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Designing Academic Open Spaces:

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***Abstract*—Recently, with the quantitative expansion of educational institutions, and seeking to balance the supply and demand of undergraduate students, this quantitative need is balanced and it is time to consider the importance of investigating the impact of open spaces on academic sites on improving the quality of education. This paper aims to provide a deeper understanding of academic open spaces (AOS) as a health promoting in academic institutions by analyzing different typologies of AOS. Due to the diversity of students' activities; university campuses need to have many different open spaces to accommodate the activities students wish to engage. Our study of AOS at Helwan University and Ain-Shams University is one of the first attempts to quantify health promoting effect of AOS among students, adding to our understanding of how AOS can serve as everyday therapeutic landscape. We take a closer look at the interconnection between students' perception of their health and physical social and mental well-being in AOS. From the previous researches, the space used by youth differs from that of general society: particularly their psychosocial needs and the activities they carry out toward this nature differ from those of children and adults. Limited researchers identified these needs and linked them with the activities they do in public open spaces. They did not focus specifically on the student needs in the campus open spaces. Thus, there is a lack in the design requirements that contribute to encouraging the learning process and requiring mental health. The paper starts with the literature review of the university campus, campus open spaces definitions and its typologies, and the students' activities.**

Keywords*— *Academic Open Spaces (AOS), Social Health, Physical Health, Mental Health

I. INTRODUCTION

The academic institutions must start considering not only to invest in classes but also in all spaces, especially those "outdoors" since more than 50% of students' activities including social activities, learning, and teaching in university campuses occurs outside the classrooms. Even academically, although students may spend more than 40 hours per week on academic pursuits, they spent only 12 to 16 hours in class per week [1]. Speake conducted a study to deduct where students at Liverpool Hope University in England spend their free time [2].The researchers found that more than half of the participants spent their free time in an open space near the classroom. In a similar study done by Liprini at the University of Pretoria, South Africa, 80.4% of participants indicated that they preferred to spend their free time outdoors in open spaces [3]. Furthermore, many institutions have plans and targets that support the vision that the task of the institution is not only concerned with academic purposes but also have the aim of helping students to "improve and develop their social lives, acquire leadership skills and create their personality" [4].

Fig. 1. University of Pretoria, South Africa
Source: https://ihararejobs.com/

Fig. 2. University of Pretoria, South Africa
Source: https://www.iol.co.za/

AOS offers an integrated environment for daily routines of working and learning for an increasing number and diversity of students. Students spend a considerable amount of their time on campus involved in activities that constantly require highly focused attention and connection. Universities serve not only as a place of formal education but also provide an environment in which students develop their personal and social identity at a significant stage in their lives. Mental health issues are growing concerns for college and university students all over the world, both in terms of prevalence and severity [5].

A. Research Problem

Lack of land or unawareness of academic open spaces design standards, open spaces have been reduced and closed spaces such as classes and workshops were constructed.

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B. *Research Objective*

The main objective of the research is to design healthy academic open spaces that suit the students' activities. Furthermore, the purposes of this study is to explore and describe health and well-being factors that affect the campus urban design principles, to investigate and examine the degree of Helwan University and Ain-Shams University student satisfaction with the urban design of their campus.

C. *Research Hypothesis*

If we apply the health and well-being factors to the surrounding environment (academic open space), this will increase productivity and decrease anxiety and stress levels for individuals (students).

D. *Research Methodology*

The research methodology was based on an inductive approach through a theoretical study of the academic open spaces and the different typologies of these open spaces for different activities, by defining the various typologies of campus open spaces and their main features, their associated with health and well-being factors, and deducing the relationship between their health and different open spaces typologies was also studied. A deductive and analytical approach was used on a case study of various universities in Egypt. Analysis of health factors that influenced open spaces design was then carried out in order to identify campus open spaces typologies depend on student's different activities in considering health factors.

II. THEORETICAL FRAMEWORK

A. *Historical Context of the Egyptian University Campus*

Egypt's intellectual leadership began with the founding of Al-Azhar. It was established in Cairo in the tenth-century, students from across the Arab world and Africa came to Al-Azhar to pursue Islamic studies. Kamel stated that king Fouad 1 University, now Cairo University, was the first Egyptian university established at 1908, and then the American University in Cairo (AUC) 1919. Kamel confirmed that during the first decades of the 20th century, Egypt had three national universities and one private university. These were Cairo, Alexandria, and Ain Shams University, and the American University in Cairo. The total number of students enrolled was around 50,000 and nowadays exceeds two million. After second worldwide war, (from 1939 to 1945), Al-Azhar University was established in 1961, which become an Islamic university for the muslim world [6].

B. *Academic open spaces (AOS) Importance and Typologies*

The design of AOS has a significant effect on students' feelings towards educational institutions, and plays a major role in the learning processes. It has positive effects on students' physical, mental and social health, leads to positive changes in personal and behavioral skills and increases student self-confidence, and enhance students' opportunities for mental refreshment between classes, thereby increasing their performance levels in class. In addition, open spaces provide a place for physical activity and entertainment that helps in mitigating the negative feelings resulting from the stress of routine studying [7]. Typically, students remember open spaces more than the buildings of their university [8].

The hierarchy of open spaces provides multi-functional purposes encouraging students to stay, eat, study, sit, watch, meet with others, attend events or go through and past spaces. Student social interaction and activity depends on the physical settings of campus and whether its design offers spaces diversified enough to hold various student activities. Social interaction between students within campus open spaces can improve student physiological health and self-esteem and reduce stress levels [9].

AOS should be classifies according to the different activities that occur in each space, as different activities call for different treatments in size, landscaping, and furnishing of a space, or due to its location and accessibility on the campus [10]. Figure 4 shows the different types of open space typologies on most university campuses.

According to Yıldız and Sener, the quality of AOS is associated with the concept of "use value." It is calculated according to the components of frequency and density of activity, along with the time and density of uses [11]. It is important to determine the use value and its role in to campus design improve the quality of spaces. These open spaces act in different ways relative to different criteria, as shown in figure3. Building frame open spaces shaped by building edges, landscape and paths the distribution of landscape elements, plazas, paths, and green lawans, spatial organizations the arrangement of trees, shading elements, and other vertical landscaping affects, thermal comfort AOS can accommodate thermal comfort by studying buildings orientation to limit heat gain, shades, and trees [12].

Fig. 3. Campus design improving the quality of spaces
Source: https://www.sasaki.com

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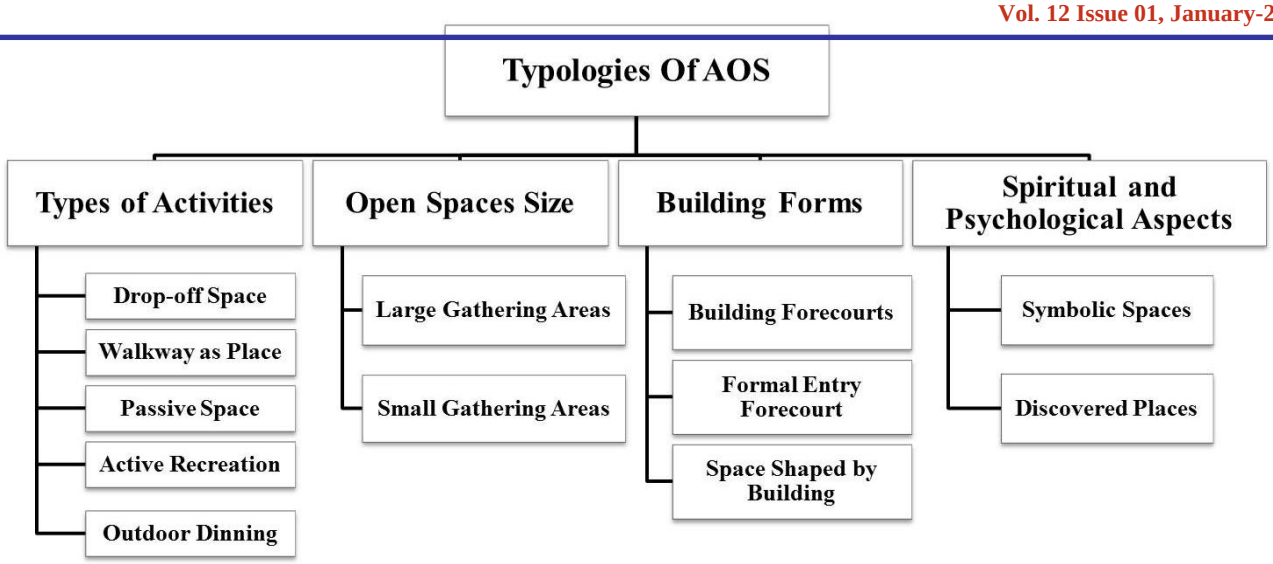

Fig. 4. Typologies of Academic Open Spaces, Source: Author based on (Nassar, 2021 & Alhusban et al., 2019)

C. Health and Well-Being Importance

Many studies stated that open space relates to quality of life aspects, such as social, physical and mental health. From human health point of view, open space as a place for relaxation and calm to reduce the stress, which has a direct effect on decreasing the diseases. According to World Health Organization WHO the surrounding environment is the key to the health and well-being of its users [13]. Wan-Yu argued that natural environments help people not only restore from mental stress but also lower the physical muscle tension and blood pressure [14].

TABLE I. SUMMARY OF HEALTH EFFECTS OF NATURAL VIEWS, SOURCE: (STEPHEN, 2014)

Healing effects	Design elements
Lower mental fatigue	Varying levels of nature (trees and grass) surrounding buildings
Improved self-discipline	Amount of window view of nature
Increased powers of concentration	Garden, with old fruit trees and a variety of flower species
Higher happiness, lower stress, anger, depression and tension	Park-like forest area with creek
Reduced stress and improved mood	Natural environment: tree views/nature reserve
Restorative benefits for heart rate data and emotional states	Painting of natural scene; distant mountains, sunset, clustered trees and open grassy areas, path (mystery

There are factors affect health and well-being, these factors are;

- **Participation;** Parallel to the developments and alterations in pedagogy, students have increasingly been required to engage actively, often through participating in small groups
- **Safety;** is an indispensable condition of livable open space. It is a prerequisite for people's well-being and students tend to avoid the places associated with risks.
- **Happiness and Subjective Well-being;** happiness is a result of a positive experience in which a person can say if s/he lives happily or not. The descriptor "subjective" in subjective well-being is added to limit the scope of a person's quality of life to the person's own perspective. SWB is defined as people's evaluation of their lives, an evaluation that includes both the cognitive judgment of the standards of what constitutes "the good life" and an affective evaluation of feelings and emotions.
- **Social Interaction;** one of the most important dimensions of AOS is to create opportunities needed for social interactions. Interaction with other users of the campus leads to creating a stronger relationship with the place.
- **Attractive Public Realm;** is all areas of the open spaces to which the students have access. The physical and functional qualities of AOS are related to physical amenities, the activities the accessibility conditions, and the surrounding land-use that support the activities there. Attractive public realm classified into location, form, positive and negative space, edge and center, flexibility, and scale.
- **Pedestrian Friendly;** is divided into two elements, walkability is a common form of physical activity, which has a lot of social, health and recreational benefits and Accessibility provides the concept of quality of open space. It makes the open space more defined and the users feel safety. The factor of safety controls the livability and the activities in the open space. AOS should be accessible for all users including both the able-students and physically disabled ones
- **Landscape;** People generally tend to prefer the landscape with more natural elements such as water features and trees or plants. It means that the larger proportion of natural patch area promote environmental preference in urban settings. Overall, dense trees and large artificial structures have negative effects on humans, while large continuous grassland

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patches or water patches enhance humans' positive responses.

- **Lightning;** is an important factor to take into consideration while designing open space to enhance the psychological health of the users. It includes artificial and daylight, it enhances students' mood and behavior. Light can affect not only our perception of open space, but also the way we use open space.
- **Colors;** students often have more energy and are exiting with warm colors around, while calming with cool colors. Therefore, cool colors usually used in calming space and creating a pleasant and a relaxing environment. On the other hand, warm colors usually used in energizing spaces, which could lead to higher energy levels.
- **Air quality:** Is another factor that greatly affects students' health and wellbeing. It is better to improve the natural ventilation air quality in the open spaces to make a better use for the open space by students. It can be improved by planting green areas and trees to absorb the pollution to improve the surrounding environment and purifying the open space air.
- **Noise & Quietness:** Is another environmental variable that can cause a multitude of detrimental effects. Some researchers believe that noise in campus causes distraction and interferes with learning. Even if students do not realize that they are distracted by noise, they can still be affected negatively. Studies proved that when people are distracted by noisy conditions (55-65 decibels), they are less likely to take simple steps that would aid in concentration. People working in quiet conditions (40 decibels or less) are more likely to find additional ways to enhance their concentration.
- **Thermal comfort:** Is influenced by four environmental conditions that affect the body simultaneously: air temperature, humidity, air movement, and mean radiant temperature. One study found that at temperatures higher or lower than 23°C, students showed decreases in memory, suggesting that the optimum temperature for learning is 23°C.

Human were attracted to urban open spaces for physical activities, social interactions, and a relief from daily life, which benefit their mental and physical health [15]. Therefore, campus open space can promote healthy environment by promoting activities in physical, mental and social well-being. These activities are linked to health outcomes and improvements such as stress recovery, attention restoration, social interaction, evocation of positive emotions, and collective experience of nature [16].

Depend on the previous literature review table2 declares the measuring tools for a healthy AOS;

TABLE2. AOS FACTORS AND MEASURIING TOOLS FOR HEALTH

AOS Factors		Health Elements	Measuring Tools	
Participation	**P**	Social Health	Social events, Type of activities, and Users	
Safety	**S**	Mental Health and Physical Health	Non – physical factors Physical factors	Criminal activities, Individual factors, Social and cultural factors, Maintenance and management Surveillance, Access control, Increasing the illumination, and Physical environmental design
Happiness and Subjective Well-being	**H**	Mental Health	Green, Colorful Open space	
Social Interaction	**I**	Social Health	Open spaces design, Users' needs, Time spending	
Attractive Public Realm	**A**	Social, Physical, and Mental Health	Location, Form, Edge & Center, Flexibility, Scale	
Pedestrian Friendly	**F**	Social, Physical, and Mental Health	Walkability Accessibility	quality of footpaths, Quality of sidewalks, Building Accessibility, Safety (Separating the movement of vehicles from pedestrians), Friendliness, Aesthetics, and Comfort Safety, Clear, Visible, Alternative touts, and Connectivity
Landscape	**L**	Social, Physical, and Mental Health	Grass land and Water patches	
Lighting	**G**	Physical and Mental Health	Daylight, Artificial Light	
Color	**C**	Mental Health	Saturation, Brightness, Warm colors, and Cool colors	
Air Quality	**Q**	Physical and Mental Health	Natural Ventilation and Planting	
Noise Quietness	**N**	Physical and Mental Health	55-65 decibels 40 decibels or less	
Thermal Comfort	**T**	Physical and Mental Health	Air temperature, Humidity, Air movement, and Mean radiant temperature	

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III. APPLIED RESEARCH

The rationale behind the selection of these Egyptian university case studies lies in the design principles and landscaping incorporated into these models and the successful and active urban planning of the university campuses, especially the main plaza. The Universities are considered to be among the largest and oldest in Egypt, have played an important role in the learning process over the years and have great historical and symbolic value, combining the characteristics of comparable Universities in terms of size, area, student and user capacity and its historical place in the university. This paper examines three open space typologies, the main plaza, walkways as places and building forecourts at Helwan University and Ain-Shams University.

A. Helwan University

Helwan University was established in 1975 and is considered one of the most important universities in Egypt. The university campus layout is divided into three main areas, the first area consists of university buildings and lecture halls, the second area consists of sports and gymnasiums, and the third area consists of university dormitories. The university has separate sidewalks from vehicles. The university campus as a whole is characterized by a large area of open spaces and low building density, accounting for 65% of the university's layout area.

TABLE3. ASSESSMENT FOR OPEN SPACES IN HELWAN UNIVERSITY

AOS Typology	AOS Factors												Activities Notes
	P	S	H	I	A	F	L	G	C	Q	N	T	
Drop-off 	√	√	X	X	X	√	X	√	√	√	X	X	**Necessary activities** (walking and waiting) and **Social activities** (events, social interaction, small gathering, and making conversations).
Main Plaza 	√	√	X	X	X	√	√	√	√	√	X	X	**Necessary activities** (walking and waiting), **Optional activities** (sitting) and **Social activities** (events, small gathering, and making conversations).
walkway 	X	√	X	√	√	√	√	√	√	√	X	X	**Necessary activities** (walking and waiting), **Optional activities** (watching other), and **Social activities** (making conversations).
Passive space													
Active Recreation 	√	√	√	√	√	X	√	√	√	√	X	X	**Social activities (**Sports activities).
Outdoor dining 	√	√	X	√	X	√	X	√	X	X	X	X	**Necessary activities** (walking and waiting), **Optional activities** (watching other), and **Social activities** (making conversations).

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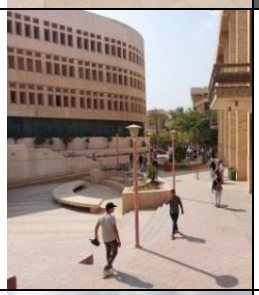
Large Gathering Area		√	√	X	√	√	√	X	√	√	X	X	X	**Necessary activities** (walking and waiting), **Optional activities** (enjoy nature and sitting), and **Social activities** (concert, events, graduation ceremony, social interaction, small gathering, and making conversations).
Small Gathering Area		√	√	√	√	√	√	X	√	√	X	X	X	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Building Forecourts		√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Formal Entry Forecourt		X	√	X	X	X	√	X	√	√	X	√	X	**Necessary activities** (walking and waiting).
Space shaped by Building		√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Symbolic Spaces		√	√	X	X	√	√	X	√	√	X	X	X	**Necessary activities** (walking and waiting), and **Social activities** (evens, social interaction, small gathering, and making conversations).
Discovered Places														

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B. *Ain-Shams University*

Ain-Shams University was established in 1950. It is located in Cairo Governorate, between the Abbasiya district in the southwest and Heliopolis district in the northeast. Most of the university buildings and colleges are located in the campus, except for the Engineering and Education College and Girls College, which take other independent locations.

The designer of Ain-Shams University campus took the Zaafaran Palace as a core to public buildings and colleges nearby. The campus of Ain-Shams University as a whole is characterized by the low density of its buildings in relation to the large land surface that contains green areas with various trees and palms. The university campus contains the administrative and public buildings, the central library, and the faculties of arts, law and science.

TABLE4. ASSESSMENT FOR OPEN SPACES IN AIN-SHAMS UNIVERSITY

AOS Typology	AOS Factors												Activities
	P	S	H	I	A	F	L	G	C	Q	N	T	
Drop-off 	√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking and waiting), **Optional activities** (enjoy nature), and **Social activities** (social interaction and making conversations).
Main Plaza 	√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
walkway 	√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Passive space 	√	√	√	√	√	√	√	√	√	√	√	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Active Recreation 	√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking and waiting), **Optional activities** (watching other and sitting), and **Social activities** (social interaction, small gathering, and sports activities).

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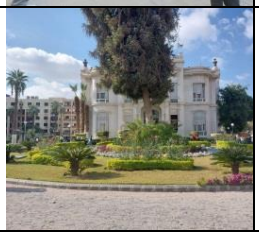
Outdoor dining		√	X	X	√	√	X	X	√	√	√	X	X	**Necessary activities** (walking, waiting, and eating), **Optional activities** (sitting), and **Social activities** (social interaction, small gathering, and making conversations).
Large Gathering Area		√	X	X	√	X	X	X	√	√	√	X	X	**Necessary activities** (walking and waiting) and **Social activities** (concerts, events, graduation ceremony, social interaction, small gathering, and making conversations).
Small Gathering Area		√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Building Forecourts		√	√	√	√	√	√	√	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities (**enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).
Formal Entry Forecourt		X	X	X	X	X	X	X	√	√	√	X	X	**Necessary activities** only (walking and waiting), because of the poor social factors in this open space.
Space shaped by Building		√	√	√	√	√	√	X	√	√	√	X	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, and sitting), and **Social activities** (social interaction, small gathering, and making conversations).
Symbolic Spaces		√	√	√	√	√	√	√	√	√	√	√	√	**Necessary activities** (walking and waiting), **Optional activities** (enjoy nature, watching other, relaxation, and resting), and **Social activities** (social interaction, small gathering, and making conversations).

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Discovered Places		√	√	√	√	√	√	√	√	√	√	√	√	**Necessary activities** (walking, waiting, and eating), **Optional activities** (enjoy nature, watching other, quite study, relaxation, resting, and sitting), and **Social activities** (group studying, social interaction, small gathering, making conversations, outdoor classes, class meeting, and presentation).

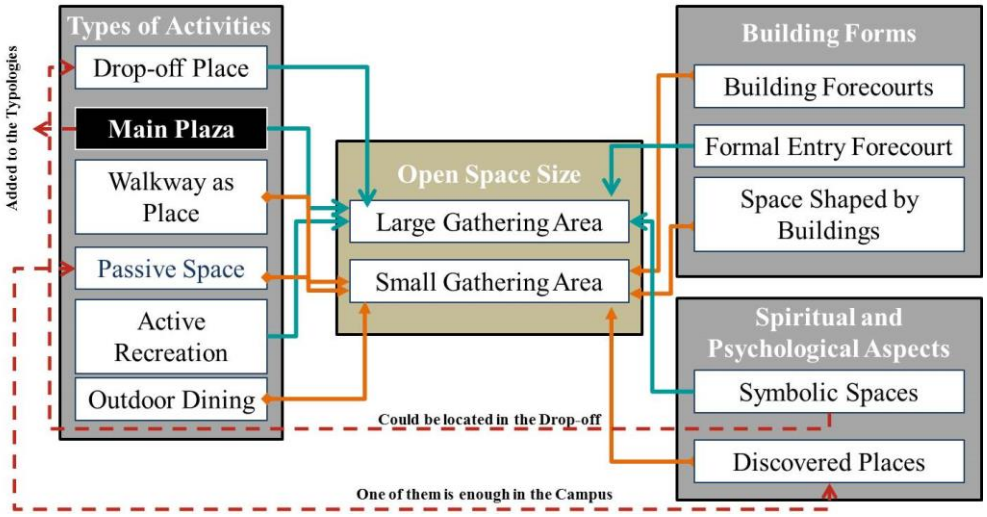

Fig.5. AOS Typologies

From table 3 and 4; Helwan University results, 11 AOS good in safety and light factors, 10 AOS good in pedestrian friendly and color factors, 9 AOS good in participation, 7 AOS good in social interaction and attractive public realm, 6 AOS good in air quality, 5 AOS good in landscape,4 AOS good in happiness and subjective well-being, only 2 in thermal comfort and only one in quietness. Ain-Shams results, 13 AOS good in color, air quality and light factors, 12 AOS good in social interaction and participation factors, 11 AOS good in attractive public realm, 10 AOS good in safety, happiness and subjective well-being, pedestrian friendly, and thermal comfort, 9 AOS good in landscape and only 3 in quietness. So, Ain-Shams University gives better results in achieving social, physical, and mental health factors.

After studying Helwan and Ain-Shams University, we came out with better classification to the AOS typologies that is suitable for AOS in Egypt, as the typologies of campus open spaces are not separated from each other, they could be integrated. Large gathering area could be a separated open space for events and ceremonies but not a must, furthermore, this events could be located in the open space adjacent to the formal building, the formal entry forecourt, figure 5.

IV. CONCLUSION

In order to achieve the healthy three elements; social, physical, and mental in AOS

- Social health; designers need to take the different activities types and students needs into consideration while designing the AOS.
- Physical health; AOS should be easy to access, flexible to walk through one space to another, and providing thermal comfort.
- Mental health; the colors of the adjacent buildings should be taken into consideration, the AOS quietness, and thermal comfort by providing shades and green area.

In the end, well-designed campus open space will increase productivity and decrease anxiety and stress levels for students. A successful AOS can influence students' educational perception and behavior and promote health. It can also contribute positively to student quality of life and promote psychological comfort. The students who spend more time in open spaces were better able to deal with academic challenges and were better equipped to apply knowledge learned, than those who spent less time in these areas

V. RECOMMENDATIONS

The AOS designers must not only provide an environment for study but also one that promotes physical and mental health. Hence, they must pay attention to the health requirements of the primary users of the campus and

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must incorporate a restorative environmental design into the campus design.

The study's recommendations include the following: While designing academic open spaces, the classification of the various AOS typologies and the activities that take place within them must be considered. University locations should determine suitable areas for the future expansion of all buildings stage. While designing a downtown university, it is preferable to expand vertically to have areas for open spaces, as well as disturbing the ground floor to take advantage of it as shaded spaces. Designers must maximize the amount of shade when designing courtyards, pay attention to greenery.

REFERENCES

[1] Ali F., (2020), "Effect of Common Outdoor Spaces on Social Interaction: The Case of College of Engineering Campus at Salahaddin University – Erbil, Iraq", Journal of University of Babylon for Engineering Sciences", Vol. (28), No. (1).

[2] Speake J., Edmondson s., and Nawaz H., (2013), "EVERYDAY ENCOUNTERS WITH NATURE: STUDENTS' PERCEPTIONS AND USE OF UNIVERSITY CAMPUS GREEN SPACES", HUMAN GEOGRAPHIES – Journal of Studies and Research in Human Geography

[3] Liprini, RM., (2014), "Students' perceptions of green space on a university campus: An Attention Restoration Theory perspective", (unpublished master's disserta- tion), University of Pretoria, South Africa

[4] Kenney D., Dumont R. and Kenneg G., (2005), "Mission and Place Strengthening Learning and Community Through Campus Design". USA. American Council on Education, Praeger Publishers, pp. 35-49.

[5] Julia F., Thomas K., (2021), "Academic Greenspace and Well-Being Can Campus Landscape be Therapeutic? Evidence from a German University", Science direct https://doi.org/10.1016/j.wss.2020.100003

[6] Kamel, S., (2014). "Education in the Middle East: Challenges and opportunities". In N. Azoury, Business and Education in the Middle East (pp. 99-130). New York: Palgrave Macmillan.

[7] Alshimaa A. Farag, (2019)," Assessment of user happiness in campus open spaces", The Journal of Public Space ISSN 2206-9658 2019 | Vol. 4 n. 1

[8] Hanan, H. (2013), "Open space as a meaningful place for students in ITB campus", Procedia - Social and Behavioral Sciences, Vol. 85, pp. 308-317.

[9] Mcfarland, A.L., Waliczek, T. and Zajicek, J.M., (2008), "The relationship between student use of campus green spaces and perceptions of quality of life", HorTechnology, vol. 18, no. 2, pp. 232 – 238.

[10] Alhusban, A., Alhusban, S., & Al-Betawi, Y. (2019). "The degree of the Hashemite University students' desires, needs, and satisfaction with their campus urban design". Journal of Place Management and Development, 12(3), 408-448.

[11] Yıldız, D., & Sener H., (2003), "Factors affecting the use value of campus outdoor spaces". In Nuran Zeren Gülersoy, Nur Esin, and Ahsen Özsoy (Eds.), Quality of urban life: Policy versus practice (pp. 609–621). Istanbul Technical University.

[12] Nassar U., (2021), "Humanizing Taibah University Campus Open Spaces In Madinah: Toward A Sustainable Environment For Walkability And Green Spaces", Journal of Sustainability Science and Management Volume 16 Number 3, April 2021: 235-256

[13] World Health Organization (WHO), (2013), "Urban Population Growth". Available online: http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en

[14] Wan-Yu C., Ching-Hsien L., Chun-Yen C., (2016), "Relationships between urban open spaces and humans' health benefits from an ecological perspective: a study in an urban campus", The 4th International Conference of Urban Biodiversity and Design

[15] Thwaites K, Helleur E, Simkins IM., (2005), "Restorative urban open space: exploring the spatial configuration of human emotional fulfilment in urban open space", Landsc Res 30(4):525–547. doi:10.1080/01426390500273346

[16] Andrea Abraham, (2009), "Landscape and well-being: a scoping study on the health-promoting impact of outdoor environments", Birkhauser Verlag, Basel/Switzerland.

[17] Stephen S., (2014), "Healthy Campus by Open Sppaces Design: Approches and Guidelines", Frontiers of Architectural Research (2014) 3, 452-467