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Student Research Report

# The Effects of Green Spaces on Perceived Level of Focus

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## **The Effects of Green Spaces on Perceived Level of Focus**

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### **Executive Summary**

Previous research has found that campus green spaces can have positive implications on a student's well-being, affect and to an extent on their academic behaviors (Foellmer et al., 2021; McFarland et al., 2008). While UBC offers a variety of campus green spaces, both through LEED certified buildings and extensive outdoor areas, the SEEDS client believes that green spaces can be inaccessible to students and that they may be unaware of their impacts. This research project sought to understand how our indoor campus green-spaces can have implications on students' affect and perceived focus.

Our background research demonstrated that indoor green spaces have numerous positive implications associated with one's mental health and physical health. We conducted a qualitative survey of UBC students to gain an understanding of their focus and affect in comparison to the perceived greenness of their study spaces. Participants demonstrated both higher positive affect and focus skill when they reported moderate levels of green study space. Our findings demonstrated a moderate effect size, implying some statistical significance. Based on our findings, we proposed that UBC implement low cost modifications of pre-existing study spaces through additions of potted plants.

## Introduction

In Mark Poskitt's paper on greenery and the effects of well-being, it suggested that individuals benefit from green spaces and how it can encourage more positive behavior. It suggests that indoor green spaces allow people to feel more calm to help soothe any potential stress or negative affect. Through this study they were able to establish more of a relation to greenery with the ability to affect individuals' moods. (Poskitt, M., 2020) With this, we are able to start with the understanding that indoor greenery helps with people's moods, but what about their perceived level of focus?

Dadvand and colleagues explored how indoor green spaces have numerous positive implications associated with one's mental health, physical health and have also recognized them as a buffer to the health effects attributed with urban living (Dadvand & Nieuwenhuijsen, 2019). This again allows us to question how plants not only encourage positive effects but how does it establish more focus in individuals?

By investigating people and environment interactions, Genereux explores the relationship indoor plants have with human behavior. In this study it was determined that the majority of participants had positive opinions of plants and quite liked them for their representation of nature and the outdoors. It was encouraging for people to see indoor plants around the buildings that they frequented and made the environment more relaxing (Genereux, R., 1987). This local UBC study allows us to have a basis of understanding regarding the subject of indoor plants. Currently, there is no functional definition of indoor greenspaces, however the Oxford dictionary defines an exterior green space as an area purposed for recreational and aesthetic use with plants (2019). For the purpose of this study we have defined indoor green space as a similar use of plants to emulate an outdoor green space. Additionally, perceived level of focus indicates how individuals report their focus through the standardized test.

In this study, we are targeting focus. The driving forces of this behavior are the environment, and if it is able to nurture enough focus in an individual to complete a task. The interaction between human behavior and their environment is evident here. Through our recommendation of inserting more indoor plants within study spaces, we are promoting more perceived focus. Individuals through our survey have reported more positive affect and a moderate amount of perceived focus when frequently studying in a space with more indoor greenery.

## Research Question and Hypothesis

Our research seeks to answer the question of how the presence of greenery in specific chosen study environments affect an individuals, in the present study UBC students, perceived level of focus. We hypothesized that participants in a green campus space would have higher level of perceived focus in their chosen study environments, and that these green spaces would be correlated with higher reported levels of focus in participants.

## Methodology

### Participant Sample:

Our study aimed to recruit 300 participants, and our target demographic was undergraduate students at the University of British Columbia. Initially, we were going to target students who studied in two different green space environments, but upon further review we decided against this method as a result of the Covid-19 Pandemic. Instead, we circulated a survey around UBC, and were able to achieve a sample size of 77 participants in total. Our main

demographic of UBC students had a large portion of third year students, and a relatively equal divide between males and females.

**Conditions:**

The condition in our study was the presence of green space in an individual's study environment, ultimately how the perceived green space affected the individual's levels of focus and stress. Our independent variable was the participants' self-reported rating of how green their study space was.

**Measures:**

The dependent variables of our study are the individual's scores on a standardized focus and affect survey. We used the Psychology Today Concentration and Focus Skills test, which explores how participants felt while studying, examining whether they are focused or concentrated on the task at hand. It uses a 5-point Likert Scale to examine the participants' perceived focus. Our study also utilized the Positive and Negative Affect short scale test, which examines the affective states of participants. Both of these questionnaires used an established and validated scale. These questions were relevant to our research as they helped us gain an understanding of how participants self-report their level of focus on relation to the perceived greenness of their study space.

**Procedure:**

The survey we used for our research study was created using Qualtrics and introduced survey respondents to our two conditions described above, which was then followed up by the questions we found and created for assessment (Appendix A). On the set of questions regarding perceived level of greenery we used a 5-point Likert scale: In which (1) represented no green space and (5) represented lots of greenery. These scores represented our independent variable of how green the participant perceived their study space to be. Furthermore, for both the Positive and Negative Affect-Short Scale tests as well as the concentration and focus test we used a 5-point likert scale; a score of one corresponded to "never" and a score of five corresponding to "always". The responses to these sets of questions represented our dependent variable of the participants' scores on affect and focus. Questions were determined for use in order to estimate how perceived green spaces impact the participants' level of focus and affect. This flow of questions allowed us to get a more in-depth understanding of the participants' responses.

Data was collected through posting the survey in multiple UBC student forums as well as individually messaging the survey to individuals we came across. As we are amidst the Covid-19 pandemic we believed this would be the safest and most effective way to get results. Furthermore, we implemented all ethical protocols and included a consent form in our survey. We made sure that anonymity was established and all respondents were made aware that they wouldn't be named in the reporting of results. The survey was circulated around UBC for several weeks and was our primary source of data collection for the entire research project.

**Results**

Once our data was collected, we had a total of 77 participants. We divided our participants into two categories: those with little to no self-reported green space (1-2 on our 5-point scale), and those with moderate to lots of self-reported green space (3-5 on our 5-point scale). We then compared the low-green and high-green groups' scores on the PANAS Scale and

PTCFST Test. On the PTCFST, we found that there was a measurable difference in focus between the high-green group ( $M = 3.1$ ,  $SD = 1.1$ ) and the low-green group ( $M = 2.7$ ,  $SD = 1.1$ ). Cohen's  $d = 0.4$ ,  $t = 1.5$ ,  $p = 0.1$ ,  $df = 75$ . On the PANAS, we found that there in was also a measurable difference in mood between the high-green group ( $M = 3.3$ ,  $SD = 1.1$ ) and the low-green group ( $M = 3.1$ ,  $SD = 1.0$ ). Cohen's  $d = 0.2$ ,  $t = 0.8$ ,  $p = 0.4$ ,  $df = 75$ .

<i>Group</i>	<b>PTCFST Test Scores</b>		<b>PANAS Scale Scores</b>	
	<i>Mean (<math>\bar{X}</math>)</i>	<i>Standard Deviation</i>	<i>Mean (<math>\bar{X}</math>)</i>	<i>Standard Deviation</i>
High-green Group	3.1	1.1	3.3	1.1
Low-green Group	2.7	1.1	3.1	1.0

While our results do not rise to the level of outright statistical significance, our effect size shows a measurable improvement in students' focus and mood when green and growing things are introduced into study spaces (Figure 1). Notable to the study's outcomes is the fact that even moderate green space increased focus and mood, meaning changes are apparent even when the amount of green introduced into a study space is relatively small.

### Discussion

Our research suggest that being in an observed green space on campus correlates to a moderate extent with perceived levels of focus in participants. In similar study it has been found that academic greenspaces have implications on students overall wellbeing, with most students reporting less frequent negative moods when in the presence of green space (Foellmer et al., 2021). Our data suggests that students who are in the vicinity of what they believe to be a greenspace, they report higher levels of focus and concentration on the scale measure. While we only found a moderate effect size, it still represents a significant difference in perceived focus on students who study in green versus non-green spaces. A study by Browning and colleagues found that green spaces near academic buildings as well as green window views had positive implications on academic performance (2018). With this knowledge, a shift into establishing more green spaces at UBC in minor ways could potentially help students with their perceived levels of focus and overall academic achievement. While neither of our conclusions provided outright statistical significance, we did identify a consistent and measurable difference in student's stress and focus levels in green- and non-green spaces.

Another implication of our research is that a green spaces don't need to constitute new buildings or large scale projects. Our research focused on perceived green spaces, and while this may refer to buildings such as life sciences or forestry, it may also refer to buildings that have views of a green space on campus. The results of the study demonstrated a noticeable improvement in focus and mood with even moderate amount of greenery incorporated into study spaces, meaning that smaller projects may contribute to students well-being. This suggests that even participants who perceive their study space to be moderately green still reported higher levels of focus than those who reported non-green spaces.

It is important to consider that studies have found significant correlations between use of campus green space and overall quality of life at university (McFarland et al., 2008). In our study we used the Positive and Negative Affect - Short Scale (PANAS) test to examine affective states of participants, to which we found that students who reported studying in green spaces performed better on the PANAS test. This suggests that being in the presence of greenspace can have positive implications on the positive affective moods of students and participants alike. Similar to the study by McFarland and colleagues they found statistically significant correlations between students who reported usage of greenspaces and their reporting of positive affect states.

We have identified several factors that may account for a weakening in the validity of our results. Firstly, our sample size was relatively small in comparison to our target demographic of UBC students, which could have implications on the generalizability of our study. Generalizability is important when considering changes to campus green spaces as we our sample size may make it difficult to make meaningful generalizations. Furthermore, our use of self-report survey methods may have resulted in self-preservation, meaning participants answer questions to display themselves in a more favorable light. This may have led to a bias within our focus and concentration portion of the survey, with participants potentially reporting higher levels of focus when in reality they don't exhibit those levels. In a future study these limitations could be avoided by incorporating measures that mitigate drawbacks of survey usage. Furthermore, in regards to our small sample size, walking around campus and discussing the survey with students in person may have led to more responses. However because of the Covid-19 pandemic we opted to using online promotion of the survey and relied heavily on this method of collection for our survey.

### **Recommendations**

Our research project had the intentions of building upon previous students SEEDS research on the topic of campus green spaces and their implications on students well-being on UBC campus. The results of our study demonstrated that there is a moderate correlation between the perceived green space of where participants study and their levels of focus. Similar studies that focused on well-being and overall quality of life also found that the presence of green space also had an impact on participants perception of their feelings in these two streams (Foellmer et al., 2021; McFarland et al., 2008). Considering the results of our study, as well as the supplementary studies we found, it is imperative that UBC considers implementing indoor green spaces, even at a moderate level, for their student body.

We suggest UBC to start implementing minor changes to their existing student life buildings, projects that won't take large budgets or require extensive labor to the UBC foundation. Since remodeling, construction, and other major sustainability projects take a significant amount of time and resource investment on the part of UBC, we suggest that these smaller modifications (such as increasing amount of indoor plants) to study spaces will provide notable benefits to the study body. To effectively address the issue of lack of indoor greenspaces in buildings around campus, especially earlier UBC buildings such as the IRC, we believe it to be important to try incorporating smaller plant displays within the building. These changes can come at a low cost and can be supported by on-campus organizations such as the Alma Matta Society, through their pot a plant programs or even the UBC Botanical Garden. We propose that these smaller initiatives can be led and governed by students and would allow them to choose which buildings they see fit as needing additional green space. Allowing these services to be governed and run by students has already demonstrated promise within other UBC programs

such as the Botany Enthusiasts Club which seeks to promote and build a community with a shared interest in plants. These small scale, low cost projects could include incorporating potted plants in libraries or in common spaces of buildings that rank low as a greenspace. These potted plants could be donated or provided for at a low cost by UBC, and cared for by those that work and study inside these buildings.

We suggest that clubs such as the Botany Enthusiasts Club as well as the Environmental Design Society found at UBC also be made aware of how students react to a higher level of campus green spaces. We believe that integrating these clubs into the creation of small scale projects involving green spaces would broaden the impact of these spaces, allowing for a better representation of the student body. Ultimately, we hope the involvement and development of small scale green space projects will help the well-being and focus of students on UBC campus.



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## Appendix

### Appendix A: Qualtrics Survey

Are you 18 years old and above?

- Yes
- No

Are you currently enrolled as a UBC student?

- Yes
- No

What year of university are you in?

- 1
- 2
- 3
- 4
- 5+

What gender do you identify as?

- Male
- Female
- Non-binary / third gender
- Prefer not to say

Which do you identify as?

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Other

I typically study in a space that has \_\_\_ amount of greenery and growing things:

	1 - No Greenery	2	3	4	5 - Lots of Greenery
Amount of Green Space	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the frequency of each statement

	Almost Never	Rarely	Sometimes	Often	Always
My mind tends to drift away when I'm working on something.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find irrelevant information or thoughts popping into my head when I'm trying to focus on a task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I employ motivational techniques (e.g. rewards, envisioning how I will feel when the task is complete) to get me through boring or difficult tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I really need to concentrate, I can tune out my environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I arrange my schedule so that I can work on tasks that require the most concentration during the time of day when I am most alert.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I begin a task, I set specific objectives for what I want to accomplish.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to create an optimal environment when I really need to concentrate (e.g. close the door, put up a do-not-disturb sign).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find myself trying to remember what I was about to do next.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# CAMPUS GREENSPACES & FOCUS

I find myself daydreaming.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find myself doing the same thing over and over because I have lost track of what I've done (e.g., re-reading the same paragraph).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please mark this question as rarely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I start to lose focus on a task, I'll switch to something else for a little while.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I try to focus intensely, I find my mind wandering to unrelated things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If someone is having a conversation nearby while I'm working on a task, it breaks my concentration.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Before beginning a task, I set an approximate time limit as to how long I will work on it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take regular breaks when I'm working intently on something.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tend to take on more tasks than is reasonable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get bored easily.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can motivate myself to stay focused on something that I'm not completely interested in (lecture, movie, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I'm bored, I can't help but zone out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I get into the groove of doing something, almost nothing can get me out of it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I start to lose focus on my work, I take a short break.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

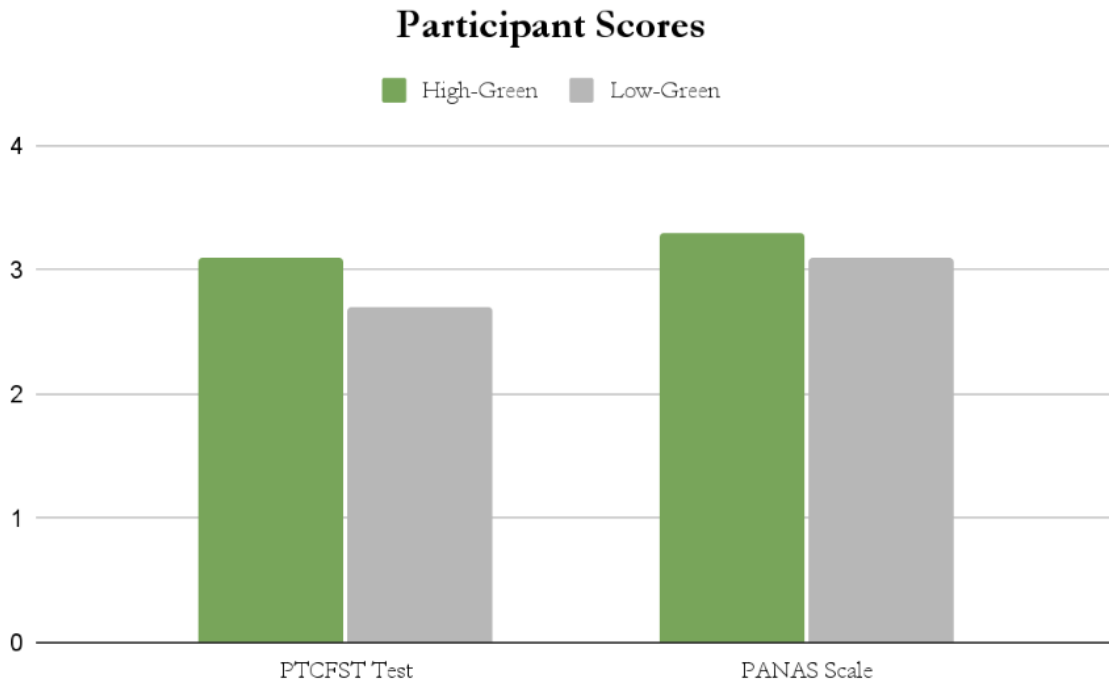
Thinking about yourself and how you normally feel, to what extent do you generally feel:

	1 - Never	2	3	4	5 - Always
Upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Appendix B: Team Member Contribution**

Throughout the project each team member contributed equally towards the project. Assignments were divided equally for both the project proposal, qualtrics survey, presentation slides and the research report.

**Appendix C:**



**Figure 1:** Participants Scores on the PTCFST Test and PANAS Scale in comparison to high-green and low-green space