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Workplace Design Contributions to Mental Health and Well-being

Jennifer A. Veitch[1]

National Research Council of Canada, Institute for Research in Construction

Abstract

People spend much of their waking time in their workplaces (~ 33% on a weekly basis), which raises the possibility that the conditions they experience there influence their health and well-being. The workplace design literature has given scant attention to mental health outcomes, instead focusing on healthy populations. Conversely, the mental health literature gives scant attention to the potential contribution of workplace design in preventing mental health problems nor on facilitating return to work. Taken together, however, the literature does suggest both lines of research and possible interventions. Existing knowledge suggests that workplace design can influence mental health via: light exposure effects on circadian regulation, social behaviour, and affect; aesthetic judgement effects on at-work mood and physical well being and at-home sleep quality; access to nature and recovery from stressful experiences; and, privacy regulation and stimulus control. This paper includes a short review of the in this area, proposals for new research directions, and consideration of the implications of this information on the design choices made by business owners, designers, and facility managers. Providing suitable working conditions for all employees would avoid stigmatizing employees who have mental health problems, while facilitating prevention and return to work among those who do.

Keywords: workplace design; light; privacy; distraction; mental health

Workplace Design Contributions to Mental Health and Well-being

Time-activity studies have revealed that people in industrialized countries spend close to 90% of their time indoors (Leech, Nelson, Burnett, Aaron, & Raizenne, 2002; Schweizer et al., 2007). People who are employed full-time outside the home spend approximately 33% of their waking hours at their workplaces. Thus, to the extent that the physical conditions at work affect one's physical or mental health, the exposures are both lengthy and frequent. If one's working conditions affect one adversely, the unwanted consequences, such as reduced capacity to work, increased error rates, or absences from work, will influence both the employee and the employer. Conversely, a well-designed workplace could be supportive, removing potential stressors and freeing individuals to focus on productive work.

Environmental psychologists have long studied work environments (Hedge, 2000; Sundstrom, 1987), although the research focus has tended to be more on offices than on other settings (Sundstrom, Bell, Busby, & Asmus, 1996), and almost universally on the effects of workplace design on healthy individuals. Common outcome measures have been job satisfaction, environmental satisfaction, job performance, and non-specific health outcomes such as Sick Building Syndrome symptoms (headache, fatigue, stuffy nose, musculo-skeletal problems). Mental health outcomes do not appear directly in this literature.

Conversely, the abundant literature concerning mental health issues in workplaces includes little consideration of the role of the physical environment as an influence on employees. A literature search identified a few articles in which workplace design was mentioned as a potential accommodation for a mental health issue (Ramsay, 2009; Woo & Postolache, 2008), but none that evaluated the success of such interventions.

In the absence of evidence to the contrary, a reasonable starting point for designing and operating workplaces that support mental health is to draw upon the evidence derived from studying healthy individuals. This review will focus on four processes through which there is some evidence that workplace conditions could benefit employees with certain mental health problems: social relations; attention focus; stress reduction; and photobiology. Each topic leads to suggestions for specific workplace designs. Mental health issues are diverse; therefore, design interventions that work for one condition might be inappropriate for another. In the absence of empirical evidence about specific effects, the design guidance provided here will necessarily be preliminary and general. The review will conclude with research recommendations to address this gap.

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Social Relations

Personal space is “the dynamic spatial component of interpersonal relations” (Gifford, 2007, p. 135). This concept encompasses dimensions of portable territoriality, inter-individual spacing, and communication — the space around oneself, one’s varying desires to be near other people, and the degree to which one wants to know and be known. Environmental psychologists study personal space through concepts such as territoriality, crowding, and privacy. Workplace design choices are fundamental to the occupants’ experience of personal space in that the layout and furnishings largely determine the physical boundaries between individuals, the spatial density of the workplace (the floor area per person), the social density (the number of people per room or area), and the degree of visual or acoustic privacy (Archea, 1977).

Territoriality can be considered the ability to monitor and to regulate the use of space (Evans, 2003). We commonly use spatial boundaries to define our territory, both individually and collectively. Work groups function best when they can create a shared identity that expresses their shared goals (Beal, Cohen, Burke, & McLendon, 2003; Latham, 2007). Architectural features contribute to the development of social cohesion in work groups, in part by defining the areas in which functional groups occur. Proximity facilitates social interaction (Fleming, Baum, & Singer, 1985); thus, group territories that include common areas can provide opportunities for unplanned social interactions between group members. Such social interaction, in turn, fosters social support, which buffers stress (Evans, 2003). Workplaces in which employees report good communication and strong social support are perceived as healthier, and this in turn predicts higher job satisfaction and morale and lower absenteeism and intent to turnover (Lowe, Schellenberg, & Shannon, 2003).

The benefits of establishing group territories have limits, in that if group size is too large then cohesion remains elusive. If the social density (expressed as the number of people per room or area) of the office is too large, individuals must manage more relationships and there are more potential intrusions. As social density increases, in general environmental satisfaction decreases (Duval, Charles, & Veitch, 2002) and physical discomfort increases (Aries, Veitch, & Newsham, 2010). The design community has adopted a social density of 10-15 people as their rule of thumb for team spaces , but there is no empirical evidence on which to base such guidance.

Social density and its cousin, spatial density (the floor area per person) are not synonymous with crowding, which is “a motivational state … directed toward the alleviation of perceived spatial restriction” (Stokols, 1972, p. 275). Increasing social density that leads to crowding, is a stressor. This stressor can cause behavioural aftereffects such as reduced frustration tolerance (Sherrod, 1974). Chronic exposure to uncontrollable environmental stressors can lead to learned helplessness, a motivational deficit with well-known connections to the affective and cognitive deficits of depression (Evans & Stecker, 2004).

Office environment research consistently reports a strong desire for privacy among employees (Brill, Margulis, Konar, & BOSTI, 1984; Veitch, Charles, Newsham, Marquardt, & Geerts, 2003). Privacy is largely a matter of controlling information flow: that is, one wants to regulate the degree to which others have information about oneself, and conversely the information one obtains about others (Archea, 1977). The ability to control environmental inputs is an important moderator of environmental stress (Evans & Stecker, 2004). When one has the ability to control one’s environment, the adverse effects of stressors are diminished.

Taken overall, the personal space literature identifies the important dimensions of workplace design that can foster (or diminish) strong social relations among co-workers: using architectural features to define group boundaries; limiting the size of work groups within the boundaries; providing adequate privacy mechanisms so that individuals can regulate social interactions. The literature does not provide specific prescriptive guidance as to the optimal design features to support good mental health outcomes. One study has identified a range of workstation sizes (area > 4.5 m^2) that will reduce the risk of environmental dissatisfaction (Newsham, Veitch, & Charles, 2008), but the authors did not reach a firm conclusion concerning optimal panel height for modular office furniture. Reasonable conclusions based on the literature would be to make workstation or office assignments that are mindful of the personal space needs of those with mental health problems, balancing the needs for social interaction, social support, territoriality and privacy. For example, an enclosed office at the end of a long corridor might not be the best location for an employee with depression; but neither would placing this individual beside a high-traffic area lacking in visual and acoustic privacy.

Attention Focus

Everyone experiences distraction from time to time, but for some individuals the ability to focus attention is a persistent problem. Researchers and clinicians now recognize that the persistence of attention-deficit/hyperactivity disorder (ADHD) from childhood to adulthood has adverse effects on workplace performance and career success (Goodman, 2007; Nadeau, 2005). In reviewing the literature for this paper, the only architectural design recommendation I could find in the mental health literature concerned office assignments for adults with ADHD: Ramsay (2009) recommended individual enclosed offices for people with ADHD, to enable them to screen potential distractions.

This is a reasonable recommendation, although not one that many organizations will be able to provide because of the ubiquitous use of open-plan office design. Where a fully enclosed office is not available, other design features aimed at increasing privacy would assist in reducing distractions: Increasing panel height to a minimum of 66 inches / 1.7 m, using carpet and sound-absorbing ceiling tiles, adding masking sound, and creating an office etiquette to promote quieter speech are all elements of providing good acoustical privacy in open-plan offices (Bradley, 2003). The person with ADHD would likely also benefit from being located away from high-traffic areas.

Work environment research consistently finds that people desire access to a view of outside through a window (Veitch, et al., 2003). This might be particularly beneficial for individuals with ADHD. Experimental investigations in healthy adults have shown that exposure to nature, both by walking in it and by viewing pictures, can improve performance on directed-attention tasks (Berman, Jonides, & Kaplan, 2008). Children who have opportunities to play in green surroundings show improvements in ADHD symptoms compared to those whose play occurs indoors or in built outdoor settings (Kuo & Taylor, 2004; Taylor, Kuo, & Sullivan, 2001). Interestingly, having a view of nature from the windows at home benefits the self-discipline of girls aged 7-12, but not boys (Taylor, Kuo, & Sullivan). There are no workplace studies of the effects of window access on adult ADHD, but as an interim recommendation it is not unreasonable to consider providing such access as part of providing workplace accommodations to improve attention focus.

Stress Reduction

Understanding the stressor — strain relationship is a major focus of occupational health psychology. Psychosocial stress is a known predictor of mental health problems (e.g., Godin, Kittel, Coppieters, & Siegrist, 2005).

Among the environmental features known to assist in recovery from stressful experiences is a window with a view. Ulrich (1984) demonstrated that hospitalized patients whose windows provided views of nature recovered more quickly from surgery and used less pain medication than those with a view of a brick wall. Exposure to nature, both directly (Morita et al., 2007) and through viewing images (Chang & Chen, 2005; Hartig, Mang, & Evans, 1991), leads to physiological and affective responses consistent with stress reduction.

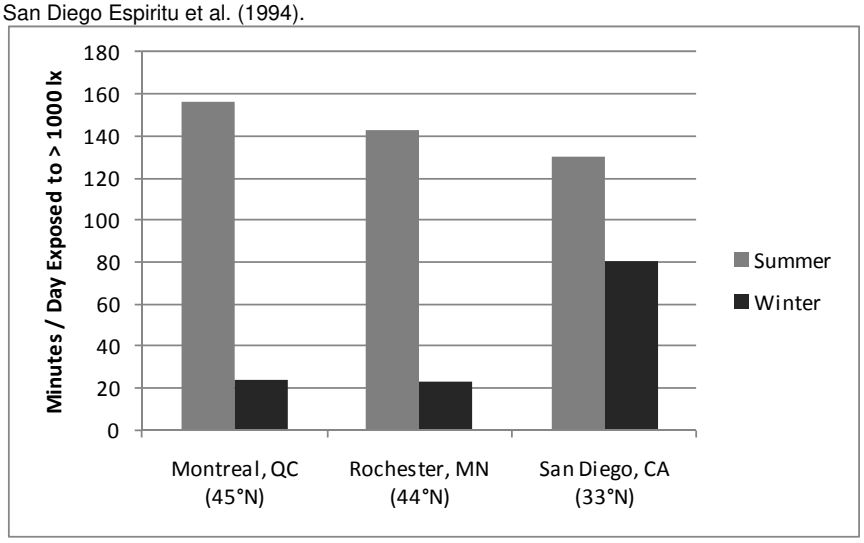
These effects might partly relate more to aesthetic judgements of the quality of the scene and surroundings, rather than to its content (natural versus built). Aries, Veitch, and Newsham (2010) found that people whose office views were more attractive, regardless of content, reported reduced discomfort at work and better sleep quality at home. Oddly, those with natural views reported increased discomfort at work, although there was an indirect pathway through which people in offices with views of nature reported more favourable office impressions, which in turn predicted lower discomfort. Clearly there is more to be understood about the relationships between view content and view quality and their effects on health and well-being.

Access to nature, or to a pleasant view, is most easily provided through window access. In many European countries, employers must by law provide window access within a prescribed distance from each desk or workstation (Danish Building and Housing Agency, 1995; Government of Norway, 1985). This is not the case in North America, with the consequence that many workplaces lack window access (Veitch, et al., 2003). Given the potential to buffer the adverse effects of work stress, those who are most vulnerable to stress-related health problems are good candidates for priority in receiving window access.

Photobiology

Estimates vary as to the prevalence of seasonal mood disorders, but there is little controversy concerning the potential for light therapy as an effective non-pharmacological treatment (Ravindran et al., 2009). Light therapy in that context involves the delivery of ~10,000 lx of white light (measured at the eye) for 30 minutes daily, usually in the early morning. This is a specific intervention for a diagnosed ailment, without a direct workplace application because of both the light intensity and timing. However, related research is revealing potential mental health benefits of increased light exposure for non-clinical populations (Commission Internationale de l'Eclairage (CIE), 2004).

Figure 1. Mean daily exposures to light levels over 1000 lx, by latitude and season. The measurements were taken from wrist-mounted devices following similar protocols. The data for Montreal are taken from Hebert et al. (1998); for Rochester, Cole et al. (1995); for San Diego Espiritu et al. (1994).



Light exposure monitoring has revealed that total daily light exposure among North Americans is low (Figure 1). One study combined the wearing of wrist monitors for light and activity levels with recurrent questionnaires about mental health status. Although the study was conducted in San Diego during a temperate and sunny period, the light level monitoring showed that people spent most of their time indoors (Espiritu et al., 1994). The median person spent 4% of each 24 hr in illumination greater than 1000 lx, and more than 50% of the time in illuminance levels from 0.1 to 100 lx (an additional 38.6% of the time was below 0.1 lx, consistent with sleeping, driving at night, etc.). The people with the shortest daily exposure time to high light levels reported the lowest mood, with a moderate correlation between atypical SAD mood symptoms and time in bright light ($r = -.27$). Other investigators have replicated the light exposure measurements in summer in Rochester, Minnesota (Cole et al., 1995) and Montreal, Quebec (Hébert, Dumont, & Paquet, 1998). Winter season high light exposures are considerably shorter even in San Diego, but are much shorter at more northerly latitudes. These findings, among others, led an international committee to conclude that the daily light dose received by people in industrialized societies might be too low for good mental health (Commission Internationale de l'Eclairage (CIE), 2004). The same report concluded that there is insufficient evidence to set a recommended daily dose at this time. This is an active area of research, but international consensus recommendations take many years to develop.

Researchers are beginning to understand the effects of bright light from a physiological perspective, and to understand the consequences for social behaviour. Among people with showing mildly seasonal mood shifts, bright light exposure increased tryptophan uptake (aan het Rot, Benkelfat, Boivin, & Young, 2007); tryptophan is a precursor of serotonin, a neurotransmitter implicated in affective pathways. This effect might explain the observation that hospitalized patients with depression had shorter hospital stays if they had been assigned to rooms receiving more sunshine than to rooms with no direct sunlight (Beauchemin & Hays, 1996).

The current evidence is not sufficient for specific recommendations about the quantity, timing, or spectral properties of the necessary daily light dose. Nonetheless, it seems reasonable to recommend that employees have an opportunity to obtain bright light exposure each day, particularly if they have a history of seasonal mood disorders. People with this history show persistent preferences for higher light levels across all seasons (Heerwagen, 1990), and evidence from lighting quality research with healthy workers shows affective benefits to working under one's preferred light levels (Newsham & Veitch, 2001; Newsham, Veitch, Arsenault, & Duval, 2004). Benefits to co-workers and employers could include more

congenial social relations, as social interactions of mildly seasonal individuals following bright light exposure (>1000 lx) can be less quarrelsome and more co-operative than those following periods in low light levels (aan het Rot, Moskowitz, & Young, 2008). The light exposure might be provided through access to direct sunlight through a nearby window, or through time spent outdoors on breaks or lunch (Wirz-Justice et al., 1996). Merely adding a task light at the desk is unlikely to increase local light levels sufficiently to trigger this response. Any attempt at increasing light exposure at work must also avoid compromising task visibility and causing discomfort; recommendations for lighting design in workplaces are available (Illuminating Engineering Society of North America (IESNA), 2004; NRC Institute for Research in Construction).

Research Directions

There appear to be no studies of the effect of workplace design on mental health outcomes, nor are there evaluations of the success of office design accommodations in facilitating workplace success for individuals with mental health diagnoses. Recommendations made here are logical inferences from the literature, but they lack the imprimatur of peer-reviewed examinations of these precise research questions.

More generally, the literature reviewed here raises questions applicable to workplace design for any employee. A preliminary list of research topics that flow from the literature cited here would include:

- What is the appropriate size of a work group to facilitate close ties between co-workers?
- Do people with mental health problems benefit from being attached to smaller work groups than others?
- What elements in the design and layout of work space most effectively promote group cohesion and social support?
- What designs most effectively balance the development of social connections against the need for distraction-free privacy?
- Does access to nature aid the attention focus of adults with ADHD? Is this access necessarily direct, or does viewing nature also confer benefits? Are there sex differences in these effects?
- What is the necessary light dose for optimal well-being: how much light, at what time of day, with what spectral properties, and for how long?

Research programmes addressing these questions need to include a mixture of laboratory and field investigations, and appropriate combinations of outcome measures: physiological, affective, cognitive and behavioural. Field investigations, particularly evaluations of design interventions, would ideally include prospective longitudinal studies assessing both symptoms and work performance measures. Such investigations would address not only the direct effects of the workplace on mental health outcomes, but would contribute to the development of strategies and inventions for effective job and career performance.

Concluding Remarks

By definition, good working conditions enable employees to work effectively. Investments in the physical workplace that create those conditions pay back quickly; salaries and benefits are ~80% of the cost of operating a building during its lifetime, whereas construction, furnishings, maintenance and operation total ~10% (Brill, Weidemann, & Associates, 2001). Designing the workplace according to the empirical literature on workplace design (e.g., Aronoff & Kaplan, 1995; Bauer et al., 2003; Becker & Steele, 1995) will benefit all employees, not only those with mental health problems. Using this design sensibility to tailor the workplace design to individual needs of all kinds will have an added benefit for individuals and society, in that stigma will disappear. No one is stigmatized when everyone's individual needs are, so far as possible, taken into account in the design, assignment, and operation of the workplace.

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