

**Green Spaces and Mental Health: Does Frequency of Use or Proximity affect Subjective Wellbeing and Perceived Stress?**

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Abstract: Urbanization is essential for economic growth; however, it has a negative effect on the environment and the psychological health of the population. Urban green spaces help in the reduction of air and noise pollution while increasing people's wellbeing through social interactions and creating an outdoor space for physical activity. Due to the rapid urbanization of the United Arab Emirates, the research on green spaces in this region is fundamental. The study included two hypotheses: 1) Greater proximity and frequency of use results in lower perceived stress and 2) Greater proximity and frequency of use leads to greater wellbeing. The results yielded non-significant for proximity to green spaces and stress and wellbeing. However, frequency of use showed a significant correlation. Additionally, the researchers explored the most common uses of green spaces and suggestions that would increase the frequency of use through open-ended questions. The results could be a manifestation of the Attention Restoration Theory and Biophilia Theory.

Key Words: Green Spaces, Mental Wellbeing, Perceived Stress, Urbanization

Background:

Subjective mental wellbeing is an individual's perception of his or her mental state. A high subjective mental wellbeing is regarded as positive (Steptoe, Deaton, & Stone, 2014). An essential contributor to poor wellbeing, stress is understood as either a stimulus (e.g. loss of job) or a response through physiological arousal (e.g. increased heart rate) and its negative cohort (e.g. anxiety) (Folkman, 2013). A growing amount of research has found positive associations between green spaces and mental wellbeing (Barton & Rogerson, 2017). Although green spaces comprise of forests and nature reserves, due to the lack of such environments in Dubai, the current research defines green spaces as urban parks and other minor natural elements (Barton & Rogerson, 2017). Urban green spaces play an important role through the provision of environmental benefits such as reduction of air and noise pollution, increased carbon storage and cooling through shade provision (Kabisch & Haase, 2014). Urban green spaces directly impact the quality of life through increased social interactions and enhanced wellbeing due to greater opportunities for recreational and physical activities (Gascon et al., 2016). Other health benefits include improved emotional states, reduced stress and increased relaxation through exposure to urban green spaces (Braubach et al., 2017).

Green spaces and its perceived benefits are particularly vital to Dubai due to its rapid rate of urbanisation (Elessawy, 2017). Urbanisation is a phenomenon involving social, economic and ecological transformations. This process of modernisation results in



cities due to the permanent concentration of a large number of people within a small area (Encyclopedia Britannica, 2018). Urbanisation plays a key role in the growth and development of any nation, particularly in its economic growth. Within 38 years, Dubai's development is at a rate of 1,700% (54 km² in 1975 to 977 km² in 2015), making it one of the fastest growing cities in the world (Elessawy, 2017). However, such progress comes at a hefty cost - negative impacts on the nation's environment and its people. Dubai's ecological footprint per capita is the highest in the world, consumed 25% faster than its availability (Fazli & Faridi, 2016). Although research on mental health of Dubai's residents remains limited, urbanisation is often cited as a cause behind

higher prevalence rates of emotional disorders (e.g. generalised anxiety disorder) and mood disorders (e.g. bipolar disorder) (Peen, Schoevers, Beekman, & Dekker, 2010). Anxiety disorders within the region have increased by 108.6% between 2005 and 2016 (HealthData.org, 2016).

Sources of stress and poor wellbeing vary between each individual and their role in society. Highly cited sources include work, money, the future, individual health and crime (American Psychological Association, 2017). The stress epidemic is shared among global populations –, 74% in the U.K. (Mental Health Foundation, 2018), --% in Japan and 77% in U.S.A (American Institute of Stress, 2017). However, little research has been conducted to reveal stress statistics in Dubai. Still, indirect sources of evidence do suggest this epidemic is present in Dubai - cardiovascular diseases account for 30% of deaths in Dubai (Khan & Ali, 2017). Cardiovascular diseases have been regarded as a result of high stress levels in an individual (American Heart Association, 2014). Although it is difficult to find the root of stress within Dubai, nutritionists and healthcare officials cite the rapid growth of Dubai, and as a result, a fast-paced lifestyle that leaves little room for exercise, healthy eating and self-care.

The Mechanisms behind the relationship between Green Spaces, Wellbeing and Stress

ART – BT:

Although the empirical evidence pointing to the psychological benefits of natural environments has significantly amassed over the past decade, a theoretical understanding of the restorative effects from stress or mental fatigue is still less clear. Two theories have been introduced to explain the restorative effects of green environments: Attention Restoration Theory (ART) and Biophilia Theory (BT).

ART conceptualises directed attention as a finite resource, part of the attention system required to perform goal-directed tasks (Kaplan, 1995). Once an individual runs out of directed attention, directed attention fatigue is declared; wherein, the individual becomes easily distracted and is inefficient in carrying out goal-directed tasks. ART introduces the concept of soft fascination stimuli, a form of environmental stimuli that engage one's attention without direct effort. Attending to these stimuli allows for reflection, which in turn, rests and restores directed attention. Features include leaves on trees or clouds in the sky.

In contrast, biophilia theory proposes that human beings have an innate attraction



toward nature due to their evolutionary history (Capaldi, Dopko, & Zelenski, 2014). The theory also posits that dependence on biophilia is based on personal fulfilment and survival. The present study will mainly focus on the utilitarian and naturalistic value of Biophilia. Existing literature in the field has demonstrated that humans prefer nature over man-made landscapes, offering support to the biophilia hypothesis (Hand et al., 2017).

Proximity:

Biophilia Theory states that every individual has a connection toward green spaces. The facilitation to create a connection through proximity increases a person's wellbeing (Lumber, Richardson, & Sheffield, 2017). However, empirical evidence suggesting the direct association between proximity and its influence on wellbeing remains limited. It has been theorised that, since a large empirical body exists supporting the relationship between proximity to green spaces and its increased use, it is plausible that proximity would influence wellbeing through the greater accessibility and possibility of frequent visitation (POSTnote, 2016). Moreover, it has been found that individuals who live within 500m of green space are 24% more likely to spend 30 minutes on physical activity, which, in turn, is associated with improved wellbeing (Foster et al., 2009). Furthermore, the presence of a nearby green area allows for increased social interaction (Maas, Van Dillen, Verheij, & Groenewegen, 2009), which in turn, is associated with high well-being scores (Daniel, Watson & Gedikli, 2017). The amount of green space surrounding a person's house has been found to be a significant predictor of their stress levels (Thompson, Aspinall, Roe, Robertson, & Miller, 2016). Hazer, Formica, and Morley (2018) found that daily physical and visual exposure to green spaces decreased the participants' perceived stress by 3.1%.

Frequency:

ART conceptualizes that green spaces act as a vehicle for reflection, soft fascination stimuli presenting an opportunity to recover from the stressors of urban environments psychologically. This opportunity to reflect has been hypothesised to allow stress reduction to occur through the green space buffering effect. This act was especially pronounced following the 9/11 attack in New York during which US National Parks reported an increased frequency of visitations. However, to the best of the researcher's knowledge, studies have not directly measured the relationship between stress and frequency of green space visitation. Recent research has begun to explore the association between urban green spaces and perceived well being (Rogerson & Barton, 2017). Similar to the reasoning behind stress reduction and green spaces, wellbeing is hypothesised to improve due to increased socialisation, physical activity and psychological restoration. A 2018 study reported that frequent visitation of urban green space is positively associated with higher wellbeing (Coldwell & Evans, 2018). Another study conducted by Laforteza and colleagues (2009) found a positive relationship between frequent visits to green spaces and perceived wellbeing during a heat wave in the UK.

Past literature in this body of research focuses on the impact of green spaces on the wellbeing and stress of Western and East Asian populations and environment. The

findings of such studies might differ when applied to the hot, urban-desert environment of Dubai. Given the limited research within the region, the study aims to explore the relationship between green spaces, mental wellbeing, and perceived stress within Dubai. The current research has two hypotheses, based on the findings from past literature. Firstly, closer proximity to green spaces will result in greater mental wellbeing and lower perceived stress. Secondly, greater frequency of visiting green spaces will result in greater mental wellbeing and lower perceived stress. Lastly, the study will explore the manifestation of the two theories - attention restoration theory and biophilia theory, in real-life.

Methods:

Design

The current study used a Spearman's correlational, non-experimental design. There were two independent variables: frequency of visits and proximity to green spaces. The dependent variables were perceived stress and subjective mental wellbeing. The qualitative results were analyzed through content analysis. Furthermore, the study included possible confounding variables: hours of physical activity and measure of emotional stability. These variables have been shown to be associated with wellbeing (Caddick & Smith, 2014; Diener, Suh, Lucas & Smith, 1999).

Participants

A total of 170 Dubai residents (84 male and 86 female) were considered for data collection using convenience sampling. Participants' median age was 30 and they described themselves as African (6.47%), British and Irish (5.88%), Central Asian (2.35%), East Asian (10.6%), European (4.71%), Middle Eastern (19.4%), North American (4.12%), Oceanic (2.35%), South African (1.76%) and South East Asian (42.4%).

Materials

Participants responded to all survey items using a 5-point Likert scale (from 1 = "Never" to 5 = "Very Often"). Perceived Stress was measured through the ten-item Perceived Stress Scale ($\alpha = .838$) created by Cohen (1994). Four out of the ten questions were reversed. Participants responded to questions such as, "In the last month, how often have you felt that you were unable to control the important things in your life?"

The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) by Tennant (2007) was used to assess the participants' Mental Well-Being. The fourteen-item questionnaire ($\alpha = .898$) required participants to rate statements which help investigate determinants of well-being (e.g.: "I've been interested in new things").

The questionnaire used to measure emotional stability was the 50-item International Personality Item Pool (IPIP) version of the Big Five Markers originally developed by Goldberg (1992). The ten-question subsection ($\alpha = .833$) of emotional stability was used for this study, along with 5 extra items removed during data analysis. Reversed scoring was used for two questions. Participants responded to questions such as, "I get stressed out easily".

In order to obtain further data from participants about their physical activity routine, uses of green spaces and frequency of visits four qualitative questions were asked:



How many hours do you spend on physical activity per week? What do you use green spaces for? How frequently do you visit green spaces per week? What would help increase your frequency of visit to green areas?

Procedure

The research proposal was first sent for approval to the Middlesex Psychology Department Ethics Panel. Once approved, a consent form along with the information sheet was provided to the participants. Data collection took place in cafés, restaurants, and public parks. The questionnaires took less than fifteen minutes to complete. Researchers collecting data provided participants with a debriefing sheet once the questionnaire had been completed. Lastly, the participants were thanked for their time.

Results:

Correlational Analysis:

Hypothesis 1: Greater frequency, greater proximity, lower stress

Analysis of stress indicated a non-significant result for its relationship with proximity ($r(170) = .054, p > .243$), and a significant relationship with frequency ($r(170) = -.175, p < .011$).

Hypothesis 2: Greater frequency, greater proximity, greater wellbeing

Correlation analysis for wellbeing revealed a significant relationship for frequency of use ($r(170) = .217, p < .003$), and a non-significant relationship for proximity to urban green spaces ($r(170) = -.061, p > .222$).

Confounding Variables:

Based on the results of the study, physical activity is not associated with wellbeing, ($r(170) = .130, p < .091$), ($r(170) = .130, p < .091$). Moreover, emotional stability positively affects the state of wellbeing of an individual, ($r(170) = -.441, p > .001$).

Qualitative Analysis:

The study explored the participants' use of green spaces through an open-ended question. As shown in Figure 1, the majority of respondents stated exercise (33%), meditation and relaxation (29%), and socializing (22%) as their preferred uses. Exercise, meditation and socializing are typically regarded as restorative or fulfilling activities to one's psyche.

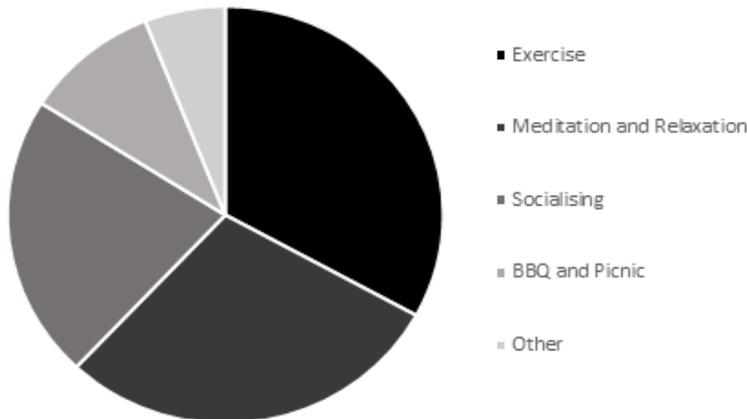


Figure 1: Participants data of green space uses

The second qualitative question investigated if certain facilities could be provided to increase the frequency of visits to green spaces. The results were divided into two categories: accessibility and recommendations. As presented in Figure 2a, the prominent themes regarding accessibility were proximity and availability. In relation to the recommendations, the answers comprised of suggestions that can be seen in Figure 2b, which if provided, would act as incentives increasing the frequency of use of green spaces.

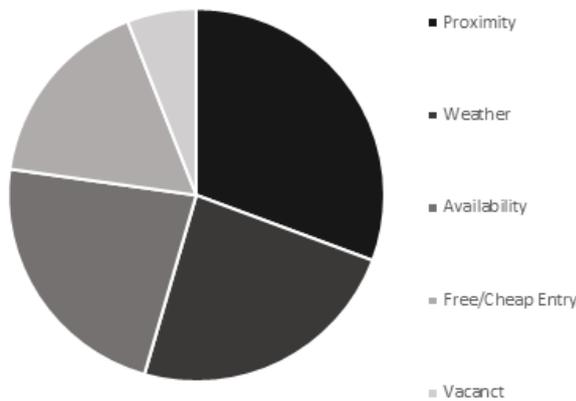


Figure 3a: Participant responses to increase frequency of green space visits

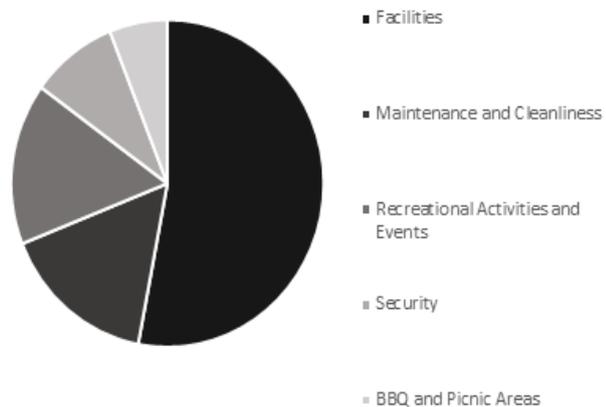


Figure 2b: Participant recommendations

Additionally, the present study identified reasons that were discouraging people from visiting green spaces on a regular basis. The most consistent responses were due to proximity, availability, unfavourable weather conditions and certain desired facilities such as sports fields.

Discussion:

Based in Dubai, the current study’s purpose was to contribute to the lack of literature



regarding stress and mental wellbeing within the region, taking note of the unique mix of an urban environment, desert region and hot climate. The study also had two hypotheses: increased frequency of visit to green spaces will result in lower stress levels and greater wellbeing. Secondly, closer proximity to green spaces should predict lower stress levels and greater wellbeing. The results and their implications are discussed below.

Contradictory to the study's predictions, both greater frequency and closer proximity did not reveal lower perceived stress levels among participants. Moreover, closer proximity to green spaces did not reveal greater mental wellbeing among participants. Although past literature contrasts our findings, Shalev's (2016) findings on the impact of viewing different pictorial landscapes on mood could help explain the current study's results. Participants in the study were asked to rate three landscapes (a green space or a landscape with water, a desert and an urban setting) in the order of most stressful, relaxing, beautiful and depleting. The study revealed that individuals who viewed or visualised desert landscapes reported feeling more stressed and depleting. However, urban landscapes elicited greater feelings of stress and depletion compared to desert landscapes and were ranked less beautiful and less relaxing than any other natural environment. Dubai's landscape largely consists of an urban and desert environment. Therefore, it can be presumed that if a region consists of a greater desert or urban environments than that of green spaces, the impact of natural greenery will be overpowered by the negative impact of desert and urban environments on perceived stress. Moreover, from an evolutionary point of perspective, deserts are perceived as less favourable for survival.

The study found a positive and significant relationship between the frequency of use of green spaces and mental wellbeing. The results are supported by the attention restoration theory, which states that constant exposure to green environments encourages constructive feelings, thus, bringing about internal healing. Moreover, individuals who frequently visit green spaces are often presented the opportunity to increase social interaction (Maas, Van Dillen, Verheij, & Groenewegen, 2009), perform physical exercise (Gascon et al., 2016) and reflect on their daily life events (Kaplan, 1995). All of which are associated with improved wellbeing in past literature (Foster et al., 2009; Daniel, Watson & Gedikli, 2017).

Overall, the current study revealed that the relationship between proximity to green spaces and its impact on mental wellbeing and perceived stress is not strong. Since Dubai is largely an urban-desert climate, closer proximity to green spaces does not equate to dense green space, but rather, a small percentage of green spaces such as trees on the side of the road or gardens within a villa. Thus, future research should focus on investigating the impact of closer proximity to green spaces on mental wellbeing and stress, while taking the kind of green landscaping into consideration. Furthermore, the study revealed mixed results for the relationship between frequency of visiting green spaces and stress and wellbeing - revealing support for frequency and wellbeing but not the former. It has been found that living or visiting green spaces frequently can build a kind of immunity to stressful events (Alcock et al., 2014). Since



Dubai is a highly multicultural region, there are many individuals who come from greener environments versus those who do not. This could explain why there was a small negative association between stress and frequency to green spaces, but a strong positive association between wellbeing and frequency to green spaces.

Qualitative Discussion:

The results from the qualitative analysis demonstrated that the most common uses of green spaces are for exercise, meditation and relaxation, and socializing. These activities can be considered restorative, which would indicate a manifestation of Attention Restorative Theory. When discussing certain facilities that would increase the frequency of use of green spaces, proximity could be seen as a prominent suggestion. These findings work accordingly with the Biophilia Theory, which states an innate desire to be closer to green spaces.

Strengths and Limitations

The main strength of the current study is that it was conducted in an urban city with a desert climate, whereas past studies in investigating this topic have shown the effects in temperate regions. The ratio of male to female participants was almost equally distributed, strengthening the reliability of the results. However, the study does have certain limitations, including the use of convenience sampling which could have created a selection bias when picking respondents. Additionally, the correlation design indicates a relationship but does not provide conclusive evidence for causation.

Implications

The results of the current study contradict past results found in different climates. Since weather has been shown to have an impact, future research should further explore the impact of green spaces throughout the different seasons. Furthermore, incorporating participants from the seven emirates of U.A.E. would be beneficial to increase the validity of the findings and accurately represent the sample size. Using a semi-structured qualitative approach might reveal other mediating factors that the present study has not considered.

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