breaks from their desks and use these spaces.

Finally, it would also be useful to consider strategies for promoting physical activity through the workplace environment, given that physical fitness can act as a mechanistic buffer which helps individuals to deal more effectively with stress (Rook *et al.*, 2018). The requirement for desk-based work tends to increase sedentary behaviour, in turn increasing the likelihood of musculoskeletal symptoms and heightening the risk of health issues such as type 2 diabetes, cardiovascular illness, and certain forms of cancer (Karakolis and Callaghan, 2014; Owen *et al.*, 2008). In this way, poor ergonomic support contributes to poor health both by increasing physical strain and by restricting one of the ways in which individuals can effectively buffer this strain.

To combat this, organisations could consider the use of fixed-height seated and standing desks, desktop height-adjustment stands, or desks which are able to be adjusted between seated and standing positions. Indeed, it has been shown that such interventions can be effective in reducing sedentary behaviour, physical discomfort, and musculoskeletal pain symptoms (Karakolis and Callaghan, 2014; Makkonen *et al.*, 2017; Straker *et al.*, 2013). Additionally, it may also be beneficial to use behavioural prompts within the workplace environment (e.g., posters, information leaflets) to encourage physical activity, although the evidence base for the effectiveness of such interventions to date is mixed (Malik *et al.*, 2014). Possibly, such interventions could be made more effective if delivered using the principles of well-supported models of health behaviour change (e.g., the Transtheoretical Model of Behaviour Change; Prochaska and Velicer, 1997).

Meaningfulness.

Meaningfulness concerns the extent to which experienced demands are perceived as challenges worthy of investment and engagement. Antonovsky (1987) considered meaningfulness to be the strongest and most important aspect of SOC, and recent evidence confirms the notion that it plays a crucial role in fostering employee health and happiness. Higher work meaningfulness is associated with higher job satisfaction and overall wellbeing, reduced absenteeism, more intrinsic work motivation, and a stronger sense of overall life meaningfulness (Arnold *et al.*, 2007; Dik and Steger, 2008; Duffy and Sedlacek, 2007; Kamdrom, 2005; Wrzesniewski *et al.*, 1997). It has been suggested that interventions to improve work meaningfulness should focus on ensuring work activities are congruent with the individual's values, and/or linking mundane work activities to distal outcomes that are personally meaningful (Dik *et al.*, 2013).

One way to promote this through the workplace environment is to support personal identity expression. In offices where it is permitted, up to 90% of employees decorate their workspace with items and/or photographs with rich personal significance, particularly those which reflect personal relationships with family and friends (Wells and Thelen, 2002). This personalisation behaviour is a strong contributor of workplace wellbeing, particularly for women (Wells, 2000). Interview data has confirmed that the behaviour is at least partially motivated by the desire to give a sense of meaning to the workplace (Brunia and Hartjes-Gosselink, 2009). In this way, personalisation should be viewed as a form of environmental crafting in which employees surround themselves with visual cues serving as reminders of the personal meaningfulness of their (possibly mundane) work, with important implications for wellbeing.

Whilst activity-based working has been presented as a solution which might help to support the needs for comprehensibility and manageability, there is a risk that its implementation might inadvertently have a negative impact on meaningfulness, because personalisation is typically prohibited in these offices (to prevent employees from reserving workspaces which they are not using). Indeed, it has been demonstrated that employees in activity-based offices often rebel against such policies and persist with personalisation and other forms of territorial behaviour (Skogland, 2017), highlighting its central role in promoting wellbeing at work. It may be especially important for those employees who are more location-dependent, and unable to experience the benefits of switching between different workspaces (Hoendervanger *et al.*, 2016). As such, organisations making the transition to activity-based working should consider whether the proposed benefits outweigh the potential harm associated with restricting personalisation, and should also consider whether personal identity expression can be supported in any other ways.

Secondly, employers could also support meaningfulness through aspects of workplace design which remind employees of their sense of purpose within an organisation. The importance of creating a purpose-driven organisational culture is being increasingly recognised (Dik *et al.*, 2013), and whilst there are presently limited studies investigating the relationship between corporate branding strategy and employee wellbeing, it is certainly feasible that this could be a worthwhile area for practitioners to consider. Khanna and colleagues (2013) created a framework for aligning corporate branding and real estate strategies, involving the development of brand values, the clear identification of internal and external stakeholders, and the creation of an action plan to communicate these values to the stakeholders through corporate real estate strategies. Possibly, explicit integration of

organisational purpose into this strategy could help organisations to foster meaningfulness through corporate branding.

Discussion

In this narrative review, we responded to the call for a more enabling workplace paradigm (Haynes, 2007a) by elucidating a salutogenic approach to the workplace environment. First, we distinguished between the (pathogenic) demands which cause disease and the (salutogenic) resources which promote health, and provided evidence to show that the effectiveness of resource deployment is determined by the individual's SOC (Antonovsky, 1987). Next, we presented the ED-R model as a representation of the same distinction specifically within the context of the workplace environment, including an illustration of the dynamic relationship between the workplace environment and the employee.

Finally, we performed a narrative review in which we creatively re-interpreted the existing evidence base from salutogenic theory, focusing specifically on environmental resources which could strength the three components of the individual's SOC: comprehensibility, manageability, and meaningfulness. Although previous theorists have discussed a salutogenic approach to the workplace (Dilani, 2009; Ruohomäki *et al.*, 2015), this is the first attempt to specifically relate workplace interventions to the SOC. The non-exhaustive list of identified interventions is shown in Figure 3.

INSERT FIGURE 3 HERE

From a theoretical perspective, it will be necessary in future research to empirically test the conceptual frameworks used in our discussion. To our knowledge, the salutogenic approach has not been explicitly adopted in any previous workplace intervention studies, and so the various predictions that were made during the view remain to be empirically verified in future research. That is, it would be beneficial for researchers to explore whether specific interventions do help to strengthen comprehensibility, manageability, and/or meaningfulness, as expected, and confirm that this in turn leads to more positive health outcomes. Similarly, the prediction that increasing environmental resources will lead to improved job performance also remains to be empirically verified. Research in this area would help to determine the effectiveness of the ED-R model as a tool to guide workplace practice.

Additional research is also needed to support evidence-based practice in workplace optimisation. In particular, we believe further research is needed to guide the effective implementation of activity-based working, given its increasing popularity and potential for mitigating several of the environmental demands which tend to arise in traditional open-plan offices. Of crucial importance is how best to manage the trade-off between flexibility and territoriality in the workspace, given that the provision of increased flexibility is typically accompanied by restrictions on personalisation. If no benefit is perceived to activity-based working, employees often persist with discouraged territorial behaviours (Skogland, 2017). As such, it would be useful for researchers to consider strategies for supporting identity expression in non-territorial offices. For example, studies might test the use of digital photo frames so that personal photographs could be easily set up at each new workstation, and/or the personalisation of group areas rather than individual workspaces.

It would also be useful to give further consideration to the types of functional spaces that should be included in activity-based offices, and the relative proportion of the overall office that should be devoted to each. In addition to the common functional distinction between spaces for “communication” or “concentration”, an emerging trend is for offices to also include “restorative” spaces for employees to recover from stress (e.g., Morgan Lovell, 2019). In future research, it will be useful to explore how these environments should best be designed and managed, and how effective they are in promoting recovery from work stress. In particular, the demonstrated restorative and instorative benefits of nature (Beute and de Kort, 2014; Kaplan, 1995; Ulrich *et al.*, 1991) lead to the suggestion that biophilic design principles should be applied in such areas. For example, a recent study demonstrated that a workplace ‘micro-break’ was more effective in aiding recovery from work strain when employees had views of nature rather than urban views (Lee et al., 2018).

The results of these research efforts will have important implications for workplace practice, and provide a conceptual framework to guide effective workplace interventions. In particular, we believe the ED-R model serves as a useful guide for understanding the overall workplace environment as a composite of pathogenic demands and salutogenic resources, and understanding employees’ behaviours as being motivated by the reduction of demands and/or the increase in resources. By viewing the workplace environment in this manner, two overarching possibilities for workplace improvements become apparent. First, physical alterations can be made to the workplace aimed at reducing the presence of demands (e.g., increasing ventilation rate to improve air quality) and increasing the presence of resources (e.g., bringing plants into the indoor environment). Second, changes can be made to the ways in which the physical workplace is able to be used, to give employees the autonomy to craft a suitable environment on an ongoing basis (e.g., through the selection of different workspaces in activity-based offices).

Conclusion

In conclusion, we have argued that the minimisation of pathogenic aspects of the workplace environment is a necessary step in office improvements, but not sufficient to fully optimise the workplace. Equal consideration must be given to opportunities for promoting salutogenic resources in the workplace environment, as these can strengthen the individual’s SOC and help them to respond to stressors in a more positive and adaptive way, with beneficial health and wellbeing outcomes in the long term. The truly healthy office should not only be free of factors which cause disease, but should also be ordered and consistent (*comprehensible*), rich enough in resources to enable the employees to effectively deal with stressors (*manageable*), and a place where employees are able to recognise their sense of personal and/or organisational purpose (*meaningful*).

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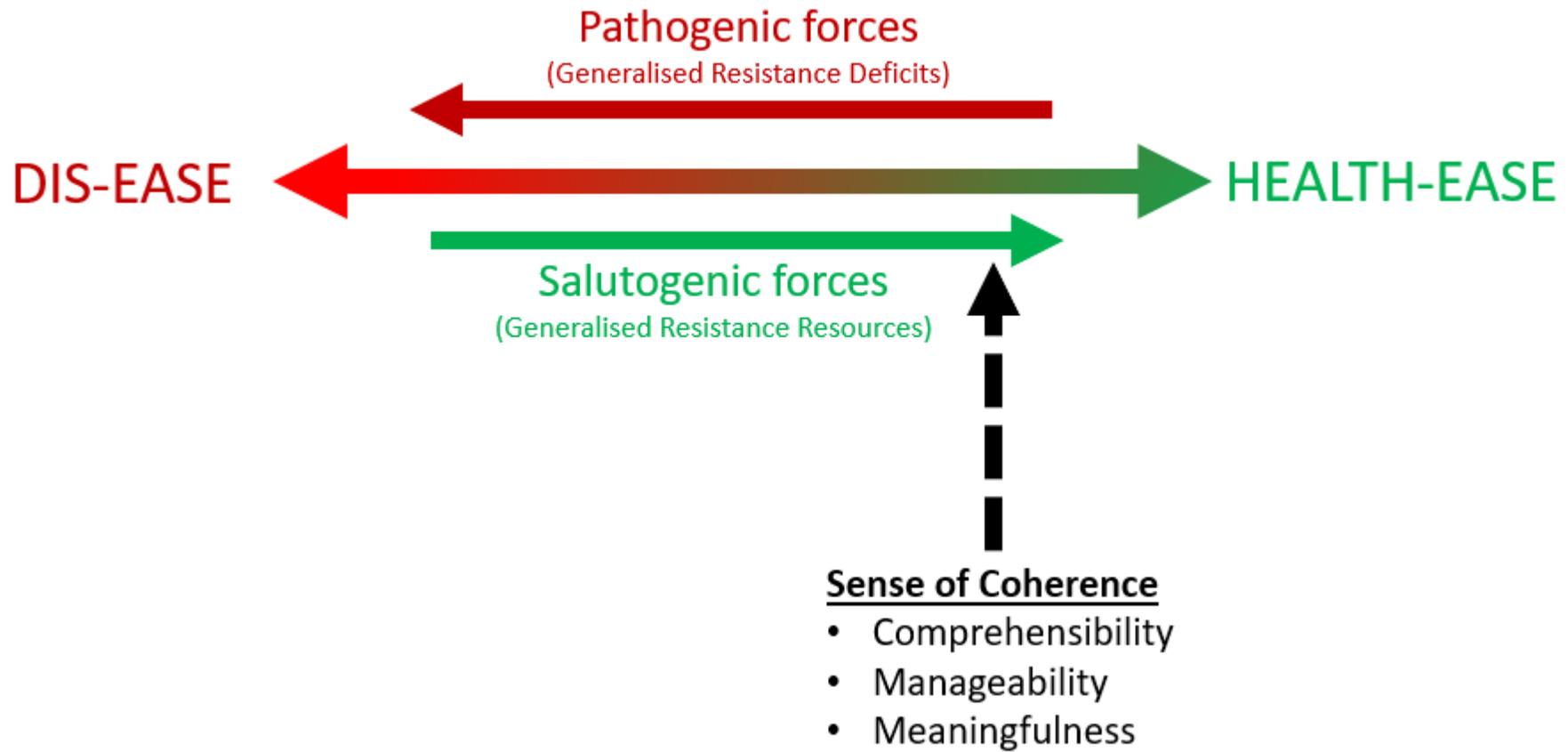


Figure 1: The dis-ease health-ease continuum

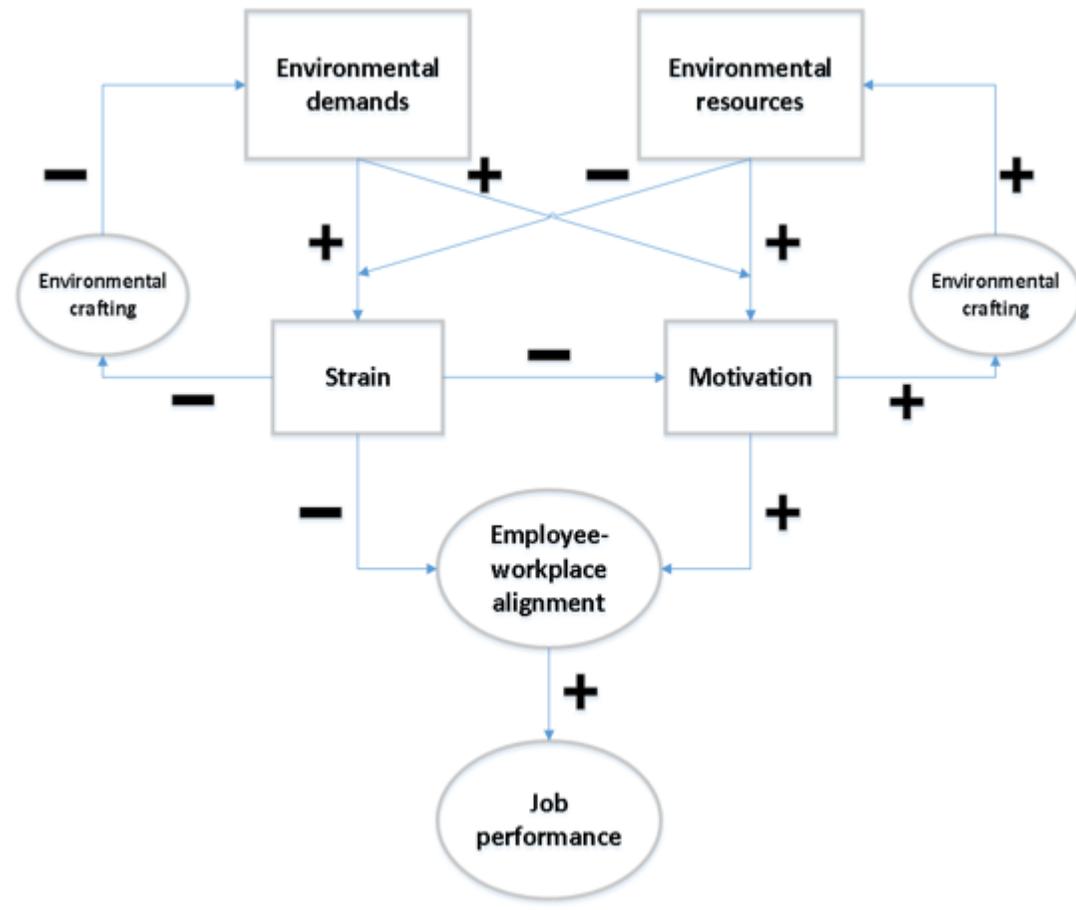


Figure 2: The Environmental Demands-Resources Model

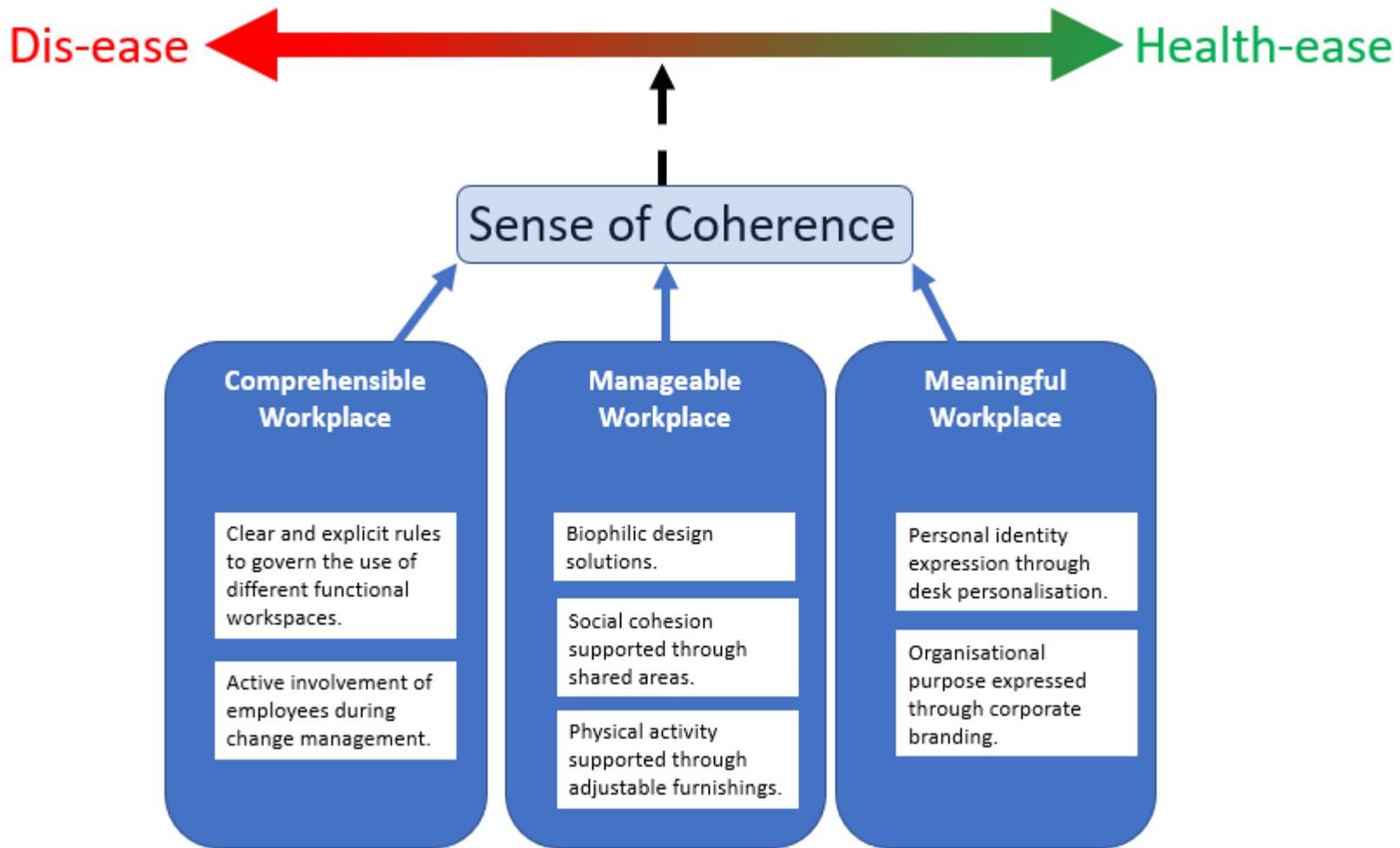


Figure 3: A non-exhaustive list of workplace interventions to support sense of coherence