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Student Research Report

Relationship between Time in Green Spaces and Stress Management Ability

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Relationship between Time in Green Spaces and Stress Management Ability

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Executive Summary: The purpose of this study was to determine the potential benefits of campus green spaces for students' well-being. Previous studies show mental health benefits when doing activities in natural environments, which reduces stress. We are interested in the correlation between the time spent in green space and the ability to manage stress. We conducted a correlation study at the University of British Columbia (UBC) and asked 147 UBC students to fill out a self-report survey, where we obtained 100 valid responses. We hypothesized that students who spend more time in green spaces tend to have a better ability to alleviate stress. Our data were analyzed by using the *Pearson r* test in JASP. Unfortunately, our results do not provide support for our hypothesis. However, we recommend further research on the possible relationship between time spent in green space and the ability to manage stress.

Detailed Report:

Introduction

Previous research on related topics to the relationship between time spent in green spaces and stress management ability has continuously demonstrated potential mental health benefits. This is shown in various studies where such benefits are highlighted when incorporating natural environments in activities. One of which reported lower levels of stress in participants when carrying out Mindful-Based Stress Reduction (MBSR) activities, which are therapeutic techniques guided by an instructor, such as meditation and yoga, in a natural outdoor environment (Choe et al., 2020). In addition, other studies have shown the ability of green spaces to be able to mitigate stress when spending just a short amount of time in them. Ibes et al., (2018) found that micro-breaks (1 - 5 minutes) spent in natural environments had a positive psychological effect on 96% of their participants. Many of these benefits are attributed to the sensory stimuli received when either going for a walk or engaging in an MBSR activity in green spaces. This is supported by Hedblom et al. (2019) in their study indicating olfactory stimuli (smell) help facilitate stress reduction potentially more than visual stimuli. These findings all entail that incorporating activities in natural environments enhances the ability to mitigate stress. However, the gap in previous studies that this current research aims to diminish is the correlation between the amount of time spent and an individual's ability to manage stress, which is not apparent in the examples above. The driving forces behind finding a correlation between the amount of time spent in green spaces and the ability to alleviate stress include the benefits of green spaces on campus for student well-being and maintaining preferred campus green spaces to ensure these opportunities are available for mental health benefits. However, barriers such as limited time on campus due to living off-campus and weather may cause difficulty in finding behaviors, perceptions, or emotions our study is targeting. Ultimately, Our findings can promote certain stress mitigation behaviors by emphasizing the relationship between time spent in green spaces and stress management ability in the hope to encourage utilizing campus green spaces to its fullest.

Research Question: How is the amount of time spent in green space associated with the ability to alleviate stress?

Hypothesis: Students who spend more time in green spaces tend to have a better ability to alleviate stress.

Methods

Participants: This study consisted of UBC students who completed the Qualtrics survey using survey links that were distributed online. By utilizing a .05 alpha value and a .95 power, the power analysis required a minimum of 202 participants for a significant interaction. Due to Covid, all data collection was done via an online survey, 147 individuals completed the survey. However, only 100 of them were valid responses, which consisted of 52 participants who identify as female, 46 who identify as male, and 2 who identify as non-binary. After removing seven outliers in the age column, the mean age of our participants was 21.67 with a standard deviation of 2.91, with the oldest participant being 38 years old and the youngest being 17 years old. Based on our calculation, 54.8% of participants are below 22 years old.

Conditions: To find out whether changes in an independent variable cause change in a dependent variable as the fundamental feature of the experiment, the conditions that were created were manipulated by the researchers or systematically vary according to different levels. For our study, in order to determine the relationship between the time spent in green space and the students' ability to alleviate stress, we presented the independent variable which is the amount of time spent in green space that related to the cause in our hypothesis. We operationalized the independent variable by asking about the time participants spend per week in the listed green spaces and their reason for spending time in them such as physical activity, spending time with pets, enjoying nature, etc.

Measures: The dependent variable in our study is students' ability to alleviate stress, which is related to the effect in our hypothesis and changed as the outcome of the independent variable manipulation. In sum, we examine students' ability to alleviate stress according to participants' scores on our survey. Qualtrics software (Qualtrics, 2022) was used primarily as the questionnaire tool. The survey has 15 questions in total which include information collection on the amount of time each participant spent in selected campus green spaces per week, consists of 6 questions about stress levels from Depression Anxiety Stress Scales (DASS), 9 questions about self-measurement of co-perception from Self-Compassion Scales (SCS), and demographic surveys including age, gender, etc. Combining the questions that relate to DASS and SCS, in fact, we can find that the ability to relieve stress is related to them. Only by being aware of their stress levels while being able to have an accurate perception of self and compassion can they cope better with stress.

To calculate the scores of the scale which represent the three major dependent variables of each participant, we used a frequency anchor for the 15 questions: Almost never =1 point, seldom =2 points, sometimes =3 points, often =4 points, almost always =5 points. However, in order to make the survey items balanced and add necessary cognitive work during the completion, some of our questions are negatively worded, which means that for some questions, for instance, lower

point (1 or 2) = lower stress level, while for other questions, higher points = lower stress level. So, we need to reverse the anchor for specific questions to make the direction all the same to get the final score of each dependent variable. As a result, the reversed anchor is: Almost never = 5 points, seldom = 4 points, sometimes = 3 points, often = 2 points, almost always = 1 point.

For the first dependent variable, stress level, scores for questions 1, 2, 3, 4, 5, and 6 are needed. The reversed anchor was used for question 2 and question 4, the final score for “stress level” was the sum of points for the 6 questions, ranging from 6 to 30, higher score means a higher stress level.

For the second dependent variable, self-compassion level, questions 7, 8, 9, 10, 11, 12, 13, 14, and 15 were included while only question 13 needed to use a reverse anchor. After summing up scores for each of the nine questions, we are able to attain the final score for “self-compassion level”, within the range of 9 to 45, a higher score means a higher level of self-compassion.

For the last and the major dependent variable, all 15 questions need to be included, among them, negatively worded questions 1, 3, 4, 6, and 13 would use a reverse anchor. The sum of all 15 questions then would be the final score for “stress management ability”, ranging from 15 to 75, a higher score means generally stronger ability to deal with stress.

Procedure: Participants completed our online Qualtrics survey from Mar 8th to April 10th, 2022 using links that were distributed on social media and through word of mouth. There were no additional benefits to motivate people to participate in this study. The consent form was presented on the first page of the survey, and participants were required to 'agree' with the consent form in order to continue. Following that, all participants were asked basic demographic post-test questions (ex. Age, gender). The questions can be accessed using their own electronic devices, such as phones or laptops, and appear on a screen for participants to read and answer. The survey required approximately 10 minutes to complete. We faced two major problems. First, we were not able to obtain enough participants for our study. Second, due to the ongoing pandemic (Covid-19), people tend to maintain indoors which results in going out less. In addition, after roughly two years of online school, new and returning students may not have had the opportunity to explore UBC's Vancouver campus. Thus, participants were not familiar with certain green spaces listed on the survey. A sample size of 202 participants was required for a significant finding. However, we only managed to receive 100 valid responses out of 147 completed surveys.

Results

Our descriptive statistics indicated that on average, the time students spend in green spaces was 5.897 hours per week with a standard deviation of 9.106 hours per week. The average score for students' stress management ability was 45.596 with a standard deviation of 6.276. The most visited green space around campus is the Rose Garden with 16.6% of students reported.

We hypothesized that students who spend more time on campus green spaces tend to have a better ability to alleviate stress. Therefore, a Pearson's correlation test was generated to examine the correlation between students' total amount of time spent in campus green space and their stress management ability. Contrary to our hypothesis, we obtained an $r = -.116$, indicating that there is a negative or no correlation between these two variables. Thus, our hypothesis is not

supported. A similar pattern was found for the relationship between the total amount of time and students' self-compassion level with an $r = -.045$. We also examined the relationship between students' time spent in green space and their total stress level. We found that $r = .129$, showing that there is a positive or no correlation between these two variables.

Besides the main correlations above, we also take a further step by looking at data on genders and age. To begin with, females ($M = 6.230$) tend to spend more time in green spaces every week than males ($M = 5.754$), and females also have a higher stress level ($M = 18.04$) than males ($M = 17.109$). However, contrary to the above two variables, the stress management ability of males ($M = 46.826$) is stronger than that of females ($M = 46.137$). Also, males tend to have a higher self-compassion level ($M = 28.065$) than females ($M = 27.333$). What is more, we examined whether age was associated with different variables. It came out that older people tend to spend more time in green spaces ($r = .24, p = .017$), and feel more stresses ($r = .20, p = .048$), while age is not associated with participants' stress management ability ($r = -.17, p = .084$) as well as self-compassion level ($r = -.17, p = .095$).

Discussion

Based on the final result of our statistical analysis, we can conclude that there is no significant relationship between students' time spent in campus green space and their stress management ability. Specifically, our research failed to support our hypothesis. However, there were various limitations that we encountered during our experiment that may have impacted our results.

The first limitation we encountered is that most participants do not live on campus. This impacts the amount of time spent in green spaces due to their need to commute from and to their homes, which ultimately may cause them to want to spend less time on campus in general for non-academic purposes. Also, off-campus students may prefer green spaces near their homes or outside of campus, such as Queen Elizabeth Park or Stanley Park.

Secondly, the recent temperature in Vancouver has been quite low and it is accompanied by many rainy days, therefore causing people to choose to stay indoors. With the limitations mentioned above, they should be considered if we re-run this research project in the future. It would be most optimal to re-run this research project during hotter weather, not during a pandemic so that students are more aware of the green spaces available, and limit participants to students who live on campus to counter these limitations to gain more accurate results.

Furthermore, Continued advancement of this research will help further understand alternative treatments for high tension-related mental illnesses. This may allow those diagnosed with mental illnesses to return to a healthy state of mind without the interference of medication, which supports both human well-being and environmental sustainability. The implications of this experiment show the impact of stress and how stress can be potentially mitigated by spending more time in green spaces. Despite a negative correlation, we are confident stress levels among a larger population can be reduced by incorporating activities in green spaces, which is supported by previous research. Stress may come from a variety and a combination of sources, such as academics, relationships, and work. However, individual thresholds for stress may vary, thus early detection and interventions are necessary. For individuals who associate with a mental illness, certain current treatments can be painful and have a high possibility of sequelae.

Therefore, finding efficient and minimal pain treatments for patients is our driving motive for our experiment, as well as stressing the importance of environmental sustainability.

Recommendations

Although a negative correlation between the amount of time spent in green spaces and the ability to manage stress was found, which may be due to certain limitations mentioned above in the discussion section, our findings implicate various elements that strengthen our recommendations.

First, we found that on average UBC students spent most of their outdoor time at the Rose Garden and the exchange residence, and the new bus loop. This suggests that the mentioned locations are most preferred among UBC students, which leads to our first suggestion; keeping such locations well preserved and maintained throughout semesters. This is an important factor for students to visit these areas. In addition, due to findings mentioned in the introduction section where natural outdoor environments can benefit mental health, it is vital to keep UBC students' most preferred green spaces attractive so that students may continue gaining mental health benefits.

Second, our data shows the least time was spent at the Bosque (urban forest next to nest) and Fairview Grove next to the biodiversity research center, both averaging around 0.21 hours. This potentially implies two things: they are not preferred green spaces among UBC students or not many students are aware of their existence. If they are not preferred among UBC students, a recommendation to consider is to make these green spaces more attractive, such as renovating by applying benches or tables for students and keeping them well maintained. On the contrary, if students are unaware of these locations, a recommendation would be to spread awareness of these green spaces. After roughly two years of online schooling, new students may not have had the opportunity to explore UBC's campus green spaces. A potential solution can be hosting events and activities or promoting them online. In short, UBC is ranked as one of the most beautiful campuses in Canada, therefore it is crucial to make use of it to its fullest potential.

Lastly, among 100 participants the average time spent in green spaces on campus is 5.897 hours per week. This average was also driven up by a few outliers with the max being 68 hours per week. However, this implies that students at UBC do not spend much time in green spaces, which could potentially impact the potency of certain mental health benefits an individual may receive from doing so. A recommendation in regard to this concern is to host Mindful-Based Stress Reduction (MBSR) activities outdoors for students to experience such benefits so that it may inspire them to increase the time spent in campus green spaces.

Ultimately, our study found various implications despite the negative correlation between the amount of time spent in green spaces and the ability to manage stress. Implications such as most and least preferred green spaces at UBC's Vancouver campus as well as the lack of time spent outdoors by students. This formed the basis of our recommendations mentioned above in the motive to create and maintain opportunities for UBC students to alleviate stress while stressing the importance of natural environments on campus.

References

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Appendix

Appendix A

Survey Questions:

How much time (in hours) do you spend in each type of following green spaces around UBC campus every week?

Please type in the following boxes.

- Rose Garden
- Nitobe Garden
- Rhododendron Wood
- Main Mall Oaks
- Fairview Commons (green space next to ESB)
- Library Garden o The Nest Knoll (small hill next to the Nest)
- The Bosque (urban forest next to the Nest)
- Fairview Grove next to the Biodiversity Research Centre
- Treed area along Main mall between LFS and Owl Daycare
- Natural areas around Thunderbird Stadium
- MacInnes Field (quasi-natural space)
- Exchange Residence and new Bus Loop
- New Saltwater Residences (partially finished construction) next to Walter Gag

What is the main reason that you go to green spaces above?

- Exercise
- Alleviate stress

- Enjoy natural beauty
- Socialize
- For pets
- Other

If you choose “other”, would you like to share with us the reason that you go to green spaces?

[text box]

Now, please take a deep breath, read the following statement carefully, and indicate that which answer applies to you best since began to live and study in campus. There are no right or wrong answers.

I tend to over-react to situations.

Almost never Seldom Sometimes Often Almost always

I can deal with problems related with social relationships easily (e.g., with intimate relationships, with friends, with family members, with colleagues).

Almost never Seldom Sometimes Often Almost always

I found myself getting agitated.

Almost never Seldom Sometimes Often Almost always

I felt well prepared for assignments and exams.

Almost never Seldom Sometimes Often Almost
always

I felt that I was emotional sensitive.

Almost never Seldom Sometimes Often Almost
always

I had poor sleep quality, or my weight changed significantly, or I experienced hair loss.

Almost never Seldom Sometimes Often Almost
always

I try to be loving towards myself when I'm feeling emotional pain.

Almost never Seldom Sometimes Often Almost
always

When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.

Almost never Seldom Sometimes Often Almost
always

When I'm down, I remind myself that there are lots of other people in the world feeling like I am.

Almost never Seldom Sometimes Often Almost
always

I'm tolerant of my own flaws and inadequacies.

Almost never Seldom Sometimes Often Almost
always

I try to see my failings as part of the human condition

Almost never Seldom Sometimes Often Almost
always

When things are going badly for me, I see the difficulties as part of life that everyone goes through.

Almost never Seldom Sometimes Often Almost always

When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.

Almost never Seldom Sometimes Often Almost always

I try to be understanding and patient towards those aspects of my personality I don't like.

Almost never Seldom Sometimes Often Almost always

When I'm going through a very hard time, I give myself the caring and tenderness I need.

Almost never Seldom Sometimes Often Almost always

Are you a student?

- Yes, I am a UBC Vancouver campus student
- Yes, but I am not a UBC student
- No. I am not.

Which gender do you identify with?

- Female
- Male
- Non-binary / third gender
- Two spirited

- Transgender
- Prefer not to say

What is your age (in year)?

[text box]

Appendix B

Table 1.

Descriptive statistics for time spent in green space and stress management ability.

Descriptive Statistics

	V1 Amount of time	V2 Stress management ability
Valid	99	99
Missing	6	6
Mean	5.897	46.596
Std. Deviation	9.106	6.276
Minimum	0.000	26.000
Maximum	68.000	61.000

Table 2.

Correlation between amount of time and stress management ability.

Pearson's Correlations

Variable		V1 Amount of time	V2 Stress management ability
1. V1 Amount of time	Pearson's r	—	
	p-value	—	
2. V2 Stress management ability	Pearson's r	-0.116	—
	p-value	0.253	—

Table 3.

Correlation between amount of time and self-compassion level.

Pearson's Correlations

Variable		V1 Amount of time	V4 Self-compassion level
1. V1 Amount of time	Pearson's r	—	
	p-value	—	
2. V4 Self-compassion level	Pearson's r	-0.045	—
	p-value	0.661	—

Table 4.

Correlation between amount of time and stress level.

Pearson's Correlations ▼

Variable		V1 Amount of time	V3 Stress level
1. V1 Amount of time	Pearson's r	—	
	p-value	—	
2. V3 Stress level	Pearson's r	0.129	—
	p-value	0.202	—

Table 5.

Correlation between age and amount of time.

Pearson's Correlations ▼

Variable		Age	V1 Amount of time
1. Age	Pearson's r	—	
	p-value	—	
2. V1 Amount of time	Pearson's r	0.240	—
	p-value	0.017	—

Table 6.

Correlation between age and stress level.

Pearson's Correlations ▼

Variable		Age	V3 Stress level
1. Age	Pearson's r	—	
	p-value	—	
2. V3 Stress level	Pearson's r	0.199	—
	p-value	0.048	—

Table 7.

Correlation between age and stress management ability.

Pearson's Correlations ▼

Variable		Age	V2 Stress management ability
1. Age	Pearson's r	—	
	p-value	—	
2. V2 Stress management ability	Pearson's r	-0.174	—
	p-value	0.084	—

Table 8.

Correlation between age and self-compassion level.

Pearson's Correlations ▼

Variable		Age	V4 Self-compassion level
1. Age	Pearson's r	—	
	p-value	—	
2. V4 Self-compassion level	Pearson's r	-0.169	—
	p-value	0.095	—

Appendix C

Contribution of each team member on the entire group project:

	Qiyu Chen	Sciaca Fan	Ruochen Feng	Zhuoran Li	Darian Ngo	Yuxin Xu
Brainstormed theme and definition	Yes	yes	yes	yes	yes	Yes
Searched for references						
Research proposal	yes	yes	yes	yes	yes	Yes
Completed proposal meeting slides			yes		Yes	
Making Proposal presentation	yes	yes	yes	yes	yes	Yes
Built Qualtrics link			Yes			
Data collection	yes	yes	yes	yes	yes	Yes
Analyzed the data	yes	yes	Yes			
Created slides for project presentation	yes	yes	yes	yes	yes	Yes

Making the project presentation						
Final report	yes	yes	yes	yes	yes	Yes
Proofread the paper	yes	yes	yes	yes	yes	yes
Check format	yes	yes	yes	yes	Yes	yes