Greenspace Accessibility : Assessing its Impact on Psychological Well-being and Cognitive Performance of Students

By

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Abstract

Considering that urbanization and population is growing gradually, open spaces with natural vegetation could at some point of time turn from a luxury into a scarcity. Unless there is a balance between urbanization and nature, both the planet and its hosts will have negative impacts in the long run. While there is a slow rise in the growth of pro-environmentalism and the global-awareness for the need for more, it could be more effective to focus on improving environmental standards for future generations. With the global student population being more than one-fifth of the world population, it is important to manage greenspaces and its accessibility to students in highly populated urban areas. With the gradual increase in population and limited space, it has become important to understand the influence of greenspaces on students. While a variety of research has shown that greenspaces have impacted the psychological well being and performance of students, it is also important to explore the different levels of accessibility available to them.

An experimental survey was conducted to understand the impact on students' mindfulness, performance and impulsivity. The study shows both a quantitative and qualitative assessment of a comparative difference from a student's point of view on how greenspace accessibility has a high impact in their life.

KEYWORDS: Green space, Cognitive performance, Psychological well-being, mindfulness, impulsivity, Greenspace accessibility

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Chapter 1

Introduction

There are many reasons why people choose to interact with nature, it could be a form of escapism, a place to reflect or brainstorm, having a purpose or just breathe and take it all in. It has been proven that green spaces such as playgrounds, parks and gardens, do improve mental health. Being around grass and trees reduces the risk of health conditions like high blood pressure, anxiety and cardiac related diseases. This kind of space helps with psychological relaxation, stimulates social interactions and eases stress. Moreover, research has confirmed that spending quality time outside is good for the body, mind and soul.

1.1. Background

From the start of time, nature has given people a spot to live, assets, and different advantages, and it has assumed an essential part in their lives. Regardless of how this relationship was created from quite possibly the main parts of human existence to a spot devoted to sporting and comparative exercises, the association among individuals and the environment stays as before.

This link may be evident in everyday places where people interact with nature quickly, whether through direct access to it, enhanced food, or anything else. However, in urban areas, these connections are quite limited, and they are frequently linked to the accessibility of neighbouring green spaces. Furthermore, these natural places have long been regarded as a valuable natural resource (Groenewegen et al., 2012; Harting et al., 2014; Jansson, 2014; de Vries et al, 2003). Considering this, their importance and their need for higher accessibility needs to be acknowledged.

Finding a "green space" term that really captures all of the features, associations, and other benefits given by these locations could be difficult, mainly because green spaces can have several diverse meanings. Nevertheless, Mitchell et al. (2008) provided the most detailed

explanation of this concept. Parks, backcountry, vegetation routes, enormous rocks, wetlands, large timberland locations, and walled areas are all examples of green space, which includes parks, backcountry, vegetation passages, huge rocks, wetlands, huge timberland locales, and places with boundaries (Jansson, 2014; Mitchell et al., 2008).

1.2. Context

Physical activity reduces stress, noise and air pollution and heat exposure; green environments can contribute to physical and psychological benefits for the human body (James et al., 2015; Stigsdotter et al., 2010; van den Berg et al., 2015; Speak et al., 2012). Many studies have indicated that a greenspace surrounding study areas improves academic achievement as well as a student's capability to focus (Li, D., Sullivan, W.C. , 2016; Mousel, E.M., Moser, L.E., Schacht, W, 2006). Studies have shown that nature does indeed have different therapeutic advantages on “teaching learning activities”, such as improved attention capacity and lower stress levels in children, as well as an influence on the elements that determine high levels of school performance and achievement(Kuo, F et al. 2017).

Even while society and peer pressure may distract them from their main goal of learning, it is important for a student to enjoy the learning experience. How a student learns matters, a good and healthy study environment, involving them in physical activities and mental health activities will help their mindset to be more calm and composed in a high pressure environment which will enable them to perform better and ultimately be successful. Consequently, their performance in studies affects their future lifestyle related to their state of being, profession and salary. For example, a student with good academic grades has the chance to join renowned companies as an employee. This enhances his or her chance to get a high salary and lead an advanced lifestyle. Furthermore, this would promote eco-friendly behaviour and lifestyle in students in their early adolescence, allowing them to develop and mature into responsible adults in a way where they would respect the environment.

Urbanization and population is growing gradually and there are drastic climate changes in the environment due to global warming(Statista, 2018). Gradual consumption of earth’s limited resources like forests and vegetation that counter global warming have also added to the

problem. While there is a slow gradual growth of awareness and of pro-environmentalism, there is still a growing need to increase greenspaces accessibility (White and Gatersleben, 2011).

1.3. Problem Statement and Objective

With the constant growth of urbanization and population, the need to analyse greenspaces for increasing effectiveness will similarly grow. Academic research has discerned the many aspects of Greenspace and examined their impact on students (McFarland et al.,2008; Weil, 2011; Browninget al.,2019). It's only more recently that research on one important factor of greenspace has emerged – greenspace accessibility. Because of a lack of research in this field, with the introduction of the newer branch, it is vital to evaluate the impact of this element and, if so, how relevant it is in an educational setting. Although the theories outlined above provide a clear demarcation of greenspace components and their impact, they omit an examination of accessibility and its ensuing factors. However, to test the effects of the different levels of accessibility, one must evaluate their impact on various factors and form a conclusion . Is the impact significant? What is the perceived attitude towards greenspace accessibility? For instance, are the line of inquiries in place. This study uses an experimental set-up with over 120 respondents to conduct a comparable analysis to determine the impact of this critical variable. The study's methodology will be to present the same set of questions to all of our respondents. The students will be presented with a survey to understand their perception of greenspace accessibility. After collecting accessibility data, scales and subjective performance measures are used to analyse effects on mindfulness, impulsivity and cognitive performance. The assessment would then provide results based on each of the three criteria to determine whether greenspace accessibility has a significant impact.

1.4. Research Question

According to research conducted by Holt et al. (2019), use of green space, passive or active was assessed based on various factors. Furthermore, McFarland et al.(2008); Weil, (2011); Browninget al., (2019); have all outlined the impact of greenspace on students. However,

there is very scarce research that takes accessibility into account. This study aims to understand the relation between Greenspace, specifically accessibility, and student well-being. The research also tries to investigate the factors of accessibility in home and study environments for students.

What is the influence of greenspace accessibility on student behavior and performance such as impulsivity, mindfulness and exam performance?

Chapter 2

Literature Review.

2.1 Introduction

This chapter discusses the arguments from previous academic authors to create a sound foundation for this research regarding whether green space and its accessibility is an influential element in a student's life and/or study environment.

"Diminishing urban green spaces limits the opportunity for students to experience nature and learn about the environment. It is therefore important to understand how the campus environment contributes to student life and students' connection with nature, particularly with green spaces in their immediate surroundings." - Speake, Edmondson and Nawaz (2013, p22)

2.2. Green-space

Several pieces of research have evaluated that the green environment has a deep impact on the well-being of people. In addition to this, it helps in reducing blood pressure along with "stress level'. Students deserve a fresh mind for understanding their study topics and it helps them to improve their performance (Ward Thompson et al., 2012). Green-space in urban

areas helps in developing the environment by removing “air pollution”. From the literature reviewed, several pieces of research have shown that greenery has a deep impact on a person’s well-being while very few have shown otherwise (Weil, 2011).

The concept of green-space and its accessibility is evaluated in this chapter to identify its impact on students’ academic performance. In addition to this, theories are evaluated to understand the effect of greenery in developing students’ academic performance. Furthermore, we will study the relationship between greenspaces and the learning environment along with their impact on teaching and learning activities, on cognitive abilities, and on the concentration level of students. It has been found that higher access to green space has an effective bearing on students' retention abilities, their concentration level as well as their performance in examinations (Maas et al, 2009).

The concept of “green-space” in educational settings is mainly referred to as the availability of greenery in study environments for improving students’ psychology. Public schools have the responsibility of developing and preparing students for civic life. It has been suggested that providing a diverse range of green areas promotes a variety of recreational and inclusionary possibilities for males and females, students with disabilities, employees, and others (Dyment & Bell, 2008). Moreover, living in places with trees and greenery lowers the risk of various diseases and improves health conditions (Maas et al, 2009).

2.3. Green space and well being

In a research study that analysed the migration of people from lower levels of vegetation to higher levels of vegetation, it was found that in the three post migration years, the people had shown significantly better mental health (Alcock et al, 2014). Active greenspace use was found to result in a higher quality of life, a better overall mood, and decreased stress among students, whereas passive greenspace use did not have as much of an effect (Holt et al., 2019). Engemann et al. (2019) stated green spaces help in lowering the risk of developing psychological disorders among adolescents. In addition, greenspaces also have an impact on psychological aspects like thinking capabilities, focus and concentration (Weil, 2011).

However, Foellmer et al (2021) stated that academic greenspace supports well- being and acts as a therapeutic influence. On the contrary, Ekkel and de Vries (2017) stated that nearby green space helps in ensuring physical well-being of students.

The relationship is a significant factor that affects learning for a student and controls his or her academic performance. As stated by (Kintu *et al.* 2017), relationships with different kinds of people affect the psychology of a student. For a student to associate with people who think in positive ways. For example, a person with positive psychology can influence a student and motivate him or her towards improving their academic performance. Similarly, the environment affects the psychological state of people throughout the world (Helm *et al.* 2018).

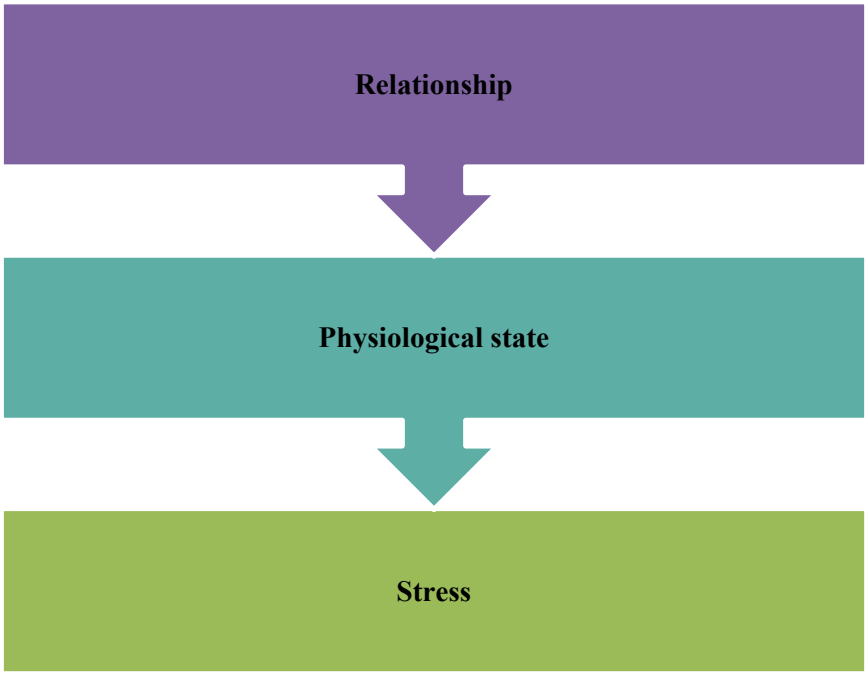

Figure 2.3: Factors affecting a student's environment (Source: Kintu *et al.* 2017)

2.4. Green space in study environments

A person's life goals, character and understanding of the world develops in an educational environment from a very young age. As per the views of Afanasyev et al. (2019), students get prepared for chasing their future goals and get established in society from their school life onwards. On the other hand, Browning and Rigolon (2019) stated that students' academic performances such as their marks and grades have a deep impact on developing their future.

It affects their future lifestyle related to their state of being, profession and salary. For example, a student with good academic grades has the chance to join renowned companies as an employee. This enhances his or her chance to get a high salary and lead an advanced lifestyle. For these reasons, it is necessary to ensure their well-being during academic life so that they can focus on their performance Holt *et al. (*2019).

Multiple studies have looked into the relationship between green space and academic performance, hypothesizing that green space can improve performance and, over time, help minimize such disparities (Matthew H. E., M. Browning and Alessandro Rigolon, 2019). In a study conducted in Spain, higher levels of greenness at home and at school were linked to greater cognitive development in schoolchildren(Dadvand et. al. 2015). Also, Hipp et al. (2016) found that students who view their campus as green also place a higher value on campus restorativeness.

2.5. Importance of Green Space Accessibility in Study Environments

Greenery in the environment and closeness to green space have a significant link to human health improvement (Dadvand et al., 2016). Specifically children are more vulnerable to health and behavioural concerns in urban areas due to a lack of green space(Veitch et al., 2011, Wolch et al., 2014). As a result, their ability to concentrate and complete activities may be hampered, impacting their academic achievement (Bratman, Daily, Levy, & Gross, 2015).

Environments with greenspace incline people towards these activities and in certain cases motivate them to spend more time exercising(Hitchings, 2013). Physical health is deeply related to psychology as one is dependent on another. For example, a student experiences stress and discomfort while going through a sickness or ailment and similarly, negative emotional states affect the optimal functioning of one's physiology(Salovey, Rothman, Detweiler and Steward, 2000). Moreover, certain forms of physical activities in neighbourhood greenspace reduce stress levels(Fan, Das and Chen, 2011; Norris, Carroll and Cochrane, 1992). Research has also shown that emotional intelligence and physical activities have positive correlation between them(Tsaousis and Nikolaou, 2005).

Studies have shown that poor study environments can adversely affect academic performance. Evidence has shown that poor indoor environmental quality has a direct association with performance(Mendell and Heath, 2005). Moreover, indoor air pollution can induce oxidative stress among college students(He et al., 2021). On the other hand, campuses that are planned and designed with green space in mind tend to create pleasant experiences and build loyalty among the students(Speake, Edmondson and Nawaz, 2013).

It is mandatory to focus on enough level of “greenness” in the University or academic campuses in order to mitigate the above issues and provide proper green space for the students. As per the evaluations of Holt *et al. (*2019), the students' initial data needs to be collected to understand their interest in this specific field. It is conceptualised that this strategy can work as a proper way for the students to establish their mental health as it is a general part of the restoration of their psychological health. Contrary to the above view, Blaschke *et al. (*2019) stated that the green space in the study environment helps students focus on their academic activities. Resultantly, it is important for the organisations to get assistance from the Ireland Government through which accessibility to greenery areas can be enhanced. It is highly valuable for the institutions to make the study environment more accessible to greenspace for both the physical and mental health of students.

2.6. Effects of Urbanization and Lack of green space accessibility

As per the views of Chuang et al (2007), environmental factors such as pollution and toxicity affect the physical state of people. The urban environment often consists of air pollution due to modern civic life and air polluting industries(Duncan et al., 2016). As stated by Mage et al.(1996), while concentrations are generally low, pollutants will continue to gradually increase as the population increases. Over the past few decades, studies have shown that the European Union population in urban areas had been exposed to fine particles and tropospheric ozone levels that widely exceeded the WHO limit values that are safe for physical health(Sicard et al., 2021). Moreover, Potgieter et al. (2019) established that high populations in urban areas tamper with the natural ecosystem.For example, urban areas such as Dublin and Cork in Ireland consist of a high population. Moreover, the urban population in Ireland

has been found to be 61.34% of the total population in 2009 and it has increased to 63.41% in 2019 (Statista, 2020). It is seen from this statistic that urbanisation is gradually expanding which in turn could affect the environment negatively in the future. Figure 2.6, for example, depicts the rise in mental health difficulties among Northern Irish individuals during the period of urbanisation. It can be noted from this figure that mental health issues among citizens of Northern Ireland have significantly increased from 2009 to 2019 (Statista, 2020).

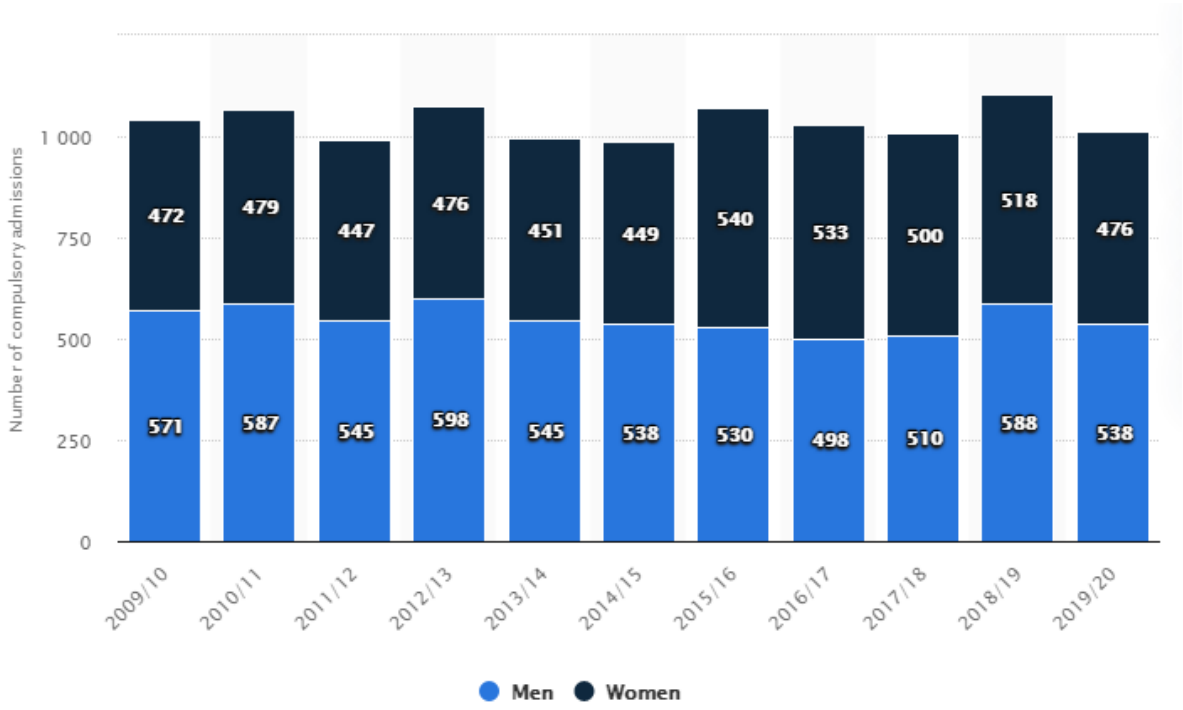

Figure 2.6: Rise of mental health issues in Ireland from 2009 to 2019 (Source: Statista, 2020b)

Research also confirms that psychological and physical health is affected when exposed to pollutants in the air over a long period of time, especially in densely populated cities(Rajper, Ullah and Li, 2018). Research has also established that chronic stress could adversely affect physical health in the long run (D'Andrea, Sharma, Zelechoski and Spinazzola, 2011). Furthermore, even in healthy young people, air pollution in urban areas has been linked to inflammation, autonomic dysfunction, oxidative stress and blood coagulation (Chuang et al., 2007).

In addition, as argued by Yolton et al. (2019), a polluted environment increases psychological

issues and can lead people towards experiencing depression even at a young age. Resultantly, people living in a polluted environment and leading complex lifestyles can face a higher level of anxiety and depression. On the contrary, Belleau et al. (2019) identified that young brains have an overactive amygdala that controls their psychological state. For this reason, young brains such as students' brains provide higher responses to a minimal stress level. For example, a student can feel more stress than an adult while facing the same level of stress. It can hamper their psychological state and create challenges for them to focus on their academic performance.

However, Ivanov et al. (2019) identified that a green environment helps in controlling the level of stress. Due to this reason, students who are growing up in a green environment can have a lower level of stress (Kweon et al. 2017). It can help them in increasing their brain efficiency and learning potentiality. Furthermore, high learning capability and high efficiency can help students in improving their academic performance. This shows that high stress and anxiety can decrease their learning capability and result in their poor academic grades while exposure to greenspace could help relieve it.

Furthermore, Leisner (2020) identified that environmental factors affect the process of creating sufficient nutrition naturally. For example, the availability of fresh foods and the air is affected due to the pollution in the environment. Consequently, lack of necessary nutrition creates challenges in the optimal functioning process of the cognitive ability of the brain. (Meeusen, 2014). Due to this, environmental hazards such as pollution and toxicity affect psychological development among students. This in turn increases procrastination and comes in the way of completing their academic activities(Senécal, Koestner and Vallerand, 1995; Steel and Klingsieck, 2016) resulting in poor academic performance. Therefore, it can be stated that green-space accessibility can help in developing students' physical state besides ensuring the availability of necessary nutrition for them. It can also contribute to optimal cognitive functioning while enhancing learning capability among them. However, a lack of greenspace can cause lower optimal cognitive functioning, negative physical and mental conditions and increased stress levels. In the same manner, lack of accessibility could lead to the same negative effects.

2.7 Theories supporting use of green-space in study environments

2.7.1 Relevance of Social learning theory

Social learning theory (SLT), first proposed by Burgess and Akers in 1966, suggests that both deviant and conforming behaviour are produced through an individual's learning processes, with the determinant being the individual's behavior's direction and influences (Fox ,2017). Students consist of premature psychology and they learn activities by observing others(reference required). Relationships are a significant factor that affects learning for a student and influences his or her academic performance. As stated by Kintu et al. (2017), the psychology of a student is influenced more with 'face-to face' interactions with the instructor. A student's ability to associate with people who think positively is imperative. For example, a person with a positive mindset can influence a student positively and motivate him or her towards improving their academic performance. On the other hand, the student can observe the positive characteristics of this person and can develop the psychology that can help him or her enhance learning potentiality. Thus, it can be evaluated that a green environment affects people's psychology and has an impact on students' performance.

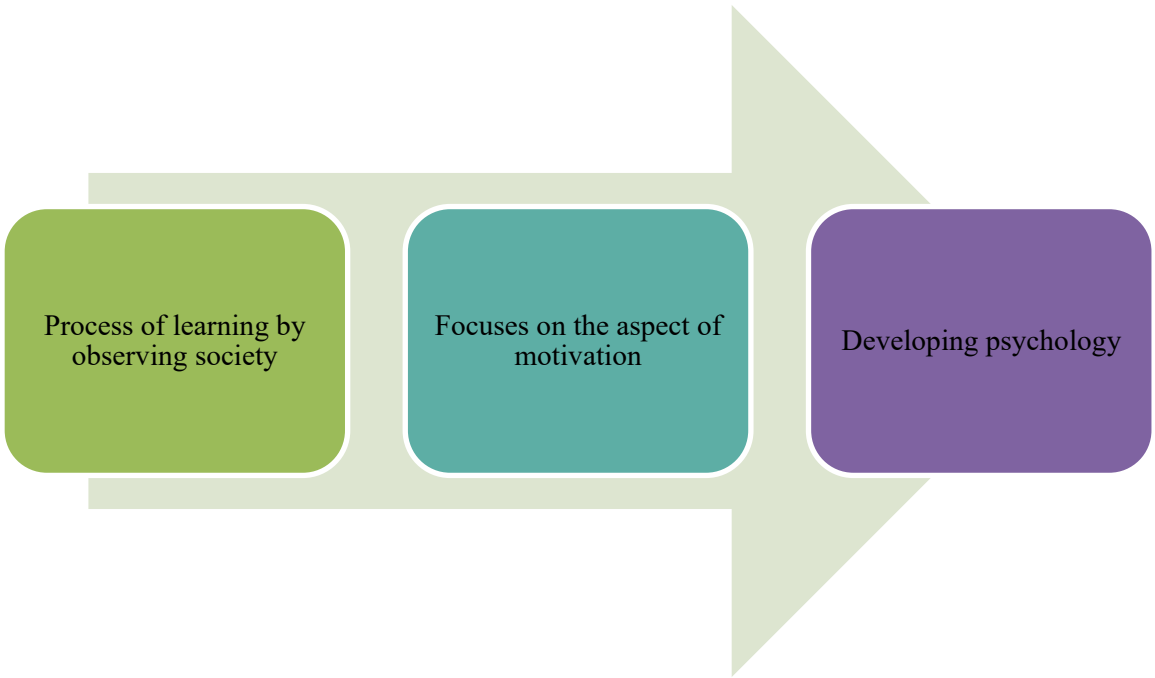

Figure 2.7.1. : Social learning theory (Source: Fox, 2017)

2.7.2 Significance of Cognitive theory

This theory focuses on evaluating behavioural patterns among learners by identifying their psychological state. As identified by Cristofaro (2020) , “cognitive theory” helps in evaluating the thought process that affects a learner’s behaviour. In addition to this, the psychological state of a person directs the thought process as well. (reference needed) For example, people with mental stress tend to have negative thoughts. Moreover, the way of thinking affects the effectiveness/mood and activities of people as per this theory. Similarly, a student can feel stress while growing up in a polluted environment(reference needed?), affecting his or her academic performance.

Stress is a significant factor that affects students’ academic performance by hampering their psychological state. As per the views of Perrotta (2021), stress enhances the release of adrenalin that results in the stimulation of the brain. Stimulation of the brain can affect the thought process and decreases its efficiency. Therefore, students with higher stress levels become unable to focus on their academic activities that result in their poor academic performance (Becker, C. et al. 2017).

On the contrary, Aardema and Wong (2020) stated that "cognitive theory" helps evaluate external factors that affect the learning capability of an individual. As per this theory, factors such as society and environment can affect the process of learning of a student. For example, a student living in a healthy environment can have a high learning potential. Improved learning conditions can help a student develop his or her academic performance. Furthermore, high academic performance increases future opportunities.

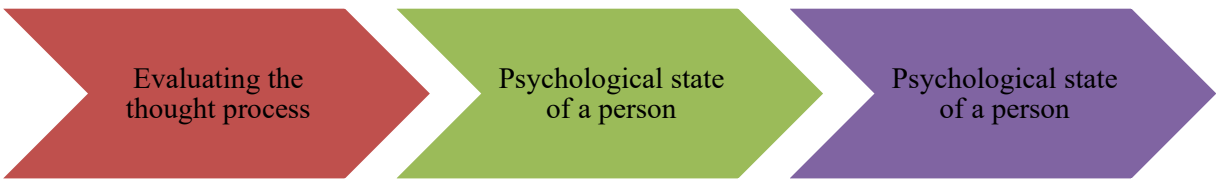

Figure 2.7.2. : Cognitive theory (Source: Cristofaro, 2020)

2.7.3. Significance of Attention restoration theory (ART)

People can concentrate better after spending time in nature or merely looking at scenes of nature, according to Rachel and Stephen Kaplan, who established Attention Restoration

Theory (ART). In research, it has been seen that contact with nature has various restorative effects on both teaching and learning activities and affects factors for success in school life and also increases attention capacity while reducing stress levels in students (Becker, C. et al. 2017).

Here are four elements proposed to have helped improve concentration levels (Kaplan, 1995). First, Individuals surrounded by a green environment have this feeling of space and disconnect from the real world which helps them focus better. They could also be hanging around the green spaces in their campus and feeling the same way. Second, there appears to be a shift between voluntary to involuntary attention; the former does not allow for reflection because the individual is entirely immersed in the extremely exciting activity. The latter is a soft fascination that helps you reflect, for eg; sounds of nature- listening to birds chirping. Third, green spaces make the surrounding feel much larger even when it actually isn't that big. Fourth, when an individual fulfills their purpose in a green space, there is a feeling of compatibility. These four components in a campus can help students focus better.

According to this hypothesis, being in nature not only feels pleasant, but it also helps us refill cognitive resources like attention capacity, which enables us to concentrate. Being in nature provides various benefits and it also provides effortless attention which is very helpful in our life and improves the potential for more capabilities in the mind.

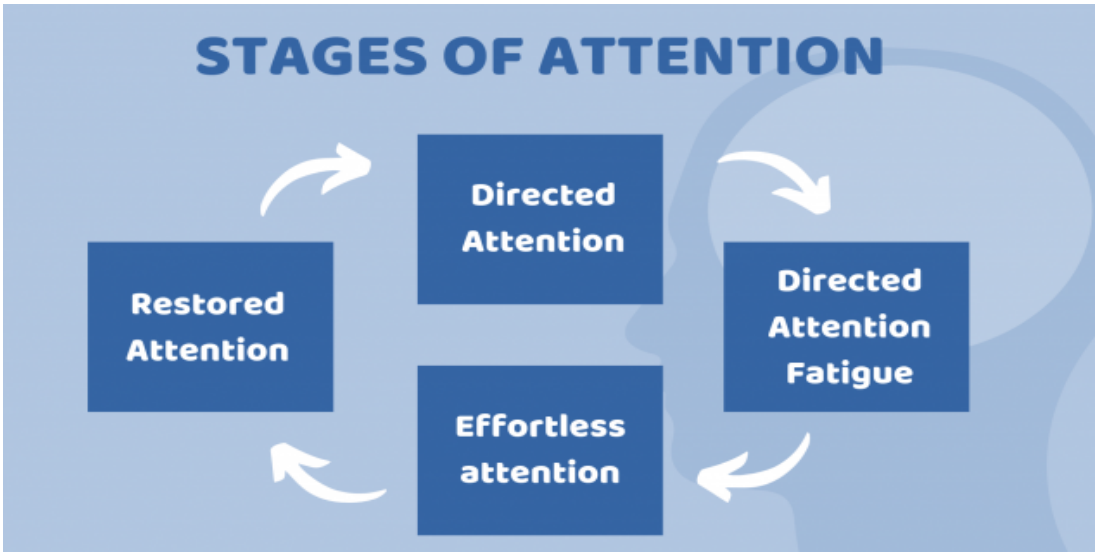

Figure 2.7.3. : Attention restoration theories in practice (Source : Becker, C. et al. 2017)

2.8 Challenges of green space accessibility

2.8.1. Urban centric development

As per the views of Makino et al. (2018), “urban centric development” is a huge issue that affects the environment in urban areas. Due to better facilities and development people from rural areas choose to move to urban areas to ensure their self and career development. Research conducted related to environmental psychology has shown that people are more likely to choose a place which has vegetation and natural elements in a more positive way than areas without natural vegetation (White and Gatersleben, 2011). There are particularly 4 findings from this research which say spaces that have greenery and vegetation are preferred over constructed spaces, furthermore,they are more pleasing to the mind and body, create positive emotions and are highly restorative. It creates a huge impact on the urban environment where lack of greenery is found due to the high population. For example, the growth rate of the population is 1.51% in Ireland and more than 60% of citizens belong to urban areas (Statista, 2018). It shows that “urban centric development” is affecting the country where high density of population is found in urban areas. Resulting in the gradual reduction of greenery in the country. The people in general not only tend to prefer a green environment but show that they find such landscapes beautiful, stress-releasing and evoking positive emotions, whereas urban scenes evoke negative effects (White and Gatersleben, 2011). As per the views of Marzukhi et al. (2020), lack of greenery creates physical and psychological diseases among people. Therefore, students of the country are getting affected due to the decrease of greenery in urban areas affecting their psychological development and decreasing their learning capability. Which in turn makes them unable to focus on academic skills, resulting in their poor academic performance.

2.8.2. Complexity in lifestyle

Citizens in developed countries are habituated to the use of advanced technologies. As opined by Turunen et al. (2017), complexity in lifestyle creates challenges for well-being and physical improvement during their early student life. Entanglement in daily life and using technological devices such as mobile phones throughout the day enhance psychological issues such as

tension and anxiety. Furthermore, students are habituated to adopt the habits and lifestyles of adults by observing them. This has led to a rise in complexities in student life that affects their psychological state. Which can also carry on to college unless influenced by positive external forces other than self-motivated reasons. Green space allows people to stay psychologically fit and fight against complexity. In addition to this, it can help students in developing their psychological state and focus on their academic goals. For example, anxiety can cause a person to think in negative ways.

2.9 Literature gap

This section focuses on finding out the gaps in previous research that need to be fulfilled in the current research. In this chapter, several pieces of research have been used to assess the impact of green space on student academic performance. It helps in identifying gaps in those researches that need to be mitigated in this study. For example, Afanasyev *et al.* (2019) focuses on the influence of the learning environment for a students' success in the long run. Moreover, the importance of academic life in evaluating future lifestyle is also discussed by these authors. However, the way of developing the learning environment using green-space activities is not evaluated here. On the contrary, Potgieter *et al.* (2019) shed light on the issue of increasing population in urban areas and its effect on the environment. Moreover, these authors have not discussed how to mitigate this issue and develop an urban environment for students.

It has been seen that most of the studies have included mindfulness, physical well-being, psychological well-being, green spaces and exam performance in isolation but there is no study that discusses them in unison. Moreover, the current study focuses on their relationship with the study environment. Furthermore,

Belleau et al. (2019) investigated the impact of stress on a students' brain. The pathway of overcoming this issue is not identified by the authors. Blaschke, P. *et al. (*2019) commented on the major strategies relevant to mitigate the problems in green space to establish the study environment. However, the authors have not focused on the major benefits of the green space applicable for meeting study requirements.

2.10 Summary

Greenery can help in developing physical aspects as well as mental health conditions among people. It can help in developing the mental health of students. It can help them in evaluating their subjects and emphasising their performance. Research shows that students often go through stress during their academic life that affects their mental health. Moreover, they often experience anxiety due to academic pressure.

The conceptual framework and its elements have also been viewed and discussed briefly in the beginning of the chapter. Moreover, theories such as "social learning theories", “attention restoration theory” and "cognitive theory" are used in this chapter to understand how different levels of greenspace affect students' academic performance. Furthermore, this chapter focuses on identifying the factors affecting green space in study environments such as psychological issues and stress. In addition to this, challenges for green space in study environments such as urban centric development and complexity in lifestyle are evaluated to explain the importance of the topic. Strategies such as focusing on greenness are evaluated to mitigate the issues of green-space in the study environment. Moreover, this chapter finds gaps in previous research to provide a clearer relationship between greenspaces and the study environment.

Chapter 3

Conceptual Framework

3.1. Proposed Conceptual framework

The graphical depiction that explains the link between the variables and factors will be elaborated in the conceptual framework(Adom, Hussein, and Joe, 2018). Much research has been performed on the impact of greenspace on many characteristics such as loneliness, cardiovascular mortality,stress, to name a few. However, when research in a field is scarce,

authors leave room for future investigation (Kureshi and Sood, 2010). The purpose of this article is to assess the different levels of accessibility in a study environment. As seen in Figure 3.1, green space accessibility is an independent variable and affects dependent variables such as mindfulness, impulsivity and cognitive performance.

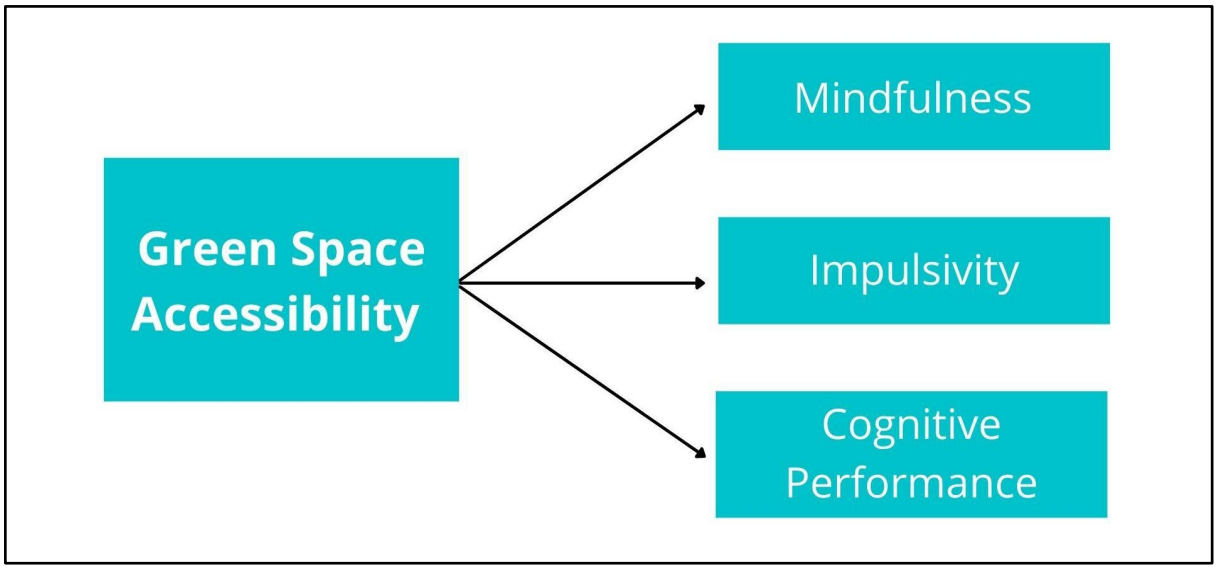

Figure 3.1 : Proposed Conceptual Framework (Self-created)

3.2. Research Hypothesis

The current study's main purpose is to determine the impact of green space accessibility levels on student well-being. A review into the factors that may be linked to green space accessibility will also be carried out. While review of the literature identified several factors i.e., frequency of visits to local green spaces, level of visual and physical access to greenery at home, locality and campus and all of which could be linked to greenspace accessibility, the findings of this study could be utilised to determine which factors are linked to increased accessibility..

The study's specific objectives were to:

1. To analyze students' level of green space accessibility with cognitive performance, impulsivity and mindfulness.
2. To assess the attitude of students towards greenspace and its accessibility
3. To see if any one group had higher green space accessibility levels based on demographics , as well as to compare demographic groups on student well-being and

performance.

CHAPTER 4

Methodology

4.1. Research Methodologies

This study consisted of a mixed methods design since it is using both quantitative and qualitative survey methodology (Bryman and Bell,2011). The data for the quantitative study came from questionnaires and scales used to assess green space accessibility levels, student attitudes, well-being perceptions, and accomplishments. To attain more insight into students' learning attitudes in respect to green space accessibility, qualitative research was done. Utilising this methodological technique is an important component of mixed methodological research. Because results acquired from various techniques have the potential to improve our knowledge of business problems and concerns, mixed methods research in business studies may play an essential part in the growth of our research. In this sense, mixed methodologies research may offer value and contribute to the advancement of our business research themes. Mixed methods studies' main goal and core premise is that combining quantitative and qualitative approaches yields a greater grasp of research challenges and complicated phenomena than either approach alone.

By enabling anonymity, internet surveys have been demonstrated to neutralize socially acceptable responses to questionnaires (Booth-Kewley, Larson, & Miyoshi, 2007). Despite the fact that cross-sectional research collects data only once and thus cannot infer a stronger cause and effect relationship between green space accessibility factors and positive well-being outcomes (which requires a longitudinal study measuring effects over time) (Bowling, 2005), it was suitable since there were time constraints. Due to potential difficulties such as attrition and order effects, an experimental design was not deemed appropriate. The four predictor variables were the green space accessibility: Surrounding greenery, Distance to Nearest GS, Frequency of GS visits and attitude of GS. The three dependent variables were Cognitive performance, Impulsivity and Mindfulness, as previous literature found these

variables predict psychological and physical well-being. In order to infer causality, cross-sectional studies are usually employed. The participants are evaluated at one moment in time to see if they were exposed to the relevant substance and if they have the desired outcome. Some of the issues will have not yet been exposed, and the consequence will be of interest. This separates the research from the rest of the observational studies. when the term "exposure" and/or "outcome" is used. The advantage of such research is that individuals are not intentionally exposed, treated, or not treated, and so ethical issues are rare. This sort of study is very inexpensive because just one group is utilised, data is gathered only once, and numerous outcomes may be investigated.

As seen in the inductive and deductive approaches, this study uses both types of analysis, referred to by Bryman and Bell as mixed method research (2011). To begin, this study shows statistics between the three degrees of greenspace accessibility that is high,medium and low level based on the result obtained through qualitative analysis. An experimental design was used in the qualitative study, with respondents being asked how they engage with greenspace and how much they would value it, to study their attitude towards greenspace. Furthermore, quantitative data is used to support/explain the conclusion gained from the aforementioned research. A variety of criteria are used to understand the insights that drive the respondents' decisions.

4.1.1. Qualitative and quantitative

A qualitative study is defined as a technique of research that focuses on the words rather than the quantification of facts. The primary purpose of qualitative research is to have a deeper understanding of the topic in the current situation. This form of study is defined by its close proximity to the data source, such as an in-depth interview. The qualitative style of analysis is usually linked with an inductive approach and a focus on theory generation(Bryman and Bell, 2011).

Quantitative research is more systematic and methodical than qualitative research, and it offers the researcher more control. A quantitative investigation's major goal is to generalise

on a certain topic. This approach is used to test ideas by looking at the relationships between different variables. This style of analysing in a quantitative study is linked to a deductive approach and a focus on theorem testing (Bryman and Bell, 2011).

4.1.2. Survey Design

The survey was designed keeping in mind the literature gap and the objectives to be covered for this thesis. The questions used in the survey have been collected from a few journals and books to cover up all the variables involved in this thesis. Previous literature speaks about how green space accessibility affects well being and health however there were very few articles that spoke or discussed about the possibility of how green space accessibility could impact performance after detailed study of the relation the variables of that impacted performance were decided and those are student attitude, mindfulness and impulsivity. Firstly, questions regarding the demographics were asked, this includes level of education, age, gender, locality and level of education (Appendix). The assessment tools focused on several sections of the students; well-being, general exposure to green spaces and overall greenspace influence statements. Furthermore, three scales were utilized in this study: green space accessibility Scale, MAAS, and BIS (Appendix). Additionally, other questions and statements were included in the survey that evaluated student's attitude towards greenspace and perceived performance.

Green-Space Accessibility Scale

The study's goal determined the influence of greenspace accessibility, however, because there was no readily accessible measure to examine student's views regarding their accessibility to greenspace, the researcher devised this scale. The scale was subjected to a dependability Cronbach's alpha test, and it was found to be reliable (0.7). The level of greenspace accessibility was assessed through an 8-Item Questionnaire. Respondents were requested to describe the level of green-space accessibility in their home, locality and campus. Possible responses ranged from "Low Access to Green Spaces" to "High Access to Green Spaces" on a 1 to 5 point scale. Respondents were also asked to describe the level of greenery in their locality where possible responses ranged

from “No natural greenery” to “Abundant natural greenery” on a 1 to 5 point scale. While other question responses included “No natural greenery” and “Abundant natural greenery” The survey also asked how far away was the nearest green-space area from their home. Possible responses ranged from “Less than a 10 minute commute” to “More than a 30 minute commute” on a 1 to 4 point scale. Students were also asked the frequency in which they engaged with greenspace. Possible responses to this question included: “Daily” “Once weekly” “Once a month” “Once every 3 months” and “Once every 6 months”.

Student Well-being Measures

The instrument selected to measure psychological well being of students consisted of two separate scales, MAAS and BIS. Validity and reliability were assessed for both of these metrics.

Mindful Attention Awareness Scale (MAAS)

The MAAS was developed as a result of a study on mindfulness as a trait that differs between and within people (Brown, Ryan, 2003). Humans differ in their levels of awareness and attentiveness to current events and experiences. Individuals' innate capability varies depending on their amount of discipline, self-control, and personality. The scale is a 15-item questionnaire that assesses the tendency to pay attention to and be aware of current events in daily life. Participants are asked to rate their level of agreement on a scale of 1 to 5, with 1 representing "Strongly disagree" and 5 representing "Strongly agree."

Barratt Impulsivity Scale (BIS)

The BIS was first devised in 1959, although Patton, Stanford, and Barratt have subsequently revised it (1995). The BIS-11-A is a 30-item self-report questionnaire with a likert scale that may be divided down into six categories: motor impulsivity, cognitive complexity, self-control, lack of delay, attention, and perseverance (BIS-11-A; Fossatti et al., 2002). Each item is scored on a four-point Likert scale ranging from "Never" to "Almost always/always," with higher scores indicating greater impulsivity. Because these characteristics have such significant intercorrelations in the student population, to have a self report measure of impulsivity as a total score is more prevalent in adolescent research. This measurement of impulsivity is the only one required for the purpose of this study.

Cognitive Performance

Due to time and cost constraints, exam performance was taken as a subjective measure to assess cognitive Performance. Additionally, A statement and 2 questions were included that instigated perceived performance and growth. “My performance has increased during the period of my course.” where possible responses ranged from “Agree Strongly” to “Disagree strongly” on a 1 to 5 point scale. “How do you rate your overall performance during your course?”Possible responses ranged from “Very Poor” to “Very Good” on a 1 to 5 point scale. “Which of the modules do you find easier to pay overall attention to?” where possible responses ranged from “Modules with both physical and visual access to greenery”, “Modules with only visual access to greenery”,“Modules with only physical access to greenery” and ”Modules with neither”.

Attitudes towards GS & A

To assess students’ attitudes towards greenspaces, they were asked to respond to statements and questions regarding their use and frequency of greenspace, importance of having a local greenspace and influence of green space accessibility in a learning environment. Statements such as “Green-spaces should be places where you can relax and unwind.”, “Physical accessibility of green space or lack of, affects my ability to study.” and “Visual accessibility of green space or lack of, affects my ability to study.” where possible responses ranged from “Agree Strongly” to “Disagree strongly” on a 1 to 5 point scale. Furthermore, the questions were, “How important do you consider it is to have green-spaces in your local area?”where possible responses ranged from “Very important” to “Not at all important” on a 1 to 5 point scale. and “From the times you have visited the local green-space, how many of them are for educational purposes?”where possible responses ranged from “More than half”, “Half of them”,“Less than Half” and ”None of them”.

Reliability Assessment

The quality of new scales is typically recapped by reporting reliability coefficients of the constituent items. The most often used reliability metric is Cronbach's alpha reliability coefficient. The three scales that are used to measure the psychological well being and green space accessibility levels fit well against these standards. The alpha reliability coefficient for green space accessibility Scale is 0.7, for MAAS 0.88, and for BIS 0.75. All of the coefficients

are higher than the recommended levels for study. The findings of our analyses, taken collectively, show that these scales have significant construct validity and reliability.

Statistical Analysis

For the statistical analysis, the statistical package for social sciences (Version 26.0, SPSS; SPSS Inc., Chicago, IL, USA) for windows was performed and the significance was set at $p<0.05$. Statistical analysis included correlations, frequencies, descriptive statistics and analysis of variance. Variables were split into categorical variables and continuous. The former represented count and percentage, while the latter represented mean and standard deviation (SD).

Pearson correlation coefficient

It is a measure that determines the relationship between two variables that are quantifiable. This coefficient, r also determines the extent to which the two variables are intertwined with one another. This means that as one variable increases, the other one would increase as well.

ANOVA

Analysis of Variance is a statistical method that compares the population means to approximate the degree of shift between dependent variable and independent variable. If one has to use for additional tests, this is done by separating observed variance data into different components. This model helps to analyse the variance within groups The ANOVA Significance level (p score) is used to test the hypothesis. The p-score <0.05 is considered to show the significant difference between variables. For this study, a score of under $p<0.05$ shows that the factor being analysed would have a significant dependence.

GLM Univariate

GLM univariate, also known as the general linear model, shows the linear relationship between factors with the dependent variable. The model aids us in comprehending the interaction between factors and dependent variables.

4.2. Data Source and Collection

Primary data and secondary data are the two types of data that can be collected.
Primary data is the most basic type of data in statistical research which is collected through sources like surveys, experiments, interviews, etc. These sources need to be tailored to meet the requirement of the research, hence it is important to set objectives and target groups before selecting the data collection source. Primary data is said to be the most recent and accurate information gathered. Secondary data is the type of data that is already available, which various researchers would have reviewed and revised through statistical analysis. This data can be gathered from different research papers, books, journals or articles etc; (Malhotra, Nunan, and Birks, 2017).

Structured interviews, questionnaires, focus groups and content analysis are the kinds of methods to conduct both qualitative and quantitative analysis, Bryman and Bell (2011). In this paper both primary and secondary data has been collected for analysis on how different levels of greenspace accessibility impact an individual's well-being in a study environment. An extensive survey of over N = 120 participants responded with their views on greenspaces and its accessibility within their study environment. All the participants consented to the policy of being made anonymous and their data will be used only for the purpose of this thesis. As COVID-19 created alot of restrictions, the survey link was circulated virtually through all platforms from whatsapp messages, social media channels and emails. Word of mouth and leveraging other people's network and connections helped maximise responses.

4.3. Population and sample

The participants made up a total sample size of N = 120. The target demographic was current students. Majority of respondents were from the age group 20-30 years, which is nearly 65% of total respondents in the group. It means that youngsters were forming a major part of our analysis, around 30 % of the participants were from the age group above 31 years and the rest were below 20 years of age.

4.3.1. Method of Sampling

A non-probabilistic sampling approach was explored, as recommended by Goodman (1961), allowing for an extensive study by collecting the largest number of participants. This approach, known as Snowball Sampling, requires each person to transmit the survey to a different person in the population. As a result, a larger audience will be reached, which increases the sample size. Moreover, the data was collected using the Simple Random Sampling method. Each variable in the population has an equal probability of being chosen in a basic random sampling approach. It eliminates personal factors and lowers prejudice. As a result, the responses were chosen at random.

4.4. Ethical Considerations

When a research is conducted then certain legal and ethical issues arise, Ethical considerations are very important and it is necessary to give importance to these before we start our research work. When our research is concerned with academic work, it becomes important to consider legal and ethical grounds, to arrive at our results. We also interact with students, professionals and academicians in order to complete our research and it may be possible that these interactions with the participant cause harm though unintentionally. As a result, it is the researcher's obligation to ensure that no harm occurs while performing the research, and research should be structured in such a way that search harms are minimised or eliminated from the study.

Different issues that can arise due to a research work may be classified mainly in 3 headings:-

1. Psychological harms like nudity in advertising can harm students
2. Financial harm, like leaking secrets of business may be leaked or employee’s information being shared with owners or vice versa.
3. Social harm that may arise due to personal information of an individual may get leaked in society or his preference may get exposed without his knowledge and intention.

Chapter 5

Analysis and Result

The goal of this study was to determine the impact of greenspace accessibility on student well-being and performance perceptions. This chapter contains descriptive statistics and data analysis for the results of surveys completed by 120 students. Furthermore, demographic data was obtained from students in order to make comparisons between students with varying levels of access.

There were two kinds of data analyses employed in this study, one is descriptive and the other was statistics. Descriptive statistics measured the mean, median, standard deviation and range of participant's results in relation to attitudes, temperature, perceptions, task performance and decibels. Inferential statistics were conducted after the descriptive statistics. Inferential statistics were used to make sense of the descriptive and further explain the findings. The inferential statistics that were one-way analysis of variance (ANOVA) and Pearson's Product moment correlation. ANOVA helped determine the difference in task performance between the three environments.

5.1 Survey Analysis

Demographics of the sample of 120 students were randomly selected to receive surveys. Respondents were distributed across levels of education including about 42.5% (51) Diploma, 7.5% (9) Undergraduates, 48.3% (58) Masters and 1.7% (2) Ph.D. students(Table 1). Of the respondents, approximately 4.2% were under the age of 20 (5), 65.8% were between the ages of 20 and 29 (79), 22.5% were between the ages of 30 and 39 (27), 7.5% were 40 and above (9). Additionally, approximately 47.5% (57) of the respondents were male and 50% (60) were female and 2.1% (3) said they did not prefer to say (Table 1). Approximately 45.8% (55) of respondents indicated they were from the city, 36.7% (44) indicated they were from a town, 13.3% (16) indicated they were from a village and 4.2% (5) indicated they were from a rural area (Table 1).

Table 1. Demographic analysis of the overall student sample by age, gender, level of education and locality.

Variable	Sample Size	Percent
	N=120	(%)
Age		
20 Below	5.00	4.20
20-29	79.00	65.80
30-39	27.00	22.50
40 above	9.00	7.50
Gender		
Male	57.00	47.50
Female	60.00	50.00
Prefer not to say	3.00	2.50
Level of Education		
Diploma	51.00	42.50
Undergraduate	9.00	7.50
Masters	58.00	48.33
Ph.D.	2.00	1.67
Locality		
City	55.00	45.83
Town	44.00	36.67
Village	16.00	13.33
Rural Area	5.00	4.17

5.1.1. Objective One

The first objective of this study was to analyze students' level of green space accessibility with

performance, impulsivity and mindfulness. Descriptive statistics were used to organise overall results, this includes mean scores on the green space accessibility scale, performance, MAAS, and BIS scale for each demographic group and overall sample.

Green Space Accessibility Scale

Respondents were asked questions about their locality,home and institutions regarding levels of greenspace and accessibility (green space accessibility scale). They were classified as having levels of low, medium and high green space accessibility based on their responses to the green space accessibility scale. Individuals who scored less than 2 points had levels of "Low green space accessibility" while individuals with 2-3 points had levels of "Medium green space accessibility," and individuals with 3 or more points had "High green space accessibility". Respondents included 1 low green space accessibility (0.8%), 4 medium green space accessibility (3.3%), and 115 high green space accessibility (95.83%) (Table 2). Respondents' overall green space accessibility scale scores ranged from 1 to 5 points, with a mean score of 3.96 and a standard deviation of 0.59. This indicates that, on average, more than half the students had levels of "High-green space accessibility".

Table 2. Descriptive statistics indicating membership in green space accessibility Levels based on education level

	Low-green space accessibility		**Medium-green space accessibility**		**High-green space accessibility**		**Total**
Level of Education	**(N)**	**(%)**	**(N)**	**(%)**	**(N)**	**(%)**	
Diploma	0	0.0	1	1.96	50	98.04	51
UnderGraduate	0	0.0	0	0.00	9	100.00	9
Masters	1	1.7	3	5.17	54	93.10	58
Ph.D.	0	0.0	0	0.00	2	100.00	2
Total	1	0.8	4	3.33	115	95.83	120

Student Well-Being

Students were assessed psychologically by measuring Impulsivity (BIS) and Mindfulness (MAAS). Respondents' scores on the BIS ranged from 1 to 4, with a mean score of 2.54 and a standard deviation of 0.3. This indicated that on average, respondents had a moderately high

level of Impulsivity. Respondents' scores on the MAAS ranged from 1 to 5, with a mean score of 3.49 and a standard deviation of 0.69. This indicated that on average, respondents had a high level of Mindfulness. Furthermore, their cognitive performance was measured through a subjective exam performance, an overall performance question and a perceived performance growth statement. Respondents' scores on their exam performance ranged from 1 to 7 with a mean score of 4.51 and a standard deviation of 1.22. This indicated that on average, respondents had a moderate performance .Respondents' scores on perceived performance ranged from 1 to 5, with a mean score of 3.28 and a standard deviation of 1.13. This indicated that on average, respondents had a moderately high level of perceived performance. Respondents' scores on perceived performance growth ranged from 1 to 5, with a mean score of 3.57 and a standard deviation of 0.85. This indicated that on average, respondents had a moderately high level of perceived performance growth.

Table 3. Descriptive statistics indicating mean scores of measures of student well-being

Measure	**Sample Size**	**Percent**
	N=120	**(%)**
Psychological Measure	**Mean**	**S.D.**
BIS	2.54	0.30
MAAS	3.49	0.69
Cognitive Measure		
Exam Performance	4.51	1.22
Perceived performance	3.28	1.13
Perceived performance growth	3.57	0.85

Analysis

A Pearson Product-Moment correlation was run between respondents' green space accessibility scores and their responses to BIS, MAAS, Cognitive Performance Measure(Table 4). The correlation between green space accessibility scores with BIS(P=0.37) and MAAS(P=0.57) was not significant. However, statistically significant correlations were found between green space accessibility scores and responses of perceived performance growth

(P=0.0002) with a moderate relationship (r=0.332).

In a study, writing scores had a higher percentage of null and negative findings, which might be explained by the fact that it causes less anxiety than other academic courses or particular exams(Browning and Rigolon, 2019). Many students are tense and afraid of mathematics as a subject, final examinations that decide end-of-semester marks, and college-preparatory exams, for example. These sentiments emerge as test anxiety, which impairs focus and, as a result, performance. Students would be better able to concentrate if writing caused less test anxiety. As a result, the attentional repair provided by green space would be less noticeable.

Table 4. Pearson's Product-Moment correlation between green space accessibility Scores and measures used.

Measure		**green space accessibility Score**
BIS	Pearson Correlation	0.0818
	P	0.3744
	N	120.0000
MAAS	Pearson Correlation	0.0514
	P	0.5770
	N	120.0000
Cognitive Performance		
Exam Performance	Pearson Correlation	0.0018
	P	0.9844
	N	120.0000
My performance has increased during the period of my course.	Pearson Correlation	.332**
	P	0.0002
	N	120.0000
How do you rate your overall performance during your course?	Pearson Correlation	0.1314

	P	0.1526
	N	120.0000

5.1.2. Objective Two

The second objective of this study was to assess aspects that could possibly build the attitude of students towards Green Spaces and their accessibility. Five questions were asked to the respondent to express their attitude towards greenspace (Table 5).

The major insight drawn from these results is that greenspaces being present in the locality is considered very important by the students (M=4.6, S.D.=0.7) and that greenspaces are perceived strongly as relaxative(M=4.2, S.D.=1.3), however, it can be seen that students don't prefer to use greenspaces for educational purposes(M=1.8, S.D.=1.0). Finally, students don't have a clear indication whether physical(M=3.2, S.D.=1.1) and visual accessibility(M=3.3, S.D.=1.2) has any effect on their ability to study.

Moreover, from Table 5, it can be seen that the majority of the students(N=77, 64.3%) find it easier to pay attention to modules which have both physical and visual access to greenery while a few(N=12, 10%) prefer without either. Furthermore, it can see that a few(N=24, 20%) students prefer only visual access while others(N=7, 5.8%) prefer only physical access.

Table 5. Descriptive statistics showing frequency of prefered module type.

Module Type	**(N)**	**(%)**
Modules with both physical and visual access to greenery	77	64.2
Modules with only visual access to greenery	24	20.0
Modules with only physical access to greenery	7	5.8
Modules with neither	12	10.0
Total	120	100.0

In the test conducted, statistically significant correlations were also found between green

space accessibility scores and responses assessing GS & A attitude (P=0.008,P=0.02,P=0.007,P=0.039,P=0.011) (Table 6). These correlations indicated a relationship between green space accessibility scores and student attitude (r=0.24,r=0.2,r=0.24,r=0.18,r=0.23) (Table 6).

Table 6. Pearson's Product-Moment correlation between green space accessibility Scores and Student Attitude towards greenspace and accessibility.

Student Attitude towards greenspace and accessibility		**green space accessibility Score**
How important do you consider it to be to have green-spaces in your local area?	Pearson Correlation	0.2410
	P	0.0080
	N	120.0000
From the times you have visited the local green-space, how many of them are for educational purposes?	Pearson Correlation	.203*
	P	0.0260
	N	120.0000
Green-spaces should be places where you can relax and unwind .	Pearson Correlation	.242**
	P	0.0078
	N	120.0000
Physical accessibility of green space or lack of, affects my ability to study.	Pearson Correlation	.188*
	P	0.0394
	N	120.0000
Visual accessibility of green space or lack of, affects my ability to study.	Pearson Correlation	.230*
	P	0.0115
	N	120.0000

5.1.3. Objective Three

The study's third objective was to see if any one group had higher green space accessibility levels based on demographics , as well as to compare demographic groups on student well-being and performance.

Education Level Group Comparison

Analysis

Scores of UnderGraduate, Diploma, Masters and Ph.D. students were compared using a Pearson's Product-Moment correlation. After that, analysis of variance (ANOVA) tests were used to see if a certain group appeared to have and be influenced more by higher levels of green space accessibility.

Green space accessibility levels

A Pearson's Product-Moment correlation indicated that there was no statistically significant relationship between education level and the green space accessibility scores (P=0.44) (Table 7). An ANOVA test showed that no statistically significant differences (P=0.054) were found in green space accessibility scores based on level of education (Table 8).

Table 7. Pearson's Product-Moment correlation between green space accessibility score and level of education

		green space accessibility Score
Level of Education	Pearson Correlation	-0.0700
	P	0.4460
	N	120.0000

Table 8. ANOVA test comparing mean scores on the green space accessibility Scores based on level of education

Level of Education	Sample Size N=120	Percent (%)	Mean	S.D.	df	F	P
Diploma	51.00	42.50	4.034	0.564	3	0.722	0.541
Undergraduate	9.00	7.50	3.736	0.539			
Masters	58.00	48.33	3.953	0.636			
Ph.D.	2.00	1.67	3.813	0.088			

Age Group Comparison

Analysis

To check if a given age group appeared to have and be influenced more by greater green space accessibility levels, a Pearson Product-Moment correlation and ANOVA tests are used to compare the scores of the different age group categories.

Green space accessibility Scores

Pearson's product-moment correlation proved that there was no statistically significant relationship between the green space accessibility scores (P=0.057) (Table 11) and age group classification. This resulted in students of all age groups having similar responses to the green space accessibility items.

Table 11. Pearson's Product-Moment correlation between green space accessibility score and age group

		green space accessibility Score
Age Group	Pearson Correlation	-0.0520
	P	0.5720
	N	120.0000

Gender Group Comparison

Analysis

To check if a specific gender appears to have and be influenced more by higher levels of green space accessibility, male and female scores were compared using a Pearson's Product-Moment correlation and ANOVA testing.

Level of Green Space Accessibility

A Pearson's Product-Moment correlation was run comparing gender and green space accessibility scores, with males coded as "1" , females coded as "2", and "3" as prefer not to say. This analysis indicated no statistically significant relationship between gender and green space accessibility scores (P=0.98) (Table 13).

Table 13. Pearson's Product-Moment correlation between green space accessibility score and gender

		Green space accessibility Score
Gender Group	Pearson Correlation	-0.0020
	P	0.9860
	N	120.0000

A further comparison of gender and green space accessibility scores were done using an ANOVA test. There were significant differences between the mean green space accessibility scores for both males and females (P=0.046). Descriptive statistics showed that females have a higher green space accessibility score than males.

Table 14. ANOVA test comparing mean scores on green space accessibility scores based on gender

Gender group	**Sample Size**	**Mean**	**S.D.**	**df**	**F**	**P**
	N=120					
Green space accessibility Score						
Male	57.00	3.93	0.629	2.000	3.166	0.046
Female	60.00	4.04	0.495			

Prefer not to say	3.00	3.21	1.283			

Locality Group Comparison

Analysis

Scores of students from various localities ("City", "Town", "Village" and "Rural") were compared using ANOVAs to investigate whether or not a specific locality appeared to have and be influenced more from higher levels of green space accessibility.

Green space accessibility Scores

An ANOVA test compared locality groups and green space accessibility scores(Table 17). There are statistically significant differences between groups (P=0.031).

Table 17. ANOVA test comparing mean scores on green space accessibility scores based on locality

Locality	**Sample Size**	**Mean**	**S.D.**	**df**	**F**	**P**
	N=120					
green space accessibility Score						
City	55.0	3.9	0.572	3	3.063	0.031
Town	44.0	3.9	0.618			
Village	16.0	4.4	0.504			
Rural Area	5.0	4.1	0.508			

Post hoc analysis (Tukey's HSD) revealed that in green space accessibility Scores, students from the villages were different from the rest (Table 22). Overall, students from the villages appeared to have higher scores when compared to students from towns. This indicated that students from villages, in general, have higher levels of green space accessibility.

Table 18. Mean differences of scores (Tukey's HSD) in green space accessibility Scores

Locality	**City**	**Town**	**Village**	**Rural Area**

green space accessibility Score				
City	-	0.03068	-0.44801*	-0.21364
Town	-0.03	-	-0.47869*	-0.24432
Village	0.44801*	0.47869*	-	0.23
Rural Area	0.21364	0.24432	-0.23437	-
* : The mean difference is significant at the 0.05 level				

5.2. Survey Results

Perceived Green Space Accessibility Level

From our findings, it can be seen that almost all of the students from our sample believe that they had high levels of accessibility to Green Space. This could mean that students are aware of their nearest greenspaces and overall, find them highly accessible. Furthermore, the results indicate that Perceived Green Space Accessibility Level only changed within certain demographics, specifically, within gender and locality. Students of all age groups had similar levels of green space accessibility. Similarly, students of all education levels had similar levels of green space accessibility.

Moreover, the results proved that there was no statistical relationship between education level and the green space accessibility scores. An ANOVA test also showed that no statistically significant differences were found. Furthermore, tests indicated no statistically significant relationship between age group classification and the green space accessibility scores. This indicated that students of all age groups tended to have similar levels of green space accessibility.

A Pearson's Product-Moment correlation was run comparing gender and green space accessibility scores. This analysis indicated no statistically significant relationship between gender and green space accessibility scores. An ANOVA test further compared gender and green space accessibility scores. This test however showed that statistically significant differences were found between the mean green space accessibility scores for males and females. Descriptive statistics revealed that females tended to have higher green space

accessibility scores than males.

Tests compared groups based on locality and green space accessibility scores. There are statistically significant differences between the groups. Further tests revealed that in green space accessibility Scores, students from the villages were different from the rest (Table 22). Overall, students from the villages appeared to have higher scores when compared to students from towns. This indicated that students from villages, in general, have higher levels of green space accessibility.

Relationship Between green space accessibility Scores and Student Well-being

The correlation between green space accessibility scores with neither BIS nor MAAS were significant. However, statistically significant correlations were found in one of the cognitive measures,ie. between green space accessibility scores and perceived performance growth. Moreover, these correlations indicated a positive relationship(Table 3). ANOVA tests were conducted comparing the different aspects of student well-being based on level of education(Table 10). No statistically significant differences were found in BIS, MAAS, Subjective Exam Performance and perceived performance growth. However, statistically significant differences were found in the perceived performance scores. Post hoc analysis (Tukey's HSD) revealed that in perceived performance scores, it was Undergraduate and Masters students who were different from the other level of education (Table 11). Overall, undergraduate and masters students appeared to have higher scores in the perceived performance measure when compared to other levels of education. This indicated that undergraduate and masters students, in general, felt more positively about their performance.

Student Well Being

Student well being was assessed through three aspects ie., impulsivity, mindfulness and cognitive performance. Respondents' scores on the BIS indicated that on average, they had a moderately high level of Impulsivity. Respondents' scores on the MAAS indicated that on average, they had a high level of Mindfulness. Furthermore, their cognitive performance was measured through a subjective exam performance, an overall performance question and a perceived performance growth statement. Respondents' scores on their exam performance

indicated that on average, respondents had a moderate performance. Furthermore, respondents' scores on perceived performance indicated that on average, respondents had a moderately high level of perceived performance. Finally, respondents' scores on perceived performance growth indicated that on average, respondents had a moderately high level of perceived performance growth. Thus students in general felt fairly confident about their performance and their growth.

CHAPTER 6

Discussion and Conclusion

The study analyses levels of greenspace and compares them with student behavior and performance in terms of impulsivity, mindfulness and exam performance. It was an online survey where students had to respond to questions based on type, frequency and interval of greenspace use and perceived influence of greenspace accessibility. The purpose of this study was to develop a theory on how greenspace accessibility impacts students.

Objective one : To analyse students' level of GSA with cognitive performance, impulsivity and mindfulness.

The correlation between GSA scores with neither BIS nor MAAS were significant. The cognitive performance of the participants in this study was assessed using a subjective exam, an overall performance question, and a perceived performance growth question. While there was no significant correlation found between GSA and subjective performance questions, a moderately positive correlation was found between greenspace accessibility and perceived performance growth. This would indicate that students who have higher exposure seem to feel that there is a notable growth in their performance. Furthermore Dongying Li (2015) in his research concluded that students placed at the window with a greenspace view had better attentional capacity and recovered their minds much faster than the ones placed at the windows which had a view of buildings. He also states that there is no significant change in the mood of a person because of just daylight. Finally, there was no evidence that stress played a role in the relationship between green landscape views and attention restoration.

This indicates that there are two separate processes impacting psychological and cognitive performance of students. In this research the Respondents' scores on the BIS indicated that on average, they had a moderately high level of Impulsivity. Respondents' scores on the MAAS indicated that on average, they had a high level of Mindfulness whereas in the research by Berry MS (2014) the results state that the participants who viewed greenspaces made less impulsive decisions as compared to the ones that had man made city environment as their view and this group did not make impulsive decisions but also did not make less impulsive decisions.

One of the factors that is impulsivity shows us results which go against our hypothesis which was that the subjects' impulsivity levels would be lesser as compared to those who do not view greenspaces, However the thesis resulted with most of the subjects showing an impulsive behaviour with respect to the survey. The study also shows that mindfulness is not impacted by greenspace, but rather maybe due to other factors like work stress, or family problems. Greenspace could maybe impact people who are moderately happy or in a good mood by lifting up their levels of happiness whereas the subjects that are under pressure or stress find it difficult for anything to have an impact which if not treated early could lead to depression (Cochran, 1981).

Objective two : To assess the attitude of students towards greenspace and its accessibility

After analysis, statistically significant correlations were found between GSA scores and responses assessing GS & student attitude. Moreover, these correlations indicated a positive relationship. This means that students with a more positive attitude towards greenspaces tend to have higher accessibility levels.

The major insight drawn from the results is that greenspaces being present in the locality is considered very important by the students and that greenspaces are perceived strongly as relative. The restoration possibility of university outdoor areas with vegetation was rated higher by university students than the standard design. The findings of the research are supported by data from a recent research of Australian primary kids, who rated school playgrounds with more vegetation as having a higher probability of repair. However, it can be

seen that students don’t prefer to use greenspaces for educational purposes. Finally, students don't have a clear indication whether physical and visual accessibility has any effect on their ability to study. However, we can see that the majority of the students find it easier to pay attention to modules which have both physical and visual access to greenery while a few prefer without either. Furthermore, In a research conducted the goal of this study was to see if Dutch university students' preferences and perceptions of restoration likelihood changed across campus settings with and without vegetation(Van den Bogerd, Dijkstra, Seidell and Maas, 2018). According to this survey, university students preferred university surroundings with some sort of vegetation over university environments without greenery. University students also awarded university outdoor spaces with vegetation better perceived restoration likelihood ratings than those without. In research studying how seats were chosen, it was found that the view of the seat was considered crucial(Gou, Khoshbakht and Mahdoudi, 2018). This shows that students would prefer seats with visual aspects as well.

In this survey Students between the age group of 20-29 tend to be more proactive, as they might be more comfortable studying indoors. On the other hand, students between the age group of 30-39 found it easier to carry out educational activities outdoors, as they may have attained a higher level of seriousness and maturity in academics or in general. In a research conducted by Browning and Rigolon (2019), they explore the relationship between green space and academic outcomes. There were many findings that trees and green window views supported academic achievement similar to other forms of greenspace. Also, among all the measures, a percentage of the findings showed that green space improved grades,i.e. cognitive performance more than the other measures.

Objective three: To see if any one group had higher GSA levels based on demographics, as well as to compare demographic groups on student well-being and performance.

Gender

Tests revealed that females tended to have higher GSA scores than males. This shows that lack of green space has a slightly higher impact on women. There is a higher effect of green space on women due to the low concentration of cortisol, the stress hormone. As women tend to outdoor/ green spaces, it increases the physical activities, which improves their mood,

social contact, and well-being.

Distance from local greenspace

The distance of accessible greenspace from the subjects home also showed no significant difference among the subjects that lived 5 minutes away from accessible greenspace and the subjects that lived 20 minutes away from accessible greenspace. However, in our literature it is stated that people with an intention of exercising show more interest in using accessible greenspace very often.

Education level

Overall, undergraduate and masters' students appeared to have higher scores in the perceived performance measure when compared to other levels of education. This indicated that undergraduate and masters' students, in general, felt more positively about their performance. However, derived with the help of the Anova test, the findings of this research show no statistical major difference between the level of education and the GSA scores. However in a research conducted by Ian Alcock(2013) the results state the mental health was even lower where the standard of education was higher.

Locality

Tests were conducted comparing the different aspects of student well-being based on locality. No statistically significant differences were found in BIS, MAAS, Subjective Exam Performance and perceived performance. Overall, students from villages appeared to have lower scores in the perceived performance item when compared to those from cities and towns. This indicates that students from cities and towns, in general, students from villages, in general, have higher levels of green space accessibility.

There could be less insecurity amongst the students from the village as they are subjected to a greener environment and stay hidden from the chaos of urban environments. Students have greater access to green spaces in villages, when compared to urban areas that have limited green space. However, previous cross-sectional research has demonstrated that mental health is better in greener urban areas, and estimates based on within-individual differences have revealed that mental health improves "on average" over time in greener places.

6.1. Assumptions and limitations

While the goal of this study is to give a student's viewpoint on greenspace accessibility, it is based on the premise that the respondents' situations and conditions are all similar. Furthermore, several factors such as the level of usage, preferences, perceived levels of greenery are also factors to consider on a standard level. Furthermore, the terminology included in the research is adopted from previous research, presuming that it is familiar with the students. Nonetheless, the study categorises the students' opinions based on a variety of factors, including age, attitude towards greenspaces, their perception of the influence of greenspace in their study environment and at home. However, one limitation was that all measures were self reported. Notably, average green space accessibility levels were much higher than anticipated, with 95% of respondents reporting having high levels of accessibility. Because of the cross-sectional character of the study, assigning causality to the associations that were discovered is complicated and difficult. Furthermore, while it had data on the perceived level of greenspaces present, it lacked spatial data, which would have been more precise. Additionally, the sample size was not limited to a specific country or institution, which makes the sample relatively global.

6.2. Conclusion

It is mandatory to focus on enough level of “greenness” in the University or academic campuses in order to mitigate the above issues and provide proper green space for the students. As per the evaluations of Holt et al. (2019), the students' initial data needs to be collected to understand their interest in this specific field. It is conceptualised that this strategy can work as a proper way for the students to establish their mental health as it is a general part of the restoration of their psychological health.

Contrary to the above view, Blaschke et al. (2019) stated that the green space in the study environment helps students focus on their academic activities. Resultantly, it is important for the organisations to get assistance from the respective Government bodies through which the greenery areas can be enhanced. It is highly valuable for the institutions to make the study

environment enriched for both the psychological and physical health of students.

To conclude, it can be seen that there is a positive correlation between greenspace and student well-being. The findings highlight the relevance of exposure to greenery for students, demonstrating that a university campus needs to incorporate greenery in their classes and maybe even in hallways. Furthermore, policies should also be introduced to increase the local greenspace areas, especially in urban areas. However, it is important to note that no special consideration needs to be given based on gender when creating policies to manage greenspace. Students also believe that local green areas are crucial and that they are an important place for relaxing. Hence, providing window views in classrooms, having plants in classes and having greenspace areas around campus/locally, would improve students' psychological and cognitive capabilities.

Suggestions to mitigate the barriers related to green spaces in study environments

As per the definitions of Malekinezhad et al. (2020), the green spaces allow students to freely discuss their demanding tasks. Therefore, the government is needed to formulate the proper communication with the management of the institutions through which the availability of the green spaces as well as its demands for the students can be viewed. Students' state of being is also developed with the proper justifications of the greenery environment in the institutions through which the proper studies are also enhanced.

From the above view, it has come out that promoting a restorative environmental design helps improve the mental health of university students. Adopting this approach has resulted in progressive increases in students' academic performance, as well as general well-being and learning capability (Malekinezhad et al. 2020). The general consistency also needs to be formed in the institutional management through which the major criteria of green space can be fulfilled to support the students' academic career. The above notation has also clarified that the concept of outdoor campus landscape does contribute to the perception of campus resotativeness. Therefore, it is necessary to strategise the development through which the proper requirement for green space can be met and the students may freely enhance their knowledge.

Recommendations for Additional Research

1. Studies should be carried out one university at a time.
2. Studies should be carried out using the green space accessibility scale along with GIS data to confirm its reliability.
3. Studies should be carried out using more subjective tests to record performance.
4. Studies should be carried out where the tests are measured while subjects are in their local greenspaces.
5. Studies should be carried out exploring other psychological factors.
6. Studies should be carried out exploring the impact of greenspaces during lockdowns.
7. Studies should be carried out exploring how they use their greenspaces.
8. Studies should be carried out segmenting the influence of greenspace accessibility in other environments, such as small businesses, corporate buildings, hospitals, etc..

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Appendix

Survey Questionnaire

Assessing the Impact of Green-Space in Study Environments

The objective of this survey is to assess the impact of green-space in study environments and whether physical or visual access to green-space promotes student performance and well-being.

Some examples of questions are as follows:

- During the period of your course, how often did you visit your local green-space areas?
- How would you rate your overall performance during your course?
- Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?

This information will help us to determine whether green-space improves over-all well- being and attentiveness.

Completing the survey is easy and would take roughly 10 minutes.

We look forward to your participation!

*Required

Please Participate !!!

You are invited to participate in a online survey on the impact of green-space being present in our study environment. This is a research project being conducted by Akhil George Pulinat, a student at National College of Ireland.

PARTICIPATION

Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. You are free to decline to answer any particular question you do not wish to answer for any reason.

Please complete this survey by July 30th, 2021.

BENEFITS

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about the impact of green space in our study environments.

Introduction

Exposure to green space* affects the development of cognition positively in young people. Increased cognitive capacity in student life can impact the cognitive function in adulthood.

Research shows that a window facing green space can increase the attention span in students compared to those who have no access to a green-space facing window.

Research also states that natural views from the windows of the dormitory are correlated with improved results of university students. Moreover, the presence of trees is seen to reduce distraction in people.

The study will assess whether physical and visual access of green-space improve a person's performance and state of being while pursuing education.

* By green-space, we mean public green or open spaces and water in urban areas, for example, parks, playing fields, play areas, allotments and community gardens, woodland and more natural areas, canal paths and riversides.

Confidentiality and Contact Information

Your survey answers will be sent to a link at google forms where data will be stored in a password protected electronic format. Google forms does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study.

CONTACT

If you have questions at any time about the study or the procedures, you may contact my research supervisor, Professor Cleary-Gaffney or via email at michael.cleary-gaffney@ncirl.ie.

If you feel you have not been treated according to the descriptions in this form, or that your rights as a participant in research have not been honored during the course of this project, or you have any questions, concerns, or complaints that you wish to address to someone other than the investigator, you may contact National College of Ireland at info@ncirl.ie

ELECTRONIC CONSENT

Please select your choice below. You may print a copy of this consent form for your records. Clicking on the "Agree" button indicates that

You have read the above information
You voluntarily agree to participate
You are 18 years of age or older

1. Do you consent? *

Mark only one oval.

- ◯ Agree *Skip to question 2*
- ◯ Disagree *Skip to section 2 (Declined Consent)*

Declined Consent

You have declined to participate in the survey. Thank you for your time. You may close the browser or click submit below.

Background

In this section we would like to learn more about your background, namely, the specifics of your study schedule and its environment.

2. What is your age? *

_____

3. What gender do you identify as? *

Mark only one oval.

- ◯ Female
- ◯ Male
- ◯ Prefer not to say
- ◯ Other: _____

4. Which educational course are you currently pursuing? *

Mark only one oval.

- ◯ Highschool
- ◯ UnderGraduate
- ◯ Diploma
- ◯ Masters
- ◯ Ph.D.
- ◯ Other: _____

5. What locality is your institution is located in? *

Mark only one oval.

- ◯ City
- ◯ Town
- ◯ Village
- ◯ Rural Area

Local Green-Space Availability

By green-space, we mean public green or open spaces and water bodies.

Eg : Parks, playing fields, play areas, allotments and community gardens, woodland and more natural areas, canal paths and riversides.

In this section, we would like to know about your physical and visual access to green-spaces and how often you used it during your course.

6. How would you best describe the level of green-space accessibility in your locality? *

Mark only one oval.

	1	2	3	4	5	
Low Access to Green Spaces	◯	◯	◯	◯	◯	High Access to Green Spaces

7. How would you best describe the level of greenery in your locality? *

Mark only one oval.

	1	2	3	4	5	
No natural greenery	◯	◯	◯	◯	◯	Abundant natural greenery

8. How would you best describe your home? *

Mark only one oval.

	1	2	3	4	5	
Low Access to Green Spaces	◯	◯	◯	◯	◯	High Access to Green Spaces

9. How would you best describe your campus when you first joined? *

Mark only one oval.

	1	2	3	4	5	
Low Access to Green Spaces	◯	◯	◯	◯	◯	High Access to Green Spaces

10. How far away from your home is your nearest green-space area? *

Mark only one oval.

- ◯ Less than a 10 minute commute
- ◯ Within an 11 minute - 20 minute commute
- ◯ Within a 21 minute - 30 minute commute
- ◯ More than a 30 minute commute
- ◯ Other: _____

11. During the period of your course, how often do you visit your local green-space areas? *

Mark only one oval.

- ◯ Daily
- ◯ Once weekly
- ◯ Once a month
- ◯ Once every 3 months
- ◯ Once every 6 months
- ◯ Other: _____

12. From the times you have visited the local green-space, how many of them are for educational purposes? *

Mark only one oval.

- ◯ None of them
- ◯ Less than Half
- ◯ Half of them
- ◯ More than half

13. How important do you consider it is to have green-spaces in your local area? *

Mark only one oval.

- ◯ Very important
- ◯ Quite important
- ◯ Neither nor
- ◯ Not important
- ◯ Not at all important

14. Green-spaces should be places where you can relax and unwind . *

Mark only one oval.

	1	2	3	4	5	
Agree strongly	◯	◯	◯	◯	◯	Disagree strongly

15. I would have physical access to green-spaces daily. *

Mark only one oval.

	1	2	3	4	5	
Agree strongly	◯	◯	◯	◯	◯	Disagree strongly

16. I would have visual access to green-spaces in my study environment daily. *

Mark only one oval.

	1	2	3	4	5	
Agree strongly	◯	◯	◯	◯	◯	Disagree strongly

Well Done..!!

You're halfway there..!!

47. Visual accessibility of green space or lack of, affects my ability to study. *

Mark only one oval.

	1	2	3	4	5	
Agree Strongly	◯	◯	◯	◯	◯	Disagree strongly

48. Physical accessibility of green space or lack of, affects my ability to study. *

Mark only one oval.

	1	2	3	4	5	
Agree Strongly	◯	◯	◯	◯	◯	Disagree strongly

49. My performance has increased during the period of my course. *

Mark only one oval.

	1	2	3	4	5	
Agree Strongly	◯	◯	◯	◯	◯	Disagree strongly

50. Which of the modules do you find easier to pay overall attention to? *

Mark only one oval.

- ◯ Modules with both physical and visual access to greenery
- ◯ Modules with only visual access to greenery
- ◯ Modules with only physical access to greenery
- ◯ Modules with neither

51. How would you rate your overall performance during your course? *

Mark only one oval.

	1	2	3	4	5	
Very Poor	◯	◯	◯	◯	◯	Very Good

52. Which slab have you achieved for your most recent semester exams? *

Mark only one oval.

- 30-40
- 40-50
- 50-60
- 60-70
- 70-80
- 80-90
- 90-100

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
I drive places on 'automatic pilot' and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

MAAS Scoring

To score the scale, simply compute a mean of the 15 items. Higher scores reflect higher levels of dispositional mindfulness.

Mindfulness Attention Awareness Scale (MAAS)

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

	① Rarely/Never	② Occasionally	③ Often	④ Almost Always/Always
1	I plan tasks carefully.			① ② ③ ④
2	I do things without thinking.			① ② ③ ④
3	I make-up my mind quickly.			① ② ③ ④
4	I am happy-go-lucky.			① ② ③ ④
5	I don't "pay attention."			① ② ③ ④
6	I have "racing" thoughts.			① ② ③ ④
7	I plan trips well ahead of time.			① ② ③ ④
8	I am self controlled.			① ② ③ ④
9	I concentrate easily.			① ② ③ ④
10	I save regularly.			① ② ③ ④
11	I "squirm" at plays or lectures.			① ② ③ ④
12	I am a careful thinker.			① ② ③ ④
13	I plan for job security.			① ② ③ ④
14	I say things without thinking.			① ② ③ ④
15	I like to think about complex problems.			① ② ③ ④
16	I change jobs.			① ② ③ ④
17	I act "on impulse."			① ② ③ ④
18	I get easily bored when solving thought problems.			① ② ③ ④
19	I act on the spur of the moment.			① ② ③ ④
20	I am a steady thinker.			① ② ③ ④
21	I change residences.			① ② ③ ④
22	I buy things on impulse.			① ② ③ ④
23	I can only think about one thing at a time.			① ② ③ ④
24	I change hobbies.			① ② ③ ④
25	I spend or charge more than I earn.			① ② ③ ④
26	I often have extraneous thoughts when thinking.			① ② ③ ④
27	I am more interested in the present than the future.			① ② ③ ④
28	I am restless at the theater or lectures.			① ② ③ ④
29	I like puzzles.			① ② ③ ④
30	I am future oriented.			① ② ③ ④

Patton, Stanford, Barratt (1995). *J Clin Psy*, vol. 51, pp. 768-774

Barratts Impulsivity Scale (BIS)