

Effects of Indoor Plants in the Reduction of Stress

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Executive Summary. A correlational, between-subjects design was done in order to further investigate the positive effect that indoor plants have on stress in the UBC campus. The present study makes an initial attempt to evaluate the potential benefits of placing indoor plants in pocket lounges in the Nest, which are areas that students often use to either rest or study. A Profile of Mood States survey, that included other demographical questions, was administered to approximately 52 students who were present in the pocket lounge at the time when the experiment was conducted. Data were analyzed to compare the levels of stress, operationalized by measures of mood, before and after plants were added to the room. The findings suggest no significant ($P > 0.05$) decrease in the level of stress that students have even with the addition of various plants. The results show a minor decrease in the following items ranked in the survey, although other variables and confounds, such as timing and change blindness, may have affected the plant's effect on the individual's stress level. Overall, no differences were found between independent items in the survey, nor were they found in the comparisons between both conditions.

GO CLEAN OR GO HOME

Jonathan Kang | Oliver Parker | Kody Durnford | Michelle Liu | Anastasya Abigail

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As stress plays a great role in university life among students, stress is often the main focus of various researches in order to investigate the factors that encourage improvement in student life. A number of studies have been done to examine the relationship between the effects of natural settings and an employee's performance in the workplace. One of the study's outcome showed that the overall satisfaction of work would benefit by the presence of plants in the workplace (Dijkstra, Waliczek, Lineberger & Zajicek, 2008). Not only does job satisfaction increase, but the plants also help to ease feelings of discomfort that is caused by the "sick building syndrome" (Fjeld, 2000; Fjeld et al., 1998 as cited in Bringslimark, Hartig & Pati, 2007). Another study focused on the correlation between stress and discomfort among people and plants (Thomsen, Sønnderstrup-Andersen & Müller, 2011; Dijkstra, Waliczek, Lineberger & Zajicek, 2008). Significant results were found in a study that engaged natural plants in the environment, and showed that stress levels decreased due to the fact that the indoor environment is perceived to be more attractive than usual (Dijkstra, Waliczek, Lineberger & Zajicek, 2008). Environments that involved natural elements tend to have stronger stress-reducing effects. It has also been confirmed that participants of the study preferred areas that enabled them to observe plants and have a more natural surrounding. With regards to the fact that many studies had been done to investigate the impact of indoor plants toward employees that focused on working places only, the question that is investigated in this research is how the presence of live plants in a common lounge area will have an effect among the stress levels of university students who are utilizing this space.

To testify whether implanting indoor greenery would result in reducing stress levels among university students, a study was conducted for further research. A survey was distributed to University of British Columbia students who use a public area in the Nest called the Pocket Lounge. The study hypothesized that if live plants are introduced into the environment, then the stress levels of individuals occupying the pocket lounge should decrease.

Methods

Participants. The participants in the study were 52 people who were observed to be using the pocket lounge, with 26 participants in each condition. All of the participants indicated that they were current students at the University of British Columbia, mainly undergraduates, with a small number of graduate students. Participants either filled in a survey and dropped it in a box in the centre of the room, or were approached by an experimenter and asked to fill one out.

Conditions. The baseline condition was intended to measure anxiety levels in the tested pocket lounge before any manipulations were carried out. This involved asking people using the pocket lounge in its standard layout to fill out questionnaires. The results of the questionnaires were analysed in order to find a baseline level of anxiety among users of this space for comparison purposes. The independent variable in this study was the addition of indoor plants to the pocket lounge, ranging from small succulents placed on each table to bigger plants, such as snake plants and ponytail palms, that were positioned in different areas of the room. This was the experimental condition, intended to test the hypothesis by determining whether the presence of

plants lowered participant anxiety levels. The questionnaires used in this condition were identical to those used in the baseline.

Measures. A survey with demographic questions and a 7-item version of the Profile of Mood States Survey was used to measure individual's stress by their current moods and feelings, seen in Table 1, as well as a section for participants to comment about the pocket lounge. Stress was measured using items chosen from the tension/anxiety scale on the Profile of Mood States Survey. These items used a Likert scale to allow the participants to rate their level of each feeling on a scale of one to five, with each number corresponding with a descriptor, ranging from "not at all" to "extremely" (1=not at all, 5=extremely). The numerical response for each item was then added to determine anxiety level. One of the items, "relaxed", is reverse scored, so the number chosen for this item is subtracted from the total score, in order to minimize extreme response bias. As well as measuring anxiety, the questionnaire also included questions about whether the participant was a student or not, and also what they were using the room for. The participants were also asked to provide comments on their opinion of the room's layout, usefulness and appearance.

Procedure. The participants who were present in the pocket lounges were either approached by a researcher and were asked for consent to partake in the study, or surveys were placed in the tables for people to voluntarily be involved in the study. Students who were asked to participate were told that the purpose of the study is to gain insight on pocket lounge areas in the Nest and they were informed that their responses to the survey would remain anonymous. Participants were told that the current space that they were in is called the "pocket lounge." Upon handing out the survey to different individuals, the researcher would stand aside and give a few minutes for participants to complete the survey. Participants would then approach the researcher to hand in their questionnaire. Due to the nature of the survey, individuals only had two alternatives for each question (ie. choosing "1" from a given 1 to 5 point scale) or they could choose to abstain from responding. At the end of the survey, a comments section was also provided whereby students were able to discuss their opinions regarding the pocket lounge. Some participants also discussed their feelings towards the pocket lounge to the experimenter, however this information was excluded from the data. Most students reported the reason they chose the area of study, although only a small fraction expressed their opinions regarding the pocket lounge. The responses from the survey were then exported to SPSS in order to evaluate the data obtained.

Results

An independent sample T-test concluded that there was no significant results to our study [$t(25)=0.0334$, $p > 0.05$] between both conditions. Individual means of all the items used in the modified Profile of Mood States survey (uneasy, on-edged, relaxed, and etc.) was calculated as seen in Figure 2. Overall scores from the Profile of Mood States survey indicated that the presence of plants did not create a decrease in stress levels amongst those utilizing the space. Descriptive statistics calculated through SPSS showed that the stress levels of students in the original pocket lounge (mean score = 8.15, SD = 6.46), as well as reported levels of stress after the plants were implemented (mean score = 6.77, SD = 4.62) rated their moods similarly in both conditions. Based on all the data gathered from the survey, it can be said that there was a constant decrease on each item of the Profile of Mood States, except for "relaxed" that showed an increase, from the control group to the manipulated group.

Discussion

Although the study showed no significant results, the data collected portrays the potential effect that plants can have in decreasing stress. Students that participated in the experiment were unaware of the changes made to the pocket lounge, which may be the reason for insignificant outcomes. Individuals that were chosen to partake in the survey were also overlapping on multiple days that the experiment was conducted, which hindered experimenters to gain a bigger sample size. While the data remains insignificant, the results that we collected did show a small reduction to students stress levels throughout each item of the Profile of Mood States questionnaire. This suggests that the manipulated group were affected by the plants presence, but the sample size influenced the significance of the entire study. This result, combined with external research from past papers, propose that the addition of plants can reduce stress levels while increasing self reporting of performance and productivity (Bringslimark, 2009; Larsen, Adams, Deal, Kweon & Tyler, 1998). A larger gap of time would be needed to ensure rotation of students in the pocket lounge.

In addition to this, observations made by the researchers showed that participants who were present in the time when the study was conducted may have already been in a state that does not elicit stress, which may contribute to low results in the negative mood scores. Often times, the participants were resting with their peers (most likely taking a break in between classes), while others were studying. Since multiple experimenters handed out the surveys, whereby the phrasing of their question was varied, this may have caused experimental bias. To minimize this effect, a basic script was ensued and the procedure for issuing the survey. This could have affected the experiment as it affected the participants' mood and stress levels with the different approaches.

Prior to the study, a discussion was made regarding the placement of plants and whether or not it would possibly get in the way space that was being used. Plants were placed in each table, but were sometimes moved, which made it invisible to potential participants. This would have had an effect on the study's results with the different placements affecting the room and participants with different effects. To reduce the effect, plants were moved back to their original position whenever a researcher noticed this movement. One might also suggest that the aspects such as size, colour and placement of plants may play a role as to why some of the plants were unnoticed by the participants. Most of the plants that were used in the study were of a dark green colour, and the carpet and colour of the sofas were black, showing only a slight contrast between the two objects.

It can also be brought up that the range in time in which this experiment was conducted may influence the moods, and ultimately the stress levels of each individual. Data collection began near the middle of the semester which could typically have higher levels of stress associated with midterms. These extraneous variables could not be controlled, and therefore have an affect on students' stress levels. Much like other past research, the nature of the conditions does not allow us to make claims for accounting for all other variables that also impact stress. A variety of other variables could have impacted stress levels as well, such as the purpose of using the space and noise levels in the Nest.

It is imperative that further research dealing with factors that influence stress to minimize confounding variables to produce significant results that can be used throughout other educational institutions.

Recommendation for clients

Our team has a number of recommendations that can be implemented within the pocket lounges for potential improvements. As mentioned, we suggest that another experiment be conducted with a larger sample size to prove the significance that plants have on decreasing stress levels. The addition of the plants to a room can also increase attractiveness, which was proved to mediate perceived stress (Bringslimark, 2009). Although the findings of this study were insignificant, we think that further research will indicate that adding plants to the pocket lounges can decrease stress levels in the student body. Furthermore, we recommend looking into factors of stress that would study the relationship that plants have in reducing stress in other rooms across UBC, such as classrooms and other study spaces.

Another conclusion that can be drawn from our data is that the purpose of the room varied for most students, impacting stress levels. One recommendation that we would make would be to dedicate the pocket lounges to specific needs; some with space for relaxing and others with larger workspaces for group or individual projects; this was mentioned by a few students in the comment section of our survey.

Other research questions that could be tested in the pocket lounges that revolve around stress reduction could include finding the most appropriate furniture, furniture layout or making changes to the lighting in the rooms. In the comments sections of our survey, these concerns were all mentioned by a number of students. This included asking for more comfortable furniture, asking for more or less lighting and changing the layout of the room completely to maximize the space available for students. Finally, further research could be done looking into the overall impact that nature has on environmental awareness across campus.

Appendix

Results: Figures

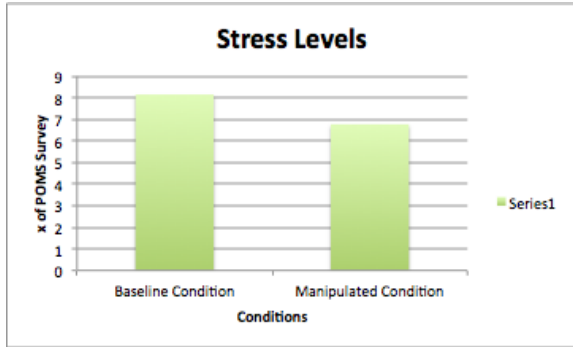


Figure 1. Stress levels from both conditions were calculated using the scoring system of the Profile of Mood States. There was no significant decrease in stress levels between both conditions.

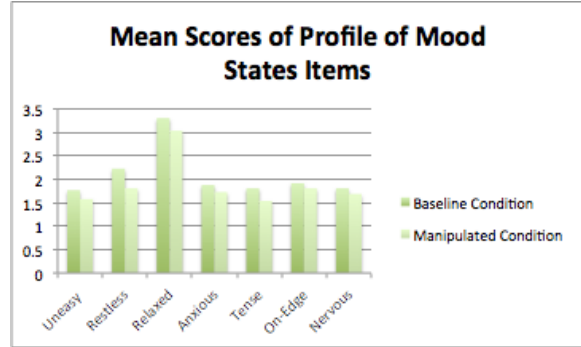


Figure 2. The calculation of the average of each item from the Profile of Mood States survey showed a constant decrease from the control group to the manipulated group, but no significant difference ($p > 0.05$).

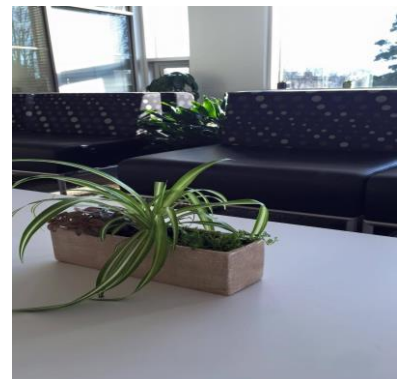
Baseline/Manipulated Conditions (Original/Plants)



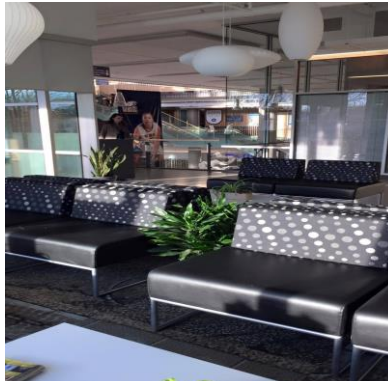
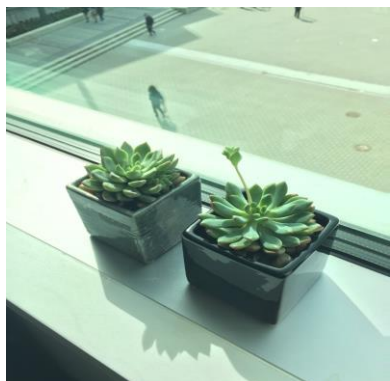
Baseline Condition



Succulents



Ponytail Plant



Succulents

Snake Plant

Chinese Evergreen

Survey

Questions

Table 1. Demographic questions, such as age and year of study, as well as the modified 7-item Profile of Mood States (below) was used to measure stress levels of participants of the study.

<u>Feeling</u>	<u>Not at All</u>	<u>A Little</u>	<u>Moderately</u>	<u>Quite a Lot</u>	<u>Extremely</u>
Uneasy	1	2	3	4	5
Restless	1	2	3	4	5
Relaxed	1	2	3	4	5
Anxious	1	2	3	4	5
Tense	1	2	3	4	5
On-edge	1	2	3	4	5
Nervous	1	2	3	4	5

Complications.

One limitation that investigators faced was the pocket lounge area itself. Originally our team had plans for a different pocket lounge than the one used in the study. However, due to a mix-up by our clients, we had to change pocket lounges. We were going to originally place paintings around the room to see if there was a stress reduction effect from paintings and a combined effect between the paintings and the plants. Unfortunately because of the design of the current room with little wall space, the paintings were not installed in the pocket lounge, which is why we only had 2 conditions in our experiment. As we further discussed the possibility of placing paintings in the experimented area, Jennifer asked us to consult with the AMS representative that is responsible for these types of requests. We concluded that the placement of paintings would require some sort of hook or nail to be positioned in the wall, which violates the regulations of the university space. This removed two of the four original conditions, which potentially affects the results of the study.

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