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THE COMPARATIVE EFFECTS OF GARDEN PANSIES AND MONILOPHYTES ON
PERCEIVED STRESS AMONG COLLEGE STUDENTS

By
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Abstract

This study is designed to compare how college students rate their sense of stress in the presence of garden pansies or monilophytes (ferns). The objective is to discover more ways in which students can incorporate stress-reducing elements in their workspace. 32 students were placed in a room at a desk supplemented by a single pansy or fern. The students were asked to complete a 10 minute timed survey consisting of demographic questions and statements taken from the State Trait Anxiety Inventory. The hypothesis is that students will report feeling less stressed in the presence of the flowering pansy. Results consisting of high p-values (0.2689-0.7233) show no correlation between perceived stress/positive emotions for one plant compared to the other. The evidence of this study does not support the original hypothesis, therefore it cannot be reasonably concluded that including flowers in a student's workspace will reduce their sense of stress.

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Introduction

The thesis proposed investigates how garden pansies and monilophytes compare in reducing sense of stress among college students. Numerous studies have been done in various settings regarding how plants can provide benefits to humans. Settings include offices, waiting rooms, schools, hospitals, and more. For example, In Largo-Wight's *Cultivating Healthy Places and Communities: Evidence Based Nature Contact Recommendations* a multidisciplinary review was conducted in several fields of study in which findings were organized into public health recommendations. The recommendations include: cultivate grounds for viewing, maintain healing gardens, incorporate wooded parks and green space in communities, advocate for preservation of pristine wilderness, welcome animals indoors, provide a plethora of indoor potted plants within view, light rooms with bright natural light, provide a clear view of nature outside, allow outside air and sounds in, display nature photography and realistic nature art, watch nature on TV or videos, and listen to recorded sounds of nature. Concerning the recommendation for many indoor plants, studies found that indoor plants reduced volatile organic compounds, and increased participant's feelings of well-being. They reported that the more plants participants were subjected to, the better they felt.

In a second experiment the authors write, "This study documents some of the benefits of adding plants to a windowless work place—a college computer lab. Participants' blood pressure and emotions were monitored while completing a simple, timed computer task in the presence or absence of plants. When plants were added to this interior space, the participants were more productive (12% quicker reaction time on the computer task) and less stressed (systolic blood pressure readings lowered by one to four units). Immediately after completing the task, participants in the room with plants present reported feeling more attentive (an increase of 0.5 on

a self-reported scale from one to five) than people in the room with no plants” (Lohr, Peason-Mims, and Goodwin, 1996). Therefore, according to this study there is a measurable health benefit in the form of decreased blood pressure when plants were present in the room.

A third study experimented with putting plants in hospital rooms. The study reported that, “Viewing plants during the recovery period had a positive influence linking directly to health outcomes of surgical patients. Patients in hospital rooms with plants and flowers had significantly more positive physiologic responses evidenced by lower systolic blood pressure, and lower ratings of pain, anxiety, and fatigue than patients in the control room. Patients with plants also felt more positively about their rooms and evaluated them with higher satisfaction when compared with patients in similar rooms without plants. Based on patients' comments, plants brightened up the room environment, reduced stress, and also conveyed positive impressions of hospital employees caring for patients” (Seong-Hyun and Mattson, 2009). This study shows that nature does not just affect human productivity, but has a noticeable effect on physical health as well, presenting an exciting opportunity in helping patients to a speedier recovery.

In a fourth study, *Exposure to Nature Versus Relaxation During Lunch Breaks and Recovery From Work: Development and Design of an Intervention Study to Improve Workers' Health, Well-being, Work Performance and Creativity*, workers were observed during their lunch breaks (de Bloom, Kinnunen, and Korpela, 2014). Each worker was randomly assigned a lunch break activity: a nature walk, relaxation, or regular lunch break. Online questionnaires were used to gauge the recovery processes of the participants. “The objective of this research project [was] to understand and to improve workers' recovery from work stress” (de Bloom, Kinnunen, and Korpela, 2014). The study had interesting results observing that recovery was more quickly

achieved when the activity matched with workers' personal preferences. This is valuable information in regard to this thesis, as it represents a possible limitation to the experiment. If students prefer garden pansies over monilophytes, this could be reflected in their reactions and potentially skew feelings of perceived stress than if a student were to have no preference.

In a fifth study, *Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room*, “[a] field study investigated the potential stress-reducing effects of exposure to real or artificial nature on patients in a hospital waiting room. Additionally, it was investigated whether perceived attractiveness of the room could explain these effects” (Beukeboom, Langeveld, and Tanja-Dijkstra, 2012). This study addressed the question of how much impact other aspects of the room could have on a person's response to added nature. Results showed that plants caused patients to perceive the room as more attractive, and that attractiveness of the room had a direct correlation with reduced stress levels. Therefore, combined interior design techniques, such as soft lighting and natural elements, could produce an even greater effect on stress reduction than any one element alone.

In one last example, an experiment was performed in order to see if nature had any effect on impulsive decision-making. This particular characteristic was chosen because, “the effects of natural environments on impulsive decision-making remain unknown” (Berry et al., 2014). Therefore a study was conducted in which participants were subjected to a series of questions to test their impulsiveness, before which they viewed a natural picture, an urban picture, or a geometric control picture. It was found that impulsivity decreased when participants viewed the natural setting first. “Interventions that decrease impulsive decision-making may ultimately contribute to the preservation of natural environments, which will benefit both humans and our ecosystems. Beyond the beneficial aspects provided to humans, natural settings are also essential

for ecosystem function, vital resources, wildlife habitat, and preventing continued species extinction” (Berry et al., 2014). As stated, in addition to all of the aforementioned benefits of plant exposure, plants can even improve the human ability to make sound decisions.

Nature has restorative effects because, “Nature, which is filled with intriguing stimuli, modestly grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Unlike natural environments, urban environments are filled with stimulation that captures attention dramatically and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative” (Berman et al., 2008). However, in reviewing the relevant literature, there was no specific mention of whether or not there was a difference in results concerning the types of plants utilized in the experiments. To what extent could flowering plants affect stress among college students compared with non-flowering plants?

For the purpose of this study, two varieties of plants were chosen: flowering and non-flowering. The flowering agent for this experiment is the garden pansy, also known as violas or violets. The garden pansy is a hybrid plant with large flowers consisting of two overlapping top petals, two side petals, and one bottom petal (Diderot, 2013). They come in a variety of colors and are a common choice in many American homes and gardens. The non-flowering agent for this experiment is a monilophyte, commonly referred to as a fern. Ferns are vascular plants, meaning they have water-conducting vessels. They reproduce through spores and do not produce flowers or seeds (Basic Biology, 1996). Ferns are also a common houseplant. Common plants were specifically chosen so as to reduce the potential for distraction of subjects, such as if using exotic plant species.

As stated in *The Cognitive Benefits of Interacting with Nature* (Berman et al., 2008), “...Simple and brief interactions with nature can produce marked increases in cognitive control.

To consider the availability of nature as merely an amenity fails to recognize the vital importance of nature in effective cognitive functioning.” College students are often under large amounts of stress in completing their education. “Difficulty adjusting to the demands of college can lead to early withdrawal. Two decades ago, some estimates suggested 30-40% of college students could be expected to drop out before earning a degree (Tinto, 1987; Levitz & Noel, 1989). As Berry et al. (2014) stated, “The benefits of visual exposure to natural environments for human well-being in areas of stress reduction, mood improvement, and attention restoration are well documented...” Because plants have a wide range of physiological benefits, studying their link to sense of stress among college students can open doors to find viable ways of minimizing the pressures of educational performance. In addition to this, the positive effects of plant exposure act as reinforcement in enjoying natural settings. This reinforcement, especially when observed at an impressionable age, can promote environmentally conscious decision-making that will be vital to supporting the sustainability of Earth’s threatened ecosystems (Berry et al., 2014).

The formulated hypothesis is that the flowering agent, garden pansies, will have more of an effect on reducing sense of stress because they are more easily noticed through their bright coloring and pleasant floral scent. Potential limitations to this research include having too small of a sample size to make accurate correlations, not having enough plants present to cause a significant effect, and the propensity for errors in the data due to lack of professional scientific experience. In reviewing relevant literature to explore the benefits of plant exposure, the proposed thesis was formulated to research the effects of garden pansies verses monilophytes on perceived stress among college students in hopes that the research will provide future opportunities to reduce college-related stress and promote eco-friendly attitudes.

Methods

A sample size of 32 UNL students were recruited as volunteers and randomly assigned to one of two trials, totaling 16 participants in each trial. The first condition was labeled Group A, in which one garden pansy was placed in clear view in the room. The second was labeled Group B, in which one monilophyte was clearly visible in the room. Only one plant was used in the two plant conditions because the results of the experiment should be applicable to current college students. It was assumed that that incorporation of more than one plant into a dorm room or home could be an economic constraint on college students with generally low incomes.

The room chosen for the experiment setting was 149a in Hardin Hall, where each participant entered, sat down at the provided desk, and took a ten-minute timed survey consisting of fourteen questions. The first four questions accounted for the demographic information of gender, hometown, major, and age. These responses were analyzed for possible correlations between demographics and response to plants. The following ten questions (e.g. “I feel calm, “I feel worried”) were based on the Dutch and Abridged State Trait Anxiety Inventory in which participants responded using the 4 point scale where 1 reflected ‘not at all’ and 4 reflected ‘very much so’ (Van der Bij et al., 2003). “The State-Trait Anxiety Inventory (STAI) is a commonly used measure of trait and state anxiety” (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). It is often utilized within clinical settings to diagnose anxiety. When used in research, it can be an indicator of caregiver distress, which works well for the intentions of this study. Responses to this scale were compiled and analyzed for statistically significant trends reflecting reduced sense of stress in response to the assigned condition. This experiment model was based on the study titled *Stress-Reducing Effects of Real and Artificial Nature in a Hospital Waiting Room* in which the Dutch and Abridged State Trait Anxiety Inventory was used to observe how patients rated

their sense of stress in a hospital waiting room when surrounded by either real or artificial nature (Beukeboom, Langeveld, and Tanja-Dijkstra, 2012).

Using excel, data was compile and then examined for possible trends. Due to the small sample size of participants, each question was subjected to a non-parametric chi-squared test to check for statistical significance. For the purpose of these tests, participant answers of 1 and 2 (1=not at all, 2=somewhat) were represented simply as '1' to reflect a general state of being in which the emotion in question *was not* felt. Participant answers of 3 and 4 (3=moderately so, 4=very much so) were represented simply as '2' to reflect a general state of being in which the emotion in question *was* felt. All participants were made aware that their information would remain confidential. No names were ever released. Although some quantitative measures were used, the experiment design as a whole represented a qualitative analysis of perceived stress in response to the assigned plant.

Results

32 total UNL students volunteered for the study (n=32). Median age of trial participants was 21 years old, with average age rounded at 20.7. Of n=32, 16 were male (50%) and 16 were female (50%). All participants were given the same survey, in the same room, and at the same desk. The respective plant used was not changed for Group A or Group B. Examples of the results for the garden pansy and fern conditions can be found in Tables 1 and 2. The non-parametric chi-squared tests applied to each question yielded results of p-values 0.2689-0.7233. An example of the chi-squared results is provided for question 1, "I feel calm" (Table 3). These p-values are well above the standard significance value of 0.05. The small sample size provided extremely varied demographics; therefore they were not tested for significance.

Discussion

The original hypothesis for this study was that when in the presence of the garden pansy, participants would answer the provided questions in a way that concludes they feel less stressed and/or more positive. It was believed that this correlation would be statistically significant. Results show p-values above 0.05 for all questions, therefore evidence fails to support the hypothesis that garden pansies will cause students to feel less stress than ferns. In light of these results, students should not expect that the addition of flowering plants to an academic workspace would create any more of a pleasant environment than non-flowering plants. The objectives to potentially identify a factor within plant exposure benefits to reduce college-related stress and promote eco-friendly attitudes was not found in the limitations of this study. Although the larger body of literature review has shown that plants in a workspace can promote stress reduction, mood improvement, and attention restoration—this particular experiment design does not add to this evidence.

Summary and Conclusions

According to the aforementioned literature, the addition of plants to a space can provide a multitude of benefits to those who utilize them. Nevertheless, literature was lacking in studies done regarding differences in benefits found between specific types of plants. With college-related stress, mental health issues, and environmental challenges on the rise, this study sought to compare the potential for reduced stress between specific flowering and non-flowering plants. The hypothesis was that the garden pansy condition would prove to effect students in a more positive way than the fern condition, and that this knowledge could be used to help college students incorporate stress-reducing elements in their workspaces. However, the results of this

study have shown no significant correlation (as represented by $p\text{-values} > 0.05$) between positive emotions and a flowering plant, or vice versa, and therefore do not support this hypothesis.

In order to further research on this topic it is highly recommended to gather a larger sample size so as to better represent the population in question and provide more options for statistical analysis. It is also suggested that future participants spend more time in the presence of the selected condition, for most students spend more time studying and completing other academic duties than the allotted ten minutes of this study. A last proposition is to include more floras in the experiment setting. It is likely that the single plant restriction in this study was not enough to garner a positive or negative response.

Tables

Table 1

SELF EVALUATION QUESTIONNAIRE: STAI Form Y-1
Group A: Garden Pansy Condition

ID #	Age	Sex	Q1: calm	Q2: tense	Q3: relaxed	Q4: nervous	Q5: at ease	Q6: worried	Q7: pleasant	Q8: upset	Q9: content	Q10: strained
1	22	M	2	4	3	4	2	4	2	2	4	4
2	22	F	2	2	2	2	3	1	3	1	3	2
3	21	F	3	1	3	2	3	2	4	1	4	1
4	21	F	4	1	3	1	3	2	4	1	4	2
5	21	F	3	1	3	2	4	2	2	1	2	2
6	21	M	3	2	2	1	3	1	3	1	4	1
7	22	M	2	2	2	1	2	2	2	1	2	1
8	22	F	3	1	4	1	4	1	3	1	4	1
9	20	M	1	3	1	3	1	4	1	2	1	4
10	20	M	3	2	4	1	3	2	4	3	3	1
11	20	F	1	2	1	2	1	2	1	4	1	2
12	22	M	2	1	3	1	2	1	3	1	3	1
13	22	F	4	1	4	1	4	1	4	1	4	1
14	22	M	3	1	3	1	3	1	2	1	2	1
15	22	M	2	2	2	3	2	3	2	2	2	3
16	19	F	3	1	4	2	3	1	4	1	3	1

Table 2

SELF EVALUATION QUESTIONNAIRE: STAI Form Y-1
Group B: Fern Condition

ID #	Age	Sex	Q1: calm	Q2: tense	Q3: relaxed	Q4: nervous	Q5: at ease	Q6: worried	Q7: pleasant	Q8: upset	Q9: content	Q10: strained
1	19	F	3	1	3	1	3	2	3	1	3	1
2	21	F	3	3	2	2	4	2	3	1	3	1
3	20	M	4	1	4	1	4	1	3	1	4	1
4	20	M	2	2	2	3	3	3	3	2	3	4
5	22	M	2	2	2	1	2	2	3	1	3	1
6	21	F	2	3	2	4	2	3	1	2	2	1
7	22	M	1	2	2	2	1	2	1	2	2	2
8	21	F	4	1	3	1	3	1	4	1	4	1
9	22	F	3	1	2	1	3	2	3	2	3	2
10	21	M	4	2	3	2	4	1	3	2	3	1
11	21	M	1	1	1	3	1	2	1	1	1	2
12	22	M	2	2	4	1	3	1	2	2	2	2
13	19	M	2	2	2	2	2	2	2	2	2	2
14	21	F	1	4	2	3	1	4	1	1	2	4
15	19	F	3	2	3	2	3	2	3	2	3	1
16	20	F	3	2	3	1	4	2	2	1	3	2

Table 3

Chi-squared test results for Question 1: I feel calm

Type III Tests of Fixed Effects						
Effect	Num DF	Den DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
state	1	30	0.23	0.23	0.6284	0.6319

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