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Original Article

Evolution in the Office: How Evolutionary Psychology Can Increase Employee Health, Happiness, and Productivity

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Abstract: We review the empirical literature that has implemented aspects of our ancestral environment into the workplace and discuss the positive influence these factors have had on employees' physical and psychological health. We focus upon several components of our ancestral environment, including sunlight, greenery, sleep, physical movement, and social interaction with fellow humans as well as animals (specifically, dogs). Employers who are willing to adopt an evolutionary psychological approach to organizing their workplaces may drastically improve their workers' overall physical and psychological health as well as their overall productivity. This will, in turn, decrease employer costs related to medical care, absenteeism, and lack of productivity. Suggestions regarding how to implement these evolutionary psychological methods to the workplace are also discussed.

Keywords: applied evolutionary psychology, sunlight, greenery, workplace, employee productivity, mismatch hypothesis

Introduction

Our ancestors thrived in savannah-style environments and, as a result, certain traits that aided survival in those environments were positively selected and are seen in modern humans. Today's environment, however, is very different from our ancestral past. Instead of the savannah, we now have concrete buildings and roads. This has produced a mismatch between our adaptive traits and today's environment – which can be detrimental to human health and well-being. For instance, food was not always a plentiful resource as it is for most humans of today, thus hunter-gatherers were not guaranteed to eat every day. Because of this, hunger for calorically rich foods that were high in protein and fat was positively selected (Eaton et al., 2002). We still see these food preferences today, but now the environment has changed. Although we still crave calorically rich foods, most humans can

acquire food multiple times a day, and acquiring food is not as active of a process as it was for our ancestors (i.e., hunting and gathering). Thus we see increasing rates of obesity and weight-related disorders such as diabetes and heart disease (Cordain et al., 2005) because today's environment is not matched with our evolutionarily adapted behaviors.

This phenomenon, known as the mismatch hypothesis (Eaton et al., 2002), may also account for decreasing employee health, well-being, and productivity in the workplace. Many workplace environments provide a mismatch with our evolutionary past (Nicholson, 2000), but research has found positive physical and psychological outcomes for employees when factors from our evolutionary past are incorporated into the workplace. In fact, some have argued that our ancestors' evolution in the savannah may have also produced biophilia – an appreciation and longing for our natural environment (Wilson, 1984; see also Hinds and Sparks, 2011). Implementing facets of our natural environment, such as sunlight (Holick, 2004) and greenery (Dingle, Tapsell, and Hu, 2000), can exude specific psychological benefits in the workplace. Other factors that may be related to our ancestral past such as social interactions (Repetti, 1993) and physical movement (Lechner, deVries, Adriaansen and Drabbels, 1997) also produce beneficial effects for employees.

While these environmental elements are largely controllable in individual homes and personal spaces, people typically have little or no control over this in the workplace. Furthermore, the physical design of modern office spaces is developed and engineered primarily by architects, interior designers, and facility managers, rather than psychologists (Stegmeier, 2008). Therefore, we have provided a four-part framework for redesigning the modern workplace based on evolutionary psychological principles and empirical research: 1) Our ancestral environment has shaped us to be most healthy, content, and efficient when specific conditions are met – such as the presentation of sunlight and greenery, as well as the availability of social interaction, exercise, and sleep. 2) Many workplace settings do not provide these conditions. 3) Research has provided empirically tested ways that these conditions could be met in modern workplaces. 4) If employers are willing to adopt an evolutionary psychological approach to organizing their workplaces, they may drastically improve their workers' physical and psychological health as well as their productivity.

Sunlight

The importance of sunlight has been well documented throughout several years of research (Holick, 2004; Ne'Eman, 1974). The human body produces Vitamin D – a vitamin that is essential to human life (Beadle, 1977) – via the absorption of UVB rays from natural sunlight (Holick, 2004). Vitamin D has been shown to elevate mood and decrease depression (Lansdowne and Provost, 1998), as well as help prevent many forms of cancer, Type I Diabetes, heart disease, and osteoporosis (Holick, 2004). Although Vitamin D can be ingested orally through certain foods (e.g., certain fish, milk) and nutritional supplements, it is not usually sufficient if sunlight is limited (Glerup et al., 2000).

Many individuals spend most of their days indoors at work with limited exposure to sunlight. Also, organizations have begun to rely almost solely on thermal comfort in buildings (Ne'Eman, 1974). Recent work has also noted that the popular full-spectrum fluorescent lighting – argued to help mimic sunlight and increase mood, health, and

cognition in employees who work under these bulbs – does not have any positive effects similar to that of natural sunlight (Vietsch and McColl, 2001).

Employees strongly desire to have windows in their offices (Nagy, Yasunaga, and Kose, 1995), and the presence of windows has been found to decrease employee discomfort (Aries, Veitch, and Newsham, 2010). Sunlight penetration into office workplaces also increases feelings of relaxation in those who are sitting in the sunlight (Boubekri, Hull, and Boyer, 1991). Sunlight exposure through workplace windows has been found to be positively correlated with worker job satisfaction and their general well-being on the job, as well as negatively correlated with their intentions to quit (Leather, Pyrgas, Beal, and Lawrence, 1998).

Exposure to Greenery

Recent work using fMRI technology has found a link between increased amygdala activity and urban living (Lederbogen et al., 2011). When compared to participants from rural environments, participants who currently lived in a city exhibited greater activation of the amygdala – an area of the brain associated with anger, aggressive behavior, and perceiving environmental threat – when experiencing social stress. Participants who grew up in an urban environment (but moved away by age 15) exhibited greater activation of the perigenual anterior cingulate cortex – an area of the brain associated with processing and regulating chronic social stressors. The authors conclude that living in urban areas is associated with increased neural stress responses and may help explain why certain psychological disorders, such as schizophrenia, are more prevalent among urban dwellers (Pedersen and Mortensen, 2001).

Utilizing images of greenery – including woods, potted plants and some frames which depict natural scenery – may be able to combat the stress experienced from urban settings as it has been found to produce many physical and psychological benefits. It increases one's ability to concentrate and maintain attention (Berto, 2005), as well as decreases diastolic blood pressure, stress, and anxiety (Hartig, Evans, Jamner, Davis, and Gärling, 2003; Kaplan, 1995). Jogging through parks has been shown to decrease depression and anxiety to a greater degree than jogging through urban environments (Bodin and Hartig, 2003). Walking through parks also improves cognitive functioning in the form of directed attention (Berman et al., 2008). In addition, viewing images of natural settings and sitting in a room with indoor plants increases prosocial behaviors (Weinstein, Przybylski, and Ryan, 2009).

Current workplaces are designed to focus on efficiency rather than psychological welfare (Bain and Taylor, 2000; Handy, 1990). However, with a growing body of literature showing the relationship between the image of the workplace and employees' psychological well-being, some organizations are implementing natural images such as potted plants and images of outdoor settings into the workplace – with beneficial physical and psychological effects (Bringslimark, Hartig, and Patil, 2007). Natural images can also be implemented by providing a rotating set of images on computer desktop backgrounds.

People seek wilderness areas and urban parks for scenery and contact with nature (Hartig et al., 2003). Those unable to spend time outdoors often fill their indoor

environments with symbols related to nature (e.g., plants, photos of nature; Weinstein et al., 2009). Plants in the workplace increase employee well-being, psychological comfort, job satisfaction, physical health and comfort, creativity, and productivity (Knight and Haslam, 2010; Smith and Pitt, 2009).

There are also direct chemical benefits that improve quality of life and psychological benefits that promote relaxation. Plants improve air quality by filtering the air, reducing indoor air pollution from chemicals such as carbon dioxide, formaldehyde, and ammonia – indicating that the presence of indoor plants are beneficial for one's physical health (Dingle et al., 2000), and crucial in preventing Sick Building Syndrome – an illness that is characterized by the following symptoms: headaches, eye irritation, sore throat, exhaustion, lack of concentration, nausea, dizziness, and chest pains (Finnegan, Pickering, and Burge, 1984). Sick Building Syndrome is caused by lack of ventilation in the workplace, which leads to a large concentration of contaminants in the air, such as dust and other microorganisms (Stolwijk, 1991).

Sleeping

The demands of a strict work schedule often infringe upon regular sleep, though there have also been numerous psychological benefits linked to sleep, including insight formation, novel-language perception, visual discrimination, and motor skills (Ellenbogen, 2005). Poor quality of sleep is also associated with an increased risk of injury at work (Melamed and Oksenberg, 2002), depression (Buela-Casal, Miró, Iañez, and Catena, 2007), and poor quality of life (Ancoli-Israel and Roth, 1999). In fact, working overtime has been related to physical and psychological complaints (Nishikitani, Nakao, Karita, Nomura, and Yano, 2005; Sokejima and Kagamimori, 1998), and night shift workers have higher accident and injury rates than any other type of shift worker (Dinges, 1995).

The effects of missing sleep can adversely affect one's reaction time, judgment, short-term memory, motivation, and physical state. Napping, however, alleviates sleepiness while improving logical reasoning, alertness, and reaction time even after nights of restricted sleep (Brooks and Lack, 2006; Milner and Cote, 2009). Napping is more beneficial to performance in motor tasks and verbal learning than caffeine, which is the usual way many individuals deal with afternoon sleepiness (Mednick, Cai, Kanady, and Drummond, 2008). Napping can increase the amount of tasks completed during the day and strengthen information processing.

Afternoon sleepiness is common across the lifespan and different cultures. This phenomenon occurs regardless of food intake or quality of sleep the night before, which indicates that sleepiness is most likely due to the circadian rhythm. A recent study by the National Sleep Foundation (2008) found that approximately 48% of respondents had napped at least twice in the last month. However, when looking at workplace behavior, only 10% of respondents said they took naps at work. About one-third of employers allow their employees to nap at work, but only 16% of employers actually provide a place for napping to occur. These numbers show that while napping is potentially beneficial to the workplace, it is not regularly occurring.

Exercise and Physical Activity

Research has established that the cardiovascular, respiratory, musculoskeletal, endocrine, and immune systems are all positively impacted by exercise (Bouchard, Shephard, and Stephens, 1994; Wilmore and Costill, 1994). This is mostly attributed to the fact that exercise increases cardiac outputs, blood flow, oxygen uptake, energy levels, metabolic rate, and hormone levels while decreasing blood pressure, cholesterol, and blood glucose levels (Bouchard et al., 1994; Fletcher et al., 1996; Wilmore and Costill, 1994).

There has been a growing amount of research on the positive effects of physical exercise interventions (e.g., adding corporate gyms, free time for gym activity, etc.). In fact, physical interventions have resulted in lowering participants' body mass, blood pressure, cholesterol, and have often eliminated employee's smoking status (Shephard, 1996). In these cases, the organization theoretically will also benefit from these interventions as some studies show a strong negative correlation between the overall health of employees and their rates of absenteeism (Lechner et al., 1997; Tucker, Aldana, and Friedman, 1990). Employees' overall health is also linked to a reduction in medical care claims, increased productivity, and overall job performance (Bernacki and Baun, 1984; Cox, Shephard, and Corey, 1981).

Sedentary lifestyles are strongly correlated with obesity (Levine, Schleusner, and Jensen, 2000; Levine et al., 2005; Levine et al., 2011). Substituting sedentary actions with regular everyday movements (e.g., standing up instead of sitting down) can help combat obesity by increasing the amount of energy expended in a day – this is known as non-exercise activity thermogenesis (NEAT; Levine et al., 2000; Levine et al., 2005; Levine et al., 2011). Research into the NEAT phenomenon has found that actions such as fidgeting and standing are both positively correlated with weight loss (Levine et al., 2000; Levine et al., 2005). In fact, one study found that obese individuals tend to sit down about two hours more than lean/healthy individuals, and eliminating these extra two hours of sitting may burn an extra 350 calories per day (Levine et al., 2005).

People who live in urban areas walk less than people who live in rural areas (Levine et al., 2011). The same study found that obese urban Americans sat about four hours longer than rural Jamaicans (who did not suffer an obesity problem) – indicating that walking is another form of NEAT that could be used to combat obesity in urban areas. Thus, we see that certain practical interventions in the workplace could be implemented to increase NEAT, including high-top desks allowing for people to stand instead of sit while working as well as increased walking distances to bathrooms, cafeterias, and parking lots. Integrating a single 10-minute exercise break during work time can help provide motivation and adoption of a more active lifestyle for many of the otherwise sedentary individuals who participated (Yancey et al., 2004). This also helped the individuals to better understand a self-actualized and realistic perception of their own health and fitness levels (Yancey et al., 2004).

Social Interaction

Workplaces vary in levels of social interaction, and the type and amount of social

interaction are likely to influence worker well-being. Repetti (1993) suggests that stress associated with the workplace social environment is a factor in physical and mental health problems. Poor social relationships at work have been associated with several negative physical symptoms in white collar workers (Kawakami, Araki, Hayashi, and Masumoto, 1989), including aggression – which is a tremendous cost to employers via means such as health insurance coverage, lost work time, and legal expenses (e.g., Kaptein, 1999).

Informal social relationships in the workplace have both direct and moderating effects on reducing depression (Chen, Siu, Lu, Cooper, and Philips, 2009). Other studies have also shown the relationship between social support and positive psychological outcomes, such as providing a protective buffer from stress (Cohen and Wills, 1985) and aiding in the prevention of burnout (Anderson, 1991).

Social interaction is not only limited to verbal exchange among humans. Researchers are finding that people who bring their pets to work report less stress and greater physical and psychological health (Wells and Perrine, 2001). These benefits have also been found at the biological level. Specifically, people exhibit higher levels of oxytocin (the neuropeptide responsible for feelings of bonding, social interaction, and stress relief) after interacting with their own dog (Miller et al., 2009).

The domestication of dogs began approximately 15,000 years ago (Villa et al., 1997), which may have led to the development of bonding behaviors between humans and canines. However, these benefits also generalize to the workplace as well. New data has revealed that the presence of a dog – any dog, not just one's own dog – facilitates group cohesion, cooperation, intimacy, and interpersonal trust among participants working on a group task together (Christensen, Honts, and Colarelli, 2012). Thus, bringing one's dog to work could have added benefits on overall worker efficiency.

The Evolutionary Workspace

From reviewing these studies, we propose the evolutionary workspace as a means of creating a supportive environment for employees that will also increase employer profits (or, at the very least, decrease employer costs). The evolutionary workspace should have many windows that employees can regularly open so that they may receive sunlight exposure, as well as several different types of plants and small potted trees, as well as artwork of open savannahs and other greenery. This will decrease stress while also improving mood and feelings of relaxation, job performance, attention, and cooperation.

Providing a place for employees to take naps will also increase employee attention and performance while decreasing the likelihood of onsite accidents – which will aid in keeping down the medical and insurance costs of the employer. Providing methods to increase physical activity will also help keep employees physically and psychologically healthy (decreasing costs to employers by decreasing workers' absenteeism and hospital/doctor visits). These new methods can include the use of high-top desks that will require employees to stand instead of sitting while working. Increasing the distances to bathrooms, cafeterias, and parking lots will also increase the amount of exercise employees get. If these additions are unfeasible, employers can integrate a single 10-minute exercise break during work.

Finally, increasing human and animal social interaction in the workplace may help decrease stress and anxiety among employees. If people can talk to each other, they can develop cooperative relationships which may facilitate greater group mentality and worker efficiency in the future. Allowing employees to bring their dogs to work will increase many cooperative and productive behaviors as well. Leading companies such as Google and Amazon have been allowing their employees to do this for years.

Future Directions

Although the present review displayed many factors from our ancestral past that, if implemented in the workplace, may increase worker health and efficiency, the studies cited did not examine all of these factors together in one environment. In fact, no studies or companies to date have evaluated whether implementing the collection of these factors will actually have these positive effects. A large scale study comparing the evolutionary workplace with modern workplaces in areas pertaining to employee health, psychological well-being, and productivity would provide definitive evidence regarding the effects of implementing all of the factors discussed in this review.

There are also many other potential influences from our evolutionary past that may improve employee productivity which warrant further research. For instance, occupational noise exposure has been associated with job stress (Leather, Beale, and Sullivan, 2003) and increased cortisol levels (Spreng, 2000) – a hormone associated with stress responses and decreased psychological and physical health (Lindfors and Lundberg, 2002; Wrosch, Miller, Lupien, and Pruessner, 2008). Yet, implementing sounds from nature that may have been prevalent in our ancestral environment aids in recovery from psychological stress (Alvarsson, Wiens, and Nilsson, 2010). Future studies could attempt to implement sounds from natural environments, or current hunter-gatherer tribal environments (the closest living examples of our hunter-gatherer ancestors) to examine if these sounds decrease employee stress and/or increase worker productivity.

An optimal workplace temperature has also been proposed as a means of increasing employee comfort and productivity (Kosonen and Tan, 2004). Offices with temperatures between 21 – 23 degrees Celsius (69-73 degrees Fahrenheit) receive the fewest number of worker complaints related to thermal sensation (Federspiel, 2000). Using heating/cooling mechanisms, proper ventilation, and giving employees the ability to wear comfortable layers of clothing so that they may adjust to any fluctuating temperatures by adding or removing articles may aid in thermoregulation and increase worker productivity (Nichol and Humphreys, 2002). Psychological research in this area is still needed. These factors could be utilized as independent variables to investigate this potential causal relationship that varying levels of room temperature, ventilation, and workplace attire may have with employee productivity.

Worker health, happiness, and efficiency may also be linked to individual life history as well. Life history theory states that impulsivity is highly correlated with an environment's perceived danger and unpredictability (Kaplan and Gangestad, 2005). When an environment's future is uncertain, people tend to engage in behaviors that produce short-term benefits over delaying gratification for a greater payoff in the future (Ellis, Figueredo,

Brumbach, and Schlomer, 2009). Thus, emphasizing the stability of an environment should lead people to believe they will live to see the future of that environment, which should motivate them to care about that future (Griskevicius, Cantu, and Van Vugt, 2012). Creating a stable and predictable work environment would help employees believe that they will remain in that workplace and/or company throughout the future, which would produce a greater motivation to increase the future quality of that company. Implementing a policy to increase employees' perceived job security, as opposed to motivating employees through fear of losing their jobs, may encourage workers to maintain or improve their efficiency, thus increasing the overall quality of the workplace and helping to sustain a pleasant working environment for their future in the process.

Conclusion

Immersing employees in a workplace setting that resembles our own savannah-style ancestral environment may decrease this evolutionary mismatch and increase employee productivity, health, and overall efficiency. This would provide great benefits to both *employees*, in the form of job satisfaction, job performance, and overall physical and psychological health, and *employers*, in the form of greater worker efficiency and decreased costs of employee healthcare and absenteeism, thus increasing company profits and productivity. Because employees have little control over their workplace environment, employers may want to consider adopting the evolutionary workspace as a means of not only increasing employee physical and psychological health, but as a means of improving the overall fiscal and social quality of their companies.

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