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Measuring Emotional Response to a Planting Activity for Staff at an Urban Office Setting: A Pilot Study

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Measuring Emotional Response to a Planting Activity for Staff at an Urban Office Setting: A Pilot Study

Abstract

Background: Interaction with occupation-centered activities, such as gardening, is associated with improved mental health. With limited evidence supporting the effects of short-term nature-based interventions on employees' emotional states, the purpose of this research was to understand the impact of a one-time, short-term nature-based intervention on the emotional state of employees at an urban office building.

Method: This pretest/posttest design study used a visual analogue emoticon assessment tool, the *Interaction with Nature* scale, to measure differences in the participants' emotional states before and after participating in a planting activity. Twenty-two participants engaged in the study. Each participant potted a succulent plant to display in the participant's workspace.

Results: Quantitative results indicate with statistical significance that the participants were happier ($t(21) = 7.1, p = .001; r_s (.535), p = .010$), calmer ($t(21) = 3.4, p = .003; r_s (.486), p = .022$), and more hopeful ($t(21) = 2.9, p = .009; r_s (.634), p = .002$) after the intervention than before the intervention.

Conclusion: Findings suggest that a short-term, occupation-centered nature intervention can improve emotional state. Nature-based interventions may help to increase social interactions among staff and contribute to making a positive impact on the office workplace social context. Determining how occupation-centered nature interventions can improve emotional status and social relationships is important to consider, along with any potential implications for workforce performance.

Comments

The authors report that they have no conflicts of interest to disclose.

Keywords

occupation-centered nature activity, socialization, workplace environment, emotions

Cover Page Footnote

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Credentials Display and Country

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The curative and health-promoting value of being in and interacting with nature has been widely acknowledged throughout time and across cultures (Ward-Thompson, 2011). Ulrich's (1984) seminal study linking the value of views of nature to recovery from surgery was the catalyst for current interest in linking nature with health-promoting capacities. Evaluating the evidence related to the impact of engagement with nature on health and wellness is increasingly gaining traction in the medical, public health, and design communities. Contemporary research confirms that nature interventions improve physiological and psychological wellness (Page, 2008; Van den berg, Maas, Verheij, & Groenewegen, 2010). These interventions may be active and include activities such as hiking, walking, or gardening (Scott, Masser, & Pachana, 2015; Wolf & Wohlfart, 2014). They may also be passive. The capacity to gaze at "green" through windows, to view nature photographs, and to have indoor plants at a workplace have been shown to improve worker focus and productivity and to lower stress (Largo-Wright, Chen, Dodd, & Weller, 2011; Raanaas, Evensen, Rich, Sjøstrøm, & Patil, 2011). Engaging in nature-based interactions has also been linked to a decrease in attentional fatigue, which follows periods of prolonged and high intensity repetitive mental and physical activity (Berto, 2014).

Because of their salutary capacities, nature-based encounters are not only the topics of recent research, but also, increasingly, the subject of mainstream experiences. These include engagement in school and community gardening programs, garden clubs, veteran's farming programs, forest bathing (immersive walks in densely wooded areas), and guided meditation walks in nature that are readily available to the public. These types of programs provide consumers with easily accessible opportunities to engage in outdoor activities to improve mental and physical health and wellness.

Participation in nature-based interventions may also improve the social-emotional well-being of both service providers and recipients of occupational therapy services. Evidence finds that "[nature-assisted therapy] can have significant effect on psychological, social, physical, and intellectual therapeutic goals in diverse patient categories, with significantly reduced measurable symptoms of disease" (Annerstedt & Währborg, 2011, p. 382). These types of activities may also have a positive impact on workplace culture by providing an outlet for restoration, refocusing, and socialization for employees. This pilot study provides insight into the impact a short duration planting activity had on the social-emotional well-being of employees at an urban office workplace.

Literature Review

Nature and Health

In her AOTA article, "Gardening as a Therapeutic Experience" (1950), Elizabeth Clarke discusses the varied activities that are of interest to clients and writes,

...perhaps one of the most profitable, yet relaxing and enjoyable to all those requiring physical exercise is that of gardening. The values derived from gardening, whether the participation is passive or very strenuous are far reaching, and give each person a chance to re-create and express himself. (p. 109)

Written long before the publication of the first evidence-based study equating nature interaction with health, Clarke's concept statement is prophetic. Her acknowledgment that gardening is an occupation-centered, nature-oriented intervention that promotes health and well-being preceded what current evidence is finding. The results of a literature review of the physiological impacts of interacting with nature revealed studies showing that improved cognitive, cardiovascular, immune, and endocrine systems function as a result of nature-based experiences (Haluza, Schönbauer, & Cervinka, 2014).

Further, exercising in verdant green spaces was equated with positivity and a greater sense of restoration (Hansmann, Hug, & Seeland, 2007).

Social-Emotional Health and Well-Being

Research suggests that short- and long-term interactions with nature influence mood and cognitive processes and serve to moderate depression and stress (Bratman, Daily, Levy, & Gross, 2015; Pasanen, Neuvonen, & Korpela, 2017). Connections with nature may provide pathways for happiness, and individuals with mental health conditions who participate in gardening programs demonstrate improvement in mood and connectivity with others (Smidl, Mitchell, & Creighton, 2017; Zelinski & Nisbet, 2012). Participants diagnosed with stress or mild to moderate depression, and whose therapy commenced in a rehabilitation garden, were found to need fewer medical appointments and less inpatient psychiatric hospitalization than a matched cohort (Währborg, Petersson, & Grahn, 2014). Inpatients with diagnoses of major depression, dysthymia, or the depressive phase of bipolar disorder who participated in a multi-week gardening program showed a persistent reduction in symptoms of depression, rumination, and increased attention at a 3-month follow-up (Gonzalez, Hartig, Patil, Martinse, & Kirkevold, 2010). This was a particularly interesting finding, as many nature-based studies are for single or short-term conditions with no follow-up. The findings of the Gonzalez et al. (2010) study showing a persistent reduction of symptoms adds credence to the value of nature-based interventions for individuals with mental health conditions. Berger and McLeod (2006) discuss the benefits of infusing interactions with nature into traditional mental health services and suggest the concept of touching nature is based on the belief that through direct physical, emotional, and spiritual encounter with nature one can touch upon deep parts of one's personality, receive profound insights, and sense a strong connection to the universe (p. 89).

Stress is increasingly recognized as a source of community health problems, general burnout and depression, and lowered overall human productivity (Grahn & Stigsdotter, 2003). It is one of the leading contributors to premature death (Fali, Vallet, & Sauce, 2018). A proximity to green spaces, views of nature, and time spent in greened urban spaces can reduce the effects of stress for those living and working in cities (Pasanen, Tyrväinen, & Korpela, 2014; Vuicica et al., 2017). Researchers have also found that selectively choosing to be in green spaces has the capacity to subjectively reduce various acuties of stress (Pasanen et al., 2017) and increase attentional capacity, thus serving as a buffer to the negative impacts of stressful life experiences (Cimprich & Ronis, 2003). Research also links increased social connectivity and a sense of belonging with nature interactions (Smidel, Mitchell, & Creighton, 2017; Tse, 2010).

One activity that many people engage and participate in is gardening, which has long been used by occupational therapists as a treatment method for clients with physical, cognitive, and mental health conditions (Cipriani et al., 2017; Wagenfeld & Atchison, 2014). Based on research findings that interacting with nature positively influences physical and mental health, the purpose of this quasi-experimental study was to use a visual analogue emoticon scale to measure changes in emotional status before and after engaging in a short-term planting activity for employees at an urban office setting. We proposed the research question: How does engagement in a one-time, short-term planting activity impact the sense of happiness, calm, peace, and hopefulness for staff working in an urban office building?

Method

Design and Instrument

A quasi-experimental pre- posttest design was employed in this study. The Interaction with Nature Scale (IWN) was used to measure participants' emotional state before and after the experimental condition, which was engagement in a planting party. The IWN is a simple and engaging visual analogue scale that gathers information about the emotional impact of engaging in nature-based activities without requiring a high level of reading comprehension (Toews, Wagenfeld, & Stevens, 2018). Visual analogue scales have been shown to be an effective and efficient means to gather information on factors such as pain and consumer satisfaction (Abend, Dan, Maoz, Raz, & Bar-Haim, 2014; Ismail et al., 2015). They can be completed by individuals with low literacy and are less vulnerable to confounding factors than Likert scales (Rhee, Belyea, & Mammen, 2017; Voutilainen, Pitkäaho, Kvist, & Vehviläinen-Julkunen, 2016).

The IWN measures perceived change in four emotional states: sadness-happiness, anger-peacefulness, stressed-calm, and hopelessness-hopefulness (Toews et al., 2018). Each scale is anchored with easily recognizable emoticons, a simple and universal means to convey personal feelings (Huang, Yen, & Zhang, 2008). A negative emoticon anchors the left end of the scale and a positive emoticon anchors the right end of the scale. A horizontal line connecting each of the emoticon pairs contains seven, evenly spaced vertical lines. For this study, the participants were instructed to circle the vertical line on the scale that best represented how they felt before planting. After completing the planting activity, they turned the card over and repeated the procedure, circling a vertical line along the emoticon continuum that best represented how they felt after planting. The IWN also asks participants to indicate the time of onset and completion of the activity, as well as the weather conditions. A question asking what the participant was doing prior to the nature-based activity is adjusted to align with the population being studied. In the current study, it was a checklist including typing, writing, eating, reading, on a call, at a meeting, and/or other. A final question on the posttest side of the card asks participants to circle whether they feel better, no different, or worse at that exact moment.

Participants

The participants in the study were employees of the American Occupational Therapy Association (AOTA). AOTA has 77 employees. Twenty-nine of these employees telecommute in some capacity; 12 are full-time telecommuters who work offsite, and 36 are non-telecommuters. The study was open to all staff. There were no additional inclusionary or exclusionary criteria. Thirty staff attended the planting party, and of these, 22 agreed to participate in the research portion of the study. All 22 participants completed the research protocol.

Procedure

This study was the second step in greening the AOTA workspace. The process began as an idea proposed by the second author, who thought that introducing plants into the lunch area would further beautify a communal space and possibly help create a more positive work culture. The first and second authors formed a Green Team, which included two additional AOTA staff, who are avid gardeners. With permission from the acting AOTA CFO, the Green Team obtained and placed plants in the lunch area. A locked comment box was placed near the plants with a sign inviting staff to share their thoughts about the plants. The nineteen comments were overwhelming positive, leading the team to progress to this evidence-based study.

Following Human Subject Institutional Review Board (HSIRB) approval, an email blast was sent to all AOTA staff informing them of the planting party and the voluntary nature of engaging in the research portion of the activity. It was made clear that the party was inclusive and open to all AOTA staff at no cost to them, regardless of whether they elected to participate in the research. The study commenced in late winter at the AOTA headquarters in Bethesda, MD. It began in the early afternoon on the sixth floor in an empty room with a bank of windows running along the south-facing wall. The room is illuminated with overhead fluorescent lighting. A long row of tables was assembled in the room so that all of the participants could plant at the same time. The team placed a small ceramic pot, drip tray, spoon, and plant care instruction card at each work station. The pots were different colors and randomly placed along the table. This random setup was intentional. To obtain a pot color that they liked, the participants had good reason to plant next to someone they potentially did not know well. In doing so, there was an opportunity to interact with a fellow staff member with whom they might not typically socialize.

Those who elected to participate in the research read and signed an informed consent and then completed the pretest portion of the IWN. All of the participants selected a small succulent from a wide palette of shapes, colors, and textures. The participants brought their plants to the table and commenced to repot their plants using the spoon to scoop soil from communal bowls placed along the center of the tables, and then they watered them. After finishing the planting activity, those in the research study filled out the posttest portion of the IWN card and placed it in a lockbox located on the check-in table.

We received HSIRB approval for this quasi-experimental study through Western Michigan University. We obtained permission from the AOTA's acting CFO to facilitate the study prior to submitting the HSIRB application.

Results

Despite an inclement day, there was lively conversation prior to and during the event. Thirty AOTA staff members attended the occupation-centered planting party. Of these, 22 participated in the research study. All 22 participants completed the study. It took the participants approximately 3 to 5 min to complete both the pre- and posttest portions of the IWN. Seventeen participants responded to questions indicating start and stop time. The average length of time spent engaged in the study was 16 min, with a low of 6 min and a high of 30 min.

The only demographic information collected for the study was the participants' names, which were de-identified. Other questions asked the participants to indicate the time at the onset and completion of the planting activity, their interpretations of the weather conditions, and what they were doing prior to attending the planting party. The pre- and posttest IWN scores were tabulated on a scale from 1 to 7, with 1 representing the far left (most negative) range of the emoticon pair, and 7 representing the far right (most positive) range of the emoticon pair. While the sample ($n = 22$ completed assessments) was relatively small, paired sample *t*-tests and Spearman's rho non-parametric correlational statistics were run to ascertain, cautiously, statistically significant relationships between pre- and posttest scores. We report the findings, including general comments about the planting party, below.

Quantitative Findings

The weather was inclement on the day of the party; 27% ($n = 6$) of the participants indicated that it was cold, 73% ($n = 12$) indicated that it was cloudy, and 91% ($n = 20$) indicated that it was raining. Prior to attending the planting party, the participants were typing (36%; $n = 8$), in a meeting (36%; $n =$

8), eating (15%; $n = 3$), reading (10%; $n = 2$), other (10%; $n = 2$), engaged in two activities simultaneously (10%; $n = 2$), or on the phone (5%; $n = 1$). No statistical significance was noted between what the participants were doing prior to the study and the posttest results of the IWN. Means of all four of the pretest scores of the IWN increased at posttest (see Table 1 and Figure 1).

Table 1
Paired Samples Statistics

		Mean	N	SD	Std. Error Mean
Sad to Happy	Pre	4.64	22	1.049	.224
	Post	6.09	22	.921	.196
Stressed to Calm	Pre	4.64	22	1.329	.283
	Post	5.55	22	1.438	.307
Angry to Peaceful	Pre	5.05	22	1.618	.345
	Post	5.45	22	1.711	.365
Hopeless to Hopeful	Pre	5.00	22	1.234	.263
	Post	5.59	22	1.297	.276

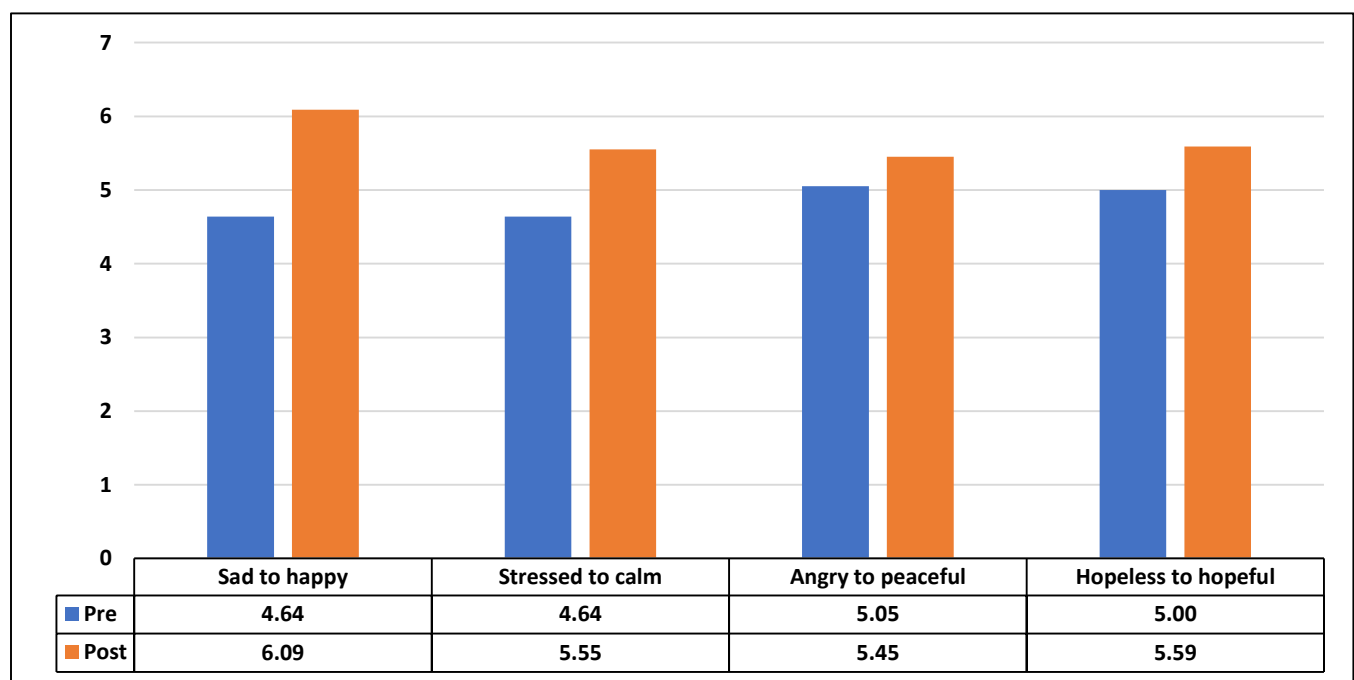


Figure 1. Mean emoticon scores pre- and posttest scales.

Statistical significance was noted between three of the four emoticon pairs. The results of paired sample t -test and Spearman's rho correlational analysis suggested that the participants were happier ($r_s (.535)$, $p = .010$; $t(7.1)$, $p = .001$), calmer ($r_s (.486)$, $p = .022$; $t(3.4)$, $p = .003$), and more hopeful ($r_s (.634)$, $p = .002$; $t(2.9)$, $p = .009$) after the planting intervention than before the intervention. No significance was found with the angry-peaceful scale (see Tables 2 and 3).

Table 2
Paired Samples t-test

	Paired Differences					t	df	Sig. (2 tailed)
	Mean	SD	SEM	95% Confidence Interval of the Difference				
				Lower	Upper			
Sad to Happy	-1.455	.963	.205	-1.881	-1.028	-7.088	21	.001
Stressed to Calm	-.909	1.269	.271	-1.472	-.346	-3.360	21	.003
Angry to Peaceful	-.409	1.182	.252	-.933	.115	-1.624	21	.119
Hopeless to Hopeful	-.591	.959	.204	-1.016	-.166	-2.890	21	.009

Note. N = 22 for all tests.

Table 3
Spearman's Rho Correlation

		Sad to Happy		Stressed to Calm		Angry to Peaceful		Hopeless to Hopeful		
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Sad to Happy	Pre	r_s	1.000	.535*	.271	.327	.240	.359	.553**	.315
		Sig. (2-tailed)	.	.010	.223	.137	.281	.101	.008	.153
	Post	r_s	.535*	1.000	.388	.892**	.349	.819**	.193	.537*
		Sig. (2-tailed)	.010	.	.074	.001	.112	.001	.389	.010
Stressed to Calm	Pre	r_s	.271	.388	1.000	.486*	.550**	.334	.157	.198
		Sig. (2-tailed)	.223	.074	.	.022	.008	.129	.485	.376
	Post	r_s	.327	.892**	.486*	1.000	.411	.780**	.135	.560**
		Sig. (2-tailed)	.137	.001	.022	.	.057	.001	.550	.007
Angry to Peaceful	Pre	r_s	.240	.349	.550**	.411	1.000	.383	.383	.243
		Sig. (2-tailed)	.281	.112	.008	.057	.	.078	.079	.277
	Post	r_s	.359	.819**	.334	.780**	.383	1.000	.258	.707**
		Sig. (2-tailed)	.101	.001	.129	.001	.078	.	.246	.001
Hopeless to Hopeful	Pre	r_s	.553**	.193	.157	.135	.383	.258	1.000	.634**
		Sig. (2-tailed)	.008	.389	.485	.550	.079	.246	.	.002
	Post	r_s	.315	.537*	.198	.560**	.243	.707**	.634**	1.000
		Sig. (2-tailed)	.153	.010	.376	.007	.277	.001	.002	.

Note. N = 22 for all tests. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

Seven of the 22 participants responded to a question in the posttest asking how they felt at the completion of the planting activity. Four indicated that they felt better and three indicated that they felt the same.

Discussion

This study provided a personalized nature activity. The participants chose their plants, pots, and positions at the communal table. They also actively participated in the planting. The study design and process aligned with the person-environment-occupation performance model (Baum & Christiansen, 2005). We considered various performance components to increase socialization (e.g., positioning of containers, large bowls of soil for shared scooping and for choosing the plants, a single long table to increase the sense of community); and environmental components, such as table height and lighting, and additional elements to increase engagement time (e.g., photos of plants with name, cookies for snacks). The planting activity was scheduled in the afternoon to adhere to the organizational routines and staff needs (e.g., before anticipated afternoon meetings, after lunch break, not too close to the annual AOTA conference).

The planting party was an eagerly anticipated event at AOTA headquarters. The conversation throughout the activity was lively and positive. Many affirmative comments from the participants focused on the novelty of having the opportunity to pot a succulent to bring back to their workspaces. One participant was surprised to see the large group of staff gathered for the planting party. There was discussion about which plant to select, as well as some concerns about caring for the plants. As previously mentioned, all of the participants received a plant care card prepared by Green Team members to ensure the plant's longevity. The Green Team members spoke about the care of the plants during the planting event and, to allay concerns, offered to look in on the plants, as needed. Despite minor reservations about plant care, none of the participants declined to engage in the activity, either as research subjects or general attendees. Some of the participants named their plants and posted positive social media comments about the activity. After the planting party, it was observed that some of the succulents have been placed on sunny window ledges, and staff are teaming up to care for the plants, which provides an enhanced level of socialization in the office. The participants continue to make comments about the planting party, including mention of the positive impact it had on them and the interest they have in participating in future social, occupation-centered activities, such as this one.

Time in Nature

The dose response associated with the health-promoting benefits of nature interaction appears to range from 5 min to 30 min (Barton & Pretty, 2010; Shanahan et al., 2016). These benefits span physical and mental health, including a reduced risk of cognitive decline. The average time spent in the planting party for this study was 16 min. Like findings from other studies, this relatively short duration nature-based intervention yielded positive outcomes for the participants.

Attentional Focus

Prior to attending the planting party, 85% of the staff were primarily engaged in activities such as typing, meetings, readings, and calls, all of which required a high level of focus and concentration. Prolonged exposure to high intensity mental or physical activity requiring focused attention, such as reading, computer work, and repetitive motor tasks, can lead to long-term negative consequences, including frustration, stress, impulsivity, anger, increased inaccuracy, problem-solving issues, and reduced productivity (Berman, Jonides, & Kaplan, 2008; Marcora, Staiano, & Manning, 2009). Introduced in the 1990s, the Attention Restoration Theory proposed that a beneficial way to reduce the effects of attentional fatigue is through engagement with nature (Kaplan, 1995). This engagement may include looking at, being in, or interacting with nature.

The planting intervention significantly impacted the participants, as the results of the study showed that following engagement in the short-term nature-based intervention the participants experienced an improved emotional state. This finding is in alignment with evidence of the positive influence of nature-based interventions on social-emotional health and of a reduction in mental fatigue. The participants felt calmer, happier, and more hopeful after engaging in the planting party.

The mean scores for all four of the pretest emoticon pairs were above neutral. This finding suggests that the participants began the study feeling somewhat positive. At posttest, the mean scores trended, albeit modestly, from the above neutral to a more positive range. This held true for all four emoticon pairs. The most notable change was with the sad-happy pair. Although not statistically significant, the change from pre- to posttest for the angry-peaceful pair indicated that the participants were more peaceful after engaging in the planting intervention. There was a collective trend toward positivity for all scales, indicating a small, rather than a dramatic, change in emotional states. The findings from this pilot study suggest that a short duration, occupation-centered nature-based planting activity can, even in a small manner, positively impact emotional state and provide a social opportunity for employees sharing a workplace. Given the small sample, these findings must be considered cautiously.

Limitations

Despite the promising findings, the study presents with some limitations. The first is that the sample was small, indicating a need to expand the number of the participants involved in the planting intervention and to measure outcomes using the IWN with other participant populations. In addition, the IWN lacks established reliability and validity.

Like other analogue and Likert scales, the IWN relies on participant self-reporting; therefore, much could be left open to interpretation in terms of self-reflection of emotional state. This limitation may be reduced by including objective measures, such as pre- and posttest heart rate, blood pressure, and cortisol levels, in the research protocol. Also, the IWN does not measure the impact of nature-based interventions on attentional fatigue, which, based on the highly-focused activities the participants were engaged in prior to the study, may have been a contributing factor to the study's outcomes. That is, the nature-based planting party intervention may have helped to ameliorate some of the effects of attentional fatigue, such as stress and frustration, in addition to having a positive impact on emotional state. Based on the study's results, it is not possible to state with certainty that the changes in emotional state were the result of the actual planting activity (an antidote to attentional fatigue), the social nature of the party, or a combination of both. A final limitation of the study was a lack of measurement of change in emotional state over a long-term period, as this was a one-time, short-term intervention with no follow-up.

Future Research

Future research should address (a) investigating the psychometric properties of the IWN; (b) measuring outcomes via biomarkers, such as heart rate, blood pressure, and cortisol levels, along with the IWN and over a longer duration following completion of the intervention; and (c) comparing outcomes from diverse occupation-centered interventions, such as planting and cooking or crafts activities, to explore the degree to which outcomes are associated with gardening or other factors inherent to the intervention (Toews et al., 2018). Further study is also needed to measure outcomes of brief, periodic nature-based activity in comparison to less frequent but longer activity, as well as an array of potential metrics, like the impact of such interventions on workplace mood, satisfaction, and

productivity. Once reliability and validity is established for the IWN, using it to determine a causal relationship between nature-based interventions and emotional state via randomized control trial research is also necessary.

The results of this pilot study indicate that a short-term, one-time, occupation-centered nature-based intervention has the capacity to make a positive impact on the emotional state of staff who share a common workplace. These types of interventions may also serve as a fun and engaging social event. If the plants remain in the AOTA workplace, they may also impart a sense of home-like comfort, which may further positively impact the staff's well-being.

Implications for Practice

As Farrow stated, “an in-depth comprehensive understanding of how the physical, mental and social environments we create can cause health is required” (2012, p. 32). Through its holistic, person-centered approach, occupational therapy has the capacity to address “individual and population health through interventions” and contexts that are health promoting (Wagenfeld et al., 2017, p. 299). This is in accordance with *Vision 2025*, which states that “occupational therapy maximizes health, well-being, and quality of life for all people, populations, and communities through effective solutions that facilitate participation in everyday living” (AOTA, 2017, para 1). With our professional commitment to providing interventions and environments that promote health, well-being, and improved quality of life, occupational therapists are well-suited to develop, implement, and evaluate the effectiveness of both long- and short-term, client-centered nature-based programming for clients, be they individuals, groups, or populations (Wagenfeld et al., 2017). The findings of this study suggest that occupational therapists can add value to workplaces by increasing inclusivity and engagement. The improved social context may result in greater mental health and improved benefits for physical health and productivity. This has implications for businesses as well as for the occupational therapy profession. Using a public health approach, occupational therapists can use their distinct knowledge and skills to improve the health and well-being of communities and organizations. Greening workspaces through group nature-based interventions may be one place to begin the process of creating health-promoting work environments.

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