JOURNAL OF ENGINEERING AND APPLIED SCIENCE, VOL. 67, NO. 5, OCT. 2020, PP. 1001-1018
FACULTY OF ENGINEERING, CAIRO UNIVERSITY

THE RESTORATIVE EFFECT OF DIFFERENT LANDSCAPE DESIGN SETTINGS ON ADULTS: THE CASE OF AL-AZHAR PARK IN CAIRO

H. M. ASSEM[1], O. S. TOLBA[2], AND S. S. ASHOUR[3]

ABSTRACT

Egyptians, specifically adults, are prone to many stresses in a demanding daily life. Recently, there has been extensive research on the role of landscape on human wellbeing, compared to the scarcity of empirical research linking landscape and human psychology in Egypt. This research assesses the restorative effect of different landscape designs on adults' emotions. It examines the theory of Aesthetic and Affective Response to Landscapes in the Egyptian context by comparing two landscape settings of different visual design properties in terms of their effect on adults' emotions. A quasi-experimental, causal-comparative case-studies approach was conducted on a sample of adult participants who were taken for a led-park walk in two spaces in Al-Azhar Park. Data was collected using: visual observation analysis of landscape design qualities of the selected spaces, POMS questionnaire for assessing emotions, and a landscape preference questionnaire. The data was analyzed quantitatively to indicate the impact of different landscape designs on participants' emotions, and qualitatively to understand user preferences. The findings concluded that the park visit to "space 1" positively affected participants' emotions more than "space 2" due to its visual landscape design properties. Finally, a matrix linking emotions' categories, restorative qualities, and elements of each space is presented.

KEYWORDS: Restorative landscape, Stress Reduction, Landscape Design Elements, Adults, Al-Azhar Park, Cairo.

1. INTRODUCTION

Egyptians trigger stress in this demanding daily life. Worldwide, many illnesses have been linked to chronic stress. In the last three decades, there have been arising research and theories about the vital effect of nature on users with regard to restoration

[1] Teaching Assistant, Department of Architecture, Faculty of Engineering, the British University in Egypt, Egypt and MSc. Candidate, Department of Architecture, Faculty of Engineering, Arab Academy for Science, Technology, and Maritime Transport, Egypt, hala.medhat@bue.edu.eg

[2] Professor, Department of Architecture, Faculty of Engineering, Arab Academy for Science, Technology, and Maritime Transport, Egypt.

[3] Assistant Professor, Department of Architecture, Faculty of Engineering, Arab Academy for Science, Technology, and Maritime Transport, Egypt.

from stresses, depression, and even diseases [1-4]. Olmsted presented the vital impact of nature on restoration: "through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration" [5]. A number of studies explained the value of paying attention to landscape design of scenery. The notion of preferred and non-preferred landscapes arouse in accordance to the effect of different landscapes on users' psychological state [3]. Studies started to examine the emotions of participants after visiting landscape sites and engaging in physical or contemplative-based activities such as walking or sightseeing through a real experience [6-8]. There is scarcity of empirical research in landscape preference in Egypt [9]. This acts as an obstacle towards determining and benefiting from restorative landscapes in the Egyptian community. Thus, the aim of this paper is to compare the effect of two landscape settings of different visual properties in terms of their effect on adults' emotions.

2. RESTORATIVE LANDSCAPES THEORIES

Restorative landscape is any kind of landscape that has a positive impact on human wellbeing [10]. The famous theories that emerged on restorative landscapes are: Attention Restoration Theory (ART) [11], Ulrich's Stress Reduction Theory (SRT), and the theory of Supportive Garden Design and Biophilia [12]. ART and SRT are basic and most widely used in empirical research. This research adopted SRT as it is concerned with the restorative effect of landscapes, while ART is concerned with the cognitive role on attention and fatigue. SRT can be linked to the Aesthetic and Affective Response to Landscapes theory to reach beneficial outcomes.

2.1 Stress Reduction Theory (Psychological Approach)

SRT explains that nature has an effective role in restoring humans, psychologically and physiologically, aside from artificial environments [13, 14]. Based on a psycho-evolutionary framework, landscapes reduce stress as follows: 1) an unconscious response to natural environments always takes place spontaneously, 2) slightest exposure to natural landscapes can quickly decrease stress and 3) response to

nature depends on the continuity of humans [6, 7]. This theory was supported by many studies [3, 7, 15, 17]. A deeper interpretation of relationship between human aesthetic preference of landscapes and psychological effect on humans aroused [11].

2.2 Preference of Landscapes: Aesthetic and Affective Response Theory

SRT stated that for an environment to help in reducing stress, it should be free of high threats to humans [6, 8, 9]. In his theory of Aesthetic and Affective Response to natural landscape elements, Ulrich proposed the various natural landscape design visual properties that are aesthetically preferred [6, 7]. His framework proposed aesthetic natural elements that lead to pleasant affective reaction (emotions) which decrease stress. His experimental studies proved that all groups prefer natural scenes over built scenery, specifically, if it includes a water element or greenery. Many other studies supported these findings [14]. Aesthetic and affective response theory defines the aesthetic preference of users for six visual properties of landscapes, which are considered effective for restoration as humans innately like them [13]. The six attributes are summarized in Table. 1 (based mainly on the theory by [6, 9]). The notion of this theory is supported in other several researches [9, 11, 12, 19].

2.3 Assessing Restoration through Profile of Mood States Test (POMS)

Several tests are used to evaluate human psychology in landscape studies, such as: positive and negative effect schedule, perceived restorativeness test (used with ART as it evaluates user experience rather than emotions), and Profile of Mood States (POMS). POMS test is chosen for this study as it is the oldest standardized psychological test among others, proved high sensitivity measurements of mood profiles in treatment studies [3, 8, 23] and is more widely academically validated than others [24]. An abbreviated version of POMS is adopted that is widely used in studies [25]. POMS has 40 emotions grouped into 7 categories of effects: tension, depression, anger, fatigue, confusion, vigour, and esteem-related affects as shown in Table. 2. Each participant should rate a degree for each emotion on a 5-point Likert scale.

Instant indicator of total mood disturbance is calculated based on degree-rates for emotions.

Table. 1. Visual landscape properties based on user aesthetic preference.

VP	Aesthetic Preference and Affective Response	Measurement of Qualities
1.Complexity	It is translated into the number of separately viewed landscape elements in scenery. A higher complexity means a greater number of elements in the scene which are dissimilar of each other. High user preference is linked to moderate to high complexity, while extremes of low or very high complexity are not preferred. Scale: no/low-moderate-high.	 Low complexity  High complexity
2.Structural Property and Focality	Structural property is the quality used to define whether the complexity present creates a focal point using order and patterns or not. High structural configuration is preferred. Focality interprets how much a space reflects having a point of focus, or catches the eye and attention of the viewer. Scale: no/low-moderate-high.	 Low/Non-structured elements-No Focal point  Highly structured -Focal space
3.Depth	Studies revealed positive relationships between moderate to high depth and aesthetic preference for natural scenes. Scale: no/low-moderate-high.	 Low Depth  High Depth

Table. 1. Visual landscape properties based on user aesthetic preference, (Cont.).

4.Ground Surface Texture	The ground surface should have even or uniform length textures that are relatively smooth, and be favorable to movement. Textures also may affect depth. Scale: Rough-moderate-Even.	 Rough  Even/uniform
5.Presence of Deflected Vistas	A deflected or curving sightline should be present, conveying a sense that new landscape information lies immediately beyond the observer's vision. Preference and curiosity occur when the line of sight in a natural or urban setting is curved, and mystery takes place through the view of depth. Scale: no/low-moderate-high.	 Non-deflected vistas  High deflected vistas
6.Presence of Water	The presence of water element is encouraged as it improves the scene and arouses interest and positivity. Scale: no/low-moderate-high.	
7.Presence of Judged Threat	The presence of a judged threat; such as: an edge of a steep cliff, a dangerous animal) can produce dislike, irrespective of the levels of variables such as depth and focality. Judged threat should be negligible or absent. Scale: no/low-moderate-high.	 No/low threat  High threat: Site at high level(left) - Steep slopes (right)

Table. 2. Seven categories of POMS test.

Category	Effects in Category						
1 Tension	Tense	On Edge	Uneasy	Restless	Nervous	Anxious	
2 Anger	Angry	Grouchy	Annoyed	Resentful	Bitter	Furious	
3 Fatigue	Worn out	Fatigued	Exhausted	Weary	Bushed		
4 Depression	Un-happy	Sad	Hope-less	Discour-aged	Miserable	Helpless	Wor-thless
5 Confusion	Confused	Unable to Concentrate	Bewildered	Forgetful	Uncertain about things		
6 Vigour	Lively	Active	Energetic	Full of Pep	Vigorous		
7. Esteem-related Effect	Proud	Ashamed	Competent	Confident	Satisfied	Embarrassed	

3. CASE STUDY

The following section discusses the analysis of the case study in Egypt.

3.1 Selected Case Study: Al Azhar Park, Cairo, Egypt

Among several parks in Cairo, Al- Azhar park is selected as it is known for the wide variety of natural and manmade landscape design elements explained in detail in the book “Plant Guidebook for Al Azhar Park and the City of Cairo” by the designer of the park [26]. Al-Azhar park is one of the sixty great public spaces in the world [27]. Figure 1 shows a map of the park. The study is conducted mainly in space No. 7, Lake side café (space 1) and space No. 13 observation points – North and South (space 2).

Fig. 1. Map of Al-Azhar Park [28].

3.2 Methods and Procedures

A causal comparative-case studies approach was used [29]. The research compares the effect of two chosen park spaces on the restorativeness of adults in terms

of calculating the total mood disturbance for participants after visiting each space. A visit of two spaces in Al Azhar Park, which have different visual properties of landscape elements, took place. A non-profitable workshop was organized for adult students of architecture, urban design, urban planning, and landscape. It was announced to students of the different universities in Cairo. Figure 2 below shows the led-walk path in the park (route A) for space1 and (route B) for space2.

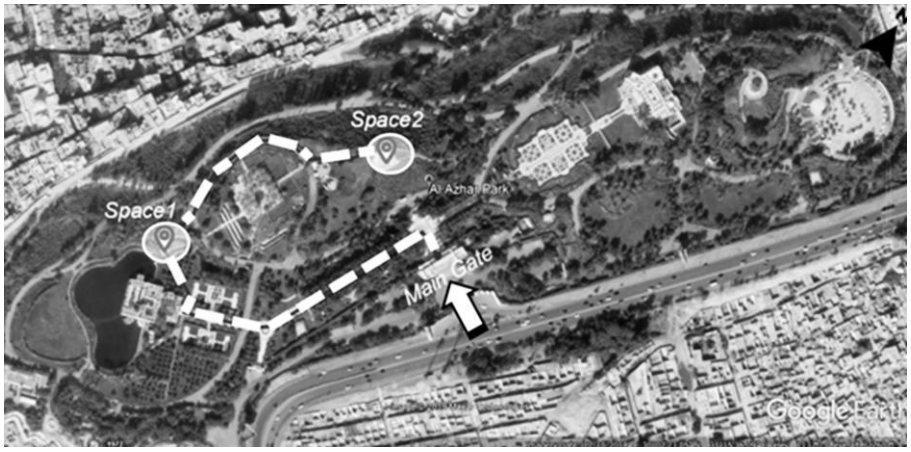


Fig. 2. The route of the led- walk experience, google earth (2019).

The two selected spaces are open spaces in the park. They are similar in terms of area (space 1 is 2374 m^2 and space 2 is 2472 m^2), with a proximity of 263.26 m apart. They have been chosen to have contrasting landscape visual properties based on theories of preference in the literature as indicated in Table 3. To ensure similar weather conditions, both spaces were visited by the same sample of participants on the same spring day (temperature of 24°C) on 30 March 2019 at (10-10:30 am) for space 1 and (10:30-11 am) for space 2 as indicated on Fig. 3.

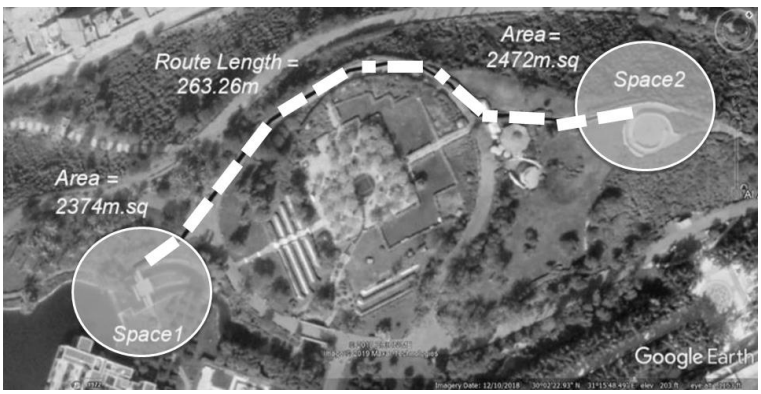


Fig. 3. Areas of selected sites in Al Azhar Park, Google earth (2019).

3.2.1 Participants

It is difficult to apply random assignment [29]. The required representative sample size was calculated by a sample size calculator. Participants were selected based on stratified random sampling then further quota sampling for quasi experimental design. The comparability among participants was based on age, education, whether they visited the park two weeks before the workshop, and the number of times they use parks per month. A total of 39 out of 58 accepted participants committed to the workshop (12 males, 46 females) and 19 were absent. Due to incomplete answers, 5 samples had to be excluded [30]. Based on pre-T-test analyses, 3 female answers had to be excluded leading to a sum of 31 samples: 8 males representing (25.8%) and 23 females representing (74.2%). The age of the participants ranged from 19 to 27 (adults). 25 participants (80.6 %) were students specialized in architecture and interior design and 6 participants (19.4%) were specialized in urban design and planning. Unequal number of males and females made it difficult to tackle gender difference and kept it for future research. This may be due to the probable higher number of female students in the chosen fields in Egypt.

3.3 Data Collection

Data was collected by multiple techniques to achieve the aim: firstly, visual observations were performed using descriptive narratives and illustrated photographs for the two settings to define their contrasting landscape visual properties. Secondly, a led-walk experience took place and participants answered 2 questionnaires: the standard psychological test POMS to evaluate emotions after visiting each space, and another test for assessing users' preference of landscapes asking about landscape preference for visual properties and elements of each setting.

3.4 Results and Discussion

POMS questionnaire data was quantitatively analysed using SPSS software and the remaining data was qualitatively analysed as shown below.

3.4.1 Visual observation analysis of the two park spaces

Table 3 is an analysis of the visual properties (VP) of the chosen spaces and was conducted based on the 3-point Likert scale indicated in Table 1.

- Complexity: Space 1 shows moderate to high complexity of landscape elements in terms of a great number of different natural elements while Space 2 shows moderate to low complexity of natural elements because elements are not tall and are less close to each other.
- Structural property and focality: Space 1 expresses high structural property and focality. The terrace acts as a focal point of the space being in the center of the space and in the lake. The lake acts as a focal point in the park. There is high ordering and patterning of the surrounding elements such as different heights and types of trees and shrubs, which increases the focus on the central space. Space 2 has high to moderate focality as well. The space acts as a focal point on top of a cliff, which generates high focality in the park. However, in comparison to Space 1, Space 2 is not surrounded with natural landscape elements that are well ordered to express focality. Unlike Space 1, Space 2 is poor in terms of order of trees and natural landscape elements as most of the elements are not at human-eye level view.
- Depth: Space 1 shows moderate depth of natural landscape elements, while Space 2 shows high depth of the view of buildings in the sky view.
- Ground surface texture: Space 1 indicates rich to moderate ground surface of even, smooth texture expressing a sense of continuous depth on which the participants could sit, interact and touch the grass [18]. The moderate to high rich texture helps in increasing complexity and enriching the structural property of the composition. However, Space 2 contains a rough, uneven texture, which interrupts the depth in the scene. Ground surface is unreachable as the site is on high level and is a steep slope, which is unsafe to explore. The poor ground surface texture negatively affects the space expressing low complexity and structural property.

- Presence of deflected vistas: Space 1 indicates moderate to low deflected vistas and a slightly curved line of sight along the river, while Space 2 depicts moderate to high level of deflected vistas as it is almost one vista. However, a highly curved line of sight is found as the slope is viewed from above.
- Presence of water: Space 1 indicates the presence of water (lake) with fish that participants tried to interact with, while Space 2 has no water elements.
- Presence of judged threat: Threat in Space 1 is absent, while in Space2, a judged threat is expressed through the dangerous edge of a steep cliff, the rough ground texture and the cacti shrubs (with thrones) are shown along the steep slope, which increases danger.

3.4.2 Results of the POMS survey questionnaire

Figure 4 summarizes all the values for total mood disturbance (TMD) after visiting Space 1 (TMD for Space1 curve) and TMD after Space 2 (TMD for Space2 curve) for each participant. It interprets the reasons behind the significant difference of the T-test, which proved the aim of the study. The two graphs show almost the same curve shape and distribution while answers are shifted downwards resembling the drop in participants' mood disturbance after visiting Space 1 (TMD for Space1 curve) more than after Space 2 (TMD for Space2 curve). Almost all participants experienced an improvement in their TMD after Space 2 in the same consistent manner as in after Space 1. There are a few values in which the TMD for Space 1 was higher than for Space 2 values (these cases are marked in rectangles). However, the difference between the TMD records for the two conditions for these participants is not large and change in participant's mood was not high (can be ignored). On the other hand, marked in ovals are TMD values for participants who scored a huge TMD difference between Space 1 and Space 2, which made the curves differ in shape; these participants experienced higher restoration effects in Space 1 than in Space 2 than others.

Table 3. Comparison of visual landscape properties in Spaces 1 and 2.

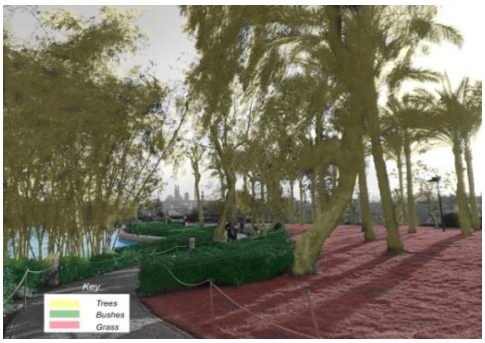
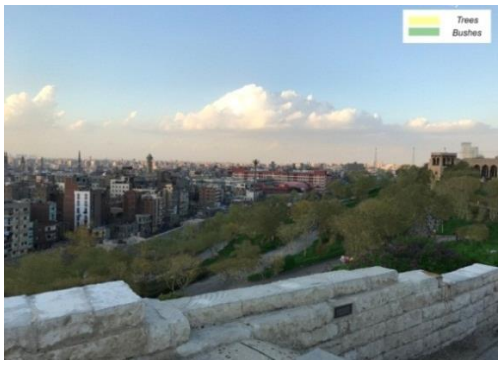
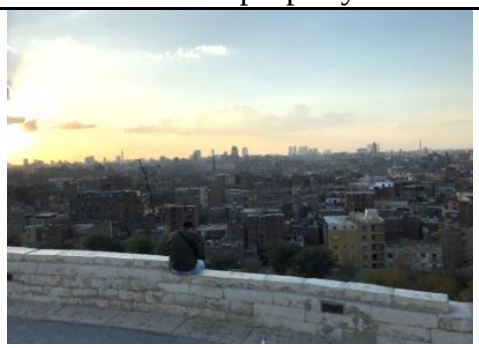
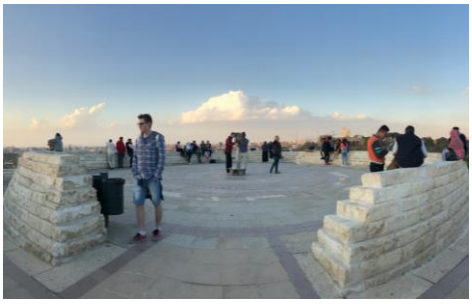
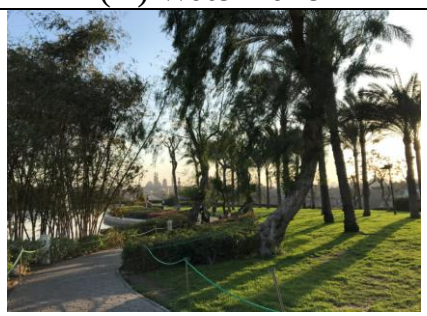
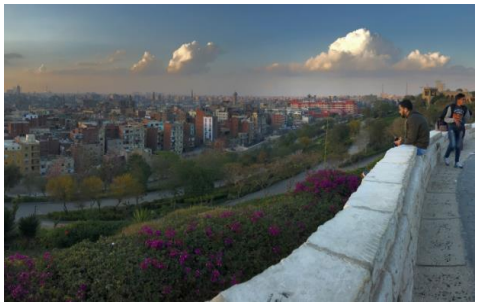
Visual Property	Space 1	Space 2
Complexity	 (a) Trees and shrubs showing moderate to high complexity	 (b) Low complexity- minimal natural elements
	 (c) Higher trees marking higher complexity	 (d) Low height natural elements marking low complexity
Structural Property& Focality	 (e) High structural property and focality	 (f) High focality but moderate to low structural property
Depth	 (g) Low to medium depth of palm trees and shrubs	 (h) High depth but of urban (non-natural elements)

Table 3. Comparison of visual landscape properties in spaces 1 and 2, (Cont.).

Groud Texture	 (i) Even and smooth ground texture	 (j) Poor and Rough ground texture that is not smooth or safe
Deflected Vistas	 (k) Slightly deflected vista (line of sight but the space has varied vistas	 (l) Highly deflected vista but not varied in views (vistas)
Water Element	 (m) Water Lake	 (n) Place lacks water elements
Judged Threat	 (o) Very safe place- No judged threat	 (p) Space raised on a cliff-danger falling on a steep slope on shrubs with thorns

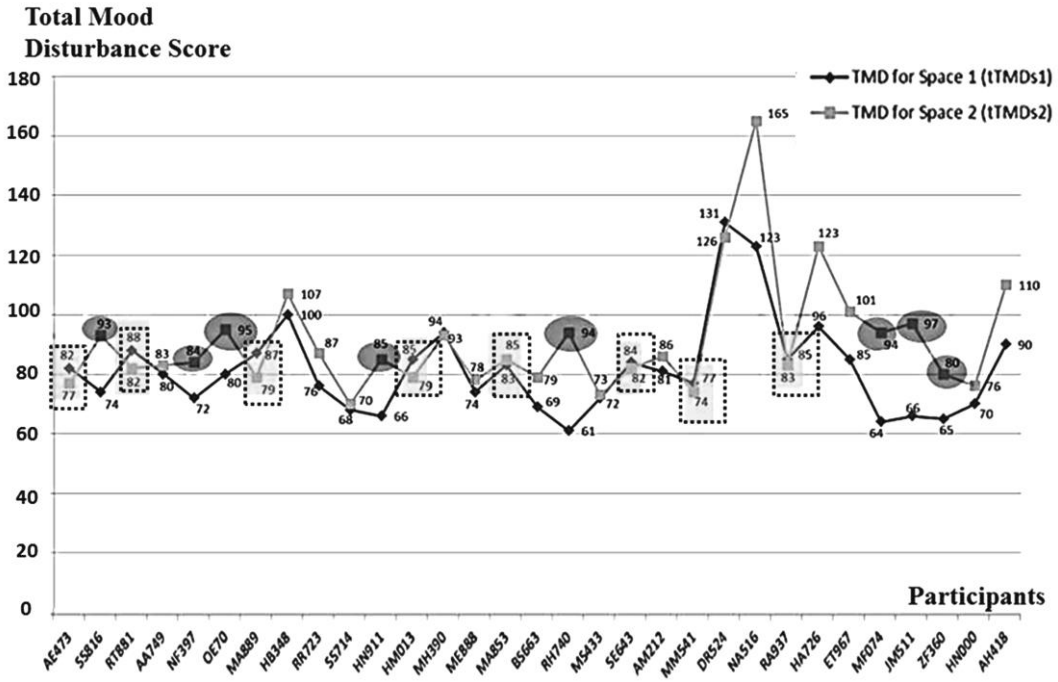


Fig. 4. Graph of the total mood disturbance values for Space 1 and Space 2.

3.4.2.1 Results of the T-test

Paired-samples of Student's T test was conducted to analyse and compare the total mood disturbance of participants in two different conditions after visiting Space 1 and after visiting Space 2 in order to assess the impact of the two landscape settings on adults' emotions. Several tests were performed to evaluate the normality of the data collected and their validity [20]. Table 4 presents the results of the T-test. The difference between the two conditions in terms of mean total mood disturbance record (90.97 for After Space 2 and 81.55 for After Space1) was 9.42, and that it was found to be statistically significant at the 0.001 level. There was a significant difference in the scores for After Space 2 (Mean (M) = 90.97, Standard Deviation (SD) = 19.295) and after Space 1 (M = 81.55, SD = 15.67) conditions; t (30) = 3.97, p-value = 4.14 E-04). The mean values for the TMD measurements proved that participants results scored mean TMD at Space 2 (M = 90.97) and mean TMD at Space 1 (M = 81.55); that is to say, that Space 2 did not decrease the participants' TMD as Space 1 did, which means that Space 1 impacted the participants more positively (restoration from negative emotions). The results of the study supported the previous studies in the

literature which [6, 9] in reference to SRT and preference to landscape visual properties.

Table 4. Differences in emotions between after Space 1 and after Space ".

	No. of Adults	Mean	Standard Deviation	Paired Diff. Std. Deviation	t Stat	P-value (T<=t) two-tail	t-Stat > t critical	Sig-nificance
After Space 2	31	90.97	19.295	13.208	3.97	4.14E-04	Yes T critical= 2.0452	Significant at level P < 0.001
After Space 1	31	81.55	15.67					

3.4.3 Preference of landscapes questionnaire results

Participants answered this questionnaire at the end of the walk. 75% of the participants visited the park for the first time and 25% stated that they visit it less than once a week. 100% of the participants confirmed that they experienced a difference in effect after the park visit. 6.5% of participants did not find a difference in effect between Space1 and Space2, while 93.5% found a difference. When participants were asked about their preference between the two visited park spaces in general, 24 (3 males and 21 females) representing 77.4% of participants preferred Space 1 over Space 2, which was chosen by only 5 (3 males and 2 females) representing 16.1%. These results confirmed the results of the POMS test (experiencing positive effect in Space1 than in Space 2). Furthermore, two males (6.5%) thought that both spaces were equal. Participants were asked to express how Space 1 differed from Space 2. Table 5 shows a matrix of the percentage of each effect in each space in relation to the restorative qualities and elements of that space. The matrix was created from the descriptive answers of participants, for example: Space 1 is "more calm and relaxing" and "I can see the greens, blue sky, and play in water or sit on the grass and meditate". Mean values of effect were based on the POMS test values. 55% of participants rated the water element as the element that positively affected their effect the most, while 35% ranked trees as the secondly preferred element, 9.7% stated other elements, such as: flowers, fish, grass, wind, and sound of birds. These results hypothesized the link

between the two main theories among which this research was established “Theory of Stress Recovery” and “Aesthetic and Affective Response to Natural Environment” [14].

Table 5. Affective and landscape aesthetic preference matrix.

	Space 1 (S1) and Space 2 (S2)	Restorative Qualities and Elements	
		S1	S2
Tension	Mean S1=2.35 Mean S2=4.5	Qualities: (1) Moderate to high complexity (2) High structural property and focality (3) High presence of water (4) Low threat (5) Even/soft ground surface texture Elements: -water-trees-fish-shrubs-flowers-sound of water – sound of birds-grass decrease tension, anger, fatigue, depression and increase vigour.	Qualities: (1) High Depth (2) High focality (3) Moderate to high deflected vistas release depression and arouses vigour (4) High presence of threat arouses vigour to 10% Elements: -Shrubs-trees-flowers-sky view decrease tension. -Cactus produces negative emotions 26% of participants -Steep slopes in vistas increase confusion, but 15% preferred them. -Absence of water-rough and poor surface texture arouses anger and tension.
Anger	Mean S1=1.5 Mean S2=2.2		
Fatigue	Mean S1=2.4 Mean S2=3.1		
Depression	Mean S1=1.8 Mean S2=3.2		
Confusion	Mean S1=3.16 Mean S2=3.8		
Vigour	Mean S1=13.4 Mean S2=10.9		
Esteem related Effect	Almost the same Mean S1=3.2 Mean S2=3		

4. CONCLUSION

The study proved that the presence of certain landscape visual properties that are commonly preferred among people provided more restorative effects than spaces lacking these preferred visual properties. The results of the T-test hypothesised significantly different results between the total mood disturbance TMD results for Space1 and Space 2, where Space1 scored a better positive impact on the effect of participants. Results of the preference questionnaire showed that participants preferred the landscape visual properties in Space 1 over Space 2, which agreed with the

literature findings that certain preferred landscapes can arouse restoration and have a positive role on effect than less preferred ones. These findings are vital for the process of landscape design and human health.

DECLARATION OF CONFLICT OF INTERESTS

The authors have declared no conflict of interests.

REFERENCES

1. Bratman, G. N., Daily, G. C., Levy, B. J., and Gross, J. J., "The Benefits of Nature Experience: Improved Affect and Cognition", Landscape and Urban Planning, Vol. 138, pp. 41-50, 2015.
2. Razani, N., Saam, M., Kohn, M. A., Wells, N. M., Thompson, D., Alqassari, M., Agodi, A., and Rutherford, G. W., "Effect of Park Prescriptions With and Without Group Visits to Parks on Stress Reduction in Low-income Parents : SHINE Randomized Trial," Vol. 60, pp. 1-17, 2018.
3. Pratiwi, P. I., Xiang, Q., and Furuya, K., "Physiological and Psychological Effects of Viewing Urban Parks in Different Seasons in Adults," International Journal of Environmental Research and Public Health, Vol. 16, 2019.
4. Hammad, S. M., and Serageldin, H. E., "Effect of Supportive Healing Environment's Design Elements on Cancer Patients in Egypt," Journal of Engineering and Applied Science, Vol. 64, No. 4, pp. 287-306, 2017.
5. Olmsted, F. L., "The Yosemite Valley and The Mariposa Big Tree: A Preliminary Report in Landscape Architecture," California, pp. 1-4, 1865.
6. Stigsdotter, U. K., Corazon, S. S., Sidenius, U., Kristiansen, J., and Grahn, P., "It Is Not All Bad for The Grey City – A Crossover Study on Physiological and Psychological Restoration in a Forest and an Urban Environment," Health and Place, Vol. 46, pp. 145-154, 2017.
7. Bielinis, E., Bielinis, L., Takayama, N., and Lukowski, A., "The Effects of a Short Forest Recreation Program on Physiological and Psychological Relaxation in Young Polish Adults," Forests Journal, Vol. 10, No. 34, pp. 1-13, 2019.
8. Song, C., Ikei, H., Park, B., Lee, J., Kagawa, T., and Miyazaki, Y., "Psychological Benefits of Walking through Forest Areas", International Journal of Environmental Research and Public Health, Vol. 15, No. 2804, 2018.
9. Mahmoud, A. H., and Amin, A., "Effects of Plant Attributes and Visual Design Elements on Preference of Landscape Settings," Journal of Engineering and Applied Science, Vol. 50, No. 2, pp. 243-258, 2003.
10. Kaplan, S., "The Restorative Benefits of Nature : Toward an Integrative Framework", Journal of Environmental Psychology, pp. 169-182, 1995.
11. Hartig, T., Mitchell, R., Vries, S. D., and Frumkin, H., "Nature and Health," Annual Review of Public Health, Vol. 35, No. 1, pp. 207-228, 2014.

12. Kellert, S. R., and Wilson, E. O., The Biophilia Hypothesis. Washington, DC.: Island Press, 1993.
13. Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., and Zelson, M., "Stress Recovery During Exposure to Natural and Urban Environments," Journal of Envirnvironmental Psychology, Vol. 11, pp. 201-230, 1991.
14. Ulrich, R. S., "Aesthetic and Affective Response to Natural Environment," in Behavior and Natural Environment, pp. 85-125, 1983.
15. Menatti, L., Casado, A., and Mace, B., "Landscape and Health: Connecting Psychology, Aesthetics, and Philosophy through the Concept of Affordance," Vol. 7, pp. 1–17, May 2016.
16. Ghazala, G. S., ElHalafawy, A. M., and Amin, A. M., "Approaching Contemplative Gardens with Special Reference to User's versus Experts views," Journal of Engineering and Applied Science, Vol. 64, No. 1, pp. 1-20, 2017.
17. El-Hefnawy, M. H. EL M., "Integration of New Architectural Trends to Improve Healing Environment in Hospital Buildings," Journal of Engineering and Applied Science, Vol. 65, No. 4, pp. 243-260, 2018.
18. Ulrich, R. S., "Human Responses to Vegetation and Landscapes," Landscape Research, Vol. 4, No. 1, pp. 17-23, 1986.
19. Mahmoud, A. H., and Amin, A. M., "Aesthetic Preference of Recreational Landscape Settings in Egyptian Coastal Environments," Journal of Engineering and Applied Science, Vol. 57, No. 1, pp. 9-25, 2010.
20. Kaplan, R., and Kaplan, S., "The Experience of Nature: A Psychological Perspective", Cambridge University Press, 1989.
21. Ulrich, R. S., "Visual Landscape Preference: A Model and Application," Landscape Research, Vol. 7, No. 5, pp. 279-293, 1979.
22. Bitar, H., "Public Aesthetic Preferences and Efficient Water Use in Urban Parks", pp. 246-249, 2004.
23. Ochiai, H., Ikei, H., Song, C., Kobayashi, M., Takamatsu, A., Miura, T., Kagawa, T., Li, Q., Kumeda, S., Imai, M., and Miyazaki, Y., "Physiological and Psychological Effects of Forest Therapy on Middle-Aged Males with High-Normal Blood Pressure," International Journal of Environmental Research and Public Health, Vol. 12, pp.2533-2542, 2015.
24. McNair, D. M., Lorr, M., and Droppleman, L. F., "Manual for the Profile of Mood States," Educational and Industrial Testing Service, No. 27, San Diego, CA, 1971.
25. Heuchert, J. P., and McNair, D. M., "Profile of Mood States 2nd Edition (POMS 2)," Toronto, Vol. 47, pp.1-8, 2012.
26. Almasry, L., Plant Guidebook for Al Azhar Park and The City of Cairo, Two. Cairo El-Shorouk International, 2013.
27. Project for Public Spaces, P.P.S., "Parks," 2006. https://www.pps.org/places/al-azhar-park. (Accessed 2019)
28. Almasry, L., Landscape Architeture and The Planting Design of Al-Azhar Park. 2013.

29. Groat, L. N., and Wang, D., Architectural Research Methods. New York: J. Wiley, 2002.
30. Heuchert, J. P., and McNair, D. M., "Assessment Report Profile of Mood States 2nd Edition–Youth", Toronto, pp. 1-7, 2012.

التأثير الاسترخائي للتصاميم المختلفة للمناظر الطبيعية على البالغين: دراسة لحديقة الأزهر– القاهرة

يقيّم البحث التأثير الإيجابي لتصميمات المواقع الطبيعية المختلفة على مشاعر البالغين من خلال دراسة نظرية "الاستجابة الجمالية والعاطفية للمناظر الطبيعية" في السياق المصري بمقارنة نسقين من مواقع طبيعية ذات خصائص مختلفة للتصميم البصري، وتأثيرهما على مشاعر البالغين باستخدام أسلوب مقاربة شبه تجريبي ومقارنة سببيه على عينة من المشاركين البالغين الذين تم اصطحابهم في نزهة لمنطقتين مختلفتين داخل حديقة الأزهر حيث تم جمع البيانات بملاحظة خصائص تصميم المواقع الطبيعية للمنطقتين المختارتين، واجراء استبيانين لتقييم الأثر العاطفي على المشاركين والتفضيل للمناظر الطبيعية وتم تحليل البيانات كمياً لرصد تأثير تنسيق المواقع الطبيعية المختلفة على عاطفة المشاركين، ونوعيًا لفهم تفضيلات المستخدمين و تبين أن زيارة "المنطقة – ١" بالحديقة أثرت بشكل إيجابي على مشاعر المشاركين أكثر من "المنطقة – ٢" نظرا للخصائص البصرية لتصميم المواقع الطبيعية وتم التوصل لمصفوفة تربط بين خصائص التصميم والعناصر الطبيعية المفضلة للمستخدمين والمسببة للتأثير الإيجابي على الحالة النفسية للمشاركين في كل من المنطقتين.