DISSERTATION

ENGAGING WITH NATURE AND WORK: ASSOCIATIONS AMONG THE OUTDOOR ENVIRONMENT AND EMPLOYEE OUTCOMES

Submitted by

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ABSTRACT

ENGAGING WITH NATURE AND WORK: ASSOCIATIONS AMONG THE OUTDOOR ENVIRONMENT AND EMPLOYEE OUTCOMES

There is substantial evidence that contact with nature is related to positive health and well-being outcomes, but extensions of this research to work-related outcomes is sparse. Some organizations are redesigning workspaces to incorporate nature and adopting nature-related policies, warranting a need for empirical studies that test the influence of nature on employee outcomes. The present mixed-methods study tests and extends the biophilic work design model (Klotz & Bolino, 2020) to examine how the type of outdoor environment (i.e., urbanity and natural amenities) and experiences of time spent outside (i.e., amount of time outside, enjoyment of time outside, outdoor activities), influence employee engagement and creativity. Participants included Amazon's Mechanical Turk workers and working students (N = 803). There were significant indirect effects of natural amenities where employees work on emotional engagement through spending more time outside at work. Similarly, there were indirect effects of natural amenities where employees live on emotional engagement and creativity, through spending more time outside during nonwork time. Additionally, there were indirect effects of natural amenities where employees live on emotional engagement, cognitive engagement, physical engagement, and creativity, through greater enjoyment of nonwork time spent outside. Different types of outdoor activities were identified in the qualitative analyses, which were correlated with the type of outdoor environment where employees work and live, the amount and enjoyment of time

spent outside, as well as work-related outcomes. This study has implications ranging from employee time use and organizational effectiveness to policy change and urban planning.

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Introduction

A large and growing body of research has shown that spending time outside in nature has a positive influence on human health, well-being, and functioning (Bowler et al., 2010; Hansen et al., 2017; Hartig et al., 2014; Kaplan & Berman, 2010; Li et al., 2007; MacKerron & Mourato, 2013; McMahan & Estes, 2015; Park et al., 2010; Twohig-Bennett & Jones, 2018). This has led some researchers to pose the following: "imagine a therapy that had no known side effects, was readily available, and could improve your cognitive functioning at zero cost. Such a therapy has been known to philosophers, writers, and laypeople alike: interacting with nature" (Berman et al., 2008; p. 1207). Despite this, American adults spend 92% percent of their time indoors (Klepeis et al., 2001), and a quarter of adults report spending less than two hours outside in nature in a typical week (Kellert et al., 2017). The rapid growth of cities and increased use of technology are potentially compounding these issues.

As of 2018, 82% of North Americans were living in an urban area, and projections estimate that an additional 2.5 billion people globally will be urban residents by 2050 (United Nations, 2019). Disconnection from nature may also be perpetuated by technological advancements – individuals spend over three hours per day on their cell phone (MacKay, 2019), and watching television was the most common leisure activity engaged in by Americans in 2019 (Bureau of Labor Statistics, 2020). Relatedly, the majority of adults believe that having a greater interest in technology prevents them from spending time outside (Kellert et al., 2017). These factors have led to the coining of the term "nature deficit disorder", which is not a clinically diagnosable disorder, but a way to illustrate how the scarcity of time spent outside has harmful consequences for individuals' physical health, emotional well-being, and ability to contribute to

society (Louv, 2005). Consequently, researchers, traditional and alternative health professionals, and policy-makers alike have recognized the importance of time spent outside in natural environments.

Unsurprisingly, organizations are also responding to these developments and incorporating nature into the physical design of the work environment and in employee wellness policies and programs. For example, a number of large and well-known companies, including Apple, Facebook, Amazon, and Walmart, have redesigned their headquarters and physical workplaces to incorporate more natural features, such as nearby meadows, lakes, trails, rooftop gardens, and indoor plants (e.g., Klotz & Bolino, 2020; Kwun, 2018; Mafi, 2017; Sears, 2016; Wilson, 2019). Other companies have nature-related policies – Patagonia has a "Let My People Go Surfing" policy, in which employees are encouraged to go outside during the workday (Chouinard, 2006). Recreational Equipment, Inc. (REI) employees get two paid "Yay Days" a year, where they are expected to spend time outdoors and reconnect with nature (REI, n.d.). Thus, it seems that organizational leaders are inferring that the wide-ranging benefits of nature will also translate to employee and organizational effectiveness. However, few studies to date have examined links between nature and work-related outcomes. Given that research is lagging behind practice in this area, scientific studies that evaluate nature in relation to employee work outcomes are warranted.

Despite the theoretical and empirical groundwork suggesting that nature's benefits should extend to work-related outcomes (e.g., Kaplan, 1993; Klotz & Bolino, 2020), research in this area is limited. Engagement and creativity at work are two particularly important work-related outcomes, as both are positively associated with employee job performance and provide a competitive advantage to organizations (e.g., Brown, 2016; Christian et al., 2011; Madsen, 2017;

Rich et al., 2010; Zhou & Hoever, 2014; Zhou & Shalley, 2008). Indeed, fostering engagement and creativity at work is critical for retaining high-performing employees (Leonard, 2008), leading business executives to prioritize employee engagement and creativity as strategies to achieve success (Society for Human Resource Management; SHRM, 2007; SHRM, n.d.). Consequently, many well-known and profitable companies are recognized for having employees who are highly engaged (e.g., Southwest Airlines, Ben & Jerry's, Google) and creative (e.g., Apple, Amazon, Microsoft; Ang, 2020; Chitre & Buss, 2013; Phelps, 2019). Additionally, the modern workforce has been characterized by a shift from a skill-based to a knowledge-based economy, reduced loyalty to employers, and heightened value placed on meaning and purpose in one's work, highlighting the importance of building an engaged and creative workforce (e.g., Cascio, 2010; Schein, 2015; Society for Industrial and Organizational Psychology, 2020). Further, some have argued that employee creativity is especially critical for developing strategies to rebuild and sustain companies' performance following the COVID-19 outbreak (e.g., Am et al., 2020; Beckett, 2020; Hurt & Dye, 2020).

Engaged employees exert emotional, cognitive, and physical energy into their job and creative employees generate original and useful ideas (e.g., Mumford & Todd, 2020; Rich et al., 2010). Although experiences of both engagement and creativity are related to employee well-being (Dolan & Metcalfe, 2012; Halbesleben, 2010; Mumford & Todd, 2020), engagement and creativity are conceptually distinct from the more commonly studied health, stress reduction, and well-being outcomes in the environmental psychology literature. Instead, engagement and creativity are motivational work-related constructs that rely on having available emotional, cognitive, and physical energy (e.g., Amabile et al., 2005; Atwater & Carmeli, 2009; Rich et al., 2010; Kahn, 1990; Zhou & Shalley, 2011); resources that are afforded by contact with nature and

the outdoor environment (e.g., Bowler et al., 2010; Hartig et al., 2015; Kaplan & Berman, 2010; Klotz & Bolino, 2020; McMahan & Estes, 2015; Park et al., 2010; Ryan et al., 2010). Thus, the benefits of nature may transcend health and well-being and have a positive influence on work outcomes of engagement and creativity.

To explore this, I tested whether the type of outdoor environment where individuals work and live impacts their experience of being outside and subsequent work-related outcomes. The *outdoor environment* is defined as a setting outside the confines of a building and is therefore the opposite of being indoors. In the present study, the outdoor environment is conceptualized in terms of the surrounding urbanity and natural amenities. *Urbanity* reflects the population size and density of an area. *Natural amenities* are geographic and weather-related characteristics typically considered as desirable, including moderate temperatures, low humidity, topographic variation (e.g., mountains), and bodies of water (McGranahan, 1999). Drawing from Klotz and Bolino's (2020) biophilic work design model, which identifies how nature restores emotional, cognitive, and physical energies, the present study provides insight about how the type of outdoor environment (i.e., urbanity and natural amenities) where employees work and live, and the experience of time spent outside (i.e., the amount of time spent outside, enjoyment of time spent outside, and outdoor activities engaged in) are linked to work-related outcomes that are driven by human energies (i.e., engagement and creativity).

Additionally, I used a concurrent mixed-methods approach, in which quantitative and qualitative data that were collected at the same time were each used in the interpretation of the results (Pluye & Nha Hong, 2014; Clark, & Creswell, 2008). My primary research question seeks to understand how the outdoor environment and experiences outdoors are associated with employee work outcomes. To answer this question, quantitative data are used to elucidate how

much time employees spend outside during work and nonwork time, and the extent to which they enjoy the time they spend outside, whereas qualitative analyses are used to identify the activities that individuals engage in while they are outside. Findings from the qualitative analyses therefore complement the primary research question by providing information about how time is actually spent outside, capturing a unique and important piece of the outdoor experience. Instead of employing mixed-methods designs, existing work on outdoor activities typically uses researcher-generated categories, which often include measurement error (e.g., double-barreled items), and are deficient (e.g., non-comprehensive categories of activities). Instead, asking participants how they spent their time outside yields more specific and accurate information that is less influenced by potential researcher bias (i.e., assumptions about how individuals spend their time outside) than if pre-determined categories were used, which is an advantage of mixed-methods approaches (e.g., Mazzola et al., 2011). Overall, in combination with the quantitative model, the qualitative data are used to identify the various activities individuals engage in at work and at home, whether activities are comparable or different in these distinct domains, and how activities are associated with work outcomes.

Contributions

The present study makes four theoretical contributions, including: 1) the exploration of nature in relation to work-related employee outcomes, 2) new and specific conceptualizations of engagement at work, 3) new and specific conceptualizations of contact with nature, and 4) the examination of both the work and home domain.

Nature and Work Outcomes

Nearly 30 years ago, environmental psychology researchers argued that nature should benefit work-related outcomes (e.g., Kaplan, 1993), but research is this area has remained limited

and has only recently seen a theoretical resurgence (Klotz & Bolino, 2020). Interestingly, despite the potential benefits of nature for employees and the organizations they work for, and the fact that some organizational leaders have begun to incorporate nature in workplace design and policies, there is an absence of research in the organizational sciences that explores nature in relation to work outcomes. Compared to the growing body of research on contact with nature and employee stress and health (e.g., Gritzka et al., 2020), the investigation of work-related outcomes is sparse. In particular, only a handful of studies have explored associations among contact with nature and engagement and creativity at work (Bringslimark et al., 2007; Hyvönen et al., 2018; Korpela et al., 2017a; Korpela et al., 2017b; Nieuwenhuis et al., 2014; Plambech & Konijnendijk Van den Bosch, 2015; Thompson & Bruk-Lee, 2019). In the present study, I test tenets of Klotz and Bolino's (2020) biophilic work design model, which outlines how contact with nature at work can influence employees' potential emotional, cognitive, and physical energies. Additionally, I extend Klotz and Bolino's (2020) model to examine specific work outcomes that require the availability of emotional, cognitive, and physical energy, including engagement and creativity at work.

Conceptualization of Employee Engagement

Similarly, of the research that has examined employee engagement in relation to nature, engagement has exclusively been conceptualized as an indicator of occupational burnout or well-being, thus contributing to the body of research linking nature with employee stress and health (Hyvönen et al., 2018; Korpela et al., 2017a; Korpela et al., 2017b; Nieuwenhuis et al., 2014; Thompson & Bruk-Lee, 2019). Instead, I use an energy-based motivational construct of job engagement, which has not yet been explored alongside contact with nature, and has important implications for employees and the organizations they work for. Moreover, there is substantial

disagreement in the organizational sciences regarding the operationalization of engagement. Engagement was originally defined as a motivational construct, in which individuals exert emotional, cognitive, and physical energy at work (e.g., Kahn, 1990; Rich et al., 2010). Later, another stream of research coined engagement as a well-being construct, characterized by experiences of vigor (e.g., mental resiliency, persistence), dedication (i.e., pride, commitment), and absorption (e.g., deep immersion) in one's work (e.g., Bakker et al., 2008; Schaufeli et al., 2002). Further, some researchers suggest that engagement is in the nomological network of job attitudes (e.g., Schleicher et al., 2011), while others argue that it is not an appraisal of the favorability of one's job and is therefore not a job attitude (e.g., Judge et al., 2017). In applied settings, combinations of multiple constructs, including perceptions of social support, growth opportunities, resources, and role clarity, are used to assess engagement (e.g., Gallup's Employee Engagement Survey, reproduced in Harter et al., 2002). I draw from Klotz and Bolino's (2020) biophilic work design model, which identifies how nature restores human energies. Thus, the original conceptualization of work engagement, which is founded on the premise of human energies put forth in one's job, is used in the present study.

Conceptualizations of Nature Contact

Environmental psychology studies have been criticized for relying on narrow conceptualizations of contact with nature (e.g., views of nature photographs or videos, hour-long park walks). Further, research in the organizational sciences has yet to examine how the degree of urbanity or nearby natural amenities may influence work-related outcomes. The limited studies on nature in relation to work engagement and creativity have either exclusively focused on the indoor work environment (e.g., office plants, window views), or examined general time spent outside, and none have explored the potential influence of urbanity or natural amenities in

the surrounding environment (Bringslimark et al., 2007; Hyvönen et al., 2018; Korpela et al., 2017a; Korpela et al., 2017b; Nieuwenhuis et al., 2014; Plambech & Konijnendijk Van den Bosch, 2015; Thompson & Bruk-Lee, 2019). Consequently, researchers have called for studies that assess more nuanced aspects of nature, such as varying degrees of urbanity and naturalness, proximity to water or topography, biodiversity of plants and animals, accessibility of nature, and actual use of greenspaces (e.g., Bratman et al., 2012; Bratman et al., 2015; de Keijzer et al., 2016; Hartig et al., 2014; Keniger et al., 2013). I respond to these recommendations in the present study by examining two aspects of the *type of outdoor environment* (i.e., urbanity and natural amenities), and three aspects of the *experience* of time spent outside (i.e., amount of time spent outside, enjoyment of time spent outside, outdoor activities). This serves as another extension of the biophilic work design model, as Klotz and Bolino (2020) do not theorize how the surrounding outdoor environment or experiences outside may influence the accumulation of energies.

Moreover, it is advantageous to examine urbanity and natural amenities simultaneously. Although the notion that urban environments are not as restorative as natural environments has been theorized and empirically supported (e.g., Bratman et al., 2015; Kaplan, 1995, Ulrich, 1983), this perspective may be too simplistic given that urban environments can afford access to nature, such as in urban parks, community gardens, nearby bodies of water, and tree canopy coverage on city streets. The idea that urban environments are not restorative is also impractical, and potentially discriminatory, given the large and growing number of people living in urban cities, and particularly individuals who are racially and ethnically diverse (Kellert et al., 2017; Parker et al., 2018; United Nations, 2019). Thus, it is not only important to capture the extent of

urbanity where individuals work and live, but also the degree to which their workplaces and residences have nearby natural amenities.

Nature at Work and Home

Finally, Klotz and Bolino (2020)'s theory is specific to nature exposure in the workplace and I extend and apply their concepts to the nonwork domain as well. Specifically, the type of outdoor environment where individuals work *and* live are explored, and their experiences of time spent outside during work *and* nonwork time (i.e., on days off, before and after work) are examined. Although nature exposure was studied during work and nonwork time in Hyvönen and colleagues' (2018) study, researchers typically focus on only one environment, leading de Keijzer and colleagues (2016) to call for research that examines nature exposure in different microenvironments, such as home, work, and school. Further, the type of outdoor environment, experience of time outside, and associated outcomes may not be universal across work and nonwork settings. For example, individuals may work and live in geographically distinct areas that afford varying degrees of urbanity and natural amenities. Additionally, the amount of time an individual spends outside, the extent to which they enjoy the time they spend outside, and the activities they engage in are likely different during work and nonwork time. Ultimately, the replenishment of energies may be different across these unique settings, resulting in different practical implications about where, when, and how time should be spent outside to elicit engagement and creativity at work. Therefore, both work and nonwork outdoor environments and experiences are examined.

Theoretical Frameworks

In the present study, I test tenets from Klotz and Bolino's (2020) model of biophilic work design. The biophilic work design model applies Kaplan and Kaplan's (1989) seminal

environmental psychology theory – attention restoration theory – to workplace settings. Thus, I will first describe attention restoration theory before addressing the biophilic model of work design.

Attention Restoration Theory

Kaplan and Kaplan (1989) proposed attention restoration theory (ART) to argue that the restorative benefits of natural environments are due to the recovery of attentional fatigue and improved cognitive functioning. Based on principles of cognitive psychology, ART outlines how directed attention (akin to William James' notion of "voluntary attention"; James, 1892) is an intentional, selective type of attention that enables executive functioning (e.g., problem-solving, planning, self-monitoring, attention switching; Kaplan, 1995). Directed attention on tasks requires mental effort, but is a finite resource and eventually leads to attentional fatigue, which is characterized by distractibility and impaired cognitive functioning and performance. This attentional fatigue is theorized to be restored the most effectively by spending time in natural environments, which have four characteristics that replenish depleted attention (Kaplan, 1995). These characteristics include "being away" (i.e., an escape from one's typical setting and cognitive demands), "soft fascination" (i.e., effortless captivated attention like watching the movement of leaves in a breeze; unlike "hard fascination", which is held by stimulating activity like watching a sports game), "extent" (i.e., ability of an environment to engage the mind, provide a sense of being in "another world", and elicit feelings of connectedness to the larger world), and "compatibility" (i.e., fit between the environment and an individual's inclinations and purpose; Kaplan, 1992, 1995). Consequently, spending time in restorative environments, particularly those that are natural, is theorized to lead to "having a clearer head", improved cognitive functioning, and ultimately, reflection and restoration (Kaplan, 1995).

Accordingly, natural settings are believed to be highly restorative, whereas urban environments are instead believed to impede the benefits of being outside (e.g., Kaplan & Berman, 2010; Ulrich, 1983). For instance, because urban areas are busy and stimulating, they require continued directed attention, and prevent individuals from replenishing their cognitive resources (e.g., Kaplan & Berman, 2010). Further, urban areas may lack access to nature that could elicit relief from stress and positive affect, emotions, and health outcomes (e.g., Bratman et al., 2015; Hartig et al., 2014; McMahan and Estes, 2015). Thus, urbanity is explored in the present study. Additionally, although urban environments are theorized as being less restorative, access to nature is still critical in urban areas. The benefits of nature within urban areas have been demonstrated in past work (e.g., Fuller et al., 2007; Kuo et al., 2001; Van den Berg et al., 2014), and there is evidence that natural areas, and natural amenities like water (e.g., rivers, lakes), benefit health and restoration regardless of the degree of surrounding urbanization (e.g., de Vries et al., 2013; Triguero-Mas et al., 2015; White et al., 2010). Therefore, natural amenities are also examined in the present study.

Biophilic Work Design Model

Although early work on ART made connections to the workplace (e.g., Kaplan, 1993), Klotz and Bolino (2020) developed a modern theory of biophilic work design, in which ART is applied to workplace contexts to explain how contact with nature at work can have energizing effects on employees. By integrating theories of human energy (e.g., Kruglanski et al., 2012; Quinn et al., 2012), with research on nature's impact on emotional, cognitive, physical, and prosocial outcomes (e.g., Keniger et al., 2013), Klotz and Bolino (2020) identify how greater contact with nature while at work can restore employees' emotional, cognitive, physical, and

prosocial *potential* energies; resources that can be stored and drawn upon in the future (Quinn et al., 2012).

Additionally, Klotz and Bolino (2020) identify how the workplace is an environment that can afford contact with nature, with varying degrees of scope and depth. Specifically, nature contact can engage any of the five human senses, with the engagement of more senses being theorized to be more restorative of human energies (Klotz & Bolino, 2020). Accordingly, the most restorative type of contact with nature is presumed to be the most direct form – actually being outside – followed by outdoors brought indoors (e.g., office plants), outdoors via a physical barrier (e.g., a natural view from a window), and representations of nature (e.g., photos of nature; Klotz & Bolino, 2020). Indeed, the benefits of nature are stronger when participants have actual exposure to natural environments, compared to virtual or simulated exposure to laboratory settings, such as by viewing images or videos (e.g., Bowler et al., 2010; Mayer et al., 2009; McMahan & Estes, 2015). Therefore, experiences of actual time spent outside is explored.

Further drawing from this model, energy-based work outcomes (i.e., engagement and creativity) are examined. Klotz and Bolino (2020) describe that *emotional potential energy* supports positive feelings (e.g., enthusiasm) and helps to regulate emotions, *cognitive potential energy* allows employees to regulate their thoughts and maintain directed attention, and *physical potential energy* enables feelings of health and strength. Each of these forms of potential energy can be replenished by contact with nature (e.g., Bowler et al., 2010; de Keijzer et al., 2016; Hartig et al., 2014; Kaplan & Berman, 2010; McMahan & Estes, 2015; Park et al., 2010; Twohig-Bennett & Jones, 2018). However, Klotz and Bolino (2020) focus on energies and do not identify specific work-related outcomes in their theory. Instead, I extend the biophilic work design model and examine engagement and creativity at work as outcomes in the present study,

drawing from theory and research that suggests that engagement and creativity at work are contingent on having emotional, cognitive, and physical energies that can be drawn upon.

For instance, work engagement is defined as a multi-faceted positive motivational state characterized by the exertion of emotional, cognitive, and physical energy in one's work role (Byrne et al., 2016; Christian et al., 2011; Rich et al., 2010). Emotional engagement is characterized by high pleasantness and activation, including feelings of positivity, enthusiasm, and interest in one's job. Cognitive engagement reflects attention (i.e., focus and concentration) and absorption (i.e., intensity of focus and concentration) in one's job, such as focusing a great deal of attention on one's job while at work. Finally, physical engagement is defined as working with intensity and exerting energy in one's job (Rich et al., 2010). In contrast, employees who experience energy depletion are distracted at work, have lower efficacy in their ability to invest resources in their job, and are unable to fully engage in their work (Kahn, 1990). In this way, potential energies gained by exposure to nature should enhance employees' engagement at work.

Next, creativity is defined as the generation of new and appropriate ideas, products, approaches, or solutions and represents a higher-level executive cognitive function that precedes innovation, or the implementation of ideas (e.g., Anderson et al., 2014; Hennessey & Amabile, 2010; Mumford & Todd, 2020; Zhou & Shalley, 2011). Creativity at work shares a similar definition, with novelty and usefulness as the key defining features, and is specific to the work domain (Zhou & Shalley, 2011). Like engagement, creativity as a motivational construct has garnered substantial research support (e.g., Amabile, 1997; Shalley et al., 2004; Zhou & Shalley, 2011). Although definitions of creativity do not mention emotional, cognitive, and physical energy, there is evidence that each of these human energies play a role in creativity. For instance, positive affect and emotions are conducive to creativity (Baas et al., 2008; Davis, 2009;

Fredrickson, 2001; Lyubomirsky et al., 2005), including creativity at work (e.g., Amabile et al., 2005; George & Zhou, 2007; Madjar et al., 2002). Further, despite evidence that negative moods can also relate to creative thinking (e.g., George & Zhou, 2002), it is generally agreed upon that positive affect is associated with creativity (e.g., Hennessey & Amabile, 2010). Being creative is also an inherently cognitive process that requires higher-order brain functioning (e.g., Dietrich, 2004). "Creative cognition" requires that individuals are able to produce, integrate, evaluate, and select ideas that will add value to their work (Zhou & Shalley, 2011). Other studies have found that feelings of energy at work (e.g., feeling alive and vital at work, having energy to complete work) are associated with workplace creativity (e.g., Atwater & Carmeli, 2009; Kark & Carmeli, 2008), suggesting that the exertion of physical energy is also important for being creative at work. Therefore, employees' creativity should also benefit from the human energies afforded by contact with nature.

Finally, as an extension to Klotz and Bolino's (2020) model, I explore contact with the outdoor environment both at work and at home. Given that contact with nature is argued to replenish potential energy stores (Klotz & Bolino, 2020), spending time outside during nonwork time should also enable employees to accumulate emotional, cognitive, and physical energy resources that can later be applied at work. Taken together, by drawing from and extending ART and the biophilic work design model, I examine motivational work-related outcomes (i.e., engagement and creativity) that rely on available emotional, cognitive, and physical energies afforded by nature at work and home.

Hypotheses and Research Questions

Type of Outdoor Environment and the Outcomes of Engagement and Creativity

The type of outdoor environment where individuals work and live should have an impact on their engagement and creativity at work. In ART, restorative environments are those that provide a break from typical daily demands, attract effortless attention, provide sufficient scope to sustain attention, and align with one's intentions (e.g., Kaplan & Kaplan, 1989; Kaplan, 1995). Natural environments are considered the most restorative, leading to more effective human functioning (e.g., Kaplan & Kaplan, 1989; Kaplan, 1995; Kaplan, 1992). Although researchers have not yet explored the influence of surrounding urbanity or natural amenities on engagement and creativity, related studies provide evidence for these associations. For instance, much of what is known about the benefits of nature on emotional, cognitive, and physical outcomes has come from studies that compared different types of environments and detected benefits (e.g., positive affect and emotions, performance on cognitive tasks) after exposure to natural but not urban settings (e.g., Bratman et al., 2015; Berman et al., 2008; Herzog et al., 2003; Korpela et al., 2014, Mayer et al., 2009; McMahan & Estes, 2015; Laumann et al., 2001; Pilotti et al., 2015; White et al., 2013). More generally, living in areas with greater access to natural surroundings has been associated with performance on cognitive tasks, stress-relief, and restoration (e.g., de Keijzer et al. 2016; de Vries et al., 2003; Kuo et al., 2001; Mitchell & Popham, 2008; Tennessen & Cimprich, 1995; Van den Berg et al., 2010; Ziljema et al., 2017).

Furthermore, the extent of urbanity and natural amenities in an individual's surrounding outdoor environment has not been studied alongside work outcomes, but related research has demonstrated that contact with nature – through indoor environments or time spent outside – is linked with greater engagement (e.g., Hyvönen et al., 2018; Nieuwenhuis et al., 2014; Thompson & Bruk-Lee, 2019) and creativity at work (e.g., Bringslimark et al., 2007; Dul et al., 2011a, 2011b; Plambech & Konijnendijk Van den Bosch, 2015). For example, Thompson and Bruk-Lee

(2019) found that urban employees who had greater contact with nature (assessed with a measure of combined indoor, outdoor, and indirect contact) were less disengaged at work. A qualitative study of Danish employees revealed that workers in creative industries (e.g., performing arts, creative arts, architecture) believe that spending time in natural outdoor environments enhances their creativity by instilling curiosity, novel idea generation, flexible thought patterns, and stress relief (Plambech & Konijnendijk Van den Bosch, 2015). Of note is that these studies did not measure features of the surrounding environment, like urbanity or natural amenities. Moreover, density (i.e., the objective number of individuals in a given space) and crowding (i.e., the subjective assessment of being near too many people) are features of urban areas (Manzo, 2018), and some research has found that crowding is associated with lower scores on creativity tasks (e.g., Aiello et al., 1977). Therefore, individuals who live in less urban areas and places with greater natural amenities should experience greater contact with nature and be more engaged and creative at work (see Figure 1).

Type of Outdoor Environment and the Mediator of Experience of Being Outside

The experience of being outside is likely influenced by the type of outdoor environment an individual is surrounded by. First, the type of environment where people work and live should play a role in how much time they choose to spend outside (Hartig, 2014). Individuals who live and work in an urban area, or a location that does not afford natural amenities, may be less inclined to spend time outside. Access to nearby natural areas and safety concerns are barriers that prevent people, particularly urban residents, from spending time outside (Kellert et al., 2017). Furthermore, urban residents report that the asphalt, lack of fresh air, development of buildings in place of natural areas, and over-crowdedness contribute to feeling disconnected from nature (Kellert et al., 2017). Conversely, inclination to spend time outside should be greater

when a location has natural amenities, such as less humidity and less extreme temperatures, as weather can be a barrier that prevents people from spending time outside as well (Kellert et al. 2017). Further, other natural amenities, like topographic variation and access to water, can provide varied activity options (e.g., mountain biking, wildlife photography, swimming) that may inspire individuals to spend more time outside. In one study, Danish workers reported being more likely to spend time outside during work time if the outdoor environment was serene (i.e., quiet and calm; Lottrup et al., 2012), a characteristic of places with less urbanity and more natural amenities. Overall, individuals who work and live in areas that are less urban, and afford greater natural amenities, will likely spend more time outside (see Figure 1).

For similar reasons, individuals should also enjoy the time they spend outside to a greater degree when they work and live in less urban places and locations with more natural amenities. Exposure to natural environments is considered inherently enjoyable and preferred over built or urban settings (Kaplan, 1995; Ulrich et al., 1983; Wilson, 1984), which has been empirically supported (e.g., Herzog et al., 2003; Kaplan et al., 1972; Kaplan & Wendt, 1972; Kellert et al., 2017; Van den Berg et al., 2003). Indeed, people commonly cite natural settings (e.g., beach, forest, mountain) as their favorite place, compared to other settings such as residences, geographic areas (e.g., country, city), leisure places (e.g., casino, amusement park), school, transportation settings (e.g., airport), shopping areas, food service (e.g., restaurant or bar), or community settings (e.g., library; Korpela et al 2001). Further, the natural amenities scale was developed to understand how population change throughout the US is associated with a location's attractiveness, and was therefore created to provide an index of locations throughout the US that differ in environmental features (McGranahan, 1999). Mild weather, varied topography (e.g., hills, mountains), and proportion of nearby water (e.g., shoreline, ponds) were

deemed to be preferred features of a given location. Other work has also found that locations with water are preferred over those without water (White et al., 2010), and water is frequently reported as a feature related to feelings of affection for nature (Kellert et al., 2017). Similarly, employees prefer working in more natural settings compared to settings comprised of buildings or parking lots (Kaplan, 2007), and enjoy spending their lunch breaks walking outside in a park (Sianoja et al., 2018), particularly during the fall season (de Bloom et al., 2017). Taken together, as depicted in Figure 1, individuals who work and live in areas that are less urban, and have more natural amenities, should enjoy the time they spend outside to a greater degree.

The Mediator of Experience of Being Outside and Engagement and Creativity Outcomes

Beyond being influenced by the surrounding outdoor environment, the experience of the outdoor environment – the amount of time and enjoyment of time spent outside – should also influence work outcomes. Actual time spent outside is considered the type of nature exposure that provides the greatest contact with nature, allowing more of the five human senses to be engaged, and enabling the replenishment of potential emotional, cognitive, and physical energy stores (Kaplan & Kaplan, 1989; Klotz & Bolino, 2020). Research has demonstrated that the amount of time spent outside and energy-related outcomes are linked. White and colleagues (2013) found positive associations between the duration of visits to natural areas and restorative feelings (e.g., calm, revitalized, refreshed). Similarly, the frequency of times employees go outside during the workday is associated with lower perceived stress and greater health (Largo-Wight et al., 2011). Other studies have explored the impact of attending multiple-day wilderness trips and found that this type of outdoor experience increases creativity (Atchley et al., 2012, Ferraro, 2015). However, wilderness trip studies have been limited by small sample sizes, potential confounds (e.g., inability to parse out effects of prohibited technology use), and

inappropriate comparison groups (e.g., lack of control group, comparison of pre-hike creativity scores of a hiking group to during-hike scores of a different hiking group). Specific to work outcomes, past research has found that spending more time outside before the work day is associated with higher effort at work (Klotz et al., 2020). Additionally, Hyvönen and colleagues' (2018) person-centered approach revealed that Finnish employees in profiles characterized by the most frequent visits to natural environments during work and leisure time experienced greater engagement at work than those in profiles characterized by the least frequent visits (Hyvönen et al., 2018). Together, these findings lend evidence that engagement and creativity at work may be enhanced by spending more time outside (see Figure 1).

In addition to the amount of time spent outside, work outcomes should also be influenced by the extent to which individuals enjoy the time they spend outside. Compatibility between an environment and an individual's preferences is a critical feature of whether an environment will effectively restore energy (Kaplan & Kaplan, 1989). In a similar vein, enjoyable work breaks and leisure time are associated with favorable emotional (e.g., positive emotions and affect, subjective well-being), cognitive (e.g., better concentration), and physical (e.g., reduced health complaints and fatigue, higher energy levels) outcomes (e.g., Hunter & Wu, 2015; Newman et al., 2014; Sianoja, et al., 2018; Trougakos et al., 2008; Van Hooff et al., 2011). Of note is that enjoyment has been conceptualized as a feature of the recovery experience (Bennett et al., 2020; de Bloom et al., 2017; Sianoja et al., 2018), and there is evidence that employees who are able to recover from work stress during nonwork time are more engaged and creative workers (e.g., de Jong et al., 2012; Eschleman et al., 2014; Sonnentag et al., 2012; Sonnentag et al., 2017). Despite this, no studies have examined enjoyment of being outside alongside engagement and creativity at work. One study found that on days when employees walked outside in park settings during

their lunch break, they reported greater enjoyment of their break, which in turn predicted better concentration and lower fatigue in the afternoon (Sianoja et al., 2018). This study sheds light on the potential work-related benefits of enjoying time spent outside. Relatedly, the benefits of engaging in preferred activities can be attributed to a reduced need to self-regulate (Trougakos & Hideg, 2009), and self-regulation and executive functioning both rely on a central resource (i.e., directed attention) that is replenished by time spent outside (Kaplan & Berman, 2010). Further, in line with Fredrickson's broaden-and-build theory (2001) and subsequent empirical work (e.g., Fredrickson, 2013), the positive outcomes associated with enjoying time outside should also enhance employees' capacity for creative thought at work. Therefore, enjoyment of time spent outside should replenish employees' emotional, cognitive, and physical energies, and enable them to be more engaged and creative at work.

Mediations

When individuals who live and work in urban environments spend time outside, they are exposed to more stimulating distractions (e.g., noise of traffic, views of advertisements, close proximity to people) and other barriers that should prevent them from spending time outside, enjoying their time outside, and ultimately reaping the benefits of being outdoors. On the other hand, those who work and live in areas with more natural amenities should spend more time outside, find time outside more enjoyable, and experience the restorative benefits of nature on their emotional, cognitive, and physical energies. Taken together, the surrounding environment should influence employee engagement and creativity because of differences in how being outside is experienced and how energies are replenished. Based on the reviewed theoretical and empirical evidence, individuals who work and live in environments that are less urban and afford access to more natural amenities should spend more time outside, and enjoy the time they spend

outside to a greater extent. In turn, these employees will have stored more emotional, cognitive, and physical potential energy, resulting in a greater ability to devote attention to one's job, feel energetic in one's job, work with intensity, and generate new and innovative ideas (see Figure 1). Therefore, the following are hypothesized:

Hypothesis 1. The negative associations between the urbanity of where employees *work* and their a) engagement and b) creativity at work will be mediated by less time spent outside.

Hypothesis 2. The positive associations between the natural amenities where employees *work* and their a) engagement and b) creativity at work will be mediated by *greater time* spent outside.

Hypothesis 3. The negative associations between the urbanity of where employees *live* and their a) engagement and b) creativity at work will be mediated by *less time* spent outside.

Hypothesis 4. The positive associations between the natural amenities where employees live and their a) engagement and b) creativity at work will be mediated by greater time spent outside.

Hypothesis 5. The negative associations between the urbanity of where employees work and their a) engagement and b) creativity at work will be mediated by lower enjoyment of time spent outside.

Hypothesis 6. The positive associations between the natural amenities where employees work and their a) engagement and b) creativity at work will be mediated by greater enjoyment of time spent outside.

Hypothesis 7. The negative associations between the urbanity of where employees live and their a) engagement and b) creativity at work will be mediated by lower enjoyment of time spent outside.

Hypothesis 8. The positive associations between the natural amenities where employees *live* and their a) engagement and b) creativity at work will be mediated by *greater enjoyment* of time spent outside.

Qualitative Responses about Outdoor Activities

Beyond the amount of time spent outside and the enjoyment of time spent outside, *how* individuals spend their time outside is another important feature of their experience outdoors. Some past work has focused on a specific type of outdoor activity, typically physical activities (e.g., exercising outside, park walks), whereas other research has examined different types of outdoor activities. For example, studies have explored the range of activities individuals engage in outside, but typically ignore activities during work time, do not examine activities in relation to work outcomes, or represent exclusively European samples (e.g., Hyvönen et al., 2018; Korpela et al., 2014; Lottrup et al., 2012; Stigsdotter & Grahn, 2011).

In a study specific to work time, Lottrup and colleagues (2012) found that Danish workers commonly eat lunch outside, but did not consider nonwork time use. Stigsdotter and Grahn's (2011) study included a comprehensive list of outdoor activities, but they explored which activities were preferred by individuals with high levels of stress, and with a Swedish sample. In a US-based study, Kellert and colleagues (2017) found that walking and hiking are American adults' favorite outdoor activities, but they did not examine the specific outdoor activities individuals actually engage in, or consider differences during work and nonwork time. Further, despite substantial research on general time-use (e.g., the American Time Use Study), less is known about outdoor-specific activities (e.g., guided nature walks are grouped in the "arts and entertainment" category and indoor and outdoor maintenance activities are combined in the American Time Use Study; BLS, n.d.). Therefore, it is currently unclear how people, particularly

in the US, are spending their time outside. Additionally, there is a lack of information about how employees spend time outside during the workday, and how this compares to their time outside during nonwork time. I pose this as a research question because the available research evidence is limited and does not warrant a testable hypothesis. Instead, qualitative responses were obtained and coded to reveal the activities that are engaged in during work and nonwork time and how these activities compare across the two settings.

Research Question 1

> What activities do individuals engage in when they are outside during work and nonwork time? How are the activities that individuals engage in during work and nonwork time similar or different?

Outdoor Activities, Engagement, and Creativity

Certain types of outdoor activities may be associated with favorable work outcomes. Of the existing research, outdoor physical activities are the most commonly explored. Oppezzo and Schwartz's (2014) four-part study found that walking has a positive effect on general creative thinking, and that walking outside, compared to indoor environments, is particularly beneficial for idea generation. Other research suggests that walking outside can improve concentration at work, as well as general cognitive performance outcomes and mood (e.g., Berman et al., 2008; Sianoja et al., 2018), factors that can influence work engagement and creativity. Psychological benefits have also been found for other types of outdoor physical activities (e.g., swimming, running, cycling; Barton & Pretty, 2010; Korpela et al., 2017a). Whether these effects are comparable for other outdoor activities, like climbing trees, bird watching, running errands, mowing a lawn, or performing work duties outside, remains unknown. Further, it is unclear if these benefits translate to work outcomes, like engagement and creativity at work.

Some past work has explored how outdoor activities relate to recovery and restoration, which are important precursors to work-related outcomes. In Korpela and Kinnuen's (2010) work, Finnish participants reported that "exercise and being outdoors" activities were the most effective for recovering from work stress. However, the "exercise and being outdoors" category included physical activities that occurred outdoors (e.g., cycling) but also physical activities that were not explicitly outdoors (e.g., dancing, "keep-fit"), making the outdoor component less central, and work-related outcomes were not explored. White and colleagues (2013) found that participants who visited nature throughout England reported greater feelings of restoration when walking compared to playing with children, visiting attractions, and picnicking, and that nature visits with children were less restorative than visiting nature alone.

Specific to the work domain, researchers have explored how general activities relate to energy replenishment, For example, Trougakos and colleagues (2014) found that relaxing lunch breaks reduced fatigue at the end of the workday, whereas social and work-related breaks increased fatigue, particularly for employees with low autonomy. In Bennett and colleagues' (2020) study, employees who engaged in microbreaks at work that allowed for mental disengagement from one's work (i.e., detachment) reported reduced fatigue. Other work has focused specifically on outcomes of engagement and creativity at work. For instance, ten Brummelhuis and Bakker (2012) found that spending time on leisure activities during nonwork time (e.g., social, low effort, or physical activities), but not work or household related activities, predicted greater engagement at work. Other researchers have found that employees who are more creative in their nonwork time are also more creative at work (Eschleman et al., 2014). In Eschleman and colleagues' (2014) study, general nonwork creativity was assessed (e.g., "I expressed myself creatively"), rather than actual creative activities (e.g., songwriting,

photography). These studies provide some, though provisional, evidence that activities are associated with engagement and creativity at work in unique ways, but outdoor activities were not explicitly examined.

One noteworthy exception is Hyvönen and colleagues (2018) person-centered study, in which profiles were examined based on frequency of nature visits during the summer and winter seasons, frequency of nature visits during work, and leisure outdoor activities. Surprisingly, across all profiles, most participants reported "enjoying nature and natural scenery", "relaxing and dwelling", and "walking and jogging", as leisure outdoor activities (Hyvönen et al., 2018). Due to this, profiles were characterized by the frequency of time spent in natural settings and variability of activities engaged in, rather than the type of activities. Collectively, although informative, previous research has not explored outdoor activities, both at work and home, alongside work-specific outcomes. It is therefore unknown whether specific activities, or categories of activities, are associated with engagement and creativity at work. To address this, participants were asked to explain how they spent their time outside in work and nonwork contexts. Responses were coded, categorized, and explored alongside engagement and creativity at work.

Research Question 2

Are the activities that individuals engage in when they are outside associated with engagement and creativity at work?

Methods

Participants and Procedure

I conducted three separate data collections for this project. Two samples were collected from working undergraduate students (N = 239), one in the fall semester (December 2019, N = 90), and one in the following spring semester (March 2020–May 2020, N = 149). An additional employee sample was collected from Amazon's Mechanical Turk (MTurk; December 2019–January 2020, N = 564). Data from each data collection were combined for analyses (N = 803) and indicators were used to control for the sample. There are a number of reasons the samples were combined. The first reason for combining samples is that all students were enrolled at the same university, so the type of outdoor environment where students live and work (particularly for natural amenities) is likely homogeneous, thus limiting the variance in the environment type predictor variables. Additionally, combining samples produces a larger sample size and greater power to detect effects, which is particularly important for mediation analyses (Fritz & MacKinnon, 2007). Finally, as described below, controlling for the sample also accounts for potential season (i.e., winter versus spring) and COVID-related effects, given that the second working student sample was collected during the pandemic. Details about each data collection are provided below.

Working College Students

Working undergraduate college students from a large state university in northern Colorado were recruited. Given that the present study explores the influence of work and home locations on experiences of being outdoors and work outcomes, collecting data from participants who live and work in a location that affords access to natural amenities, and potentially varying

degrees of urbanity, was critical. Moreover, working students comprise eight percent of the United States labor force, and over half of undergraduate college students report working in a paid job (Carnevale et al., 2015).

Working students were recruited through an online research subject pool facilitated through the psychology department. Eligible participants included students who were currently enrolled in undergraduate-level introductory psychology or research methods courses, were at least 18 years old, and who were working in a paid job for at least 20 hours per week. I was interested in a range of outdoor experiences during work and nonwork time, so recruitment messages were vague and did not disclose that the study was related to time spent outside. Instead, this study was advertised as a study on working college students' time use during work and nonwork time. Otherwise, recruiting participants based on their *outdoor* time use may have led to an overrepresentation of participants who spend more time outside or enjoy spending time outside to a greater degree than an average participant. Students who met the eligibility requirements were invited to take a 20-minute online Qualtrics survey, though participants took an average of 16 minutes to complete the survey, and were compensated with 0.5 points that could be used towards required research credits in the introductory psychology and research methods courses they were enrolled in.

MTurk Workers

Archival cross-sectional survey data collected from MTurk was also used. The MTurk sample reflects a broader, more representative sample of workers compared to working students, as MTurk participants tend to be representative of the US population and are significantly more diverse than undergraduate student samples (e.g., Buhrmester et al., 2011; Casler et al., 2013). Importantly, in contrast to the participants in the working student sample who primarily reside

and work in the same region, the MTurk sample includes participants from different geographic regions that afford varying degrees of urbanity and natural amenities. Therefore, despite some criticisms about collecting survey data from MTurk workers (e.g., Paolacci et al., 2014), gathering data from MTurk workers throughout the US was ideal for the present study.

MTurk workers who were located in the US, at least 18 years old, had a Human Intelligence Task (HIT) rate of 95% or higher (i.e., only 5% or less of their previous work had been rejected), and had at least 100 previously approved HITs (Cheung et al., 2017) were first invited to take a five-question screening survey. Participants who reported working at least 20 hours per week in at least one additional paid job other than their MTurk position, and who work primarily indoors, were recruited to complete the study survey. Although the study survey was advertised to take 20 minutes, the average time it took participants to complete the survey was 15 minutes. Monetary rewards were used to incentivize MTurk workers to participate. MTurk workers were compensated $0.05 for the completion of the five-item screening survey and qualifying participants who took the full survey were paid $0.75. Researchers have indicated that $0.75 is an appropriate payment for a 30-minute MTurk survey (i.e., $0.38 for 15 minutes; Barger et al., 2011), or that $1.38 per hour must be offered for workers to complete MTurk tasks (i.e., $0.35 for 15 minutes; Chilton et al., 2010). Therefore, although participants were compensated less than the federal minimum wage (i.e., $7.25 per hour or $1.81 for 15 minutes; U.S. Department of Labor, n.d.), they were paid more than what is typically recommended for MTurk workers.

Measures

All measures were oriented to the previous week. For all work-related measures, both working students and MTurk workers were prompted to think about their primary paid job (in

the event they worked more than one job). Additionally, MTurk workers were prompted to think about their primary paid job that was not their MTurk position. In line with Newman's (2014) recommendations, all available items were used in the creation of scale scores.

To assess the internal structure of the study's latent variables, confirmatory factor analyses (CFAs) were performed for the job engagement scale and the creativity at work scale. Recommendations from Hu and Bentler (1999) and Yu (2002) were used to assess model fit. Specifically, model fit values near the following cutoffs indicate good model fit: a non-significant χ^2 statistic (i.e., *p*-value greater than .05), CFI greater than or equal to .95, TLI greater than or equal to .95, RMSEA less than or equal to .06, and SRMR less than or equal to .08. CFA results are reported below.

Urbanity

The 2013 urban-rural classification scheme for counties, developed by the National Center for Health Statistics (NCHS) within the US Department of Health and Human Services, was used to assess the type of environment where participants work and live (Ingram & Franco, 2014). State and county information is required to link participants with urban-rural categories, so participants were asked to report the state, county, and zip code of their work and home addresses (see Appendix A). Work and home addresses were measured separately to account for employees who may work in a location that is in a different county from where they live.

In the development of the NCHS urban-rural classification scheme, each county in the US was categorized broadly based on population size, drawing from 2010 US Census data in conjunction with the US Government Office of Management and Budget standards for defining core-based statistical areas. Core-based statistical areas are those with at least one core urban area with a population of at least 10,000 and adjacent counties with high social and economic

connections and commuting ties to the urban core (Ingram & Franco, 2014; Office of Management and Budget, 2010). The two categories of core-based statistical areas are metropolitan statistical areas (i.e., MSAs; locations with a population of at least 50,000 and population density of 1,000 people per square mile, and adjacent areas of at least 500 people per square mile) and micropolitan statistical areas (i.e., areas with an urban cluster of at least 10,000 people but an overall population of less than 50,000; Ingram & Franco, 2014).

There are six categories in the NCHS urban-rural classification scheme, with four metropolitan (metro) categories (i.e., large central metro, large fringe metro, medium metro, small metro), and two nonmetropolitan categories (i.e., micropolitan, and noncore). The *large central metro* category (e.g., Los Angeles county, California, New York county, New York) represents counties in MSAs with at least one million people and either contain the entire population of the largest city in the MSA, have their entire population within the largest city of the MSA, or contain at least 250,000 residents of any large city in the MSA. The *large fringe metro* category also includes counties in MSAs with at least one million people, but do not otherwise qualify as large central metro counties (e.g., Essex county, Massachusetts). The *Medium metro* category includes counties in MSAs with populations of 250,000 –999,999 (e.g., Larimer county, Colorado). The *Small metro* category includes counties in MSAs with populations less than 250,000. The *Micropolitan* category includes counties in micropolitan statistical areas with a population less than 50,000 but include an urban core of at least 10,000 people. Finally, the *noncore* category includes counties that do not contain an urban core with a population of at least 10,000, and therefore have the smallest population sizes and are the most rural (e.g., Big Horn county, Wyoming). In the NCHS urban-rural classification scheme, each category is coded on a 1 to 6 scale, with lower scores indicating a more urban area and higher

scores indicating a more rural area (see Appendix B). For this project, scores were reversed such that higher scores reflect greater urbanity.

Natural Amenities

The natural amenities scale developed by the United States Department of Agriculture (USDA) Economic Research Service was used to measure natural amenities where participants work and live (McGranahan, 1999; USDA, 2019). Similar to the urban-rural classification system, scores are identified by linking participants' work and home addresses with the natural amenities scale. Each county in the US has a unique natural amenities score (except for those in Alaska and Hawaii, due to unavailability of data; McGranahan, 1999). Generally, locations with greater natural amenities are characterized by having warm and sunny winters, mild temperatures and low humidity in the summer, access to water, and being hilly or mountainous. Scores are derived from archival data based on average hours of sunlight in January (from 1941 – 1970), average temperature in January (from 1941 – 1970), average temperature in July (from 1941 – 1970; to obtain a variable that reflects the winter-summer temperature gap), average relative humidity in July (from 1941 – 1970), proportion of water area (e.g., lakes, ocean), and topographic information based on land surface topography (McGranahan, 1999). Each of these factors are then transformed into standardized z-scores, summed to create a raw natural amenities score, and then converted to a 1 to 7 scale. For example, a 1 represents natural amenities scores that are more than two standard deviations below the mean (e.g., Champaign county, Illinois) and a 7 represents natural amenities scores that are more than 3 standard deviations above the mean (e.g., Napa county, California). Final natural amenities scores range from 1 to 7, with higher scores reflecting greater natural amenities (see Appendix C).

Time Outside

Participants were asked to report the total amount of time, in hours, they spent outside in the last week across three settings (i.e., at work, on days off, and before and after work). Specifically, the following questions were asked: "How many hours did you spend outside during work time last week?", "How many hours did you spend outside during your days off (e.g., the weekend) last week?", and "How many hours did you spend outside during your nonwork time (i.e., before and after work) last week?".

Enjoyment of Time Outside

Participants were asked about the extent to which they enjoyed the time they spent outside last week. These questions were presented to participants immediately after they were asked about the amount of time they spent outside. Items were adapted from the item used in Sianoja and colleagues' (2018) paper (i.e., "I enjoyed my lunch break"). Single-item measures were used to assess enjoyment of time spent outside at work ("I enjoyed the time I spent outside during work last week"), and during nonwork time ("I enjoyed the time I spent outside during my days off [e.g., the weekend] last week") and ("I enjoyed the time I spent outside during my nonwork time [i.e., before and after work] last week"). Response options range from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating greater enjoyment of time spent outside in nature.

Engagement

Rich and colleagues' (2010) 18-item job engagement scale is a measure used to assess the exertion of emotional, cognitive, and physical energies in one's work role. The job engagement scale is recommended for scientific research as it directly captures the components of engagement outlined in Kahn's (1990) theoretical work (Byrne et al., 2016). A single-factor CFA for the 18-item job engagement scale had poor model fit; $\chi^2(135) = 4104.42$, $p < .05$, CFI = .67,

TLI = .63, RMSEA = .19, SRMR = .13. In line with the theoretical conceptualization of job engagement as having dimensions for emotional, cognitive, and physical engagement at work, a three-factor model was tested next. The three-factor CFA had adequate model fit; $\chi^2(132) = 1017.14$, $p < .05$, CFI = .93, TLI = .92, RMSEA = .09, SRMR = .04, and demonstrated significant improvement in model fit compared to the single-factor model ($\Delta \chi^2 = 3087.28$, $p < .001$). Therefore, separate scale scores were created for emotional engagement (e.g., "I feel energetic about my job"), cognitive engagement (e.g., "At work, I concentrate on my job"), and physical engagement (e.g., "I exert my full effort to my job"; see Appendix D) and used as separate outcomes in all analyses. Response options range from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores reflecting greater job engagement. Responses were averaged to create mean scale scores for emotional engagement (α = .94), cognitive engagement (α = .94), and physical engagement (α = .87).

Creativity

A 13-item scale was used to assess creativity at work (Zhou & George, 2001; α = .95). Zhou and George's (2001) scale is the most frequently used measure to assess creativity in the organizational sciences (Anderson et al., 2014). In the original scale, items were phrased so supervisors could rate their employees' creativity, and were adapted for the present study to reflect participants' self-reported creativity (e.g., "I often have new and innovative ideas", "I come up with creative solutions to problems"; see Appendix E). To ensure work-specific creativity was reported, instructions prompted participants to think about their experiences at work. Response options range from 1 (*strongly disagree*) to 5 (*strongly agree*), such that higher scores represent greater creativity at work. Responses were averaged to create a mean scale score for creativity at work. The single-factor CFA for the 13-item creativity at work measure had

sufficient model fit; $\chi^2(65) = 515.94$, $p < .05$, CFI = .94, TLI = .93, RMSEA = .09, SRMR = .03, and was used in analyses.

Outdoor Activities

In the same online surveys, participants were asked to describe qualitatively how they spent their time outside during work and nonwork time in the last week for each setting (i.e., at work, days off, before and after work). Responses about how time was spent on days off and before and after work were combined for the present study, given the focus on comparisons between work and nonwork time. There was no limit to how much text participants could add, though most responses ranged from one word to a few sentences in length. As described below, responses were qualitatively coded to generate outdoor activity categories.

Control Variables

Variables that relate to substantive constructs in the hypothesized models were selected as controls to account for alternative or spurious explanations of findings (Spector & Brannick, 2011). Gender, age, race, number of hours worked in the previous week, work schedule, primary location of work (i.e., indoors or outdoors), and sample were selected (see Appendix F).

Demographic Control Variables. Previous research has found that the exposure to nature benefits men more than women (e.g., Lottrup et al., 2013), whereas other work has found that women benefit more (e.g., Shibata & Suzuki, 2004). There are also gender differences in the extent to which individuals spend time in natural areas, such that men have reported visiting natural areas more frequently than women (Boyd et al., 2018). Additionally, there are age-related differences in the extent to which adults spend time in outdoor environments, with older adults spending less time outside (Boyd et al., 2018; Kellert et al., 2017). Lastly, there are race-related differences, particularly for people of color having reduced access to and use of outdoor

environments (e.g., Boyd et al., 2018; Kellert et al., 2017). Therefore, gender, age, and race were used as demographic control variables.

Work-Related Control Variables. Number of hours worked in the last week (i.e., the week that employees were oriented to think about), is likely associated with the extent to which employees had available time to spend outside, as perceived lack of time is the most common reason for not spending time in nature (Hithings, 2013; Kellert et al., 2017). Work schedules may also influence whether employees spend time outside. For instance, night shift employees may be less inclined to walk outside during a work break. Therefore, number of hours worked last week and work schedule were controlled for. Further, where work is primarily conducted (i.e., indoors or outdoors) was also used as a control variable to account for the potentially unique experience of one's primary work duties occurring in the outdoor environment.

Other Control Variables. Finally, the sample was controlled for by including two dummy coded variables, with MTurk workers as the reference group. Specifically one dummy code reflected students who took the survey in the fall semester (i.e., fall students = 1, spring students = 0, MTurk workers = 0), and the other dummy code reflected students who took the survey in the spring semester (i.e., spring students = 1, fall students = 0, MTurk workers = 0). Controlling for sample accounts for potential associations attributed to differences between working students and MTurk workers. Additionally, because the data collections were administered in the winter (i.e., student fall semester and MTurk) and spring (i.e., student spring semester), controlling for sample (with students in the fall and spring semester considered as separate samples) also accounts for potential season effects. Finally, the COVID-19 outbreak that began in March of 2020 presumably influenced how much time was spent outside, in addition to work-related variables. For instance, some individuals may have spent fewer hours outside due

to Stay at Home orders, or out of fear for contracting COVID-19. It is also possible that individuals spent more time outside as a way to relieve stress, exercise, or because there were fewer other activity options available (e.g., closed restaurants). The spring semester survey began in March of 2020, therefore, potential effects due to COVID-19 are also accounted for.

Data Cleaning and Preliminary Screening

Both data sets were cleaned by first removing participants who failed either of the two attention check items (e.g., "select strongly disagree") or if they provided no useable data. Next, participants who reported working less than 10 hours last week were excluded. In addition, participants who reported spending zero hours outside at work last week, but who did not have a work break in the last week, were excluded from the work-specific path models. To generate the urbanity and natural amenities scores, zip code, city, state, and county data were carefully checked for accuracy and corrected as needed (e.g., if a participant entered "USA" for county, their other location data was used to determine their zip code, county names were corrected based on the zip code provided, spelling mistakes were corrected). Additionally, open-response information from the work schedule variable was reviewed and some recoding was performed to correctly categorize participants into the appropriate work schedule categories. For example, work schedules that were similar to a regular daytime schedule (9am–5pm), such as 7am–3pm or 6am–2pm, were recoded to "regular daytime schedule" instead of "other".

It was possible for the same student or MTurk worker to take the survey more than once, but provide honest and otherwise good-quality survey responses. Therefore, working students created a unique identifier code, and MTurk workers provided their MTurk identification code, in order to identify potential duplicate participants in the data sets. All cases of duplicate responses were carefully assessed (e.g., for matching demographic information) to determine whether a response should be retained. In cases in which the same participant ID was used, but with discrepant demographic information (e.g., impossibly different ages, different races), both

responses were removed[1]. Otherwise, the first response was retained, given that it would most closely resemble other participants' experiences who only took the survey once, and the other was removed (Meade & Craig, 2012).

Next, missing data were explored and addressed following Newman's (2014) procedures. Person-level missing data is characterized by participants who did not answer any part of the survey and were therefore not used in analyses. A total of 19 participants did not respond to any survey questions (and only consented to participate and provided a participant ID; a .02% nonresponse rate). Similarly, the rate of item-level and construct-level missing data was also very low and considered to be missing at random or completely at random. However, four missing cases for the natural amenities score were considered to be missing not at random, due to natural amenities scores not being available for counties in Alaska or Hawaii.

Using procedures outlined in Tabachnick and Fidell (2013), univariate outliers were identified and removed for the following variables: 1) work hours last week, 2) hours outside last week during work time, and 3) hours outside last week during nonwork time[2]. One univariate outlier of 84 hours worked last week was excluded from the data. For the hours of time spent outside in the last week variables, impossible cases were first excluded. Impossible cases for

[1]Similarly, in instances in which MTurk workers took the *screening* survey more than once, but provided inconsistent responses to the screening questions, they were not invited to take the full survey.

[2]All analyses were also performed with the outliers included. When outliers are included, the significant positive association between natural amenities at work and hours spent outside at work is no longer significant. Relatedly, when outliers are included, the indirect effect of natural amenities at work on emotional engagement via hours outside at work is not significant (i.e., CI does not change sign, but contains zero). In addition, when outliers are included, the significant positive association between hours outside at home and emotional engagement is no longer significant, and relatedly, the indirect effect of natural amenities at home on emotional engagement via hours outside at home is not significant. Otherwise, all other significant direct and indirect effects are retained.

hours spent outside during work were determined as values that were greater than the total number of hours worked last week. Impossible cases for hours spent outside during nonwork time last week were determined as values that were greater than the total number of available nonwork hours last week (i.e., calculated by subtracting the total number of work hours from 168, or the total hours in one week). A total of eleven impossible cases were excluded from the hours outside during work time variable and two impossible cases were excluded from the hours outside during nonwork time variable. Next, "true" univariate outliers were determined as cases with z-scores greater than the absolute value of 3.29 (Tabachnick & Fidell, 2013). An additional fourteen outliers (24–45 hours outside during work last week) were removed from the hours outside during work variable and an additional nine outliers (50–120 hours outside during nonwork time last week) were removed from the hours outside during nonwork time variable. Participants who reported these values are not representative of the intended sample, as they reflect individuals who spend extreme amounts of time outside (i.e., the majority of their work and nonwork time spent outside), which is considerably different than American adults' typical outdoor time use (Kellert et al., 2017; Klepeis et al., 200l).

Finally, assumptions of multiple regression analyses, and mediation models using bias-corrected bootstrapping techniques were tested and addressed based on Preacher and Hayes (2008a) and Tabachnick and Fidell's (2013) recommendations (i.e., linearity, homoscedasticity, independence of observations, no multicollinearity among predictors). Given that bootstrapping is a nonparametric approach, there are no distributional assumptions related to the normality of sampling distributions and of indirect effects (Hayes & Preacher, 2010; Preacher & Hayes, 2004; Preacher & Hayes, 2008a, 2008b).

Qualitative Coding and Data Analysis

A content analysis approach was used to analyze the qualitative data that participants provided in open-ended survey responses to questions about how work and nonwork time outside was spent in the last week. Content analysis is a process that enables qualitative data to be described in a meaningful way and is characterized as being a systematic and flexible data reduction approach (Schreier, 2014). Unlike other qualitative approaches, content analysis is particularly useful when analyzing large amounts of text-based data and when the unit of analysis is a simple word or phrase (e.g., Braun & Clarke, 2006; Krippendorff, 2004).

Precoding, Coding, and Recoding

Qualitative coding is an iterative, recursive process (Ravitch & Carl, 2016; Schreier, 2014). Initially, I engaged in "precoding" of the data, in which I read through responses in an unstructured way to familiarize myself with the data (Ravitch & Carl, 2016). This, in conjunction with the research questions of interest, led to the decision to use descriptive coding in a content analysis framework with the goal of identifying the activities that individuals engage in during work and nonwork time. The descriptive coding method, also known as "topic coding" was used (Saldaña, 2016). Descriptive coding is intended to capture the topic of a response, or what a participant writes about (Saldaña, 2016). Given that the questions of interest prompt participants to report how they spent their time outside, outdoor activities were the topics that were coded for. In line with the content analytic approach, all relevant units of qualitative data were reduced into codes that could then be categorized in data-driven and/or concept-driven ways (Schreier, 2014).

In line with best practices for qualitative coding, coding was a collaborative process performed by multiple independent coders (e.g., Ravitch & Carl, 2016; Ritchie et al., 2014;

Saldaña, 2016). I trained and worked with a research assistant who performed the coding and categorization processes with me. Interpretive authority is a form of power held by researchers to translate participants' experiences (Ravitch & Carl, 2016). If the coding process is not conducted in a thoughtful manner, results may be biased by the researcher's lens and prevent participants' true messages from being conveyed (Ravitch & Carl, 2016). Therefore, during the coding processes, we established explicit norms to frequently challenge one another's assumptions and interpretations of participants' responses.

First, we conducted "open-coding", in which we independently read through each of the qualitative responses and developed exhaustive lists of specific outdoor activities that participants reported. In this stage of the process, we were as specific as possible by including all possible unique responses that participants reported without making any generalizations (e.g., "jog", "walk", "run", and "exercise" were listed as separate activities). We reached a point of perceived data saturation, in which no additional unique activities engaged in outside were present in responses (Ravitch & Carl, 2016; Schreier, 2014). Then, to create the initial categories for the codebook, we independently developed a list of categories that each of the specific codes could be organized within. We met to discuss our ideas for the categories, which were largely consistent, and moved forward to develop the codebook.

Categorizing Codes in a Codebook

The codebook included descriptive names of codes, brief definitions, inclusion and exclusion criteria, typical examples, and "close, but no" examples (Bernard & Ryan, 2010). The codebook included mutually exclusive categories that describe the activities individuals engaged in during work and nonwork time (e.g., physical activity, relaxation, errands; Schreier, 2014). In line with best practice, multiple codes could be assigned to a given response, but not to the

specific unit being coded (Ravitch & Carl, 2016; Schreier, 2014). For example, three separate codes would be applied to a response in which a participant described that they walked, ran errands, and spent time with family outside. On the other hand, if a participant described that they walked to a store, their response would only receive one code. In line with common practice, coding of the data was initially inductive and driven purely by the responses provided by participants, before categorizing codes using more deductive approaches, in which theory and prior research were used to create broader categories of codes (Ravitch & Carl, 2016).

All activities mentioned in participants' responses were coded and entered into a category, as exhaustiveness is a requirement in content analysis, and residual categories were used sparingly (Schreier, 2014). In the first draft of the codebook, there were 17 categorical codes, with 15 substantive categorical codes and two residual categories (see Appendix G for detailed codebook information). Regarding the residual codes, a "no response" category was created for participants who did not provide any text, or erroneously entered a single numerical value or letter. Additionally, responses that included activities that explicitly or presumably occurred indoors, rather than outdoors (e.g., "I did not go outside", or "I was playing video games"), were coded in a "not applicable" residual category as they were not relevant to the research questions in the present study. The final codebook included 10 categorical codes, with eight substantive codes and the same two residual codes. The eight substantive codes were created by organizing the 15 original codes into broader categories (e.g., combining intentional walking, incidental walking, and exercise categories into a physical activity category). The categorical codes representing different types of outdoor activities included: 1) leisure activities and hobbies, 2) recovery activities, 3) physical activities, 4) work social interactions, 5) nonwork social interactions, 6) work tasks and errands, 7) nonwork tasks and errands, and 8) traveling and

transportation. Unsurprisingly, work-specific tasks and errands (e.g., completing work deliveries) and social interactions with work colleagues occurred more frequently during work time than nonwork tasks and errands (e.g., landscaping in one's yard) or social interactions with friends or family members. It was rare that participants reported work-specific work tasks and errands or social interactions with work colleagues during nonwork time. For these reasons, work and nonwork social interactions and work and nonwork tasks and errands were combined and six final categories were used in all analyses.

Of note is that a number of challenging subjective decision points were encountered throughout the categorization processes. For example, there was a smoking category in the first version of the codebook, but this was later combined with the leisure activities and hobbies category because it reflected a "free time" activity and had the most conceptual overlap with the leisure activities and hobbies category. Relatedly, there was initially a unique category for caregiving and interacting with animals, but this category was later combined with social interactions given that social connection can also be derived from interactions with non-human animals, like pets or farm animals (e.g., "I was doing yardwork […] And I was alone as far as people were concerned but I was far from alone. My dogs are very involved"). These subjective decisions are viewed as an inevitable part of the qualitative coding and categorization processes and are noted here for transparency.

Inter-Coder Reliability

Inter-coder reliability was assessed using percent agreement and Cohen's kappa reliability coefficient. Cohen's kappa reliability coefficient is a more conservative test of reliability compared to simple percent agreement calculations because it accounts for agreement based on chance (Fleiss & Cohen, 1973; McHugh, 2012). Typically, 80% agreement is

considered minimally acceptable and kappa values greater than .80 are considered strong (McHugh, 2012).

The codebook with 17 categories was used for the first coding practice. After each coding practice, the research assistant and I discussed discrepancies, gaps, and activities that did not fit within a category, and revised the codebook accordingly. Specifically, our first set of coding was conducted for 24 participants (i.e., 1,152 coding decisions), which yielded 94% agreement and a moderate overall kappa value of .71. However, the kappa value was low for work time activities (.57; considered weak; McHugh, 2012). After meeting to discuss our discrepancies and updating the codebook, a set of coding was conducted for 10 different participants (i.e., 510 coding decisions) and resulted in 96% agreement and a strong kappa value of .80. However, the kappa value for the work time activities was still only moderate (.64). After additional conversations and refinements to the codebook (i.e., the creation of 10 broader categories that were used for the final coding), we completed a full practice of coding the work time activities for all 803 participants (i.e., 8,029 coding decisions) and had 98% agreement and a kappa value of .91. We had another meeting to discuss our discrepancies and make final minor changes to the codebook. The final round of coding was conducted for all 803 participants and for each setting (i.e., 24,090 coding decisions) and resulted in 98% overall agreement and overall kappa value of .92, which is considered a nearly perfect level of agreement (McHugh, 2012). Finally, each of the remaining discrepancies that were present in our coding decisions were discussed until agreed upon.

Results

Indirect Effects

Fully-saturated mediated regression path models were used to test each of the hypothesized indirect effects of natural amenities and urbanity at work and home on engagement and creativity, via amount and enjoyment of time spent outside, controlling for gender, age, race, work hours last week, work schedule, primary location of work (i.e., indoors), and samples[3]. All analyses were performed in Mplus version 7. All outcome variables were included in each model, separate models were used to test the hypotheses in the work and nonwork domain, and separate models were performed for each mediator. Therefore, a total of four path models were performed. Bootstrapping with 5,000 bias-corrected bootstrapped samples was employed, based on Preacher and Hayes'(2008b) recommendations, and given that this method is the most powerful for tests of mediation (Fritz & MacKinnon, 2007). Asymmetrical confidence intervals were assessed because they more accurately represent the distribution of the product of coefficients, which is not normally distributed (MacKinnon et al., 2004). Therefore, significance of indirect effects was determined by 95% bias-corrected bootstrapped asymmetrical confidence intervals that did not include zero. See Table 1 for descriptive statistics and correlations, Tables 2–5 for direct effects, and Table 6 for indirect effects of the hypothesized quantitative models.

[3]All analyses were also performed without control variables. Without control variables included, the significant indirect effect of natural amenities at work on emotional engagement via hours outside at work was not significant, as the 95% confidence interval included zero, though did not change sign. Additionally, without control variables included, the significant indirect effect of natural amenities at home on creativity at work via hours outside at home was not significant. Otherwise, all other significant indirect effects were retained. Differences in results for direct effects with and without control variables included in the model are discussed further in the supplemental analyses section.

Work Time Spent Outside as a Mediator

Controlling for all other variables in the model, there was a significant indirect effect of natural amenities at work on emotional engagement through hours spent outside during work (indirect effect = .008, 95% CI [.001, .020]; see Table 6). Given that there were no significant associations between natural amenities and emotional engagement, these associations were fully mediated by hours of time spent outside during work (see Table 2). However, there were no significant mediations of natural amenities on physical engagement, cognitive engagement, or creativity through hours spent outside during work. Additionally, there were no significant mediations of urbanity on physical engagement, emotional engagement, cognitive engagement, or creativity at work through hours spent outside during work. Therefore, hypothesis 2a was partially supported and hypotheses 1a, 1b, and 2b were not supported.

Nonwork Time Spent Outside as a Mediator

There was a significant indirect effect of natural amenities at home on emotional engagement through hours spent outside during nonwork time (indirect effect = .016, 95% CI [.007, .030]), after controlling for all other variables in the model. Additionally, controlling for all other variables in the model, there was a significant indirect effect of natural amenities at home on creativity at work through hours spent outside during nonwork time (indirect effect = .009, 95% CI [.001, .020]); See Table 6. Natural amenities at home was not significantly associated with emotional engagement or creativity at work, indicating that these associations were fully mediated through hours of nonwork time spent outside (see Table 4). There were no significant mediations of natural amenities on physical engagement or cognitive engagement through hours spent outside during nonwork time. Further, there were no significant mediations of urbanity on physical engagement, emotional engagement, cognitive engagement, or creativity

at work through hours spent outside during nonwork time. Thus, hypothesis 4a was partially supported, hypothesis 4b was supported, and hypotheses 3a and 3b were not supported.

Enjoyment of Work Time Outside as a Mediator

After controlling for all other variables in the model, there were no significant indirect effects of urbanity or natural amenities at work on physical engagement, emotional engagement, cognitive engagement, or creativity through enjoyment of time spent outside during work (see Table 6). Therefore, hypotheses 5a, 5b, 6a, and 6b were not supported.

Enjoyment of Nonwork Time Outside as a Mediator

There were significant indirect effects of natural amenities at home on physical engagement (indirect effect = .007, 95% CI [.001, .019]), emotional engagement (indirect effect = .018, 95% CI [.005, .038]), cognitive engagement (indirect effect = .008, 95% CI [.001, .021]), and creativity (indirect effect = .014, 95% CI [.004, .030]), through enjoyment of nonwork time outside, and after controlling for all other variables in the model (see Table 6). There were no significant associations between natural amenities at home and the work-related outcomes, indicating that each of these associations were fully mediated by enjoyment of nonwork time outside (see Table 5). However, there were no significant indirect effects of urbanity at work on physical engagement, emotional engagement, cognitive engagement, or creativity through enjoyment of nonwork time spent outside. Therefore, hypotheses 8a and 8b were supported and hypotheses 7a and 7b were not supported.

Outdoor Activities During Work and Nonwork Time

Results from the content analysis indicated that there were six primary ways that participants spent their time outside including: leisure activities and hobbies (e.g., reading, eating), recovery activities (e.g., relaxing, clearing one's head), physical activities (e.g., walking,

playing sports), social interactions (e.g., spending time with family, having lunch with a coworker), tasks and errands (e.g., running errands, shopping), and traveling (e.g., driving, riding public transportation). Interestingly, although traveling and transportation often occur in an enclosed vehicle, some participants considered this to be an outdoor activity.

Although findings may be reported entirely qualitatively (e.g., describing themes and categories), quantifying qualitative data is common in content analysis and can be effective for studies with large sample sizes (Braun & Clarke, 2006; Krippendorff, 2004; Pluye & Nha Hong, 2014; Schreier, 2014). Therefore, descriptive quantitative results from the qualitative portion of the study are also reported[4]. Overall, it was more common for participants to report not spending any time outside during work time compared to nonwork time (see Figure 2). Additionally, of the six primary categories, most participants (65%) reported only one outdoor activity at work, with 29% reporting two outdoor activities, and an additional 6% reporting three or more activities (range of 1-4). During nonwork time, participants described spending their time on more varied activities (range of 1-5), with approximately one-third (36%) reporting only one outdoor activity, one-third (35%) reporting two different activities, and one-third (29%) reporting three or more activities.

Regardless of setting, most participants spent their time outside participating in physical activities, followed by tasks and errands. However, a greater proportion of participants did

[4]Percentages should be interpreted with the acknowledgement that the denominators were different for those who spent time outside during work in the last week ($N = 472$) and those who spent time outside during nonwork in the last week ($N = 756$). Percentages represent the proportion of participants *who went outside during work time in the last week* and provided a response to the open-ended question about how time was spent outside, or *who went outside during nonwork time in the last week* and provided a response to the open-ended question about how time was spent outside. Additionally, given that multiple activities were often mentioned within a response, percentages will typically not sum to equal 100%.

outdoor physical activities during nonwork time, with approximately half of participants who spent time outside during work reporting physical activities, whereas 68% of participants who spent time outside during nonwork reported physical activities. Similarly, a greater proportion of participants reported outdoor tasks and errands during nonwork time (47%) compared to work time (32%). Leisure activities and hobbies were engaged in to a similar extent during work (28%) and nonwork time (27%). Of note is that activities involving social interactions were more common during nonwork time (34%) than work time (11%). Similarly, recovery activities were slightly more likely to occur during nonwork time (16%) than during work time (12%). Traveling was the type of outdoor activity that was mentioned the least frequently by participants and occurred at comparable proportions during work (7%) and nonwork (8%) time.

Taken together, participants reported spending more time outside during nonwork time compared to work time. Outdoor social activities and recovery activities were more common during nonwork time than work time, and it was more common for participants to report multiple types of activities during nonwork time compared to work time. Otherwise, participants reported largely similar activities regardless of whether they were outside during work or nonwork time. In particular, spending time outside on physical activities and tasks and errands were the most commonly reported.

Intentionality of Outdoor Activities

During the qualitative coding process, we noticed that some participants explicitly indicated that they were only outside as a byproduct of another task, particularly for traveling to places and running errands, whereas others would describe intentionally spending time outside. Therefore, I conducted an additional coding process in which responses were categorized as being intentional, incidental, or both intentional and incidental. Drawing from Keniger and

colleagues' (2013) distinction between incidental and intentional experiences of nature, *intentional* outdoor activities were considered those that involved purposefully being outside, whereas *incidental* outdoor activities were those in which being outside was a by-product of another activity. The following response illustrates going outside incidentally: "We also went outside to run errands, though the act of being outside was merely to drive to the destination. The errands themselves took place indoors."

A different participant described only going outside to get to a destination, and mentioned that their time outside was brief:

> The occasion was practical in nature, so I was outside as a byproduct of trying to get from one place to another. I was not paying much attention to my surroundings and I was not outside for very long.

Another participant reported a similar experience, attributing their short amount of time outside to the weather:

> The only times I was outside last week were when I was going to and from places. i.e. to my vehicle to drive somewhere, then get out of my vehicle and walk into a building. Again, it's december and I live in the midwest and there are 5 inches of snow on the ground. I'm spending as little time outside as possible.

It was also common for participants to report simply walking to and from their car, or driving to and from destinations (e.g., "Running errands – getting in and out of the car, and walking to and from and between buildings"; "I walked from my car to the grocery store and from my car to the gas pump"). During work time, it was common for participants to report work-related tasks or errands like the following: "I was walking from building to building for work related matters", "I spent most of my time moving items around from different warehouses,

along with delivering items to different places", "grounds keeping and janitorial duties, "gathering up shopping carts", or "I deliver packages by car and by walk".

These responses seemed to clearly contrast with reports of intentionally going outside. For instance, some participants reported going outside during work as a way to relieve stress:

> I also spent some time on the nature trail as well. I was really stressed out one day and needed to be around the quiet calm of nature. I feel like doing some light hiking through nature was very calming for me.

Similarly, other participants described going outside during work time as a way to unwind, such as "walking to clear my mind". Another participant described a work ritual:

> I need time to think and be away from the demands of the job. Just seeing the green grass and being alone helps to clear my mind for the rest of the day. It has become a ritual to me. I go, I sit, I think.

Some responses about nonwork time outside were similar, like "spending time sitting in parks and bodies of water to calm my mind", or involved relaxing activities, such as: "Relaxed soaked in the sun and read a book outside for a little bit when I could. Relaxed and just did some inner thought.", "Most of the time was spent walking or simply watching the environment around me: the wind going through the trees, squirrels running around and waves coming in off of Lake Michigan", and "How I spent my time outside during my days off was relaxing on my backyard porch. I would spend time sitting on my backyard porch enjoying nature and just relaxing."

During this coding stage, many responses included mentions of both intentional and incidental outdoor activities, so categorization was selected based on which type of activity was described to the greatest degree. Otherwise, responses in which participants described intentional

and incidental outdoor activities to an equal extent (e.g., "walking either for pleasure or to a store", "walking and errands"), were categorized in an intentional and incidental category. To do this, leisure activities and hobbies (except for smoking), recovery activities, and social activities (except for dog walking) were initially considered intentional, whereas tasks and errands and traveling and transportation were initially considered as incidental. Smoking and dog walking were changed, as being outside was considered incidental to the need to smoke a cigarette or walk one's dog. Responses with a physical activity code were not initially categorized as being intentional or incidental, due to the variability in responses (e.g., "walking to the grocery store" compared to "hiking on a trail"). Instead, each response was reviewed and categorized as needed.

During work (53%) and nonwork (53%) time, about half of participants who went outside reported intentional outdoor activities, followed by incidental outdoor activities (37% during work time; 25% during nonwork time), with both intentional and incidental outdoor activities being the least frequent (10% during work time; 22% during nonwork time)[5]. A combination of both intentional and incidental outdoor activities were reported more frequently during nonwork time, both because participants reported more varied activities during nonwork time, and because responses about how time was spent on days off and before and after work were combined (see Figure 3).

Associations Between Outdoor Activities and Engagement and Creativity at Work

Associations between type of outdoor activities (i.e., leisure activities and hobbies, recovery activities, physical activities, social interactions, tasks and errands, and traveling) on engagement and creativity at work were explored using linear regression analyses in SPSS

[5]Percentages for work and nonwork settings do not sum to 100% due to the presence of some not applicable codes.

Version 26. In these models, a dichotomous variable reflecting whether participants reported engaging in an outdoor activity was explored as the predictor variable. Additionally, associations between the intentionality of outdoor activities on engagement and creativity were also explored. For these models, two dummy codes (i.e., one for only intentional outdoor activities and one for both intentional and incidental outdoor activities) were included as predictors, such that the reference group reflected those who reported only incidental outdoor activities. Across models, all control variables were included and each outcome variable was explored separately. See Tables 7 and 8 for correlations.

Emotional Engagement as an Outcome

No outdoor activities during work time were significantly associated with emotional engagement. Nonwork outdoor activities involving physical activities (B = .21, SE =.07, p < .01, R^2 = .03) and social interactions (B = .16, SE =.07, p = .03, R^2 = .03) were significantly and positively associated with emotional engagement, even after accounting for control variables. No other outdoor activities during nonwork time were significantly associated with emotional engagement. Finally, intentional outdoor activities during nonwork time were associated with significantly higher emotional engagement compared to incidental activities during nonwork time (B = .20, SE =.08, p = .02, R^2 = .03).

Cognitive Engagement as an Outcome

After accounting for all control variables, there was a significant and positive association between task and errands during work time and cognitive engagement (B = .20, SE =.08, p = .01, R^2 = .07). However, no other outdoor activities during work or nonwork time were significantly associated with cognitive engagement. Additionally, the intentionality of outdoor activities was not significantly associated with cognitive engagement.

Physical Engagement as an Outcome

No outdoor activities during work time were significantly associated with physical engagement. However, nonwork outdoor activities involving social interactions (B = .13, SE = .05, p < .01, R^2 = .06) and tasks and errands (B = .13, SE =.05, p < .01, R^2 = .06) were significantly and positively associated with physical engagement, even after accounting for control variables. No other outdoor activities during nonwork time were significantly associated with physical engagement. The intentionality of outdoor activities was also not significantly associated with physical engagement.

Creativity as an Outcome

After accounting for all control variables, no outdoor activities during work or nonwork time were significantly associated with creativity at work. However, intentional outdoor activities during nonwork time were associated with significantly greater creativity compared to incidental activities during nonwork time (B = .17, SE =.07, p = .01, R^2 = .06).

Supplemental Exploratory Analyses

To explore whether different types of outdoor activities were associated with the environment where participants work and live, or their experience of the environment, supplemental point-biserial correlational analyses were conducted (Tabachnick & Fidell, 2013). Outdoor activities during work time were examined alongside work-specific variables (i.e., urbanity at work, natural amenities at work, amount of time spent outside at work, enjoyment of time spent outside at work), and outdoor activities during nonwork time were examined alongside nonwork-specific variables. Additionally, models with and without control variables were tested and compared. Results from these supplemental exploratory analyses are reported below.

Outdoor Activities and Urbanity

There were no significant correlations between the level of urbanity where participants work and the type of outdoor activities they engaged in during work time, though there was a significant and positive correlation between traveling (e.g., driving) during nonwork time and urbanity (r_{pb} = .08, p = .03). Otherwise, there were no other significant correlations between the level of urbanity where participants live and the type of nonwork outdoor activities they reported. Additionally, there were no significant correlations between urbanity at work and home and whether outdoor activities were intentional, incidental, or both.

Outdoor Activities and Natural Amenities

There was a negative correlation between the natural amenities where participants work and outdoor recovery activities (r_{pb} = -.11, p = .02). Otherwise, no other outdoor activities were significantly correlated with the natural amenities where participants worked. There were positive correlations between the natural amenities where participants live and outdoor leisure activities and hobbies (r_{pb} = .17, p < .001), recovery activities (r_{pb} = .10, p < .01), and physical activities (r_{pb} = .18, p < .001) during nonwork time. Further, there were no significant correlations between natural amenities at work and whether outdoor activities were intentional, incidental, or both. However, there was a significant and positive correlation between natural amenities at home and reports of intentional outdoor activities (r_{pb} = .19, p < .001) and a significant and negative correlation between natural amenities at home and reports of incidental outdoor activities (r_{pb} = -.20 p < .001).

Outdoor Activities and Time Spent Outside

There were significant and positive correlations between outdoor tasks and errands (r_{pb} = .12, p = .01) and traveling (r_{pb} = .15, p = .001) during work and hours spent outside at work. In

the nonwork domain, there were significant and positive correlations between outdoor leisure and hobbies (r_{pb} = .14, p < .001), recovery activities (r_{pb} = .11, p < .01), and physical activities (r_{pb} = .22, p < .001) and duration of nonwork time spent outside. No other activities were significantly correlated with amount of time spent outside during work and nonwork time. Next, there was a significant and positive correlation between reports of both intentional and incidental outdoor activities and amount of time spent outside during work (r_{pb} = .11, p = .02), but not for only intentional or only incidental outdoor activities. During nonwork time, reports of both intentional and incidental outdoor activities were not significantly correlated with amount of time spent outside, but reports of only intentional outdoor activities were significantly and positively associated with more time spent outside (r_{pb} = .14, p < .001), and reports of only incidental outdoor activities were significantly and negatively associated with time spent outside (r_{pb} = -.20, p < .001).

Outdoor Activities and Enjoyment of Time Outside

During work time, there were significant and positive correlations between leisure activities and hobbies (r_{pb} = .11, p = .01) and recovery activities (r_{pb} = .09, p = .04) and enjoyment of work time spent outside. During nonwork time, there were significant and positive correlations between outdoor leisure activities and hobbies (r_{pb} = .12, p < .01), recovery activities (r_{pb} = .11, p < .01), physical activities (r_{pb} = .18, p < .001), and social activities (r_{pb} = .12, p < .01) and enjoyment of nonwork time spent outside. In addition, there was a significant and negative correlation between traveling and enjoyment of nonwork time outside (r_{pb} = -.09, p = .03). Regarding intentionality, reports of intentional outdoor activities during work were significantly and positively correlated with enjoyment of time spent outside during work (r_{pb} = .19, p < .001), whereas reports of incidental outdoor activities during work was significantly and

negatively correlated with enjoyment of time spent outside during work (r_{pb} = -.21, p < .001). Reports of both intentional and incidental activities outside at work was not significantly correlated with enjoyment of time spent outside at work. A similar pattern was detected during nonwork time – there was a significant and positive correlation between reports of intentional outdoor activities and enjoyment of time outside (r_{pb} = .22, p < .001), a significant and negative correlation between reports of incidental outdoor activities and enjoyment of time outside, (r_{pb} = -.29, p < .001), and no significant correlation between reports of both intentional and incidental outdoor activities and enjoyment of nonwork time outside.

Summary of Supplemental Outdoor Activity Analyses. Overall, there were correlations between the type of outdoor activities participants reported during work and nonwork time and location of the environment, amount of time spent outside, and enjoyment of time spent outside. Regarding the surrounding environment where participants work and live, surprisingly, recovery activities at work were negatively correlated with natural amenities at work. Natural amenities at home was positively correlated with outdoor leisure activities, hobbies, recovery activities, physical activities, and intentional activities, and negatively correlated with incidental activities. Lastly, there was a positive correlation between living in more urban areas and spending time outside for traveling or transportation.

Next, the activities that were correlated with spending more time outside differed depending on the setting. At work, tasks and errands, traveling, and a combination of intentional and incidental outdoor activities were correlated with more time spent outside. On the other hand, during nonwork time, leisure activities, hobbies, recovery activities, physical activities, and intentional activities were correlated with more time spent outside, and incidental activities were correlated with less time spent outside. The patterns of correlations between type of

activities and enjoyment of time outside were more consistent across settings. During both work and nonwork time, leisure activities, hobbies, recovery activities, and intentional activities were correlated with greater enjoyment of time outside, whereas incidental activities were correlated with less enjoyment of time spent outside. During nonwork time, physical activities and social activities were also correlated with more enjoyment of time outside, though being outside for traveling or transportation was correlated with less enjoyment.

Influence of Statistical Control Variables

All analyses were conducted with and without control variables included in the models. Although most of the indirect effects were comparable regardless of whether control variables are included in the models, interestingly, some direct effects were different depending on whether control variables are included in the models. In particular, without control variables included, there were significant and negative associations between natural amenities at work and both cognitive engagement and creativity. Additionally, without control variables included, there were significant and negative associations between natural amenities at home and cognitive engagement, emotional engagement, and creativity. Of note is that these associations are the opposite of what would be expected based on theory and past research. However, in models with control variables, these negative associations were not significant. “If the relationship between X and Y is entirely due to C (i.e., is entirely spurious), the regression coefficient for X is expected to be 0 when C is also entered into the analysis” (Spector & Brannick, 2011, pg. 293). Thus, the negative associations between natural amenities and the work outcomes that are present prior to

the inclusion of control variables are presumed to be due to underlying causes (i.e., spuriousness; Spector & Brannick, 2011)[6].

Upon exploration of these discrepant effects, it appeared that the spurious associations between natural amenities and engagement and creativity outcomes were due to demographics of the samples. For instance, age, work hours, and work schedule were positively correlated with engagement and creativity outcomes, such that older individuals, those who work more hours, and those who work regular daytime schedules also reported greater engagement and creativity. Of note is that participants in the working student samples were younger, worked fewer hours, and worked less regular schedules compared to MTurk workers (i.e., age, work hours, and work schedule were negatively correlated with the student samples) and students were more likely to work and live in areas with high natural amenities compared to MTurk workers (i.e., the natural amenities variables were positively correlated with the student sample). However, engagement and creativity were positively correlated with age, work hours, and regular work schedules. Thus, the natural amenities scores were inflated by students who primarily live in Colorado (i.e., a location with high natural amenities), but who were also younger, worked fewer hours, and worked non-regular daytime work schedules, which were characteristics associated with lower engagement and creativity. This appears to be why the negative direct effects between natural amenities and engagement and creativity were not significant once demographics were

[6]In the outdoor activity work-specific regression models, before control variables were included, there were significant associations of physical activities at work and lower physical engagement, and of tasks and errands at work and greater physical engagement. In the outdoor activity nonwork-specific regression models, before control variables are included, there were significant associations of nonwork social activities, and nonwork tasks and errands, and greater cognitive engagement, and of traveling during nonwork time and lower physical engagement. However, given that there were no a priori hypotheses about how types of activities should relate to engagement and creativity outcomes, these associations are only provisionally interpreted as being due to spuriousness.

accounted for. Indeed, when correlations were explored by sample (i.e., MTurk versus student samples), all of the correlations between natural amenities and work outcomes were either not significant, or were significantly and positively correlated in the expected directions, providing further support for spuriousness due to sample-specific demographic variables.

On the other hand, the significant direct effect of hours spent outside during work time on greater emotional engagement, and of hours spent outside at home on greater creativity were only significant when control variables were included in the model, but not without control variables. Further, in the outdoor activity models, the associations between intentional nonwork outdoor activities on greater emotional engagement and creativity were also only significant when control variables were included in the model. Thus, it is possible that suppression was also occurring, as the removal of the effects of control variables (particularly sample-related demographics of age, work hours, and student sample) appeared to clarify and enhance the associations between hours outside, outdoor activities, and work outcomes (e.g., MacKinnon et al., 2000; Tabachnick & Fidell, 2013).

Discussion

Theoretical Implications

Results from the present study demonstrate that the benefits of nature extend to motivational work-related outcomes of engagement and creativity, which has not yet been explored in prior research. Therefore, this study provides some of the first support for tenets of Klotz and Bolino's (2020) biophilic work design model, by demonstrating how nature contact can restore employees' energies, while also extending the model by evaluating specific work-related outcomes (i.e., engagement and creativity) that are contingent on available emotional, cognitive, and physical energy stores. As an extension of the biophilic work design model, the type of outdoor environment was assessed in terms of urbanity and natural amenities. Broadly, individuals who work and live in areas with greater access to water, topographic variation, temperate climates, and favorable weather (i.e., natural amenities) reported spending more time outside and enjoying time outside to a greater degree, and these experiences were associated with greater engagement and creativity at work. Klotz and Bolino's (2020) model focuses specifically on nature in the work domain, yet results from this study suggest that experiences of being outdoors during both work time *and* nonwork time are associated with engagement and creativity at work. The biophilic work design model is therefore also extended in the present study by considering contact with nature both at work and home.

More specifically, participants who work in areas with greater natural amenities reported spending more hours outside during the workday, and subsequently, greater emotional engagement in their work. Similarly, individuals who live in areas with more natural amenities also spend more time outside, which restores their energy and enables greater feelings of

enthusiasm, positivity, and pride about their job (i.e., emotional engagement) as well as creativity in their work. Living in an area with a temperate climate, low humidity, access to water, and varied topography is associated with greater enjoyment of time outside. Importantly, employees who experience greater enjoyment of time outside during the workday, on their days off, and before and after they go to work, in turn report working with high effort and intensity, feeling excited about and interested in their job, having the ability focus their attention and concentrate on their job, and generating creative and useful ideas for their work. Therefore, spending time outside and enjoying time outside seems to replenish emotional, cognitive, and physical energies that enable employees to be engaged and creative in their job.

Next, the qualitative portion of the present study provided insight into how individuals spend their work and nonwork time outside. Overall, participants in this study spent their time outside on leisure activities and hobbies, recovery activities (e.g., relaxing, clearing one's mind), physical activities, social interactions, tasks and errands, and traveling. Across settings, physically active activities (e.g., walking, playing sports) were the most commonly reported, followed by tasks and errands (e.g., going to the store, shopping). Similarly, White and colleagues (2013) also found that physical activities (e.g., walking, jogging) were the most common activity reported by individuals who visited natural areas in England. Some participants spent time outside intentionally, while others went outdoors as a by-product of another activity, such as incidentally being outside to complete work tasks or run errands. Participants reported doing more varied activities outside during their nonwork time compared to work time. Moreover, results also revealed how different activities are associated with where individuals work and live, the amount of time they spend outside, the enjoyment they derive from spending time outside, and motivational work outcomes. These findings are used to contextualize results

from the quantitative model, inform specific practical recommendations, and extend theory, as the influence of specific outdoor activities on the replenishment of energies is not theorized in ART or the biophilic work design model.

The examination of different types of outdoor environments alongside varying experiences of time spent outside addresses calls in the environmental psychology literature to capture multiple facets of nature contact (e.g., Bratman et al., 2012; Bratman et al., 2015; de Keijzer et al., 2016; Hartig et al., 2014; Keniger et al., 2013). Of note is that the level of urbanity where individuals work and live was not associated with the amount of time spent outside, enjoyment of time spent outside, or any of the motivational work-related outcomes. Instead, results from the present study show that the natural amenities where individuals work and live are more predictive of how time outside will be experienced than the level of urbanity of the surrounding area. This is in line with previous research that has found that natural amenities can provide restoration regardless of surrounding urbanity (e.g., de Vries et al., 2013; Triguero-Mas et al., 2015; White et al., 2010). Thus, some of the detriments of urbanity that have been theorized in ART may have been overstated. Instead, individuals who work and live in places with more natural features (e.g., bodies of water, mountains) and favorable weather (e.g., temperate climates, low humidity) report spending more time outside during work and nonwork time and enjoying their nonwork time outside to a greater degree. Further, there were positive correlations between living in areas with more natural amenities and reports of spending time outside on leisure activities and hobbies, recovery activities, physical activities, and on outdoor activities that are intentional rather than incidental. On the contrary, living in more urban areas was positively correlated with spending time outside for traveling or transportation. These results

indicate that how individuals choose to spend their time outside is partly contingent on aspects of their surrounding environment (i.e., natural amenities and urbanity).

Overall, more effects were found in the nonwork models compared to the work models. This pattern of results highlights the importance of extending the biophilic work design model to the home domain as well. Interestingly, natural amenities at home and work were highly correlated (r = .97), though were related to experiences of being outside in different ways. Effectively recovering from work requires relaxation, avoiding thoughts about work, having control over how one's time is spent, and opportunities to learn something new (Sonnentag & Fritz, 2009; Sonnentag et al., 2017), each of which may be harder to achieve during work time compared to nonwork time. Another possible explanation is that it was common for participants to report not spending any work time outside in the last week, which is unsurprising given that employees have limited available free time during work hours that could be spent outdoors. Thus, the fewer effects in the work models with hours outside as a mediator could be attributed to the reduced variability in the number of hours individuals spent outside during the workday.

A lack of indirect effects in the work models can also be attributed to the lack of associations between where employees work and how much time they spend outside, or the extent to which they enjoy time outside. Given that actual time spent outside is considered the most restorative type of nature contact (Klotz & Bolino, 2020), it would be useful to explore boundary conditions of the biophilic work design model in terms of workplace factors that may act as barriers to being able to go outside during the workday, such as a lack of schedule flexibility, job autonomy, availability of work breaks, or workplace norms surrounding the use of work breaks. These factors may be more predictive of whether employees go outside during the workday than the location of their work environment. Additionally, the qualitative responses

indicate that individuals may be more likely to spend time outside during work if their job requires them to (e.g., going outside for tasks and errands or traveling). Results also demonstrate that outdoor work tasks and errands are associated with greater cognitive engagement. In contrast to ART and the biophilic work design model, tasks that draw upon directed attention were found to enhance, rather than diminish, cognitive energy. It is possible that completing work tasks and errands helps to fulfil the psychological need for competence (i.e., feelings of being effective and valuable at work), which has been described as energizing and critical for goal attainment in past work (e.g., Ryan & Deci, 2000; Trougakos et al., 2014). Feeling competent, coupled with being outdoors (i.e., an environment that is theorized to restore cognitive fatigue; Kaplan & Kaplan, 1989), may help to restore cognitive energies necessary for concentrating and devoting attention to one's job. Moreover, when outdoor work tasks and errands involve direct contact with nature (e.g., farming, gardening), they should be especially restorative (Klotz & Bolino, 2020). Thus, it may be worthwhile for future work to integrate tenets of self-determination theory (e.g., motivation from the fulfillment of basic psychological needs) with ART and the biophilic work design model (Kaplan & Kaplan, 1989, Klotz & Bolino, 2020; Ryan & Deci, 2000; Deci et al., 2017).

During nonwork time, outdoor social interactions, physical activities, and tasks and errands were associated with engagement at work. Participants who reported going outside for social interactions during nonwork time reported greater physical and emotional engagement in their job compared to those who did not have outdoor social interactions. This is similar to past research on the widespread benefits of social capital and social support, and as well as engaging in social activities during leisure time (e.g., Almedon, 2005; Haber et al., 2007; Newman, 2014), though is somewhat discrepant from other work that has found that outdoor social interactions

(e.g., being with children outside) can inhibit restoration (e.g., White et al., 2013). In alignment with self-determination theory, the findings in the present study suggest that social connectivity, or meeting the psychological need of relatedness or affiliation (i.e., feelings of belonging; Ryan & Deci, 2000), may be important for replenishing energies that enable individuals to exert full effort in their work and feel energetic and positive about their job. Next, the positive association between physical activities and emotional engagement aligns with the large literature on the psychological benefits of physical activities (Stathopoulou et al., 2006; Wiese et al., 2017), particularly when exercising outdoors (Barton & Pretty, 2010; Weng & Chiang, 2014). Lastly, despite past research that has found that participating in household chores can inhibit job engagement (ten Brummelhuis & Bakker, 2012), participants in this study who performed nonwork tasks and errands reported being better able to exert their full effort and energy into their job (i.e., physical engagement). Thus, completing tasks and errands during nonwork time may also facilitate feelings of competence (Ryan & Deci, 2000).

In line with Keniger and colleagues (2013), personal intent for interacting with nature can range from going outside purposefully and intentionally compared to as a by-product of another activity (e.g., driving). Results from this study revealed that participants who went outside for intentional reasons, compared to incidental reasons, also reported being more positive and excited about their job (i.e., emotional engagement) and more creative at work. Of note is that intentional outdoor activities during nonwork time were also considered to be more enjoyable. Going outside for intentional reasons may be easier for those with greater control over how they spend their nonwork time, as having control (i.e., autonomy) over how leisure time is spent is an important feature of the recovery experience (Sonnentag et al., 2017). Further, research from the positive psychology literature suggests that intentional activities (e.g., practicing gratitude,

prosocial behaviors) can foster greater happiness in one's life (Layous, 2018). It would be worthwhile to integrate knowledge from the environmental psychology, occupational health psychology, and positive psychology literatures with work conducted by researchers studying daily life activities (e.g., in occupational therapy or gerontology fields; Marcum et al., 2013; Wiener et al., 1990; Wilhelm et al., 2012) to disentangle why intentional outdoor activities replenish energies that enable greater emotional engagement and creativity at work.

Lastly, enjoyment of time outside was a mediator variable linking where individuals live with greater emotional engagement, cognitive engagement, physical engagement, and creativity at work. In line with past research, enjoyment is an important feature of leisure time and work breaks (e.g., Kuykendall et al., 2015; Newman et al., 2014; Pressman et al., 2009; Sianoja et al., 2018; Sonnentag et al., 2017; Van Hooff et al., 2011), and of greater importance for employee outcomes compared to the length of a work break (Bennett et al., 2010; Hunter & Wu, 2015). Thus, the importance of enjoyment for energy restoration extends to time spent specifically in outdoor settings. This finding also provides support for the notion that compatibility (i.e., preference) is a critical feature of whether being in outdoor environments will restore energy (Kaplan & Kaplan, 1989; Klotz & Bolino, 2020). Notably, regardless of setting, participants who reported engaging in outdoor leisure activities, hobbies, recovery activities, and who reported going outside intentionally rather than incidentally, were more likely to enjoy their time outside than those who did not report these types of outdoor activities. During nonwork, participants who participated in physical activities and had social interactions outdoors also reported greater enjoyment of time outside, whereas participants who were outside for travel or transportation reported lower enjoyment. Therefore, how time is spent outside is an important factor in whether that time is perceived as enjoyable. Although the distinction between attention that is held by

activities that allow for reflection and introspection (e.g., watching clouds; soft fascination) and attention that is held by stimulating activities (e.g., watching sports; hard fascination) is emphasized in ART and the biophilic work design model, a comprehensive range of outdoor activities, and their links with energy restoration, are not delineated. Therefore, a more nuanced consideration of specific types of outdoor activities, beyond those that enable soft and hard fascination, would be a worthwhile extension of these environmental psychology theories.

Overall, spending more time outside, and going outside intentionally rather than incidentally, can be beneficial for motivational work outcomes, though it is particularly important that time spent outside is enjoyable, which may be achieved by engaging in intentional outdoor activities, leisure activities, hobbies, recovery activities, physical activities, and socializing, and avoiding incidental outdoor activities like traveling (e.g., driving, riding a bus). Taken together, the findings from the present study largely provide support for ART and the biophilic work design model, while also extending and providing additional avenues for further refinements and extensions of these theories.

Practical Implications

In addition to theoretical implications, results from this study inform practical recommendations related to outdoor-specific time use at work and home that can be implemented by individual workers, and encouraged by supervisors and organizations. There are also broader urban planning and policy implications of this work.

Recommendations for Individuals

At the individual level, there are simple practical recommendations for how employees can enhance motivational work outcomes, including spending time outside at work, before and after work, and on days off. How time is spent outside matters; results suggest that employees

who go outside for physical activities, social interactions, and tasks and errands, and who go outside intentionally rather than incidentally, report greater engagement and creativity in their work. In light of these results, during the work day, employees could volunteer to run work errands that require them to go outside or complete some of their work tasks outdoors. On days off, allocating time to spend with friends, family members, or with pets should also benefit employees. Another recommendation would be for employees to exercise outdoors, rather than inside their home or at an indoor gym facility, during their nonwork time. It would also benefit employees to avoid only going outside as a by-product of another activity.

In particular, it is important for employees to spend time outside in ways that they find enjoyable, based on the findings that enjoying time outside is associated with greater reports of engagement and creativity at work, as well as prior research that has demonstrated the importance of enjoyment for recovery and restoration (e.g., e.g., Newman et al., 2014; Sianoja et al., 2018; Sonnentag et al., 2017; Trougakos & Hideg, 2009; van Hooff et al., 2011). Of note is that outdoor leisure activities, hobbies, and recovery activities during work and nonwork time were correlated with enjoyment of time spent outside. Therefore, spending a lunch break sitting outside and observing the surrounding environment (e.g., attending to plants, looking at the sky, listening to birds) would be a recovery activity that may be enjoyable for employees. Alternatively, reading a book or listening to a podcast outside during a work break, or before and after going to work, may also be enjoyable for employees. During nonwork time, physical activities (e.g., exercising) and social interactions (e.g., walking with a friend) are also positively correlated with enjoyment. Additionally, intentionally going outside rather than only being outside incidentally as a byproduct of another activity, can also enhance the enjoyability of outdoor experiences. So, going outside in between stores during a shopping trip, to and from a

vehicle when traveling, or to smoke a cigarette will likely be perceived as less enjoyable than going outside for intentional reasons, like birdwatching, picnicking, or kayaking. Relatedly, driving is less likely to be considered enjoyable, so opting for alternative commute methods (e.g., walking, biking, rollerblading, skateboarding) when traveling (e.g., to work, for errands) may be worthwhile.

Results also suggest that the natural amenities of an area, like favorable weather (e.g., temperate climate, low humidity) and natural features (e.g., water, mountains), influences the amount and enjoyment of time spent outside. However, while relocating to, or spending time off (e.g., weekends, vacations) in places with greater natural amenities is likely beneficial, for most individuals, these options are unfeasible, undesirable (e.g., wanting to live near family members and friends), or prohibitively expensive. Instead, individuals can take advantage of surrounding natural amenities, like visiting public parks, bodies of water, or mountains, or spending time outside on days with good weather. Being intentional about going outside, such as by scheduling in time to spend outdoors or inviting others (e.g., neighbors, friends) for accountability, may also inspire individuals to make a habit of appreciating their surrounding natural areas and amenities.

Recommendations for Supervisors

Supervisors can also influence how employees spend their work and nonwork time. Past work has demonstrated that it is uncommon for employees to be encouraged to go outside during the workday, but those who are encouraged are more likely to spend time outside at work (Lottrup et al., 2012). Supervisors could encourage employees to spend their work breaks outside, complete work tasks outside, or hold outdoor meetings with their employees. Furthermore, given that enjoyment of time outside at work is associated with more engagement and creativity, it would be worthwhile for supervisors to provide their employees with autonomy

in where and how they spend their work breaks. However, it is also possible that some employees simply do not enjoy being outside, and for which being outdoors would likely deplete, rather than restore energy (e.g., Trougakos & Hideg, 2009). Therefore, it would be important for supervisors to get input from their employees on whether they are interested in being outside during the workday before making these decisions.

Supervisors may also be able to influence enjoyment of nonwork time outside, such as by enacting family-supportive supervisor behaviors, which help employees balance the demands of their work and nonwork lives, including their personal needs (Hammer et al., 2009). Although not previously discussed specifically in this way, this support could extend to encouraging employees to spend time outside. Supervisors who take time to learn about their employees interests will be better able to provide support for their nonwork lives. Family-supportive supervisors are also role models to their employees, by demonstrating how they are personally able to balance work and nonwork, and be successful on and off the job (Hammer et al., 2009). In this way, supervisors can role model taking time off and doing things that they find enjoyable, to signal to their employees that this is acceptable and encouraged. Further, reducing employees' availability or response expectations during nonwork time, thereby enabling recovery and enjoyment of nonwork time (including time that is spent outdoors), should benefit workers (e.g., Barber & Santuzzi, 2015). This can also be achieved through role modeling, in which supervisors themselves avoid sending work-related emails outside of business hours or refrain from sharing that they work during their nonwork time.

Recommendations for Organizations

It is critical that companies adopt the philosophy that employees will not be able to produce high quality work if their basic needs are not met, and recognize that nature is a basic

need for many people (e.g., Wilson, 1984). At the organizational-level, workplaces can be redesigned to provide greater opportunities for employees to have contact with nature at work. Redesign efforts could be extensive, such building spaces using biophilic architectural designs (e.g., natural lighting, use of natural materials), overhauling company parking lots to include trees or greenspaces, creating rooftop gardens, or installing on-site basketball or tennis courts. On a smaller scale, redesign options could include installing bike racks or seating areas (e.g., picnic tables) outside of work buildings, creating nearby paved walking or biking trails with wheelchair accessibility, or bringing indoor plants into workspaces. On the one hand, organizations can provide varied options for employees to learn about which types of outdoor activities they enjoy. On the other hand, organizations could survey employees to learn about what they enjoy doing outside, and then create spaces and provide resources based on employee recommendations.

In addition, organizations have the option to adopt nature-related policies, similar to REI's "Yay Days" or Patagonia's "Let My People Go Surfing", that provide employees with paid days off or time off during the workday to spend outdoors and connect with nature. This could also be achieved by workplaces offering full or discounted local, State, and National Park passes, or ski passes, to employees to offset the cost of visiting natural areas. Another option is for companies to sponsor off-site retreats at nearby natural areas, though it would be important that retreats are advertised in a way that respects employees' boundary preferences (i.e., the extent to which they prefer to have their work and nonwork lives separated or integrated; Allen et al., 2014; Bulger et al., 2007), such as being optional rather than mandatory. More broadly, organizations can support employees in spending time outside and in enjoyable ways by instituting and enforcing flexible schedule policies (e.g., Kelly & Moen, 2007; Thomas &

Ganster, 1995). For instance, flexible schedules could allow employees who want to surf in the morning, hike in the afternoon, sunbathe mid-day, or stargaze in the evening to do so, without the pressure or expectation to be working during these times. The present study and follow-up research in this area should inspire organizational leaders to recognize and appreciate the strategic value of nature.

Urban Planning and Policy Implications

There are broader urban planning implications of this work. The natural amenities where individuals work and live were found to predict how the outdoor environment was experienced and subsequent work outcomes, even after accounting for the level of urbanity of an area. Although increasing the natural amenities of an area is challenging, it may be possible by combating issues related to climate change, which can impact the extremity of weather patterns (e.g., Coumou & Rahmstorf, 2012). Relatedly, urban sprawl, or the uncontrolled development and expansion of cities to peripheral areas, has detrimental environmental impacts including pollution and destruction of natural areas (e.g., Resnik, 2010). To combat these environmental issues, some cities that have experienced rapid population growth and the related consequences of urbanization (e.g., Yokohama, Japan) have developed urban planning initiatives that increase environmental sustainability and livability (e.g., Gandhi, 2017; PwC Japan Group, 2016). These initiatives are in line with the "Smart Growth" policy framework, a proposed way to mitigate urban sprawl, in which cities are intentionally densely populated, employ mixed-use developments (e.g., combined residential, commercial, and entertainment spaces), have walking and biking paths, accessible public transit, and preserved greenspaces (e.g., Resnik, 2010). These tactics, in addition to other nature-related urban planning initiatives, like urban forestry (i.e., planning, care, and management of trees and natural spaces in urban settings) can increase the

natural amenities of urban areas. Consequently, these initiatives may encourage greater use and enjoyment of outdoor spaces, and have a positive impact on employees' work experiences (i.e., greater engagement and creativity at work) and related organizational outcomes.

Overall, the present study provides evidence that nature influences work-related outcomes that are highly valued by organizational leaders (i.e., engagement and creativity). This information should not only provide a business case for nature-related organizational practices, but may also influence broader public policies related to the creation and protection of public lands, such as national parks, forests, conservation areas, seashores, and trails, as well as local community greenspaces (e.g., parks). However, care should be taken to consider potential unintended consequences of some of these efforts, such as "green gentrification" (i.e., the displacement of communities resulting from increased property values) which may be mitigated through parks-related anti-displacement strategies (Anguelovski et al., 2019; Rigolon & Christensen, 2019). Rigolon and Christensen (2019) identified that effective parks-related anti-displacement strategies are characterized by involving residents and community-based organizations to identify ways to prevent displacement near developed greenspaces, and establishing affordable housing, job opportunities, and anti-displacement displacement policies and laws. Businesses can influence public policies in a variety of ways (e.g., lobbying, political contributions) and can also be affiliated with or financial sponsors of environmental organizations. It is critical that business leaders thoughtfully select which environmental policies and organizations to partner with and sponsor. Relatedly, corporate social responsibility (CSR) is a business model that aims to enact ethical workplace practices, benefit broader society, and contribute to environmental sustainability (i.e., "people, planet, and profit"; Rupp & Mallory, 2015). Socially responsible business practices are positively associated with employee

performance outcomes, job attitudes, and company reputation and attractiveness (Rupp & Mallory, 2015). Thus, there are likely widespread benefits for organizations that actively strive to support and advance community-driven environmental initiatives and policies.

Limitations

The primary limitations of the present study are methodological. First, the present study relies on a cross-sectional design to detect indirect effects, and cross-sectional mediation models have been criticized for limitations surrounding the inference of causality (Kline, 2015). However, given that the investigation of nature in relation to work outcomes is new and uncommon in the organizational sciences, the present study is useful as an initial project in this line of research, as cross-sectional designs are appropriate when exploring new areas (Spector, 2019). Additionally, it is assumed that the home and work addresses provided by participants reflect the locations where they spent their time, though it is possible that participants traveled to different places, with different levels of urbanity and natural amenities, during their work breaks or days off.

To address these limitations, an important next step would be to explore similar research questions using advanced study designs, such as longitudinal (Kelloway & Francis, 2013) or experience sampling methodologies (ESM; Beal, 2015). For example, a long-term longitudinal study could assess the different places individuals live and work across their life course and examine how different locations influence experiences of the outdoors and work-related outcomes. Alternatively, in an ESM study, participants' locations could be reported or assessed using geographic data and information (GIS), while simultaneously assessing length of time outside, current levels of enjoyment, and activities engaged in, and then examine same- or next-day work outcomes. ESM studies could also be achieved by partnering with researchers who

developed the smartphone software application, *Mappiness*, which assesses users' location and provides brief questionnaires to assess well-being at random intervals (MacKerron & Mourato, 2013). Additionally, future mixed-methods research could also use the pleasure, productivity, and restoration (PPR) profile (i.e., a daily assessment of enjoyment, energy restoration, and feelings of accomplishment based on how time is spent; Atler, 2012; Atler et al., 2015) alongside reports of outdoor activities.

Further, although the use of objective location data is a strength of the study, all other variables were self-reported by participants, introducing the possibility for common method bias (Podsakoff et al., 2012). To address this, future research could employ the use of other-reports in addition to self-reports for work outcomes. For example, an employees' creativity at work is also commonly assessed by their co-workers or supervisors (Mumford & Todd, 2020). Other-reports are particularly advantageous given that the key components of creativity include originality and usefulness, which may be biased by an employees' self-efficacy beliefs (Mumford & Todd, 2020). Future research could also explore innovation (i.e., an outcome of creativity) by having others evaluate an employee's creative performance on a product rather than rate the creativity of the employee themselves or their creative process (Mumford & Todd, 2020). Additionally, organizational data, such as production rates, sales, or customer satisfaction ratings, could be used to assess more "objective" indicators of employees' engagement and creativity (e.g., Mumford & Todd, 2020; Wildman, 2011).

A final limitation is that most qualitative responses were short and lacked detail, although this is expected given the prompt and the fact that this was asked in a larger online survey. Responses can have both denotative (i.e., literal, dictionary meaning of a word) aspects and connotations (i.e., descriptive elements, often based on emotional associations evoked by words).

Presumably due to how the questions were asked, the majority of survey responses in the present study included denotative information about how time outside was spent (e.g., "walking to the store", "listening to birds"), though few supplemented this information with relevant connotative descriptors (e.g., "it's very peaceful", "I enjoyed the fresh air, though it is a bit cold", "it was a nice day so i had the harley out for a ride its a treat in ohio to get to ride in january"). It would be advantageous for researchers to ask participants about their time use outside in a way that would garner more rich and detailed responses. For example, in focus groups or interviews, participants could be asked about how they spend their time outside, but also about why they choose to go outside (e.g., Pasanen et al., 2018), what they enjoy about being outside (e.g., the activities, the scenery), and how they feel before, during, and after being outside. This would allow for the assessment of intentionality and motives for going outside, specific aspects of being outside that are enjoyable, as well as the subjective experience (i.e., connotations) of being outdoors. Furthermore, given that many participants reported multiple types of outdoor activities, future work could also explore different activity combinations in a person-centered (e.g., latent profile analysis) framework.

Future Research Directions

There are a number of additional avenues for future research. Nature's role in the replenishment of depleted attention is a key component of ART (Kaplan, 1995), which was extended to include the renewal of emotional, cognitive, and physical energies in the biophilic work design model (Klotz & Bolino, 2020). Specific mechanisms that explain the associations found in the present study and that more closely capture emotional, cognitive, and physical energy mechanisms could be explored. For example, it is possible that positive affect or emotions are acting as additional mediators, as having more leisure time and enjoying oneself

can produce positive feelings (e.g., Newman et al, 2014; Trougakos et al., 2008), which can relate to greater engagement and creativity at work (Bledow et al., 2011; Hennessey & Amabile, 2010). Indeed, Klotz and colleagues (2020) recently found that morning exposure to nature has an influence on positive affect and subsequent work effort. Regarding cognitive energy, attention restoration can be assessed with cognitive tests (e.g., backwards digit-span test) or self-reported measures (e.g., the attentional function index; e.g., Berman et al., 2009; Thompson & Bruk-Lee, 2019), which could also be explored as mediating variables. It would be fruitful for future research to examine positive affect, emotions, and attention restoration as additional explanatory mechanisms linking contact with nature, amount of time outside, enjoyment of time outside, and work outcomes.

As another example, sleep can be influenced by the surrounding environment and time spent outside. American adults who live in areas with greater natural amenities and greenspace are less likely to report sleep insufficiency (i.e., perceptions of not getting enough sleep; Grigsby-Toussaint et al., 2015) and have lower odds of short sleep (i.e., an average of less than six hours; Johnson et al., 2018). Accordingly, recent reviews have highlighted the benefits of nature exposure for sleep quantity and quality (Shin et al., 2020). Further, being outside provides exposure to vitamin D and natural light; vitamin D deficiency is associated with sleep disorders (McCarty et al., 2014), and natural light influences the secretion of melatonin, a hormone involved in the sleep-wake cycle that helps to promote the initiation of sleep (e.g., Wright et al. 2013; Xie et al., 2017). Even indirect light exposure at work (i.e., workplaces with windows) can have a positive influence on employees' melatonin levels and sleep quality (Harb et al., 2015). Moreover, similar to contact with nature, healthy sleep is critical for energy replenishment and related emotional, cognitive, and physical outcomes (e.g., Crain et al., 2018). Future work could

examine the role of sleep as another linking mechanism connecting nature exposure with work-related outcomes. In addition, although environmental psychology researchers have recognized sleep as a restorative activity, they have argued that nature is more restorative than sleep because the aesthetic appeal of natural environments provides individuals "the opportunity for reflection and consideration of unresolved issues" (Ohly et al., 2016, pg. 306; Kaplan & Berman, 2010; Kaplan & Kaplan, 1989). Yet, there is a large body of research demonstrating similar functions of sleep for cognitive and emotional processing and adaptation (e.g., Spencer et al., 2017; Stickgold et al., 2001; van der Helm & Walker, 2009; van der Helm et al., 2011). Thus, it would also be interesting for researchers to test competing hypotheses about the relative importance of nature exposure and sleep for energy replenishment and related employee outcomes.

Regarding the sample in the present study, data were collected from working adults in geographically dispersed locations throughout the US. This is advantageous because it enables an examination of both urbanity and natural amenities that would otherwise not be possible if only one co-located sample was used. However, research that has explored the benefits of nature have been geographically biased and conducted predominantly in Europe and the US (Keniger et al., 2013). It is important to extend this line of research to regions of the world that have different cultures and environmental features that can influence how people interact with and experience nature (Keniger et al., 2013). For example, in the Scandinavian culture, there is a philosophy called "frilufsliv" (i.e., "open-air living"), in which time spend outdoors in nature is embraced regardless of the weather (Smith, 2020). Regarding environmental features, some regions of the world with the greatest biodiversity (e.g., Brazil) are the least represented in the environmental psychology literature (Keniger et al., 2013). Further, many of the most populated cities in the world are not located in the US (e.g., Tokyo, Delhi, Shanghai), so it would be worthwhile for

researchers to understand the experiences of working people who live and work in highly urban settings in future work.

In future work, it would also be valuable for researchers to explore characteristics of employees work that may influence how time is spent outside and motivational work outcomes. For example, autonomy at work has been shown to have a positive influence on experiences of job engagement and creativity (e.g., Christian & Slaughter, 2007; 2010; Liu et al., 2011), as well as the restorativeness of work breaks (Trougakos et al., 2014), and likely plays a role in the extent to which employees can spend time outside during their workday. Additionally, the level of contact with nature at work is likely related to individuals' jobs and industries. Klotz and Bolino (2020) identify how jobs can vary according to the level of contact with nature from the job context and job tasks. For instance, warehouse forklift operators have low contact with nature at work in both their job context and job tasks, whereas a florist would experience high contact with nature in terms of job tasks but not job context (Klotz & Bolino, 2020). Beyond this, engagement and creativity at work may also differ across jobs. For example, chefs, landscapers, and graphic designers likely require an especially high degree of creativity to be successful. Future research could focus on a specific occupation or industry, control for job type, or examine job type as a substantive (e.g., predictor, moderator) variable that may influence nature contact, the experience of time spent outside, and work outcomes.

In addition to these work-related variables, it would also be useful to assess individual difference variables in relation to experiences of the outdoor environment and associated work outcomes. First, there is variability in the extent to which people want to spend time outdoors versus indoors. In particular, individuals who feel strong connections to nature likely choose to spend more time outside and find being outside in natural environments more enjoyable than

those who do not feel connected to nature (e.g., Nisbet et al., 2009). In this way, the benefits of nature for energy-related work outcomes may be greater for individuals who prefer to be outside. There is some preliminary evidence for this idea, as Klotz and colleagues (2020) found that spending time outside in the evening only predicts positive affect the following morning for individuals who are high on nature connectedness (e.g., Klotz et al., 2020). In future work, individual differences related to perceived connections with nature using could be assessed with measures of nature relatedness that captures comfort with and desire to be in natural areas (Nisbet et al., 2009; Nisbet & Zelenski, 2013). Additionally, individual differences related to mental and physical abilities are also important. In the present study, it was assumed that participants did not have disabilities that may have inhibited or influenced their use of outdoor spaces. However, the experience of outdoor environments (e.g., amount of time spent outside, activities engaged in) presumably varies depending on participants level of functioning. Researchers could ask participants about the presence of diagnosed mental or physical disabilities, or gauge limitations in performing activities with the International Classification of Functioning (World Health Organization, 2002) in future work.

Regarding the measures used to capture the type of outdoor environment, I use publicly available and objective indicators of urbanity and natural amenities. An important next step would be for future work to extend the conceptualization of contact with nature even further by also exploring other features of the outdoor environment. For example, greenspace can be measured by using the National Land Cover Database, which includes metrics related to tree canopy coverage and various land cover categories (e.g., grassland, deciduous forest, water). Additionally, Keniger and colleagues (2013) highlight the dearth of research on nature and wellbeing that examines biodiversity. Therefore, the biodiversity of plants and animals in

participants' respective work and home locations could be measured in future research as well. This could be achieved by linking location data with publicly available data related to plant and animal biodiversity (e.g., Jenkins et al., 2013).

There are also social and environmental justice implications of this work that should be explored in future research. For instance, the policy of "redlining" persisted throughout the 20th century and systematically discriminated against people of color and their families in favor of native-born white families in terms of homeownership rights and resources. The residential racial segregation that followed, particularly in suburban and metropolitan areas throughout the US, has been linked with modern racial injustices (Rothstein, 2017). Thus, a finer-grained examination of location could be achieved by considering how historical redlining relates to current barriers to accessing natural spaces. Specifically, measures of proximity and access to natural areas could be integrated with data on the real estate "grades" that were assigned to neighborhoods between the 1930s and 1940s, when redlining policies were first implemented, to understand how the potential benefits of nature exposure (for health, restoration, and related work outcomes) are influenced by historic and modern housing discrimination (Breen, 2019; Mapping Inequality: Redlining in New Deal America, n.d.).

Finally, future research could explore nature in relation to work in a variety of other ways, such as exploring nature inside workplaces (e.g., indoor plants), indirect nature exposure in the workplace (e.g., through physical barriers like windows), and representations of nature (e.g., photos of the outdoors; Klotz & Bolino, 2020; Largo-Wight et al., 2011). Additionally, other work variables could be explored alongside nature contact. For example, Klotz and Bolino (2020) theorize that contact with nature at work should also increase prosocial energy, which allows individuals to invest resources in the well-being of others. This is in line with the

reasonable person model, an extension of ART which stipulates how supportive environments (which are often natural) enable reasonableness, cooperation, helpfulness, and "bring out the best in people" (Kaplan & Kaplan, 2003; Kaplan & Kaplan, 2011; Kaplan & Basu, 2015). These ideas about how nature can influence prosocial behaviors have gained some empirical support (e.g., Zelenski et al., 2015; Zhang et al., 2014). Applied to the workplace, employees with greater contact with nature may also exhibit more organizational citizenship behaviors, prosocial behaviors, and effective teamwork behaviors, and perform fewer counterproductive behaviors at work. Examining other types of nature contact at work and other work-related variables are promising avenues for future research.

Conclusion

In a test and extension of the biophilic work design model, results from the present mixed-methods study demonstrate that working in areas with greater natural amenities was indirectly associated with greater emotional engagement at work, via spending more time outside during the workday. Comparably, living in areas with more natural amenities was indirectly associated with greater emotional engagement and creativity at work, mediated by spending more nonwork time outside. Further, living in areas with greater natural amenities was associated with greater enjoyment of time outside. During work and nonwork, enjoying time outside was especially important for experiences of physical engagement, emotional engagement, cognitive engagement, and creativity at work. In turn, there were indirect effects of natural amenities at home on each of the engagement and creativity outcomes, through greater enjoyment of being outside. Different types of outdoor activities were associated with the amount of time spent outside in each setting (i.e., work and nonwork), though outdoor leisure activities, hobbies, recovery activities, as well as activities that are intentional rather than incidental, were consistently associated with greater enjoyment of time outside. Outdoor social activities during nonwork time may be particularly beneficial for enhancing the enjoyment of being outside and related job engagement outcomes. In contrast to ART and previous research findings, the level of urbanity where individuals work and live was not associated with the amount of time spent outside, enjoyment of time spent outside, or engagement and creativity at work. Overall, the present study advances industrial-organizational psychology and environmental psychology theory and research, and provides practical recommendations for employees, supervisors, organizations, urban planners, and policy makers.

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Table 1

Descriptive Statistics and Correlations Among Study Variables

Note. W = Work, H = Home, NW = Nonwork. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample or MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample or MTurk Sample). Time Outside Variables are in Hours. * $p < .05$, ** $p < .01$

Variable	*N*	*M*	*SD*	1	2	3	4	5	6	7	8
1. Natural Amenities (W)	796	4.44	1.45								
2. Urbanity (W)	800	4.40	1.29	.05							
3. Natural Amenities (H)	797	4.44	1.44	.97**	.06						
4. Urbanity (H)	801	4.39	1.29	.05	.92**	.06					
5. Gender	798	0.59	0.49	.02	-.08*	.02	-.07*				
6. Age	801	32.99	12.77	-.38**	.06	-.38**	.05	.00			
7. Race	803	0.66	0.48	-.14**	-.08*	-.13**	-.09*	.00	.06		
8. Work Hours Last Week	803	33.20	11.43	-.37**	.06	-.37**	.05	-.16**	.40**	-.01	
9. Work Schedule	803	0.54	0.50	-.27**	.05	-.26**	.04	-.05	.29**	.05	.40**
10. Work Location	802	0.96	0.20	-.10**	.02	-.10**	.05	.06	.13**	-.05	.06
11. Student Fall Sample	803	0.11	0.32	.35**	-.07*	.36**	-.07*	.05	-.38**	-.01	-.38**
12. Student Spring Sample	803	0.19	0.39	.42**	-.08*	.41**	-.07	.03	-.48**	-.07	-.39**
13. Time Outside (W)	698	2.59	3.91	.13**	.07	.12**	.04	-.06	-.03	-.00	.04
14. Time Outside (NW)	792	9.83	8.45	.28**	.04	.29**	.04	-.05	-.15**	-.03	-.12**
15. Enjoy Outside (W)	476	4.01	0.78	-.01	.01	-.00	-.02	.04	.07	-.06	.03
16. Enjoy Outside (NW)	555	4.18	0.67	.12**	-.06	.14**	-.07	.01	-.05	-.07	-.07
17. Emotional Engagement	803	3.63	0.90	-.02	.02	-.04	.03	.03	.13**	-.02	.06
18. Cognitive Engagement	802	3.91	0.76	-.10**	-.01	-.10**	-.01	.07	.26**	-.04	.16**
19. Physical Engagement	803	3.92	0.64	-.03	-.06	-.04	-.05	.11**	.14**	-.04	.10**
20. Creativity	802	3.46	0.78	-.07	.02	-.06	.01	-.01	.16**	-.04	.18**

Table 1 Continued

Descriptive Statistics and Correlations Among Study Variables

Note. W = Work, H = Home, NW = Nonwork. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). Time Outside variables are in hours. * $p < .05$, ** $p < .01$

Variable	9	10	11	12	13	14	15	16	17	18	19
1. Natural Amenities (W)											
2. Urbanity (W)											
3. Natural Amenities (H)											
4. Urbanity (H)											
5. Gender											
6. Age											
7. Race											
8. Work Hours Last Week											
9. Work Schedule											
10. Work Location	.02										
11. Student Fall Sample	-.30**	-.04									
12. Student Spring Sample	-.26**	-.20**	-.17**								
13. Time Outside (W)	-.05	-.43**	.04	.06							
14. Time Outside (NW)	-.14**	-.05	.11**	.23**	.25**						
15. Enjoy Outside (W)	.08	-.05	-.04	-.02	.14**	.03					
16. Enjoy Outside (NW)	-.05	.00	-.01	.13**	.03	.28**	.35**				
17. Emotional Engagement	.05	.03	-.11**	-.02	.06	.09**	.22**	.18**			
18. Cognitive Engagement	.07*	.05	-.15**	-.11**	-.03	-.03	.18**	.08	.58**		
19. Physical Engagement	.00	.00	-.08*	-.03	.03	.03	.16**	.11*	.49**	.70**	
20. Creativity	.11**	.03	-.09*	-.09**	.06	.04	.21**	.14**	.46**	.51**	.44**

Table 2

Direct Effects of Type of Outdoor Environment at Work, Work Hours Spent Outside, and Work Outcomes

Note. All values were obtained from 5,000 bias-corrected bootstrapped samples. *b* = Unstandardized Direct Effect. *SE* = Standard Error. W = Work. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). Time Outside Variable is in hours. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

	Mediator	**Outcomes**			
	Time Outside (W)	Emotional Engagement	Cognitive Engagement	Physical Engagement	Creativity
Predictor	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Constant	7.85 (1.80)	3.00 (0.33)	3.31 (0.25)	3.61 (0.22)	2.65 (0.28)
Student Fall Sample	-0.02 (0.71)	-0.25 (0.15)	-0.10 (0.12)	-0.05 (0.10)	0.08 (0.13)
Student Spring Sample	0.07 (0.63)	0.02 (0.12)	0.02 (0.10)	0.03 (0.09)	0.05 (0.11)
Work Hours Last Week	0.05 (0.02)	-0.00 (0.004)	0.01 (0.003)	0.01 (0.003)	0.01 (0.003)
Work Schedule	-0.36 (0.33)**	0.02 (0.07)	-0.04 (0.06)	-0.07 (0.05)	0.09 (0.06)
Work Location	-9.34 (1.44)***	0.30 (0.20)	0.02 (0.16)	-0.03 (0.14)	0.21 (0.18)
Gender	-0.18 (0.28)	0.08 (0.07)	0.12 (0.06)	0.16 (0.05)**	0.03 (0.06)
Age	0.00 (0.02)	0.01 (0.003)*	0.01 (0.003)***	0.01 (0.002)**	0.01 (0.003)**
Race	-0.04 (0.31)	-0.05 (0.07)	-0.08 (0.06)	-0.07 (0.05)	-0.08 (0.06)
Natural Amenities (W)	0.35 (0.15)*	0.02 (0.03)	0.01 (0.02)	0.01 (0.02)	0.00 (0.03)
Urbanity (W)	0.16 (0.11)	0.002 (0.03)	-0.01 (0.02)	-0.03 (0.02)†	0.00 (0.02)
Time Outside (W)		0.02 (0.01)*	-0.004 (0.01)	0.004 (0.01)	0.02 (0.01)†
Model R^2	.26	.03	.08	.05	.05

Table 3

Direct Effects of Type of Outdoor Environment at Work, Enjoyment of Time Spent Outside, and Work Outcomes

Note. All values were obtained from 5,000 bias-corrected bootstrapped samples. *b* = Unstandardized Direct Effect. *SE* = Standard Error. W = Work. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

	Mediator	**Outcomes**			
	Enjoy Outside (W)	Emotional Engagement	Cognitive Engagement	Physical Engagement	Creativity
Predictor	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Constant	4.16 (0.35)	2.11 (0.40)	2.66 (0.29)	3.17 (0.27)	1.98 (0.33)
Student Fall Sample	-0.04 (0.16)	-0.24 (0.15)	-0.10 (0.12)	-0.05 (0.10)	0.09 (0.13)
Student Spring Sample	-0.01 (0.14)	0.02 (0.12)	0.03 (0.10)	0.04 (0.09)	0.06 (0.11)
Work Hours Last Week	-0.00 (0.01)	0.00 (0.004)	0.01 (0.003)*	0.01 (0.003)*	0.01 (.003)**
Work Schedule	0.11 (0.08)	-0.02 (0.07)	-0.05 (0.06)	-0.08 (0.05)	0.07 (0.06)
Work Location	-0.23 (0.13)†	0.14 (0.18)	0.09 (0.15)	-0.04 (0.12)	0.10 (0.15)
Gender	0.08 (0.07)	0.05 (0.07)	0.11 (0.06)*	0.15 (0.05)**	0.01 (0.06)
Age	0.01 (0.003)	0.01 (0.003)†	0.01 (0.003)***	0.01 (0.002)**	0.01 (0.003)*
Race	-0.11 (0.08)	-0.02 (0.07)	-0.07 (0.06)	-0.05 (0.05)	-0.06 (0.06)
Natural Amenities (W)	0.00 (0.03)	0.02 (0.03)	0.01 (0.03)	0.02 (0.02)	0.01 (0.03)
Urbanity (W)	-0.01 (0.03)	0.01 (0.03)	-0.01 (0.02)	-0.03 (0.02)†	0.01 (0.02)
Enjoy Outside (W)		0.26 (0.06)***	0.15 (0.05)**	0.12 (0.04)**	0.19 (0.05)***
Model R^2	.02	.07	.10	.07	.08

Table 4

Direct Effects of Type of Outdoor Environment at Home, Nonwork Hours Spent Outside, and Work Outcomes

Note. All values were obtained from 5,000 bias-corrected bootstrapped samples. *b* = Unstandardized Direct Effect. *SE* = Standard Error. NW = Nonwork. H = Home. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). Time Outside Variable is in hours. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

	Mediator	**Outcomes**			
	Time Outside (NW)	Emotional Engagement	Cognitive Engagement	Physical Engagement	Creativity
Predictor	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Constant	0.36 (2.81)	3.19 (0.31)	3.27 (0.25)	3.63 (0.21)	2.78 (0.28)
Student Fall Sample	2.78 (1.62)†	-0.26 (0.16)†	-0.11 (0.12)	-0.05 (0.10)	0.04 (0.13)
Student Spring Sample	4.66 (1.32)***	-0.02 (0.12)	0.03 (0.10)	0.04 (0.09)	0.00 (0.11)
Work Hours Last Week	0.04 (0.04)	0.00 (0.004)	0.01 (0.003)†	0.01 (0.003)†	0.01 (0.003)**
Work Schedule	-0.71 (0.66)	0.02 (0.07)	-0.03 (0.06)	-0.07 (0.05)	0.09 (0.06)
Work Location	0.16 (1.55)	0.08 (0.17)	0.06 (0.15)	-0.06 (0.12)	0.05 (0.15)
Gender	-0.94 (0.60)	0.08 (0.07)	0.13 (0.06)*	0.16 (0.05)**	0.03 (0.06)
Age	0.04 (0.03)	0.01 (0.003)*	0.01 (0.003)***	0.01 (0.002)**	0.01 (0.003)**
Race	0.24 (0.62)	-0.06 (0.07)	-0.08 (0.06)	-0.07 (0.05)	-0.08 (0.06)
Natural Amenities (H)	1.18 (0.27)***	-0.01 (0.03)	0.01 (0.02)	0.00 (0.02)	0.01 (0.03)
Urbanity (H)	0.24 (0.20)	0.01 (0.03)	-0.02 (0.02)	-0.03 (0.02)	-0.01 (0.02)
Time Outside (NW)		0.01 (0.004)***	0.00 (0.003)	0.00 (0.003)	0.01 (0.002)*
Model R^2	.11	.04	.08	.05	.05

Table 5

Direct Effects of Type of Outdoor Environment at Home, Enjoyment of Time Spent Outside, and Work Outcomes

Note. All values were obtained from 5,000 bias-corrected bootstrapped samples. *b* = Unstandardized Direct Effect. *SE* = Standard Error. NW = Nonwork. H = Home. All values were obtained from 5,000 bias-corrected bootstrapped samples. b = unstandardized direct effect. SE = standard error. W = work. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

	Mediator	**Outcomes**			
	Enjoy Outside (NW)	Emotional Engagement	Cognitive Engagement	Physical Engagement	Creativity
Predictor	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)	*b* (*SE*)
Constant	3.96 (0.28)	2.11 (0.42)	2.82 (0.33)	3.18 (0.28)	1.94 (0.35)
Student Fall Sample	-0.09 (0.12)	-0.19 (0.16)	-0.09 (0.12)	-0.02 (0.10)	0.08 (0.13)
Student Spring Sample	0.13 (0.10)	0.01 (0.12)	0.02 (0.10)	0.04 (0.09)	0.01 (0.11)
Work Hours Last Week	-0.00 (.004)	0.00 (0.004)	0.01 (0.003)†	0.01 (0.003)†	0.01 (0.003)**
Work Schedule	0.01 (0.07)	0.01 (0.07)	-0.04 90.06)	-0.07 (0.05)	0.09 (0.06)
Work Location	0.10 (0.16)	0.06 (0.18)	0.05 (0.15)	-0.07 (0.12)	0.03 (0.15)
Gender	-0.01 (0.06)	0.07 (0.07)	0.13 (0.05)*	0.16 (0.05)**	0.03 (0.06)
Age	0.00 (0.003)	0.01 (0.003)*	0.01 (0.003)***	0.01 (0.002)**	0.01 (0.003)*
Race	-0.06 (0.06)	-0.04 (0.07)	-0.08 (0.06)	-0.06 (0.05)	-0.07 (0.06)
Natural Amenities (H)	0.07 (0.03)**	-0.01 (0.03)	-0.00 (0.02)	0.00 (0.02)	0.00 (0.03)
Urbanity (H)	-0.04 (0.02)	0.02 (0.03)	-0.01 (0.02)	-0.02 (0.02)	0.01 (0.03)
Enjoy Outside (NW)		0.28 (0.07)***	0.12 (0.06)*	0.11 (0.05)*	0.21 (0.06)***
Model R^2	.04	.07	.09	.06	.08

Table 6

Indirect Effects

Note All values were obtained from 5,000 bias-corrected bootstrapped samples in fully-saturated path models testing direct and indirect effects. b = Unstandardized Indirect Effect. SE = Standard Error. CI = Confidence Interval. W =Work. H = Home. NW = Nonwork. Emo. Engage = Emotional Engagement. Cog. Engage = Cognitive Engagement. Phys. Engage = Physical Engagement. Hours = Hours Spent Outside. Enjoy = Enjoyment of Time Spent Outside.

Indirect Effect	*b*	*SE*	95% CI (upper, lower)
Urbanity (W) →Hours (W) →Emo. Engage	0.004	0.003	0.000, 0.011
Urbanity(W) →Hours (W) →Cog. Engage	-0.001	0.001	-0.006, 0.001
Urbanity (W) → Hours (W) →Phys. Engage	0.001	0.001	-0.001, 0.005
Urbanity (W) →Hours (W) →Creativity	0.003	0.002	0.000, 0.010
Natural Amenities (W) →Hours (W) →Emo. Engage	0.008	0.005	0.001, 0.020
Natural Amenities (W) → Hours (W) →Cog. Engage	-0.001	0.003	-0.009, 0.003
Natural Amenities (W) →Hours (W) →Phys. Engage	0.001	0.002	-0.002, 0.008
Natural Amenities (W) →Hours (W) →Creativity	0.006	0.004	0.000, 0.016
Urbanity (H) →Hours (NW) →Emo. Engage	0.003	0.003	-0.001, 0.010
Urbanity(H) →Hours (NW) →Cog. Engage	0.000	0.001	-0.001, 0.004
Urbanity (H) → Hours (NW) → Phys. Engage	0.001	0.001	0.000, 0.005
Urbanity (H) →Hours (NW) →Creativity	0.002	0.002	-0.001, 0.007
Natural Amenities (H) →Hours (NW) →Emo. Engage	0.016	0.006	0.007, 0.030
Natural Amenities (H) →Hours (NW) →Cog. Engage	0.002	0.004	-0.006, 0.010
Natural Amenities (H) →Hours NW) →Phys. Engage	0.005	0.004	-0.003, 0.013
Natural Amenities (H) →Hours (NW) →Creativity	0.009	0.005	0.001, 0.020
Urbanity (W) →Enjoy (W) →Emo. Engage	-0.003	0.008	-0.019, 0.012
Urbanity(W) →Enjoy (W) →Cog. Engage	-0.002	0.005	-0.012, 0.007
Urbanity (W) →Enjoy (W) →Phys. Engage	-0.001	0.004	-0.010, 0.005
Urbanity (W) →Enjoy (W) →Creativity	-0.002	0.006	-0.014, 0.010
Natural Amenities (W) →Enjoy (W) →Emo. Engage	0.001	0.008	-0.015, 0.016
Natural Amenities (W) →Enjoy (W) →Cog. Engage	0.000	0.005	-0.009, 0.009
Natural Amenities (W) →Enjoy (W) →Phys. Engage	0.000	0.004	-0.008, 0.007
Natural Amenities (W) →Enjoy (W) →Creativity	0.001	0.006	-0.011, 0.013
Urbanity (H) →Enjoy (NW) →Emo. Engage	-0.011	0.007	-0.027, 0.001
Urbanity(H) →Enjoy (NW) →Cog. Engage	-0.004	0.004	-0.016, 0.000
Urbanity (H) →Enjoy (NW) →Phys. Engage	-0.004	0.004	-0.014, 0.000
Urbanity (H) →Enjoy (NW) →Creativity	-0.008	0.006	-0.021, 0.001
Natural Amenities (H) →Enjoy (NW) →Emo. Engage	0.018	0.008	0.005, 0.038
Natural Amenities (H) →Enjoy (NW) →Cog. Engage	0.008	0.005	0.001, 0.021
Natural Amenities (H) →Enjoy (NW) →Phys. Engage	0.007	0.004	0.001, 0.019
Natural Amenities (H) →Enjoy (NW) →Creativity	0.014	0.007	0.004, 0.030

Table 7

Correlations Among Work-Specific Study Variables and Types of Outdoor Activities During Work

Note. W = Work. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). * $p < .05$, ** $p < .01$

	Leisure & Hobbies	Recovery	Physical Activity	Social	Tasks & Errands	Traveling	Intentional	Incidental	Intentional & Incidental
Natural Amenities (W)	-.00	-.11*	-.01	-.02	.06	.02	-.04	.02	.02
Urbanity (W)	.06	-.05	.05	.08	-.04	.08	.06	-.09	.05
Gender	-.01	-.00	.02	.07	.04	-.01	-.06	.03	.05
Age	.09	.05	.02	.03	-.05	.02	.06	-.09	.04
Race	-.06	-.05	.01	-.03	-.07	.02	-.02	.01	.03
Work Hours Last Week	.10*	.10*	-.09	-.00	-.03	.02	.05	-.05	-.01
Work Schedule	.00	.06	.05	.02	-.12*	.02	.11*	-.12**	.01
Work Location	.14**	.07	.05	.06	-.19**	-.07	.08	-.08	.00
Student Fall Sample	-.04	-.02	.01	-.05	.06	-.06	-.04	.04	.00
Student Spring Sample	-.10*	-.13**	-.02	-.06	.15**	.02	-.12*	.16**	-.05
Time Outside (W)	-.01	-.01	.00	-.08	.12**	.15**	-.06	-.01	.11*
Enjoy Outside (W)	.11*	.09*	.02	.08	-.06	-.06	.19**	-.21**	.01
Emotional Engagement	.02	.02	.01	.00	.05	.03	-.04	.03	.02
Cognitive Engagement	.09	.05	-.04	.01	.11*	-.03	-.04	.02	.04
Physical Engagement	.05	.05	-.10*	.08	.11*	-.03	-.07	.05	.03
Creativity	.04	.01	-.01	.01	.04	.05	-.01	-.01	.03

Table 8

Correlations Among Nonwork-Specific Study Variables and Types of Outdoor Activities During Nonwork

Note. H = Home. NW = Nonwork. Gender (0 = Male, 1 = Female). Race (0 = Non-White or Multiracial, 1 = White). Work Schedule (0 = Other, 1 = Regular Daytime Schedule). Work Location (0 = Primary Outdoors, 1 = Primarily Indoors). Student Fall Sample (1 = Participant in Student Fall 2019 Sample, 0 = Participant in Student Spring 2020 Sample, 0 = MTurk Sample), Student Spring Sample (1 = Participant in Student Spring 2020 Sample, 0 = Participant in Student Fall 2019 Sample, 0 = MTurk Sample). * $p < .05$, ** $p < .01$

	Leisure & Hobbies	Recovery	Physical Activity	Social	Tasks & Errands	Traveling	Intentional	Incidental	Intentional & Incidental
Natural Amenities (H)	.17**	.10**	.18**	-.04	-.06	-.05	.19**	-.20**	-.03
Urbanity (H)	.05	-.02	.05	.01	-.01	.08*	-.01	-.01	.02
Gender	-.02	.02	.00	.07	-.02	-.06	-.01	.01	-.00
Age	-.05	-.05	-.11**	.07*	.14**	.04	-.18**	.20**	.01
Race	-.01	.06	-.00	-.03	-.03	.03	-.03	.07	-.04
Work Hours Last Week	-.09*	-.09**	-.21**	.09**	.10**	.05	-.17**	.18**	.02
Work Schedule	-.10**	-.06	-.09*	.10**	.05	.02	-.13**	.11**	.03
Work Location	.01	-.01	-.02	.10**	.09**	-.01	-.08*	.06	.03
Student Fall Sample	-.06	-.05	.093*	-.08*	-.07	-.01	.05	-.06	.00
Student Spring Sample	.18**	.17**	.15**	-.07*	-.11**	-.07	.26**	-.22**	-.09*
Time Outside (NW)	.14**	.11**	.22**	.07	.02	-.02	.14**	-.20**	.05
Enjoy Outside (NW)	.12**	.11**	.18**	.12**	-.04	-.09*	.22**	-.29**	.01
Emotional Engagement	-.03	-.03	.08*	.09*	.01	-.06	.04	-.06	.02
Cognitive Engagement	-.02	-.03	.01	.07*	.09*	-.04	-.07	.05	.04
Physical Engagement	.01	-.01	-.01	.12**	.12**	-.07*	-.05	.01	.06
Creativity	.01	-.04	-.03	.06	.03	-.04	.03	-.03	.00

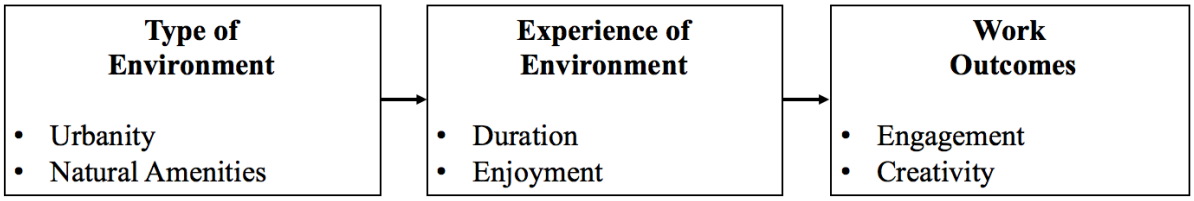


Figure 1

Conceptual Model

Note. Control variables include gender, age, race, work hours in the last week, work schedule, location of primary work (i.e., indoors or outdoors) and sample.

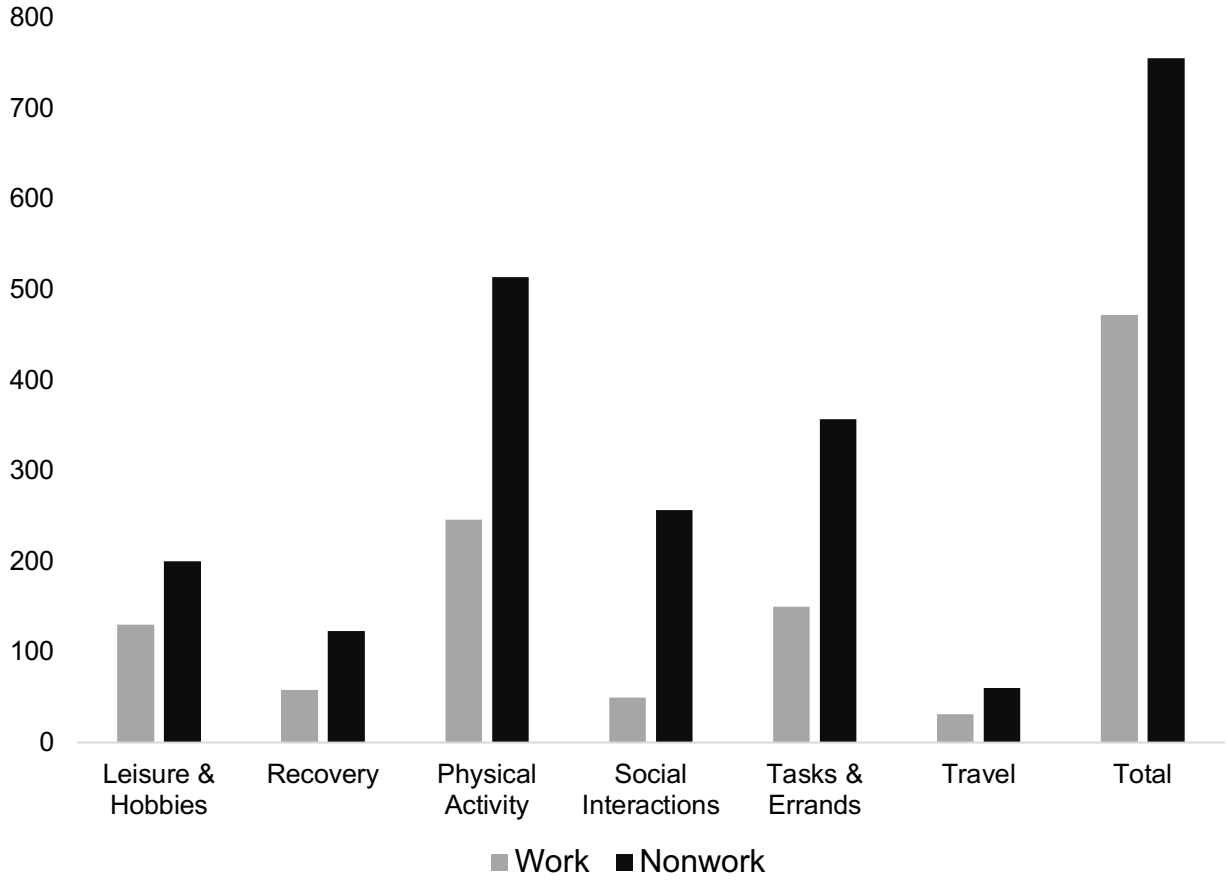


Figure 2

Frequencies of Outdoor Activities

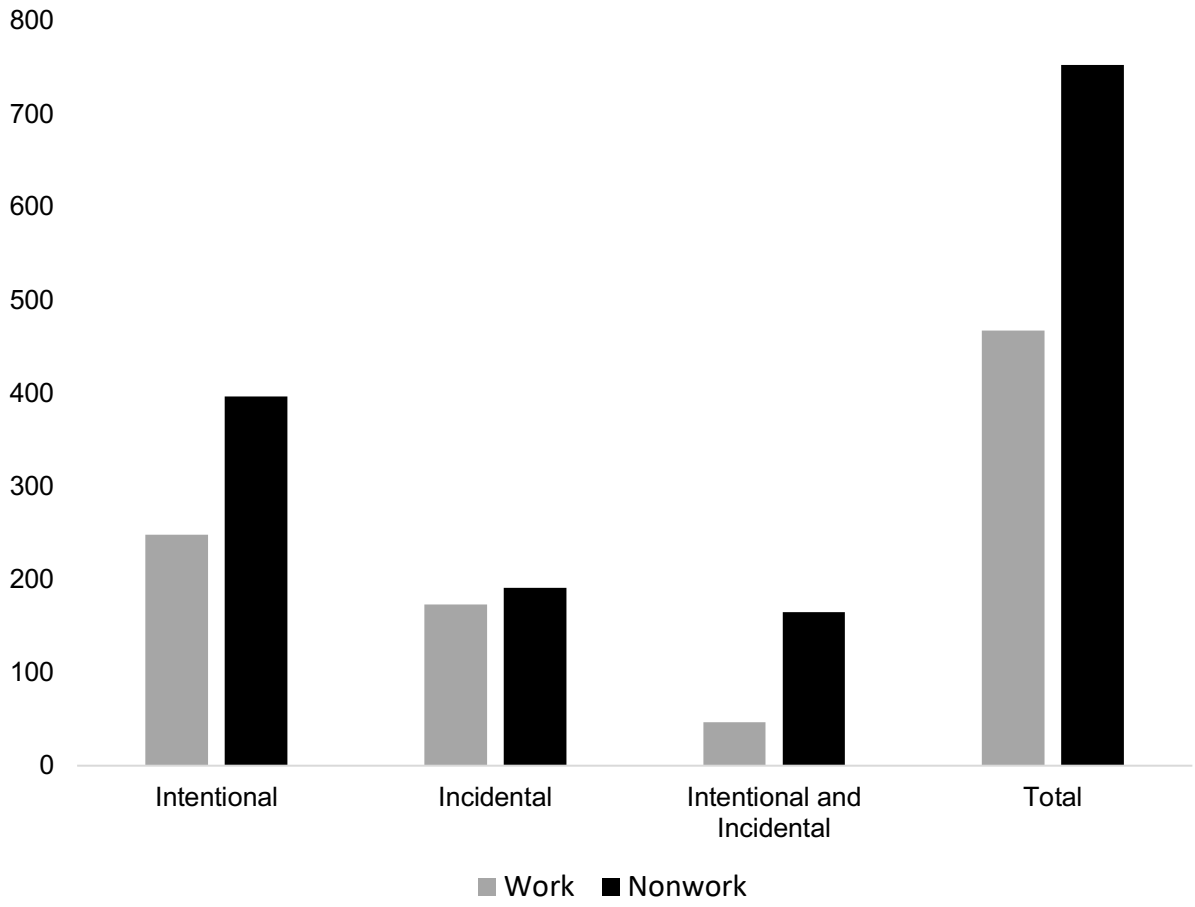


Figure 3

Frequencies of Intentional and Incidental Outdoor Activities

Appendix A: Location Information to Link with Zip Codes for Urban-Rural and Natural Amenities Scores

Working Students:

Where is your current home (e.g., residence hall, off-campus housing, family home) located?

State: _____ County: _____ Zip Code: _____

Where is your workplace located?

State: _____ County: _____ Zip Code: _____

MTurk Workers:

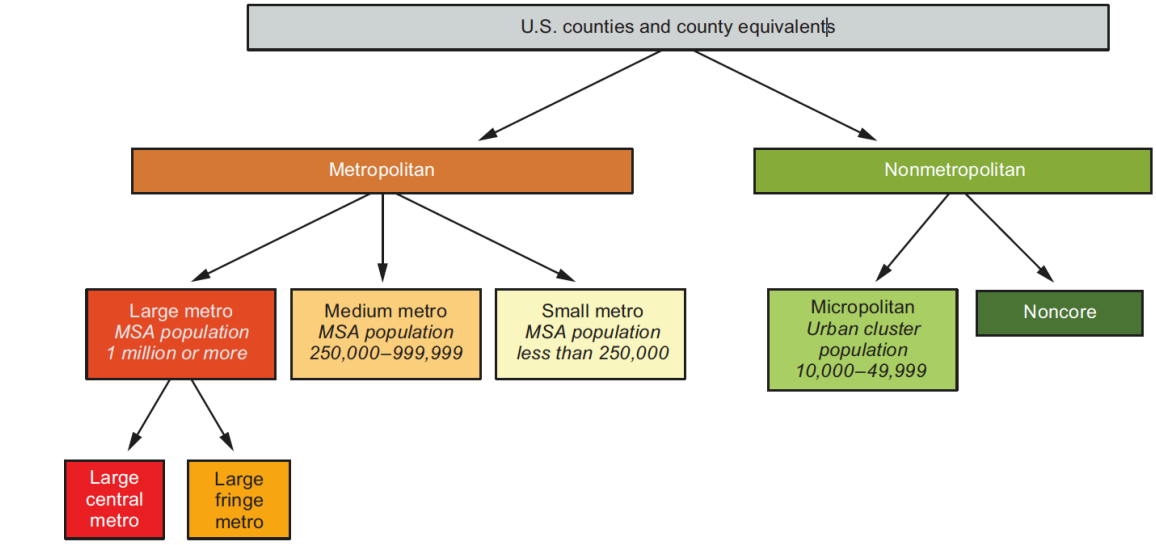
Where is your home located?

State: _____ County: _____ Zip Code: _____

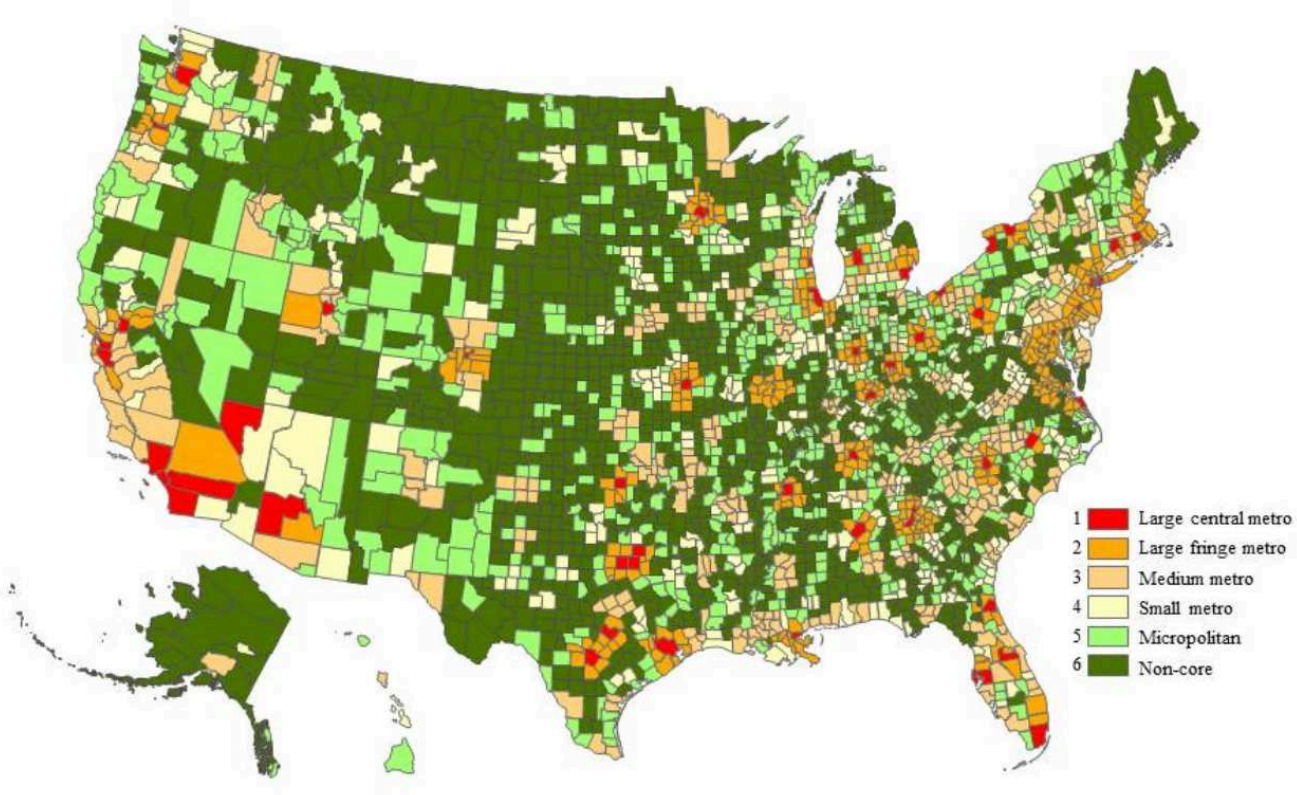
Where is your workplace located?

State: _____ County: _____ Zip Code: _____

Appendix B: Urban-Rural Classification

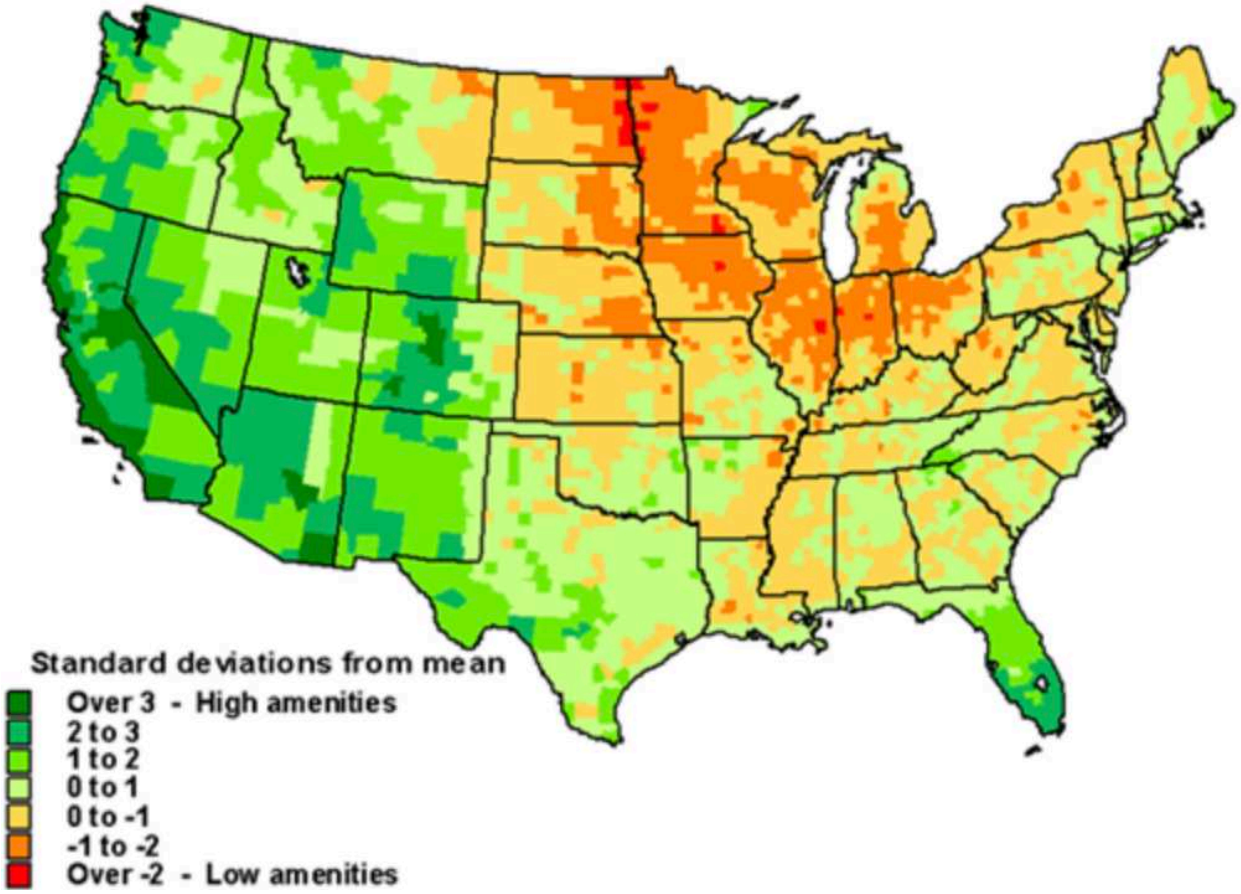


NOTE: MSA is metropolitan statistical area.



Note. Figures depict urban-rural areas and were obtained from Ingram and Franco (2014). The urban-rural classification codes were reverse-scored for the present study, such that higher scores represented more urban areas and lower scores represented more rural areas.

Appendix C: Natural Amenities



Note. Figure depicts natural amenities and was obtained from the USDA (2019).

Appendix D: Job Engagement

Rich et al (2010)

1. I work with intensity on my job
2. I exert my full effort to my job
3. I devote a lot of energy to my job
4. I try my hardest to perform well on my job
5. I strive as hard as I can to complete my job
6. I exert a lot of energy on my job
7. I am enthusiastic about my job
8. I feel energetic about my job
9. I am interested in my job
10. I am proud of my job
11. I feel positive about my job
12. I am excited about my job
13. At work, my mind is focused on my job
14. At work, I pay a lot of attention to my job
15. At work, I concentrate on my job
16. At work, I focus a great deal of attention on my job
17. At work, I am absorbed in my job
18. At work, I devote a lot of attention to my job

---

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree. Items 1–6 represent the physical engagement dimension, items 7–12 represent the emotional engagement dimension, and items 13–18 represent the cognitive engagement dimension.

Appendix E: Creativity at Work

(Zhou & George, 2001)

At work…

1. I suggest new ways to achieve goals or objectives
2. I come up with new and practical ideas to improve performance
3. I search out new technologies, processes, techniques, and/or product ideas
4. I suggest new ways to increase quality
5. I am a good source of creative ideas
6. I am not afraid to take risks
7. I promote and champion ideas to others
8. I exhibit creativity on the job when given the opportunity to
9. I develop adequate plans and schedules for the implementation of new ideas
10. I often have new and innovative ideas
11. I come up with creative solutions to problems
12. I often have a fresh approach to problems
13. I suggest new ways of performing work tasks

---

1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree

Appendix F: Control Variables

Gender
What gender do you most identify with?
1 = Male, 2 = Female, 3 = Other (Please explain: _____), 4 = Prefer to not Answer

Age
How old are you?

Race
How would you describe your race? Please select all that apply.
1 = White
2 = Hispanic, Latino, or Spanish origin
3 = Black or African-American
4 = Asian
5 = American Indian or Alaska Native
6 = Middle Eastern or North African
7 = Native Hawaiian or Other Pacific Islander
8 = Some other race, ethnicity, or origin (please specify: _____)
-10 = Prefer to Not Answer

Work Hours Last Week
How many hours did you work last week?

Work Schedule
Which of the following best describes your work schedule in your primary job?
1 = Regular Daytime Schedule (9am-5pm)
2 = Afternoon Shift (1pm-9pm)
3 = Evening Shift (4pm-midnight)
4 = Overnight Shift (midnight-8am)
5 = Variable Schedule (one that changes from day to day)
6 = Rotating Shift (one that changes from days to evenings or nights)
7 = Other (please specify: _____)

Primary Location of Work
Do you work primarily indoors (i.e., inside a building) in your primary job?
0 = No, 1 = Yes

Sample
0 = MTurk Workers, 1 = Student Workers, Fall Semester, 2 = Student Workers Spring Semester

Appendix G: Qualitative Codebook

GENERAL INSTRUCTIONS

→ All coding **must** be mutually exclusive

- Each statement (i.e., piece of data; separate activity mentioned) = one categorical code
- A single statement cannot be assigned to multiple categorical codes
- For example, "I ate lunch with friends" is assigned to one and only one category (i.e., nonwork social interaction), and may not be assigned to multiple categories (e.g., leisure/hobbies and nonwork social interaction)

→ All statements must receive a code. Do not leave any statements un-coded.

STEP 1: LIST OF ALL SPECIFIC CODES

- See Initial Qualitative Code Lists Excel spreadsheet
- These codes were used to generate the example lists in Step 2

STEP 2: CATEGORICAL CODES

Leisure/Hobbies

Definition: Leisure activities or non-exercise hobbies
Inclusion Criteria: Leisure or "free time" activities or hobbies that are not explicitly physically active. This includes going to a destination (e.g., going to the park, going to a dog park, went to the mountains).
Exclusion Criteria: Physically active activities, relaxing, reflecting, enjoying
Typical Examples: reading, eating, going to a restaurant, having lunch, playing the guitar, gardening, do hobbies and activities, playing games, going to the park, spending time in the mountains, hunting, playing Pokemon Go, watching a Christmas boat parade, grilling, going to church, religious activities, personal stuff, going to a dog park
Close, but No Examples: playing sports, watching birds, skiing, enjoying the fresh air, listening to music, eating a meal with a friend, having lunch with coworker

Smoking

Definition: Engaging in smoking-related activity
Inclusion Criteria: Smoking, vaping, mentioning nicotine
Exclusion Criteria: Anything that is not smoking-related
Typical Examples: smoking, smoking cigarettes, vaping, taking a nicotine break
Close, but No Examples: sitting, unwinding, taking a break

Relax & Reflect

Definition: Low-intensity activities that allow for relaxation or reflection in/of the outdoor environment
Inclusion Criteria: Relaxing, reflecting, thinking, detaching, watching/observing surroundings
Exclusion Criteria: High-intensity activities (e.g., exercising), leisure activities/hobbies
Typical Examples: relaxing, sitting, clearing mind, try to unwind, chillin, thinking, watch squirrels, watching the environment around me, watching the moonlight, people watching,

looking at the scenery, looking at the seals, listening to birds, taking a break, sleeping, sightseeing, hanging out
Close, but No Examples: walking, playing, listening to music, playing the guitar, talking with a friend, enjoying the air

Enjoy

Definition: Enjoying something outside
Inclusion Criteria: Participant specifically says that they are "enjoying" something
Exclusion Criteria: Participant does not use the words "enjoy", "enjoying", or "enjoyed"
Typical Examples: enjoying the sunshine, enjoyed the fresh air, I enjoyed the environment, enjoying the walk
Close, but No Examples: Had fun at the park, had a good time with friends, relaxed, listened to the birds, looked at the scenery

Walking – Intentional

Definition: Walking that is intentional and occurs for the sake of walking
Inclusion Criteria: Participant simply mentions walking or walking in a certain location (e.g., walking on a trail, walking in a park)
Exclusion Criteria: Walking for the purpose of another task (e.g., going to and from places/vehicles) for the purpose of getting to a destination (e.g., walking to the store), or walking with another person or dog
Typical Examples: walking, walking for exercise, walking on a trail, walking in the woods, walking around my neighborhood
Close, but No Examples: walking with my coworker, walking with friend, walking to and from my car, walking to and from buildings, walking to vehicles to go different places, walking to the bank, walking to the mailbox, walking to places, walking to class

Walking – Incidental

Definition: Walking in that occurs incidentally and is the result of engaging in another activity that requires walking
Inclusion Criteria: Walking for the purpose of another task (e.g., going to and from places/vehicles) or for the purpose of getting to a destination (e.g., walking to the store)
Exclusion Criteria: Participant simply mentions walking, walking in a certain location (e.g., walking on a trail, walking in a park), or walking with another person or dog
Typical Examples: walking to and from my car, walking to and from buildings, walking to vehicles to go different places, walking to the bank, walking to the mailbox, walking to places, walking to class, walking between deliveries, walking to grab lunch
Close, but No Examples: walking with my coworker, walking with my spouse, walking, walking for exercise, walking on a trail, walking in the woods, walking around my neighborhood

Exercise

Definition: Exercise or physical activity of greater intensity than walking
Inclusion Criteria: Physical activities, exercising, playing sports
Exclusion Criteria: Non-physical activities (e.g., sitting, reading) or walking

Typical Examples: running, skiing, physical activities, jogging, playing tennis, playing basketball, skateboarding, scrambling, climbing, hiking, ice skating, exercising, biking, playing in the snow, throwing ball, kicking ball
Close, but No Examples: sitting, reading, walking, walking dog, walking on a trail, playing with kids

Caregiving and Interacting with Animals

Definition: Caregiving to or interacting with pets or other animals
Inclusion Criteria: Taking care of pets or other animals, or interacting with (e.g., playing, riding, spending time with) pets or other animals
Exclusion Criteria: Taking care of kids, or watching/observing animals
Typical Examples: walking dog, playing with cat, tending chickens, caring for dog, feeding horse, riding horse, working on farm with animals, feeding ducks
Close, but No Examples: looking at the seals, watching the birds, listening to birds, watching kids, caring for children

Media Consumption

Definition: Consuming media or using technological device (e.g., phone)
Inclusion Criteria: Consuming media, using/checking social media, using phone or other technological device. Solitary media use.
Exclusion Criteria: Not consuming media, not using phone, or using phone for reading, talking, texting, or tasks/errands (e.g., checking work emails)
Typical Examples: play with phone, look at phone, catch up on social media, catching up on news, listening to music, listening to podcasts, watched YouTube videos on my phone,
Close, but No Examples: talk on phone, reading on phone, checking work emails, texting

Traveling/Transportation

Definition: Traveling somewhere
Inclusion Criteria: Traveling in a vehicle
Exclusion Criteria: Traveling by foot (e.g., walking)
Typical Examples: driving, riding busses, motorcycling, traveling
Close, but No Examples: walking to the store, running errands

Nonwork Social Interaction

Definition: Socializing and/or interacting with friends and family
Inclusion Criteria: Social or general interactions with friends and family (e.g., spouse/partner, children). Another person is mentioned in an activity. Communication via talking in person, talking on the phone, or texting. Or, participant does not mention who specifically they are interacting with, but the interaction occurs during days off or before and after work.
Exclusion Criteria: Interacting with or caregiving for pets or other animals, interacting with others at work.
Typical Examples: Spending time with family, hanging out with children, taking kids to the park, talking to people at a gathering, playing with my sister, took kids sledding, talk on phone, texting, walking with a friend, having lunch with a friend, we had lunch (only when mentioned during days off or before and after work), talking (only when mentioned during days off or before and after work), talking with other people (only when mentioned during days off or before

and after work), talked on the phone (only when mentioned during days off or before and after work)
Close, but No Examples: Playing fetch with dog, walking dog, taking care of kids (during **work** time), going to the park, hanging out with coworker, using social media

Work Social interactions

Definition: Socializing and/or interacting with others at work
Inclusion Criteria: Social or general interactions with others at work, including co-workers, supervisors, managers, subordinates, employees, clients, customers, residents, students. Or, participant does not mention who specifically they are interacting with, but the interaction occurs during work time.
Exclusion Criteria: Work-related tasks or errands in which others are involved
Typical Examples: having lunch with coworkers, hanging out with students, talking with subordinates, talking to customers, walk with a coworker, we had lunch (only when mentioned during work time), talking with other people (only when mentioned during work time), talking (only when mentioned during work time), talked on the phone (only when mentioned during work time)
Close, but No Examples: helping a customer, watching residents, watching children, playing with the kids, showing customers around the property, meeting a client, client visits, getting rid of rotten wood with a coworker

Nonwork Tasks/Errands

Definition: Completing tasks, errands, or chores in the nonwork domain
Inclusion Criteria: Tasks, errands, or chores that occur at home, during nonwork time, and are not specific to work. May also include waiting for something.
Exclusion Criteria: Work-specific tasks and errands, indoor nonwork tasks/errands,
Typical Examples: ran errands (during days off and before and after work), did chores, went shopping, shopping on foot, yardwork, worked on the house, farm work, picking up food, waiting, waiting for bus, waiting for piano lesson, did homework, schoolwork, picking up lunch, getting food
Close, but No Examples: I checked the mail for work, sent work-related emails, relaxed on my porch, cleaned inside my house, spent time with family

Work Tasks/Errands – Certain

Definition: Completing tasks, errands, or chores for one's work/job with explicit mention of one's job or work.
Inclusion Criteria: Tasks, errands, or chores completed specifically for work-related purposes and with explicit mention of one's job or work
Exclusion Criteria: Tasks, errands, or chores that seem to be for work-related purposes but participant did not explicitly mention it being for their job or work. Tasks, errands, or chores completed for nonwork-related purposes.
Typical examples: work duties, taking out trash at work, delivering packages for work, look after kids that I nanny, taking photos for work, checking work-related emails, running errands (only if mentioned during work time)
Close, but No Examples included during work time: playing ball with my children, personal stuff, doing homework, running household errands

Close, but No Examples included during days off or before and after work: ran errands, took care of packages, picked up trash, checked emails, watching children, landscaping

Work Tasks/Errands – Probable or Possible, but not Certain

Definition: A response that implies completing tasks, errands, or chores for one's work/job, but without an explicit mention of one's job or work.
Inclusion Criteria: Tasks, errands, or chores that seems to be for work-related purposes, but participant did not explicitly mention it being for their job or work. Tasks, errands, or chores completed for nonwork-related purposes.
Exclusion Criteria: Tasks, errands, or chores completed specifically for work-related purposes and with explicit mention of one's job or work
Typical examples (during work time): ran errands, getting packages, picked up trash, checked emails, gathered up shopping carts, watching children, played with kids on the playground, driving forklift, landscaping, moving materials, taking people's orders, walking people's stuff to their car
Close, but No Examples included during work time: playing ball with my children, personal stuff, doing homework, running household errands
Close, but No Examples included during days off or before and after work: ran errands, took care of packages, picked up trash, checked emails, watching children, landscaping

No Response

Definition: Participant did not respond to the question
Inclusion Criteria: A blank response, an erroneous entry of a numerical value or single letter
Exclusion Criteria: A response
Typical Examples: "_____", 2, 3, A
Close, but No Examples: I stayed inside most of the time, I was indoors

N/A

Definition: Not applicable. No outdoor activities mentioned in response. This is not meant to be a category for ambiguous codes, but rather a category for responses that clearly did not occur outdoors.
Inclusion Criteria: Participant mentioned that they not going outside, reported only spending time indoors, or reported activities that most likely occurred indoors
Exclusion Criteria: Any responses that included outdoor activities that could fit into any of the other categories
Typical Examples: I did not go outside, I spent my time indoors, I was inside, I played video games, I went to a movie, I was at the gym, cooking, cleaning inside the house, I didn't really go outside, I didn't really get to spent time outside
Close, but No Examples: watched YouTube videos on my phone, I jogged but otherwise spent most of my time indoors, checked social media, I ate at a restaurant

STEP 3: BROADER CATEGORICAL CODES

1. **Leisure/Hobbies**
    - Leisure/Hobbies, Media Consumption, Smoking categories from Step 2
2. **Recovery**

- Relax & Reflect and Enjoy categories from Step 2

3. **Physical Activity**
   - Walking – Intentional, Walking – Incidental, and Exercise categories from Step 2
4. **Work Social Interaction**
   - Work Social Interaction category from Step 2
5. **Nonwork Social Interaction**
   - Nonwork Social Interaction and Interacting with Animals categories from Step 2
6. **Work Tasks/Errands**
   - Work Tasks/Errands – Certain and Work Tasks/Errands probable or possible categories from Step 2
7. **Nonwork Tasks/Errands**
   - Nonwork Tasks/Errands category from Step 2
8. **Traveling/Transportation**
   - Traveling/Transportation category from Step 2
9. **No Response**
   - No response category from Step 2
10. **N/A**
    - N/A category from Step 2