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Universal and Inclusive Design in Public Open Spaces for Wellbeing-Oriented Cities: Design Strategies for the Case of Alexandria Public Beach

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ABSTRACT

Globally, designing cities to meet diverse community needs and improve well-being is becoming increasingly essential and challenging. At the foremost of this challenge is inclusive design (ID), which considers all individuals, is a key aspect, coinciding with a growing focus on public open spaces (POS), particularly after the outbreak of COVID-19. The pandemic and its aftermath led people to use POS to fulfill physical and recreational activities, revealing a lack of ID understanding for diverse abilities. Thus, there is a need to consider different design aspects of POS such as ease of accessibility, inclusiveness, and social interaction to maintain a wellbeing-oriented city design. From the previous, this paper aims to understand ID in POS and address design aspects in order to make cities more resilient under the mandate of Goal 11 of the sustainable development goals (SDGs). The paper follows three main phases: theoretical, identifying the research problem and framework; analytical, reviewing existing literature on universal and inclusive design (UID) strategies in POS; and empirical, analyzing a disability-friendly public beach in Alexandria as a case. The aim is to bridge the gap between design and user needs, proposing strategies and recommendations for future urban interventions.

1. INTRODUCTION

An estimated 1.3 billion people, or 16% of the world's population, experience some form of significant disability [1], with a higher prevalence in developing countries [2, 3]. Disabilities are often categorized into four main types; physical, mental, sensory, and intellectual [4] and may sometimes be a combination of one or more, they also range in type from acquired to genetic to congenital. The types are numerous and have a major impact on the lives of those affected, whether the person himself or his caregivers.

The lives of those affected by disability are often tedious, and while design, as a process, will not cure their illness, it can at least help alleviate the suffering that is incurred by the absence of inclusive design (ID) [5]. Designing for inclusivity is a humanitarian act, that not only promotes better health and well-being, but also integrates the lives of all members of the community to be part of a whole [6]. ID aims to empower people regardless of their background or ability [7], it challenges designers, stakeholders, decision-makers, and other key role-players in creating spaces that are more user-friendly and open to all.

For a design to be termed inclusive, it must address areas that are not normally addressed through design; universal accessibility, cultural backgrounds, age, socio-economic standards, education, gender, language, and ethnic origins are just some examples of what ID includes.

On the other hand, the definition set out by the Convention on the Rights of Persons with Disabilities (CRPD) for Universal Design (UD) is the "Design of products, environments, services, and programs to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" [8] (as defined by Ronald L. Mace, the father of UD) [9]. When these two strategies are combined, it produces a new concept of universal inclusive design (UID) that aims at promoting health and well-being and emphasizes the importance of fulfilling SDGs (3 and 11). UD creates ID solutions that enhances usability and promotes accessibility, to allow people of all skills and capabilities to live independently.

The UD approach, thus, focuses on the uniqueness of each person's individual abilities and strives to design holistically so that the end design, (whether it is a product or service) accommodates everyone regardless of their disabilities, size, gender, or age. This can be achieved with the human-centered approach at the heart of UD, so that the resulting design is not only user-targeted but also easy, convenient and respects various users' privacy, rights, and dignity [10]. However, for the sake of this research paper, only one form of UID is addressed; and that is the design for disability, and not in the general context, but in places of leisure and recreation, places that are often left for the "able" to enjoy and do not take into consideration the needs of others with limited abilities: public open spaces (POSs). Thus, this research paper focuses on the

idea of UID in POS for individuals with one or more forms of disability. This aim progresses through three primary phases: theoretical, which identifies the research problem and framework; analytical, involving a review of existing literature on UID strategies in POS; and empirical, which analyzes a disability-friendly public beach in Alexandria, Egypt as a case study. Therefore, this paper seeks to examine the following research question:

Q: How can universal and inclusive design strategies be effectively implemented in blue open spaces?

2. LITERATURE REVIEW

POSs are areas that have been the subject of scrutiny in the world of academia [11-13], and while there is no single definition that seems to encompass them all, there are several analogies that seem to mesh together to come up with an appropriate explanation.

Previous research concerned with urban open spaces, well-being, or quality of life, focused on three primary orientations. First, studies assessing one or more POS factors in conjunction with one or more quality of life or well-being factors [14-16]; Second, studies discussing one or more elements of POS physical environment with tangible and/or intangible individual aspects [17] or with evaluation frameworks as demonstrated [18]; Third, studies utilized different models either, to assess different urban open space elements in general with tangible and/or intangible individual aspects [15], or to analyze the influencing factors of behavioral activities as conducted [19].

Across the literature, it has been recognized, that many studies were conducted in developed countries, while there is a lack of similar research conducted in developing countries. Some attempts have emerged to address this research gap, such as the previous work [17], which examines the correlation between urban open space and quality in Medan, Indonesia [18], which investigates the relationships between resident characteristics and neighborhood open spaces in Osogbo, Osun State, Nigeria.

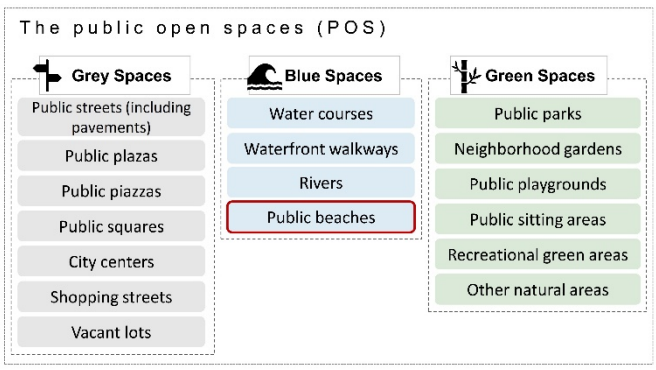

Figure 1. Configuration of POS
Adapted by authors [20]. (The scope of the paper bordered by red line)

The term 'urban open space' can describe many types of open areas including green open spaces and other public or private spaces that are open to the sky. A public space is a place that is generally open and physically accessible to the public. POSs are typically one of the following [20] (as depicted in Figure 1):

1) Grey spaces: vacant lots, urban streets (including the pavement), public plazas, public piazzas, public squares, city centers, and shopping streets.
2) Blue spaces: watercourses, waterfront walkways, public beaches, or rivers.
3) Green spaces: a land that is partly or completely covered with grass, trees, shrubs, or other vegetation like public parks, neighborhood gardens, public playgrounds, public sitting areas, sports fields, recreational green areas, or other natural areas.

It is without a doubt that POSs play a vital role in improving the physical, social, emotional, psychological, and material well-being of individuals, and hence the welfare of the community, ultimately improving quality of life. It provides areas of emotional release for people through embedded aesthetics while enhancing the environmental quality of the urban space [20, 21]. The term 'public space' may also, in some instances, be seen as a 'gathering place', or social space, which is a point of focus that has been taken up recently by social movements, and theorists, amongst others since philosopher Henri Lefebvre's 1968 "the right to the city," came out.

At the heart of public space inclusivity, is the notion that everyone should feel safe; this safety is often perceived as being free of any kind of segregation, discrimination, or prejudice and provides a sense of belonging and inclusion. Unfortunately, this is not often the case in the design of public spaces, as they are mostly designed with some type of constraints and not designed equally [22], as a result, it is often difficult to achieve inclusivity in public spaces, since not all users are subjected to the same outcomes and benefits from the final design. Another complex factor that hinders inclusive design is the diversity and differences among people. Social inclusion in public open spaces, including, but not limited to equitable and representative participation in public life and public space initiatives is not an easy feat and should be at the forefront of public space design setups so that they are accessible, both physically and socially, while being inclusive. Public spaces should also be an outlet for citizen empowerment and an area where they are encouraged to participate fully in the city's public life [22].

However, setting the barriers to inclusive design aside, there is an inherent need for people to access the outside world, ingrained in the subconscious through the love of nature. Nature and being subjected to elements attributed to nature help heal and alleviate pain [23]. It decreases the sense of suffering and increases the recovery period for patients in healthcare settings. Thus, if these can help in such dire circumstances, they would be marvels in the exterior world. Studies have shown that being subjected to fresh air helps clear the mind, enhance focus, promote memory, decrease blood pressure, help with fatigue, decrease stress and alleviate mood [24]. The effects of nature on individuals are well established in empirical evidence-based design, yet another reason to make it more accessible to all through an ID design strategy. As is classified in Figure 1, POSs include more than mere spaces that are open, they are configured into grey, blue, and green POSs, and while each of these spaces has a direct impact on the health and well-being of their users, it is the role of the blue spaces that are our focus here.

Blue spaces, (water courses, waterfronts and walkways, and beaches) are an important element of both calming and recreational effects [25]. Studies have shown that the sea breeze reduces stress and helps combat fatigue [26], it also shows that people who have direct access to waterfronts, beaches, and other waterways are better focused and calmer

[27], not to mention that the salt in saltwater is known to trigger several essential chemicals in the brain to induce happiness [28]. It is no secret that beaches also have several negative effects, like the sudden change in turbulence, high tides and waves, and other life-threatening dangers, which make them a viable threat, ideally, many people who harbor some form of disability are reluctant to tread beaches for fear of risking their lives. It is also why designing an inclusive, universal, and well-being oriented beachscape is important, both as a means to reduce stress and as a feeling of inclusion.

Disability, on its own, has dire effects on those inflicted, not only does it pose as an obstacle to employability, but it may also often lead to either the person's acceptance of lower wages in an attempt to work, or face the risk of poverty, in light of the increased cost of living with a disability. This may in turn ultimately impact their morale and quality of life. It is now important more than ever, especially after, the spread of COVID-19 that light be shed on persons with disabilities, and how they are impacted, whether by the pandemic or in general and how to help elevate their quality of life and well-being, not only in health and education but also in the design of the built environment and POS.

2.1 Types of disabilities

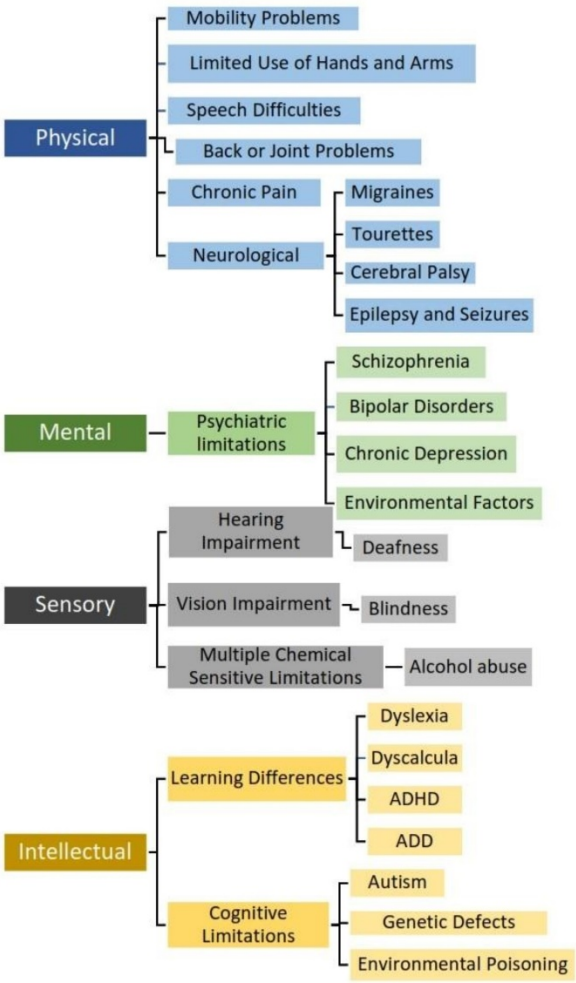

Figure 2. Types of disability
Adapted by authors [29]

When the word disability is mentioned, the first image that comes to mind is often either mental or physical disabilities, however, disabilities can take on several forms, and some may even be invisible, and while to some they may be genetic or due to invitro causes, others may result from environmental challenges, chemical or substance abuse or even injury and disease.

As previously stated, disabilities are categorized into four major types: physical, mental, sensory, and intellectual (see Figure 2), the difference between mental and intellectual disability is that mental disability affects mood, feelings, and behavior, while intellectual disability affects the person's intellect and understanding [29].

However, it is difficult to stick to these four categories, due to the fact that there is sometimes an overlap within them. Each of these disabilities poses a barrier to the person-inflicted quality of life if they are not considered during the design phase.

2.2 Types of needs and common barriers experienced by people with disability

According to Maslow [30], who developed the theory of motivation based on what he termed as the "hierarchy of needs", humans have five types of needs, he stipulates that the behavior of any individual is strongly driven by the urgency of the specific need. From the bottom of the hierarchy upwards, the needs are physiological, safety, love and belonging, esteem and self- actualization.

These needs have been proven to increase the quality of life, overall well-being, and survival, and coping techniques. Unfortunately, people with disabilities face many complex barriers that may make them cease to act socially and stay at home, eventually impacting their mental health, these include problems with accessibility in both transportation and the built physical environment, absence of proper aids and technologies, lack of an appropriate means of communication (according to the disability), gaps in service delivery, absence of legislative measures that ensure their rights and promotes involvement, not to mention, discriminatory prejudice and stigma in society [31, 32], and most of these are often present together. The Centers for Disease Control and Prevention (CDC) has identified five major types of barriers that face people with disabilities and pose a threat to their well-being and longevity: attitudinal, communicational, physical, legislative & procedural, and programmatic.

These barriers range from the most basic of barriers, like stereotyping and stigma, which may result in limiting the participation of the person in common everyday activities (attitudinal), to programmatic barriers which essentially revolve around the person not being able to receive his basic right of care [31]. Another form of barrier is the barrier of communication, appropriate signage, wayfinding, and other accessibility options that may be lacking or may be targeted at a disability-free person. Color coding, large fonts, visual aids, hearing aids, and textured terrains are among some of the ideas that should be in any ID and UD. Barriers do not only face the person with the disability on his own, but also encompass his caregivers and loved ones, that is why it is very important to also consider them during the design phase to ensure their emotional and physical well-being [33].

2.3 Well-being oriented cities

Well-being and wellness are two terms that were coined to ensure the provision of quality of life to citizens: "Well-being encompasses both mental and physical health, and it is

associated with self-perceived health, longevity, healthy behaviors, mental and physical illness, social connectedness, productivity, and factors in the physical and social environment", while wellness is defined as merely "the state or condition of being in good physical and mental health" [34].

In the 1990s, "The wellness model" came to light, based on the "Wellness and Occupational Therapy" by Swarbrick [35] and Johnson [36].

This model stemmed from a "greater desire to address disparities facing people with or at risk of developing mental or substance use disorders". "This model has evolved over many years based on the lived experiences of people facing traumatic life experiences, substance use, and mental health challenges" [37]. And with continuous global awareness regarding disabilities and the humane response to ensure their inclusion, the United Nations Convention on the Rights of Persons with Disabilities (CRPD) has addressed this through a holistic approach aiming to integrate persons with disabilities in societies, through a specific focus on the importance of ensuring the rights of people with disabilities are met. The 2030 Agenda for Sustainable Development clearly states that "disability cannot be a reason or criterion for the lack of access to development programs and the realization of human rights". The SDGs include seven main targets, aside from those that address vulnerable groups (of which people with disabilities also lie within) [32] (see Figure 3). The targets that address development for persons with disabilities are Goal 1 (no poverty), Goal 3 (healthcare for all), Goal 4 (offering and improving quality education), Goal 8 (promoting inclusive economic growth), Goal 10 (reducing inequality), Goal 11 (sustainable communities), and Goal 17 (global partnerships). The 2030 Agenda ensures UD and promotes inclusiveness through a well-being-oriented framework.

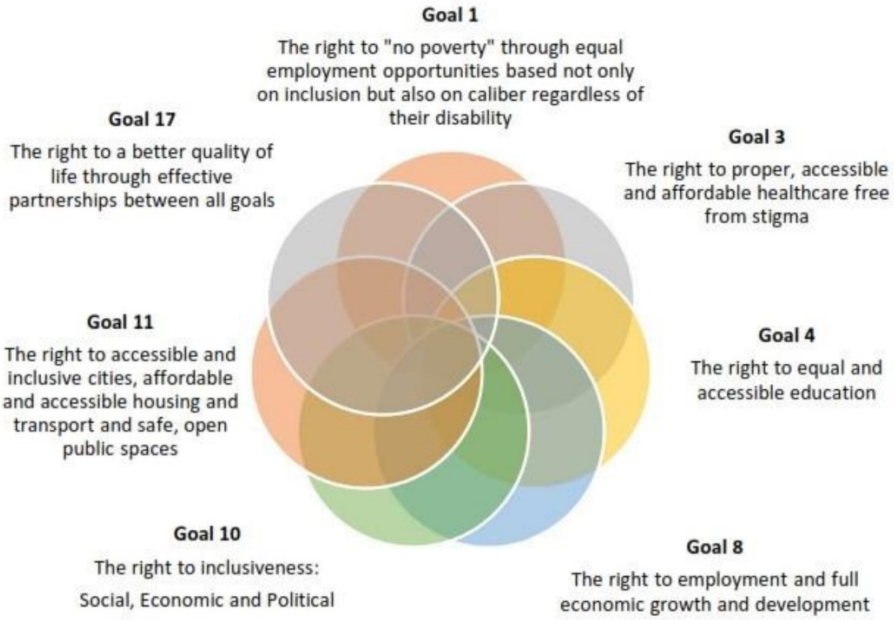

Figure 3. Inclusive sustainable development strategies for people with disabilities

3. RESEARCH METHODOLOGY

This research focuses on blue open spaces, especially disability-friendly public beaches, and introduces an example of UID in Alexandria, Egypt as a case study. The research methodology is divided into three phases theoretical, analytical, and empirical (see Figure 4).

First, the study is inductive as it focuses on the significance of POSs, and how different people vary according to their abilities (i.e., elderly, children, autistic, special needs, etc.). In addition to this, the study tries to understand the UID in POSs and address design aspects to make cities more resilient under the mandate of Goal 11 of the SDGs. Second, the study explores the interlinkage of POS inclusivity with UD and well-being dimensions. Third, the empirical phase was divided into three phases:

1) A desk-based document analysis (qualitative analysis), of literature focusing on each of the three dimensions solely (universal design, inclusive design and well-being oriented design) and a set of guidelines were deducted, as seen in Table 1, then these dimensions were mapped against the different barriers associated with disability to determine where each of the sub dimensions would be most beneficial in regards to improving the impact of disability.

2) Then a detailed analysis of existing media sources, of the disability-friendly public beach of Alexandria, such as newspapers, the internet, social media, TV interviews, NGOs, and local concern groups, was carried out to evaluate feedback regarding design from stakeholders and concerned individuals. The authors used these resources and analyzed the user experiences aiming to fill the gap between urban design and users' needs by presenting a successful attempt toward a well-being-oriented city design.

3) Utilizing both the dimensions achieved and the disability mapping, reached in the first two sections of the methodology (Tables 1 and 2), an assessment was carried out to determine whether the blue POS under study conforms to the final guidelines through a 4-point scale (fulfilled, partially fulfilled, not fulfilled, and not available) to assess whether this area does indeed achieve universal, inclusive, and well-being-oriented

design (Table 3). In addition to this, the study investigates and analyzes people's different perceptions and opinions, to develop recommendations and strategies for public beaches, which results in recommendations for urban planners and designers for future interventions.

The chosen methods were deemed the most informative due to the lack of verified statistics concerning the actual number of special needs individuals that used the beach (a rough number was provided through the beach personnel, however, no documented records were available), the times they most frequently went and the days where the most number of people were present, thus making it very difficult to assess the design based on actual one-to-one contact and direct observations, ultimately leading the researchers to depend on analyzing the impact of the beach from the other sources mentioned before.

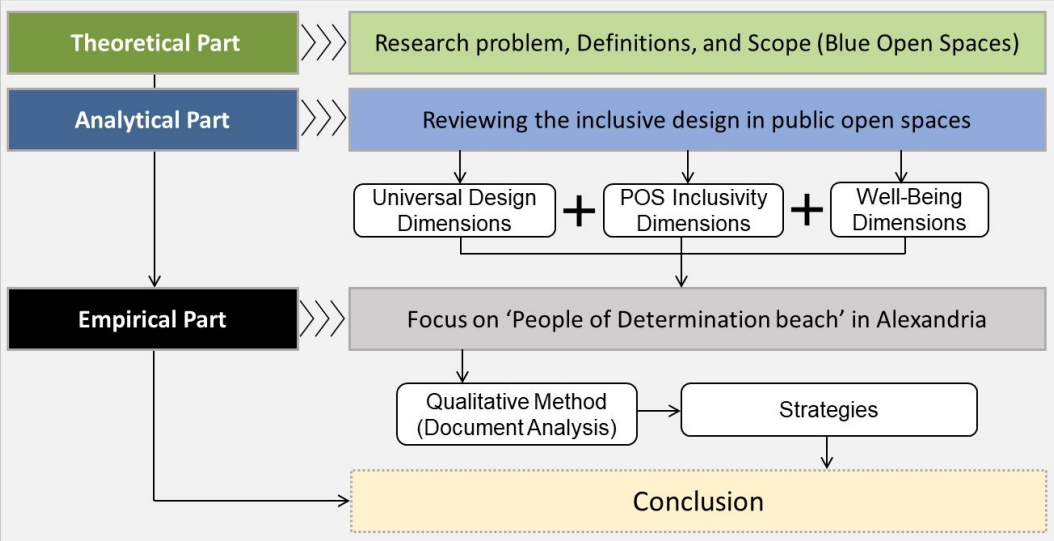

Figure 4. The research methodology

Table 1. The existing dimensions of UD, POS inclusivity, and well-being

		Dimensions	Description [22, 35, 38]
UD Dimensions [10, 36]	1	Equitable use	Design that is useful and marketable to persons with diverse abilities.
	2	Flexibility in use	Design that accommodates a wide range of individual preferences and abilities.
	3	Simple & intuitive use	Design that is easy to understand, regardless of the user's experience, knowledge, language skills, or concentration level.
	4	Perceptible information	Design that communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
	5	Tolerance for error	Design that minimizes hazards and the adverse consequences of accidental or unintended actions.
	6	Low physical effort	Design that can be used efficiently and comfortably and with a minimum of fatigue.
	7	Size & space for approach & use	Design that provides appropriate size and space for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.
POS Inclusivity Dimensions [22]	1	Physical environment	**Physical access:** UD or physical features that make the space usable by people of all ages and abilities. (e.g., ramps, crossing lights, openness, lighting). **Social access:** Having social or visual representation in the space that resonates with people and creates a sense of safety, comfort, and empowerment (e.g., local art, cultural elements, historical representation). **Access to activity:** The space is multifunctional and able to accommodate different activities (e.g., hosting performances, space for social movements and gatherings). **Transportation connectivity:** Available options for active transportation. **Walkability:** How accessible is this space by foot. **Available amenities:** Public washrooms, water fountains, sufficient seating within the space or nearby.
	2	Personal experience	This dimension explores the relationship between personal experience and public space. It considers all factors that may influence one's perception of space and sense of inclusivity in public space. Interlocking factors such as gender, age, sexuality, race, cultural background, socioeconomic status, personal values, and lived experiences can all affect how people interact with and perceive public spaces. It also affects how people interact and perceive others in the same space.
	3	Process & context	**Context and background:** Overall demographic, income distribution, household type, and other information available through census data. **History and development:** What is the historical significance of the space? How was this space created? **Management and control/stewardship:** Who has authority and control over public spaces? Who is managing and maintaining the space? Is the planning, design, and

			implementation process participatory? Is there ongoing involvement with local community members through this space? **Political context:** Certain policies may shape and change a public space depending on the political agenda at that time.
Well-being Dimensions [38]	1	Emotional/ mental	Developing skills and strategies to cope effectively with stress, challenges, and conflict, creating satisfying relationships.
	2	Spiritual	Searching for meaning and purpose in human existence.
	3	Intellectual	Recognizing creative abilities and finding ways to expand knowledge and skills.
	4	Physical	Recognizing the need for physical activity, diet, sleep, and nutrition while discouraging the use of tobacco, drugs, and excessive alcohol.
	5	Social	Developing a sense of connection and a well-developed support system.
	6	Occupational	Deriving personal satisfaction and enrichment from one's work.
	7	Financial	Feeling satisfied with the current and future financial situation.
	8	Environmental	Good health by occupying pleasant, stimulating, environments, that support well-being.

Adapted from sources as indicated by authors.

Table 2. The different dimensions and the common barriers experienced by people with disabilities

	Dimensions	Attitudinal	Communicational	Physical	Legislative	Programmatic
UD	Equitable use			●		
	Flexibility in use			●		
	Simple & intuitive use		●	●		
	Perceptible information		●			
	Tolerance for error			●		
	Low physical effort			●		
	Size & space for approach			●		
POS inclusivity	**Physical environment**					
	Physical access			●		
	Social access	●	●	●		
	Access to activity					●
	Transportation connectivity			●	●	
	Walkability			●		
	Available amenities			●		●
	Personal experience	●	●	●	●	
	Process and context					
	Context and background				●	
	History and development		●			
	Management and control		●	●	●	
	Political context				●	
Well-being	Emotional/ mental				●	
	Spiritual	●				
	Intellectual	●				
	Physical	●			●	●
	Social	●			●	
	Occupational	●				
	Financial	●				
	Environmental	●	●	●	●	●

Table 3. Analyzing the existing dimensions of UD, POS inclusivity, and Well-being for the case study, El-Mandara beach

Dimensions		Current Status
UD	Equitable use	●
	Flexibility in use	◑
	Simple & intuitive use	◑
	Perceptible information	◑
	Tolerance for error	◑
	Low physical effort	◑
	Size & space for approach	●
POS inclusivity	**Physical environment**	
	Physical access	◑
	Social access	●
	Access to activity	●
	Transportation connectivity	◑
	Walkability	◑
	Available amenities	◑
	Personal experience	◑
	Process and context	
	Context and background	N/A

	History and development	●
	Management and control	●
	Political context	●
Well-Being	Emotional/ mental	●
	Spiritual	●
	Intellectual	●
	Physical	◑
	Social	●
	Occupational	●
	Financial	●
	Environmental	●

Fulfilled	Partially fulfilled	Not fulfilled	Not available
●	◑	◯	N/A

Source: The authors

4. ANALYTICAL PHASE: POS INCLUSIVITY WITH UD AND WELL-BEING DIMENSIONS

4.1 The universal-POS inclusive-well-being oriented nexus

The literature defines seven main principles to adhere to UD, (designated as 'dimension' in Table 1 and Table 2). These dimensions are the shaping framework that should be considered to better be able to imbed the notion of a universal approach into any design project. These dimensions discuss whether the space is equitable, flexible, simple, and easily understood. It also focuses on the size of the space and the maximum effort needed to be able to use it with no room for error. On the other hand, to better design for inclusivity in POS, there are ten subcomponents, derived from three main ones, mainly revolving around context, personal experience, and the physical environment. The last trio of the nexus, the well-being component, is categorized into eight points ranging from emotional and spiritual to environmental.

Each of these dimensions should be present when designing for any disability. To better understand the barriers that face each point in the different dimensions, each of the barriers that face people with disabilities, previously mentioned, was mapped against the existing dimension to get an overall view of which barrier impacted the dimensions the most, the physical barrier had the highest incidence, while the attitudinal and legislative barriers came in second in their impact on the different dimensions (see Table 2).

The reason that the barriers were mapped was to better understand which barrier had the most effect on the different dimensions, for example, the only barrier that was present for "equitable use" was a physical one; absence of basic embedded design strategies in the area of focus, while another dimension like the "simple and intuitive use" had both a communicational barrier from lack of addressing the different types of disabilities and a physical one from a too complicated design.

4.2 Egyptian practices and policies supporting special needs and people with disabilities

In 2018, President Abdel-Fattah El-Sisi declared that that year would be the year of "Persons with Disabilities" [39]. The term "people of determination" was what the government took on to diminish the stigma accompanied by the word disabled, handicapped, or any similar phrase, in a repeating action where the President gives a slogan to each year as the year of focus to the addressed (Year of Woman, Year of NGOs, … etc.). This declaration came about to emphasize their right to be able to live in dignity, as well as their right to peacefully coexist in the community regardless of their disability.

In a report published in 2020, the Central Agency for Public Mobilization and Statistics (CAPMAS) stated that there were nearly 20 million Egyptians with special needs in Egypt [40]. And accordingly, with a number close to the fifth of the population, Egypt has taken on a task of rehabilitating and including citizens with disabilities. This included the issuance of new laws (Law No. (10) of 2018, Law No. (11) of 2019) to ensure that the rights of people with disabilities were met across all sectors; education, health, job opportunities, and pension. The actions undertaken also included the formation of the National Council for Persons with Disabilities [41]. Legislative amendments to Law 200/2020, were also made to establish a support fund (both donations and fundraising based) to support people with disabilities [42]. Later another legislative amendment was approved to enforce penalties related to bullying and harassment of people with disabilities [41].

5. EMPIRICAL PHASE: ANALYZING DISABILITY-FRIENDLY PUBLIC BEACH: A CASE IN ALEXANDRIA CITY

The following is a case study of a blue open space in the city of Alexandria, Egypt. The officials of the district along with Non-Governmental Agencies (NGOs) integrated design approaches into a beach to make it more inclusive to people with visual impairment. In this section, we state what was done, align it with the inclusive-universal-well-being nexus and deduce strategies that should be integrated into any POS realm. Regarding the geographic location of the study area, Alexandria Governorate stretches about 70 kilometers along the Mediterranean Sea. Alexandria governorate consists of three cities: one of which is Alexandria City, which harbors nine districts including Montazah second, the district where El-Mandara beach is located.

El-Mandara beach, also called 'People of Determination beach', is the first Egyptian beach to allocate an area for people of determination. On the 17th of August 2021, the governorate of Alexandria officially declared the beach of Mandara as the first disability-friendly public beach in Egypt, with an aim to attract people with various disabilities, including wheelchair users to reach seawater via a ramp. This designated part for people with mobility disabilities is characterized by the following:

a) A space that allows movement with a wheelchair on top of a box that has been prepared for this purpose. It is designed as a submersible floor path with a certain depth that allows wheelchairs to move easily (see Figure 5).

Figure 5. A beach worker helps a wheelchair-bound boy enjoy himself at El-Mandara beach in Alexandria, Egypt [43]

Figure 6. A designed buoy to help people of determination at El-Mandara beach in Alexandria, Egypt [45]

b) Providing two wheelchairs next to the private lounge for people of determination, to facilitate their movement, as one chair has been allocated to facilitate their movement inside the beach, and another for entering the toilets.
c) Above these paths are water sprinklers that allow them to feel water more.
d) Close supervision of follow-up teams and lifeguards closely watching them.
e) A "buoy" with a safety belt was created by an employee of the Department of Tourism and Resorts in Alexandria to assist elderly individuals and persons of strength into the water. The buoy was produced and tested by the rescuers, according to Major General Gamal Rashad, head of the Central Department of Tourism and Resorts in Alexandria (Figure 6).
f) Well-equipped toilets to serve people with wheelchairs.

On the 2nd of July 2022, an area allocated especially for people with visual impairment was inaugurated and it was announced that the project was a collaboration with the Alexandrian Visually Impaired Society [44]. It is noted that the designated part for the visually impaired at El-Mandara beach is characterized by the following:

a) The designated lanes are divided into three lanes in the seawater through ropes that act as both dividers and assistance and can hold dozens of people at a time.
b) The seawater lanes and the dividing ropes facilitate entry and aid movement and swimming using the individual's hands to identify the signs through special touching markers 'cork buoys' along which indicates the path of movement is within a safe water depth (Figures 7 to 9).
c) Close supervision of follow-up teams and lifeguards closely watching them (Figures 7 and 9).
d) Visually impaired individuals also have a whistle to call the follow-up teams if they need help with 'additional safety measures' [42, 44, 45].

Figure 7. A lifeguard helps visually impaired children swim at Al Mandara beach [46]

Figure 8. A visually impaired boy testing the water for the first time [47]

Figure 9. A visually-impaired boy walks with the help of a beach worker at the Mandara beach [48]

As a result, visually impaired individuals can feel these lane lines with their hands and on their own, enjoy the water as much as they want and go out alone without the need for anyone's help [45]. Tarek Jahin, the Mandara beach supervisor, said that "the two dedicated swimming areas for people with disabilities are free of charge and open every day". Similarly, the beach is free and it can accommodate 100 to 150 people with their families [41, 43].

"This beach comes as a continuation of efforts made by the Governorate of Alexandria to provide the best services for people of disabilities, to achieve principles of community integration and create a decent life for them" said El-Sayed [41]. Rashad added that the tourism administration is "willing to implement this experience on other beaches and open the doors for more visually impaired and handicapped people to enjoy their summer."

Hassan Ali Abdel Kader, head of the Association of the Visually Impaired in Alexandria, stated that "state agencies are interested in the issue of people with special needs, in order to integrate them into society", he also added that "on the

opening day of the beach, the people, especially young ones, were high in the sky. They were laughing and in a happy mood. Every day, the association's members come to enjoy the beach and we find great interaction and great happiness with the idea," Abdel-Kader said [45]. Abdel Kader assured "that the depth is suitable for all heights so that the visually impaired do not need a companion, and even children need escorts only to warn them of an area whose depth may not be suitable for them".

"They put a whistle on their necks when they go down to the beach, and we ask them to use it when they sense any danger, but in general we found them enjoying the experience and using the ropes as paths in the water very skillfully" he pointed out [45]. A member of the Human Rights and Social Solidarity Committee in the Senate, commended the opening of the first beach for the visually impaired in Alexandria and declared it as "an important step to achieving more rights for people with disabilities, and a reflection of the national human rights strategy which pays special attention to the gains of people with disabilities" [45].

5.1 Analyzing the beach inclusivity with UD and well-being dimensions

After correlating the findings from the different media segments and the observational sheets, each factor was aligned to those of the compiled guidelines achieved from the dimensions. As mentioned before in (Table 1), there are different dimensions that should be taken into consideration before we analyze if the POS at hand can be termed as inclusive, universal, and well-being oriented or not. Table 3 determines whether the public beach was indeed inclusive to its target population and if other disabilities can also use it. According to Table 3 (based on direct observation), it can be noted that the majority of the dimensions are fulfilled at El-Mandara beach.

In accordance with UD dimensions, 'the equitable use' and 'Size and Space for Approach and Use' are the only dimensions that are fulfilled, this is due in large to the main concept behind the presence of the beach itself (being one designed for people with special needs and disabilities) and their helpers and caregivers, deeming it as catering to a wide range of needs and abilities that the beach fulfilled. Another point that factors in is that the beach is designed for wheelchair access, meaning that there is relatively sufficient space for the wheelchair maneuver, verifying that it does in fact fulfill the size and space dimension.

However, the number of dimensions that are partially fulfilled are 'Flexibility in Use', 'Simple and Intuitive Use', 'Perceptible Information', 'Tolerance for Error', and 'Low Physical Effort'. This is due to the following reasons, respectively, (1) there are several elements at the beach that help in guiding the targeted users, however, they still need help from other individuals or beach workers, (2) the number of wheelchairs available at the beach is two only which is not sufficient for the beach visitors (approximately 100 to 150 visitor with their families every day), (3) the information provided is poor and not compatible with the ambient conditions or the user's sensory abilities, and (4) the beach is not equipped enough with the suitable amenities for the disabled users.

Regarding POS inclusivity dimensions at El-Mandara Beach, only two dimensions are fulfilled under the physical environment category. First the 'Social Access' due to the fact that this space is freely opened for people despite their cultural or social backgrounds, Moreover, the availability of cultural elements like guiding signage to people of determination beach, round tables with seats, flags (in red and blue colors) that identify the allocated space for people of determination. Coupled with this, the government gradually fostered the generalization of 'identity symbols' on the beaches, through cheerful colors devoid of propaganda materials except for the word Alexandria on the beach sun umbrellas, in the approved font style, and the unification of t-shirts for the beach workers with the same colors [49]. This could be useful for other types of disabilities like intellectual disabilities where the repetition of these symbols and colors gives a calming effect for the individuals.

Second, is the 'Access to Activity' dimension because the space is multifunctional and able to accommodate different activities. However, the other 4 dimensions are partially fulfilled 'Physical Access', 'Transportation Connectivity', 'Walkability', and 'Available Amenities'. The transport-related dimensions are partially fulfilled for the following reasons (1) 'Transportation Connectivity' is limited to private cars, the public transport network availability is not a disability, or wheelchair friendly, and there are no drop-off/pick-up lanes. and (2) 'Walkability' is not sufficient as the road network has an excess number of junctions in short sections, too narrow footpaths, and inadequate traffic facilities, such as foot crossings, and self-automated traffic lights. (3) Despite the availability of some amenities like water sprinklers, they are not sufficient and need more elements such as showers or toilets dedicated to disabled people.

Finally, the process and context category accommodates three dimensions that are fully fulfilled (1) 'History & Development' dimension: the historical significance of this beach is obvious because it was not dedicated before August 2021 to people of determination and it is also the first disability-friendly public beach in Alexandria, (2) 'Management and Control/Stewardship' dimension: a number of entities have the authority and control over this beach with different responsibilities, either managing or maintaining the space of local community members from the Governorate of Alexandria, the Central Administration of Tourism and Resorts in Alexandria, the Association of the Visually Impaired in Alexandria, the Human Rights and Social Solidarity Committee in the Senate, or civic groups, and (3) 'Political context' dimension: the ongoing directions from the presidency, the current policies, and political agenda are emphasizing the disabled right to be able to live in dignity, as well as their right to peacefully coexist in the community regardless of their disability. Contrary to the previous, the 'Context and Background' dimension is the only dimension that is not available at El-Mandara beach because the census data on the distribution of visitors, household type, and other information are not available quantitively, as part of this analysis depends on reporting some of the users' feedback and direct observations. Therefore, their number is relatively small which is not representative enough of the people of determination, the reason why the 'personal experience' dimension accommodates a partial fulfillment score. Lastly, all the well-being dimensions are fulfilled except for the 'physical' dimension which is partially fulfilled. The ramp finishing material needs to be firmer and more compact.

The scores of 'Emotional/ Mental', 'Spiritual', 'Intellectual', 'Social', and 'Occupational' dimensions are obtained through the narrative method which is essential for

reporting and for making sense of experience. This method is preferred in this case because it gives meaningful form to experiences the targeted groups have already lived through, provides us with a forward glance and allows us to envision futuristic interventions at this beach. For instance, "Abdul-Rahman Khamis, a 10-year-old visually impaired child, went swimming for the first time in three years as safety for people with disabilities is not guaranteed on most public beaches". "I am very glad that this beach area is assigned to people with visual impairments. It made my father change his mind and bring me here to swim every week"… "I love the sea and swimming… I feel so free when my body touches the water" Khamis added. In another case, Helmy Khaled, a 14-year-old amateur swimmer, can finally enjoy a splash at a visually impaired beach in Egypt's Mediterranean province of Alexandria this summer. "I used to swim in the sea, but it was very difficult for me because public beaches are usually crowded and not equipped with special lifeguards for visually impaired or disabled people," Khaled said. "I feel safe swimming here … Lifeguards are always close by and I also have a whistle to call them if I need help," Khaled added [44]. And thus, it was explained how universal and inclusive design strategies affects well-being."

5.2 Research limitations

There are potential factors that could have influenced the research results such as:

(a) Observer Bias: The reliance on direct observations and user feedback might introduce observer bias. The perspectives of the individuals collecting data and observing the beach environment could influence the interpretation of the findings.

(b) Cultural Sensitivity: The analysis discusses the availability of amenities and access to activities from a particular cultural perspective. Cultural biases in defining what constitutes adequate amenities or activities may influence the evaluation of POS inclusivity.

(c) Stakeholder Perspectives: The involvement of various entities with authority and control over the beach may introduce biases based on their interests and perspectives. Different stakeholders may prioritize certain dimensions (e.g., social access, access to activity) over others as accessibility and physical access, potentially influencing the overall assessment.

(d) Accessibility of Data: The availability and accessibility of data related to the dimensions, the number of visually impaired individuals that actually go the beach is unknown, even given the round figure of 100-150 per day, there are no records to show, if they are the same people or different and their statistics relevant to the visually impaired population, and whether they are locals or tourists who come from out of town.

On the other hand, the deduced guidelines could highly benefit the design of any POS if they were to be taken into consideration in the initial design and planning phase to ensure that equitable use is provided to all people in all walks of life regardless of their disabilities or other needs.

6. UID FOR PUBLIC BEACHES: PROPOSED STRATEGIES

The strategies for public beaches presented in Table 4 serve as an important tool to support urban planners, designers, and governmental bodies in developing inclusive, universal, accessible, and livable well-being-oriented cities.

The strategies are an outcome of the previous analysis of the Alexandrian case study where the citizens provided valuable feedback and insights. It should be noted that these strategies could be replicated across Egyptian beaches.

Table 4. Strategies for UID in public beaches

Dimensions			Strategies
UD dimensions		Equitable use (1)	▪ Design public beaches suitable for all users and free from social barriers. ▪ The public beach must allow for positive interpersonal interaction and socialization between individuals with different abilities and genders.
		Flexibility in use (2)	▪ Design public beach for small groups, solitude, quiet play, large groups, and active play.
		Simple & intuitive use (3)	▪ Easy to understand design that accommodates user's different abilities with intimidation.
		Perceptible information (4)	▪ Ensure full access to all relevant information, systems, and services for persons with disabilities and adapted to relevant needs.
		Tolerance for error (5)	▪ Ensure easy, flexible, UD that minimizes the possibility of any future hazards and the adverse consequences of accidental or unintended actions.
		Low physical effort (6)	▪ A boardwalk with proper materials would help individuals to access the beach via a wheelchair with a minimum clear width of 2 meters required for two wheelchair users to pass easily.
		Size & space for approach & use (7)	▪ A public beach area's big enough to accommodate a friend or caregiver.
POS inclusivity dimensions	Physical environment	Physical access (8)	▪ Multi-access routes with gentle slope gradient. ▪ Materials of the routes and ramps should be firm, compact, stable, and non-slip. ▪ The use of light colors will assist those with a visual impairment in wayfinding. ▪ Handrails on ramps and stairs should be comfortable to grip and be continuous on both sides with proper height. ▪ A mixture of seating areas and alongside seats to allow for the positioning of a wheelchair.
		Social access (9)	▪ Design public beach suitable for all users and free from social barriers and allow socialization between individuals with different abilities and genders.

		Access to activity (10)	▪ Avoid a seemingly public beach, which only serves the needs of a specific group, and design beaches that foster inclusiveness.
		Transportation connectivity (11)	▪ Accessible transportation fitted with wheelchair access. ▪ Provide bus stops with the universal symbol of access stickers and waiting sheds. ▪ Sensor-enabled pathways, both color-coded and auditory senses. ▪ Provide smart information boards. ▪ Parking areas are to be close to beach access points.
		Walkability (12)	▪ Use the proper material in curbs and pavements. ▪ Ensure good connectivity of sidewalks. ▪ Attach an audio-tactile pedestrian detector to a post to provide sound to pedestrians to warn them while crossing the street.
		Available amenities (13)	▪ Appropriate user-friendly amenities fit for the different types of disabilities. ▪ Communication signage and wayfinding strategies with visual and auditory aids for sensory disabilities.
	Personal experience (14)		▪ There is a need to compile data at regular intervals of time and analyze it to get feedback from users according to their personal experiences.
	Process & context	History & development (15)	▪ Importance of embedding UID dimensions for all beaches. ▪ Spread this experience to all beaches of Egypt, in implementation of Law No. (10) of 2018 addressing the rights of people with disabilities regarding the provision of all facilities in the state for the use of the disabled to achieve the principle of community integration and create a decent life for them [33].
		Management and control (16)	▪ POS policies and standards should meet the needs of all types of disabilities. ▪ The stakeholders should create a community-specific monitoring system to track the UID in POS dimensions if they are moving forward or accomplishing the national agenda goals.
		Political context (17)	▪ Preparing a unified and updated database on persons with disabilities, inclusively with all conditions, and setting more effective plans to guarantee their rights, in order to improve their conditions, and work to develop integrated services provided for them [33]. ▪ Government officials should open private beaches to the general public to avoid the exacerbated ecological fragility of the coastline.
Well-being dimensions		Emotional/ mental	(2), (3), (9), (10)
		Spiritual	(1), (6), (9), (10), (13), (14), (17)
		Intellectual	(2), (3), (4), (16)
		Physical	(2), (3), (6), (8), (10), (11), (12), (13)
		Social	(1), (2), (9)
		Occupational	(1), (3), (14), (16)
		Financial	(1), (9)
		Environmental	(2), (12)

Note that the number given to the ud and inclusiveness strategies would reflect on the user's well-being dimensions (that ace each one)and work on achieving them if they are successfully established.

Source: Authors, or as indicated

7. CONCLUSION

To sum up, this paper highlights the significance of UID in POS especially the blue open spaces fostering wellbeing-oriented cities. Achieving this can make the city more resilient and at the same time fulfill SDGs (3 and 11). The concept of UID integrates Universal Design (UD), inclusiveness, and well-being to create environments where everyone feels welcomed and not discriminated against. The study presents strategies derived from literature review and empirical application on El-Mandara beach in Alexandria, Egypt, as a case study. The methodology involves three phases: reviewing literature on POS types, disabilities, needs, and barriers; understanding the interconnection between UID dimensions and barriers; and assessing which barriers impact the dimensions the most.

Regarding the case study, El-Mandara beach was announced in 2021 as the first disability-friendly public beach in Egypt to allocate an area for it for people of determination with various disabilities. The assessment of the beach inclusivity with UD and well-being dimensions revealed that most of these dimensions are fulfilled in one way or more. While some other dimensions (i.e., physical access, low physical effort, transportation connectivity, available amenities) need more consideration for future interventions by the Alexandrian stakeholders. At a broader level, this study helps in filling the gaps between the design interventions and community needs by extracting and proposing strategies, resulting in recommendations for urban planners and designers for future interventions.

Future research should aim to delve deeper into several unanswered questions and areas for improvement identified in this study:

(a) Specific Barriers Analysis: While the study identified barriers impacting the dimensions of UID, further research should focus on a more detailed analysis of these barriers. What are the root causes of these barriers, and how do they vary across different types of public open spaces (POS)?

(b) Comprehensive Evaluation: The assessment of El-Mandara beach highlighted areas where inclusivity and well-being dimensions are not fully met. Future research should conduct a comprehensive evaluation of various POS to understand the extent to which these dimensions are fulfilled and identify common challenges across different locations.

(c) User Perspectives: Future research should prioritize gathering user perspectives to inform the design and development of inclusive public spaces effectively.

(d) Community-Specific Monitoring System: Establishing a

community-specific monitoring system is crucial for tracking progress towards achieving UID in POS dimensions and aligning with national agenda goals. Future research should explore the feasibility and effectiveness of implementing such a monitoring system, involving stakeholders from the community, government, and relevant organizations.

(e) Comparative Studies: Conducting comparative studies across different cities or regions can provide valuable insights into the effectiveness of various approaches to promoting UID in POS. Comparative research can identify best practices, challenges, and opportunities for knowledge sharing and collaboration among urban planners, designers, and policymakers.

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