The environmental psychology of inhabitants in Riyadh

Perceived Sensory Dimensions in "Boulevard City"

علم النفس البيئي لسكان الرياض

الأبعاد الحسية المُدرَكة في بوليفارد سيتي

Invånarnas miljöpsykologi i Riyadh.
Upplevda sensoriska dimensioner i "Boulevard City "

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Abstract

Riyadh's outdoor environment is undergoing a significant transformation, driven by rapid urban development and the challenges of a harsh desert climate. In response, new public spaces such as Boulevard City have emerged, aiming to promote physical activity, social interaction, and overall well-being. This study applies the Perceived Sensory Dimensions (PSDs) framework to evaluate how users experience this urban outdoor environment. It explores which sensory qualities are most strongly perceived and examines whether these perceptions vary across individual factors such as gender and age, as well as based on the language selected within the survey.

A mixed-methods approach was employed, using a single, bilingual survey instrument available in both Arabic and English to gather quantitative and qualitative data from visitors. The survey captured user experiences related to PSDs as natural, cultural, open, Social, cohesive, diverse, sheltered and serene. The results provide a comprehensive assessment of the PSDs at Boulevard City, revealing correlations between the different dimensions and highlighting the sensory qualities that contribute most to users' experiences. Additionally, the study provides a descriptive analysis of the area, offering valuable insights that can inform future development and planning. These findings could be used to enhance the design and richness of outdoor spaces in "Boulevard City ", also contributing to the improvement of outdoor environments across the Riyadh city.

Keywords: Perceived Sensory Dimensions (PSDs), natural, cultural, open, social, cohesive, Diversity, Sheltered, Serene, significant, association, quantitative, qualitative, human well-being, Boulevard City, Riyadh, Vision 2030

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Abbreviations

Abbreviation	Description
KSA	Kingdom of Saudi Arabia
PSDs	Perceived Sensory Dimensions
SLU	Sveriges lantbruksuniversitet
	Swedish University of Agricultural Sciences

1. Introduction

The Arabian Desert has long been inhabited by resilient community's adept at traversing its expansive golden sands and arid landscapes. For centuries, people have endured the region's hot temperatures, limited water resources, and scarce shade. However, in recent decades, advancements in technology, particularly those stemming from the oil industry, have significantly transformed the living conditions in this harsh environment. Modern innovations have facilitated the availability of air-conditioned housing and enhanced mobility through the widespread use of automobiles. This technological progress has created a stark contrast between the contemporary living environment and the natural landscape.

The Kingdom's Vision 2030 serves as a foundational motivation for this study, aiming to foster greener and more sustainable urban environments. This initiative aligns with broader efforts to enhance well-being in the outdoor spaces of Riyadh. Plans for Riyadh emphasize the development of a sustainable city characterized by urban diversity while remaining attuned to the demands of globalization and modern luxury. This study seeks to explore the social and psychological well-being of Riyadh's inhabitants in the context of the current urban landscape and the aspirations outlined in Vision 2030.

As an architect with deep-rooted connections to the region, I am committed to promoting the well-being of residents through enhanced interaction with the outdoor environment. This involves fostering a greater daily engagement between individuals and their outdoor environments.

1.1 Brief Overview of Riyadh Today

Riyadh, the capital city of Saudi Arabia, stands as the political, economic, and demographic centre of the country. Its population has expanded significantly in recent decades, reaching over 7.5 million residents by 2023, reflecting nationwide trends of rapid urbanisation. Saudi Arabia's total population is estimated at approximately 35.8 million, with a notably young demographic profile more than half of the population is under the age of 35. Riyadh hosts a diverse mix of nationals and expatriates, the latter forming a substantial portion of the city's workforce across sectors such as construction, retail, and services. National initiatives such as Vision 2030 continue to influence population distribution, urban development, and workforce policies across Saudi Arabia, with Riyadh as a key focus of transformation efforts (General Authority for Statistics, 2023).

As the capital of the Kingdom of Saudi Arabia, Riyadh is the largest city in the Arabian Peninsula and plays a pivotal role in shaping the future of the entire region. The city is characterized by a substantial volume of vehicular traffic,

primarily utilizing its extensive network of highways, which has contributed to its identity as a "car city."

In recent years, the development of specialized entertainment areas has become increasingly important, incorporating green spaces and facilities for walking and cycling. These areas include a mix of public parks and commercially utilized gardens, contributing to the city's urban landscape.

An analysis of Riyadh's current urban map reveals a dominance of built structures contrasted with the yellow hues of the surrounding desert. According to statistics from 2018, the per capita availability of green space in Riyadh was approximately 1.7 square meters, with the total green area estimated at 91 square kilometers, accounting for 1.5 percent of the city's total area (Royal Commission for Riyadh City, 2023).

1.2 Riyadh Strategic Plan for the Future

The Green Riyadh Project is a significant initiative aimed at enhancing the per capita share of green space within the city, thereby increasing the overall proportion of green areas. This ambitious plan seeks to expand and intensify afforestation efforts across various urban elements while optimizing the use of treated water for irrigation. Such measures are anticipated to improve air quality, mitigate urban temperatures, and promote a more active lifestyle among residents, aligning with the goals and objectives of "Saudi Vision 2030."

Key objectives and anticipated outcomes of the Vision 2030 framework, as outlined by the Royal Commission for Riyadh City (2023), include:

1. Reduction of Air Temperature: A target to decrease the average air temperature by 1.5 to 2 degrees Celsius across the city.

2. Mitigation of Surface Temperature: Achieving a reduction of 8 to 15 degrees Celsius in surface glare in areas with intense afforestation.

3. Carbon Dioxide Reduction: Aim for a decrease in carbon dioxide levels by 3 to 6%, while increasing oxygen levels and humidity, thereby enhancing air quality.

4. Dust and Air Pollution Control: Implementing strategies to minimize the impacts of dust and other forms of air pollution.

5. Energy Consumption Reduction: Targeting a reduction in energy consumption by approximately 650 gigawatt-hours per year through the promotion of green building principles, including the incorporation of green roofs and walls.

6. Rainwater Absorption and Flood Mitigation: Enhancing the city's capacity to absorb rainwater and reduce the risk of flooding.

7. Aesthetic Improvement: Fostering the aesthetic qualities of the urban environment.

8. Encouragement of Healthy Transportation: Promoting active transportation methods among residents.

9. Biodiversity Conservation: Preserving natural areas and increasing biodiversity within and around the city.

10. Quality of Life Enhancement: Improving quality-of-life indicators, thereby elevating Riyadh's global standing among urban centres.

11. Economic Returns: Projecting an economic benefit of approximately 71 billion riyals by 2030, primarily through reductions in healthcare costs, energy consumption, and efficient water usage, as well as an increase in real estate values.

The initiative is expected to create new investment opportunities for the private sector in areas such as nurseries, gardening, landscaping, and irrigation.

Furthermore, the program contributes to several objectives outlined in "Saudi Vision 2030" by fostering environmental sustainability, cultivating a vibrant community that embraces a healthy lifestyle, and enhancing the economic efficiency of the city. The initiative also aligns with goals from the "National Transformation Program," including the expansion of green spaces, reduction of water waste, improvement of flood drainage efficiency, and increased utilization of treated water. Additionally, the program supports the objectives of the "Quality of Life Program" by establishing open areas for social interaction and various sports activities, while promoting walking among residents.

The project plans to include the planting of over 7.5 million trees throughout Riyadh, which encompasses the establishment of 3,330 district parks, 43 public parks, and provisions for green spaces around 9,000 mosques, 6,000 schools, 2,000 parking facilities, 1,670 government buildings, 390 health facilities, 64 universities and colleges, and extensive linear kilometres of roads and green belts. This comprehensive approach aims to transform the urban landscape of Riyadh and enhance the overall quality of life for its inhabitants (Royal Commission for Riyadh City, 2023).

1.2.1 Boulevard City and the 'Car City' Phenomenon

Riyadh's deeply entrenched car culture presents significant obstacles to transforming the city into a pedestrian-friendly environment. Although Boulevard

City aims to encourage walkability, the prevailing infrastructure and lifestyle are still heavily car-dependent (Karim, 2019). This dependence can limit the accessibility and inclusivity of public spaces, particularly for those without private vehicles or adequate public transit options. The tension between maintaining convenience for car users and fostering more sustainable mobility patterns is a critical issue that Boulevard City must navigate carefully (Al-Kodmany, 2018).

1.2.2 Greening in a Desert Environment

Efforts to increase green spaces are central to Vision 2030's sustainability goals. However, greening in Riyadh's desert climate raises practical and environmental concerns. Large-scale irrigation and landscaping efforts can strain limited water resources, risking unsustainable water consumption if not carefully managed (Bahri, 2012). While the use of native, drought-tolerant species is encouraged, some greening projects still rely heavily on water-intensive exotic plants or artificial features, which may not be climate-appropriate in the long term. This highlights a critical need for balancing aesthetic ambitions with environmental responsibility.

1.2.3 Addressing Economic Inequality

Saudi Vision 2030 (2016) clearly emphasizes economic diversification, job creation, and social development as key pillars to reduce inequality and enhance inclusivity across society. Urban developments like Boulevard City are envisioned to reflect these goals by providing accessible and affordable amenities for diverse social groups (Saudi Vision 2030, 2016).

2. Theoretical Background

An expanding body of evidence highlights the beneficial effects of natural environments such as green spaces and parks on overall human health and well-being. Engaging with nature has been associated with lower stress levels, improved emotional state, better cognitive performance, and enhanced physical and mental health (Ulrich, 1984; Hartig et al., 2014). Spending time in natural surroundings can also encourage physical movement, support social engagement, and provide a calming atmosphere, all of which contribute to stronger mental resilience and greater life satisfaction (Maas et al., 2006; WHO, 2016). These findings emphasize the value of integrating natural elements into urban design strategies.

Importantly, even small, shaded areas with plants or water features can significantly improve how people feel and function throughout the day (Ali-Toudert and Mayer, 2007; de la Barrera et al., 2016; Rahman et al., 2022). Recent research supports these findings, showing that people living near green spaces report fewer symptoms of depression, better sleep quality, and higher life satisfaction (White et al., 2021; Bratman et al., 2019). Furthermore, access to green environments is linked to reduced risks of obesity, cardiovascular issues, and hypertension particularly in busy or polluted urban settings (Twohig-Bennett and Jones, 2018; Nieuwenhuijsen et al., 2017). This highlights the considerable health benefits even modest green spaces can provide close to where people live.

Equally important is the role that safe, welcoming, and socially engaging outdoor spaces play in enhancing community well-being. Recent studies emphasize that perceptions of safety strongly influence how often people use parks and green areas, with well-lit, well-maintained, and accessible spaces encouraging more frequent visitation (Jennings et al., 2017; Cohen et al., 2020). Socially inclusive design that promotes interaction and fosters a sense of belonging supports mental health and helps reduce loneliness and social isolation (Jennings and Bamkole, 2019; Ekkel and de Vries, 2017). Features such as visibility, accessibility, and programming (like community events) have been linked to higher park use and stronger neighborhood social cohesion (Sreetheran and van den Bosch, 2019; Wolch et al., 2018).

Urban planners and policymakers are increasingly recognizing the value of integrating green elements into daily life. From green walkways to small community gardens and shaded gathering spots, these spaces not only offer places for rest and relaxation but also encourage physical activity, social connection, and a sense of safety within communities.

In hot and dry or deserted climates, green spaces continue to offer essential relief but require careful design adapted to local conditions. Selecting heat-

resistant plants, creating shaded areas, and managing dust and air quality are critical to maximizing their benefits. Even modest features like shaded pockets of greenery or water elements can substantially improve comfort and well-being in these challenging environments (Ali-Toudert and Mayer, 2007; de la Barrera et al., 2016; Rahman et al., 2022).

Recent studies in arid and desert environments highlight how even small green interventions can be impactful when tailored to local conditions. A survey of park users in Jeddah, Saudi Arabia found that during the hot season people visit parks mainly for relaxation, socializing, and exercise, indicating urban green spaces serve multiple well-being roles (Abu-Zeid et al., 2022). Research shows that strategic design such as vegetation coverage and shaded layouts can reduce local temperatures by around 4–5 °C in key desert cities like Riyadh and Dammam (Environmental Science & Pollution Research, 2024; Discover Sustainability, 2025). However, studies caution that in hyper-arid climates, green infrastructure without sufficient irrigation may not be effective and can even worsen heat if not planned carefully (Building Simulation, 2024).

Al Baydha as a desert city in western Saudi Arabia has smart water-retentive landscaping, green spaces cqn be considered as a resilient community. A place that supports ecology, social life, and well-being long-term even under minimal rainfall (Al Baydha Project, 2025).

Taken together, the evidence is clear: incorporating natural elements into urban environments is essential not just for visual appeal, but for fostering well-being and community resilience. Moreover, when outdoor spaces offer a variety of uses, events, and activities, people are more likely to visit them regularly and make full use of what they offer.

2.1 Perceived Sensory Dimensions (PSDs)

This study draws on a range of theoretical concepts to guide the development of research questions and the interpretation of results. Central to this framework are the Perceived Sensory Dimensions (PSDs), which serve as a key tool to explore how outdoor environments influence human psychology. Specifically, this research adopts the PSD framework as its theoretical foundation to evaluate the sensory characteristics of the study area and their relationship with human well-being. Initially proposed by Grahn and Stigsdotter (2010), the PSD framework identifies eight core sensory dimensions Natural, Cultural, Cohesive, Diverse, Sheltered, Open, Serene, and Social that describe the ways in which individuals perceive and interact with their surroundings, fostering psychological restoration.

PSD can be recognized as a useful instrument for evaluating urban environments due to evidence linking certain sensory dimensions with reduced stress levels and

enhanced mental recovery (Grahn and Stigsdotter, 2010; Memari et al., 2017). Notably, the Serene and Sheltered qualities are associated with restorative benefits, whereas the Social and Diverse aspects foster social interactions and mental engagement (Stigsdotter et al., 2017).

2.1.1 Theoretical Overview of Perceived Sensory Dimensions (PSDs)

Stoltz, and Grahn (2021) present the Perceived Sensory Dimensions as both a coherent theoretical model and a practical tool to guide the design of urban green areas, based on 35 years of empirical research. The PSDs model addresses the lack of evidence-based tools in urban green space planning by summarizing key perceived qualities into eight core dimensions.

In a separate study, Stoltz (2019) emphasizes the importance of evidence-based design, highlighting the role of the PSDs framework in informing planning and evaluation processes to ensure that designs are grounded in empirical research and human experience. According to Stoltz and Grahn (2021), the PSDs model can be used to shape modern human habitats, green areas, healthcare settings, recreational forests, and other outdoor environments to support both restorative and motivational recreational functions.

Key dimensions include emotional well-being, social connectedness, and a sense of purpose, all significantly influenced by environmental conditions. Access to green spaces, opportunities for social interaction, and aesthetically pleasing surroundings are vital for enhancing psychological well-being. (Kaplan and Kaplan, 1989). Furthermore, aspects such as nature, culture, community cohesion, diversity, and the quality of shelter versus open spaces, as well as the balance between serene and social atmospheres, shape individuals' experiences. Conversely, environments perceived as stressful, or isolating can adversely affect human psychology.

> "A larger population study showed that exposure to Serene, Natural and Sheltered was associated with lower stress values [22]. Studies in nature-based therapy gardens also show these three qualities to be the most important in early stages of rehabilitation from stress-related mental illness [23]." (Stoltz & Grahn, 2021, p. 27)
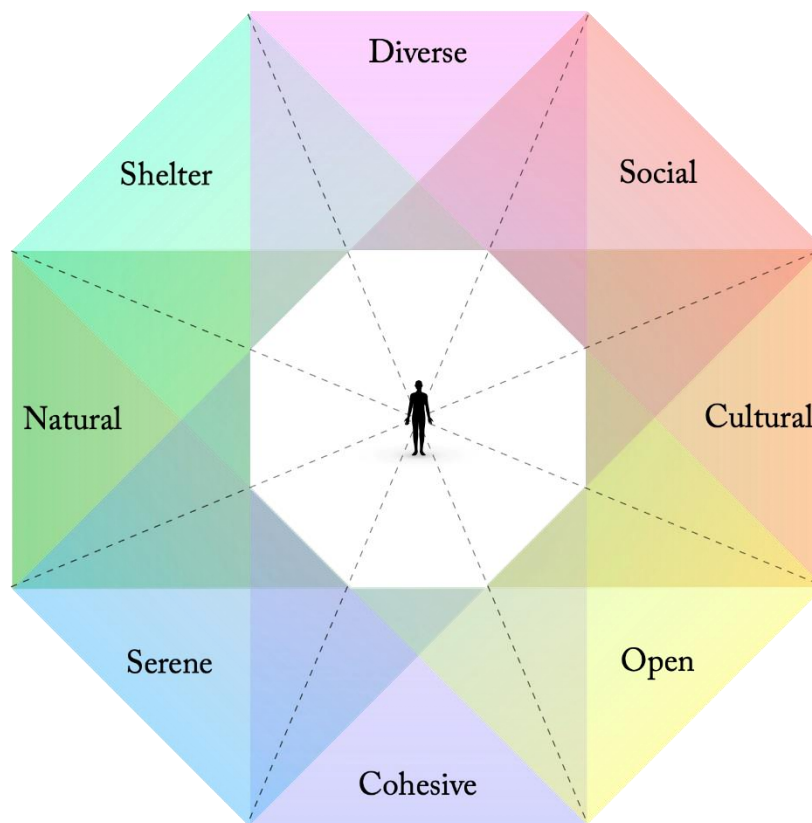
Figure 1. Eight PSDs along four axes of opposing qualities (Stoltz and Grahn, 2021). The closer together in the model, the more shared associations between qualities. Adjacent qualities thus often reinforce each other, while opposing qualities might weaken or contradict each other.

The framework is based on principles from environmental psychology and evolutionary theory, which suggest that these sensory dimensions fulfill core human needs. Stoltz (2022) highlights that dimensions like Sheltered address the need for safety, while Diverse caters to the innate drive for exploration, both crucial for emotional balance and cognitive rejuvenation. Therefore, PSDs offers a distinct theoretical approach that goes beyond aesthetics to incorporate psychological and physiological responses to environmental stimuli (Stoltz and Grahn, 2021).

In conclusion, the PSDs framework offers a robust, evidence-based, and flexible model for examining the sensory features of the study area. Its use facilitates a structured analysis of environmental factors that influence mental health and social well-being, supporting informed decisions in urban planning and design.

2.1.2 PSDs Across Diverse Cultural Contexts

This research occurs in cultural variations between Riyadh, the largest capital in the Arabian Peninsula, and other urban contexts that use the used theories. The

other social and urban environments emphasize principles such as egalitarianism and access to nature that they used theories.

That the PSD model has been developed and validated primarily within Scandinavian contexts, most notably in Sweden, it is essential to applicate this approach with a critical perspective about its applicability to the urban landscape of Riyadh. The environmental conditions in Riyadh, including its arid climate, high temperatures, and limited water availability, present distinct challenges that may affect how sensory dimensions are perceived and valued. Additionally, the cultural norms related to public space use in Riyadh, particularly regarding privacy and social behavior, differ significantly from those in northern Europe.

These contextual factors may influence the relevance and interpretation of certain PSD categories. Therefore, this study acknowledges the need to reflect on the suitability of the framework in this setting and to consider both its strengths and limitations in capturing the sensory and cultural dimensions of outdoor spaces in Riyadh. This reflection is intended to ensure that the findings are grounded in the local context and to explore whether adaptations to the PSD model may be necessary for its effective application in desert urban environments.

In Riyadh, values related to community cohesion and cultural heritage create a unique urban experience. In this context, the PSDs, as presented in the literature, offer an understanding of place and environmental psychology from the perspective of users. Moreover, the PSDs have been presented as a tool that is potentially universal and applicable across diverse cultural contexts:

> "Together, these studies indicate that the PSDs are experienced similarly regardless of cultural context, suggesting that they point towards more or less universal human needs" (Stoltz and Grahn, 2021).

Applying the PSD framework to Riyadh still presents some challenges because the city's culture, rapid growth, and harsh desert climate are quite different from the temperate Western settings where the framework was first developed (Al-Naim, 2008; Fadaili, 2009). Despite this, research shows that PSD is reliable and relevant across many different places and climates. For example, studies conducted in China have found the framework works well in urban environments that are quite different from its original context (Chen, Qiu and Gao, 2019). Other studies have also shown that PSD can be useful in various settings, including healthcare environments and areas with diverse environmental conditions (Qiu and Nielsen, 2015; Memari et al., 2017). This suggests that, with some thoughtful adaptation, PSD can be a flexible and effective tool for understanding how people perceive their surroundings in cities like Riyadh.

2.1.3 PSDs in the context of Riyadh

To apply the PSD framework in this study, as it represents a new context, a structured methodology needs to be employed by involving systematic assessment of the perceived sensory dimensions relevant to the study area. This approach involves collecting data through clear and direct tools, such as surveys or questionnaires, designed to capture user perceptions of each sensory dimension. Special attention needs to be given to adapting these tools to local conditions, including language and environmental factors, to ensure that the data gathered is both accessible and meaningful for Riyadh's residents. Conducting pre-tests of these data collection tools need to be an essential step in this study to enhance the validity and reliability of the method, allowing for the identification of any issues related to question clarity or local relevance, and enabling necessary adjustments before full deployment (Bryman, 2016; Grahn and Stigsdotter, 2010). However, the methodology will follow the limitations of the study and aim to achieve as much as possible within these constraints, with a plan to expand and refine the approach in future research conducted within the same context. This process will strengthen the overall methodology and ensure that the PSD framework is accurately assessed and appropriately adapted for the local context.

In conclusion, Perceived Sensory Dimensions (PSD) framework is considered suitable for this study and for the context of Riyadh for several key reasons. Firstly, it offers a systematic, user-oriented method for assessing how individuals perceive specific qualities of outdoor environments, which aligns with the study's aim. In Riyadh, a city undergoing significant urban transformation driven by initiatives such as Vision 2030, the use of such a framework can help identify the sensory characteristics most valued by residents. Secondly, although originally developed in a different cultural and climatic setting, the PSD model is grounded in fundamental human experiences such as calmness, natural elements, and opportunities for social contact which provides a flexible structure that can be adapted to the local context. Riyadh's distinctive environmental conditions and cultural expectations present a valuable opportunity to explore how well the framework functions outside its original context.

Lastly, the application of the PSD framework in Riyadh allows for cross-contextual analysis, making it possible to determine which sensory dimensions are universally relevant and which may require reinterpretation. This contributes to a more context-sensitive understanding of urban space, supporting the development of inclusive and responsive design strategies tailored to the needs of Riyadh's population.

2.2 Study questions:

1. Which perceived sensory dimensions (PSDs) are provided by the Boulevard City outdoor environment?

2. Are there any differences in which PSDs are strongly perceived regarding individual variables such as age, gender, residence background, visit frequency, or companionship?

3. Are there any differences in which PSDs that are reported depending on the language used to answer the survey?

2.3 Study aim:

This research aims to investigate human well-being through the perceived sensory dimensions of the outdoor environment in 'Boulevard City ', Riyadh, KSA.

3. Materials and Methods

3.1 Study area

The study site focuses on the outdoor environment of Boulevard City, a district within Riyadh, KSA that may illustrate contemporary urban planning principles. This area could be characterized by a thoughtful integration of various environmental elements that may aim to enhance the psychological well-being of its inhabitants or simply provide the entertainment of the visitors.

Boulevard City is situated in the northwestern part of Riyadh, approximately 17 kilometres from the city centre (see Figure 3). The area is designed as a multifunctional urban destination, offering a wide range of open-air spaces such as landscaped green zones, pedestrian-friendly paths, and public squares. These outdoor areas are not only visually appealing but are also intended to support physical movement and enhance social interaction among visitors.

The planning and design approach appears to reflect key ideas from environmental psychology, aiming to make the space both accessible and inviting. By ensuring ease of movement, visual connectivity, and human comfort, the design encourages people to explore, interact, and spend more time within the space. This thoughtful layout helps transform Boulevard City into more than just a recreational location it becomes a lively social environment that supports community engagement and everyday urban experiences.

Figure 2. Boulevard City entrance 'Time Square 2' by Waddah Alnajjar (CC BY-NC 2.0) Showing the gathering area after the security gate, with a fountain, security, events sculpture and information staff, markets, pedestrians, and digital screens.
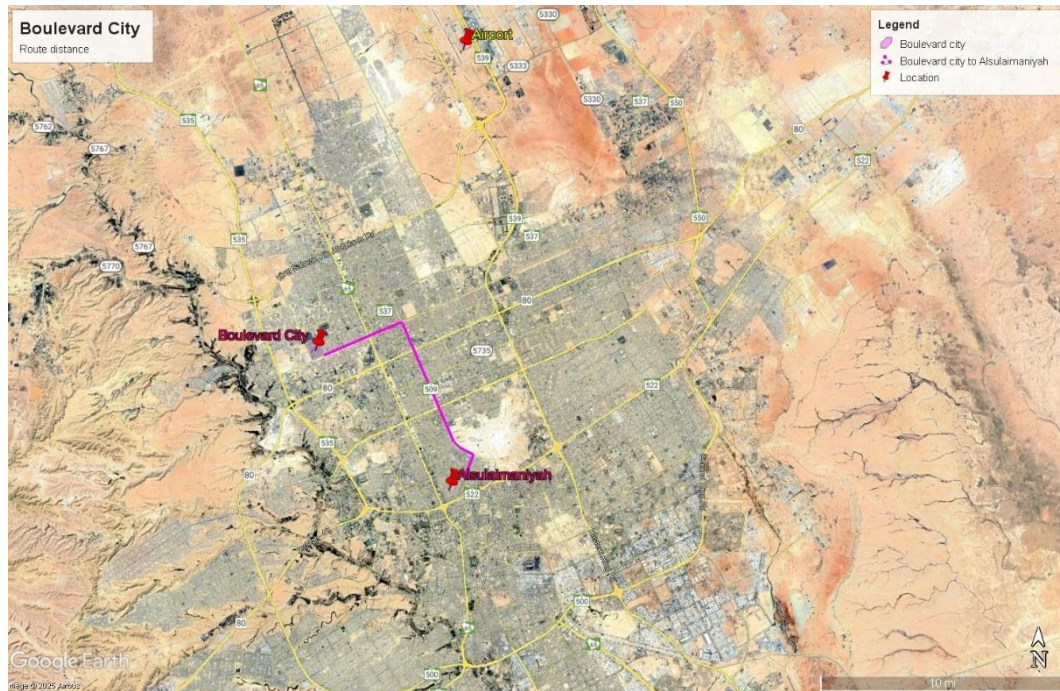
Figure 3. Boulevard City – Google Earth Location Map from Riyadh City Center | June 2025 Prepared by: Waddah Alnajjar

On the other hand, Boulevard City spans a total area of 80 hectares, thoughtfully divided into multiple functional zones, each designed to serve a specific purpose and enhance the overall visitor experience. A significant portion of the area, 20 percent, is dedicated to parking, ensuring that the development can accommodate a high volume of visitors arriving by car while maintaining smooth traffic circulation and accessibility.

The sports zone occupies 15 percent of the site, offering ample space for physical activities, fitness events, and recreational programs, reinforcing the city's commitment to promoting an active lifestyle. Several other zones, including the Fountain area, the Garden zone, the Music section, and the main Square, each take up 10 percent of the total area, contributing to the city's cultural, aesthetic, and social character. These areas are designed to provide spaces for relaxation, entertainment, and gathering, accommodating a wide range of interests and age groups.

In addition, a group of smaller yet distinct zones, Avalanche, Arena, Studios, and Trocadero, each occupy 5 percent of the total land area. Despite their relatively smaller size, these zones add variety and depth to the overall layout, supporting specialized events, performances, interactive experiences, and thematic attractions. Collectively, this spatial distribution ensures that Boulevard City offers a balanced mix of utility, leisure, and cultural engagement across its 80 hectares.

Figure 4. Boulevard City – Zone Plan Map (Google Earth View), June 2025 Prepared by: Waddah Alnajjar

Boulevard City includes a mix of built and open spaces. Around 29.2% of the area is taken up by buildings and roofed structures, which form the core of the development. These areas serve as the main hubs for indoor services and activities. In contrast, the outdoor open areas such as plazas, walkways, and uncovered public zones make up about 52.6% of the total space. These areas are essential for movement, gathering, and leisure, giving the site its open and accessible feel. The remaining 20% of the area is not specifically categorized but is likely used for roads, parking, driveways, and other support spaces that tie the whole development together and ensure smooth access and function, See Figure 6.

Figure 5. Built and outdoor spaces, by Waddah Alnajjar (CC BY-NC 2.0)

Figure 6. Built Area vs Outdoor Area Plan (Google Earth View) June 2025 Prepared by Waddah Alnajjar

On the other hand, the, Boulevard City includes a modest share of green space, with approximately 2.5% to 3% of the total area covered by trees, grass, and planted zones. Water features, including the prominent artificial lake and surrounding pools, occupy about 4.1% of the site. These natural elements offer a refreshing contrast to the predominantly built and paved surroundings. See Figure 7.
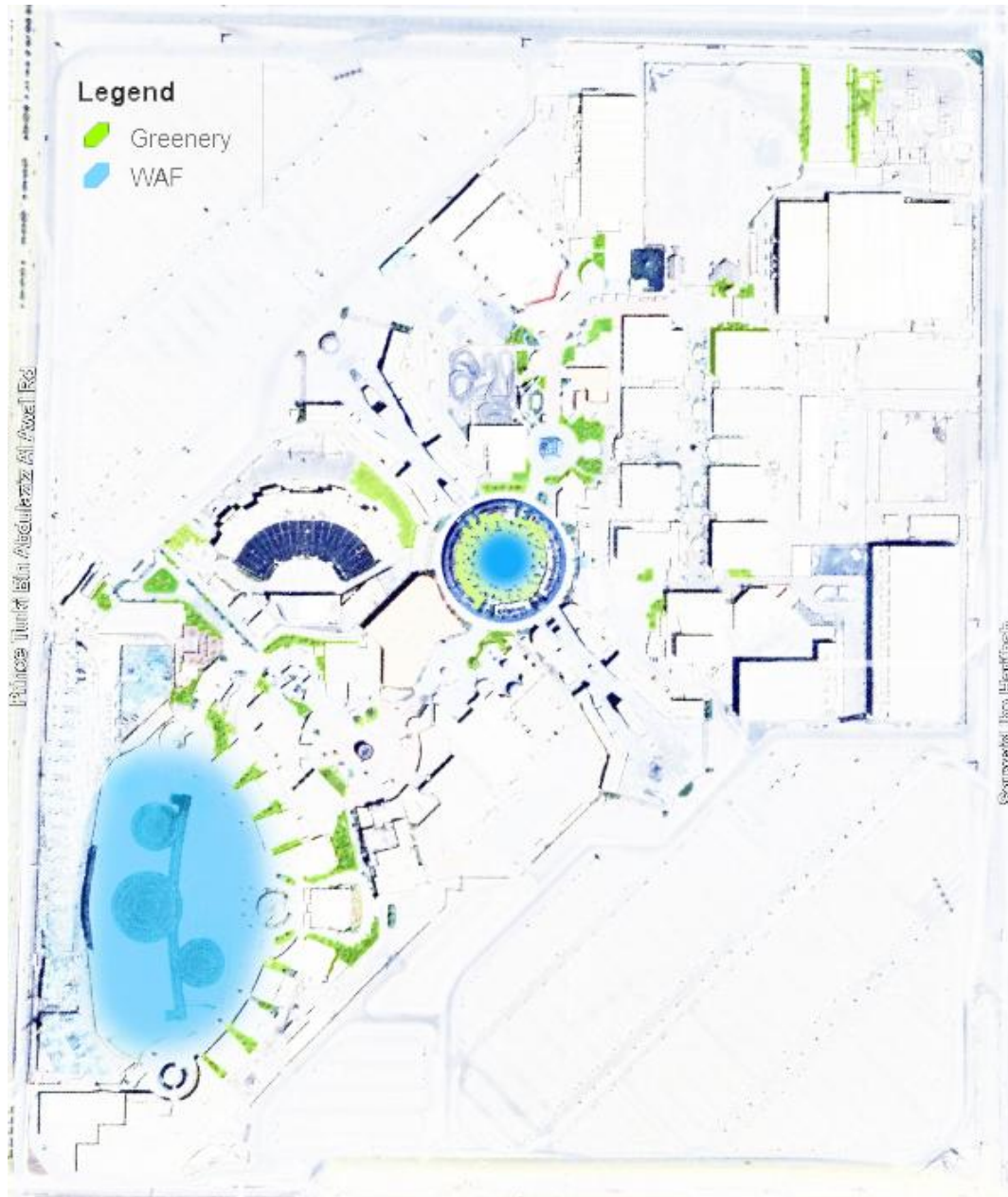
Figure 7. Boulevard City – Greenery and Water Features (Google Map View) | Prepared by: Waddah Alnajjar | June 2025

Additionally, the district may incorporate cultural and artistic elements that reflect the community's values and heritage, thereby enriching the sensory experience of the environment. By exploring the relationship between these physical attributes and the psychological experiences of visitors, this research could provide valuable insights into how the outdoor environment may influence human behaviour and well-being in urban contexts.

In this regard, Boulevard City may serve as an intriguing case study for examining the intersections between environmental design and psychological

outcomes, contributing to a deeper understanding of the potential role that outdoor environments play in shaping human psychology in this place and Riyadh in general.

3.2   The study sample

To better understand how people experience outdoor spaces in this study, it's important to consider the demographic and urban context of Saudi Arabia, especially Riyadh. Saudi Arabia is home to more than 36 million people, and its population is mostly urban, with the majority living in cities (General Authority for Statistics, 2024). Riyadh, the capital, has grown rapidly in recent decades and now has over 7.6 million residents. It is not only the political and administrative centre of the country but also a hub of cultural, economic, and environmental development (UN-Habitat, 2023). Much of the population is young around two-thirds are under the age of 35 which influences how public spaces are used and what people expect from them (World Bank, 2023).

In recent years, the city has seen major efforts to improve public life through initiatives like the Green Riyadh program, which aims to expand green spaces and make the city more liveable (Royal Commission for Riyadh City, 2022). These developments provide valuable context for exploring how people perceive the quality and function of outdoor environments in such a fast-changing urban setting.

This study will employ a stratified sampling approach to ensure a comprehensive representation of diverse demographic characteristics among participants. Such an approach enhances the robustness and generalizability of the findings by capturing a wide array of perspectives and experiences related to psychological well-being in outdoor environments. The specific criteria for participant selection are delineated as follows:

3.2.1 Age Groups:

The different life periods will be divided into groups that estimate a certain significant interaction with the outdoor environment for each:

1. Twelve or less years: This cohort encompasses children, whose interactions with outdoor spaces while they are growing. And have been affected and influenced by their family.

2. 13-19 years: Adolescents in this age are passing through many social and psychological transitions. On the other hand, they are affected and connected to their friends who share interests and have high influence abilities.

3. 20-35 years: Young adults that have a lifestyle also interact with their models and those who cross share the interests and life goals.

4. 36-55 years: This middle-aged group with an established and experienced lifestyle may find themselves in a position to interact with new interests from the younger generation like kids, younger family members or friends.

5. 55+ years: Older adults that have certain models of interaction with the outdoor environment that need to be suitable to their lifestyle and their abilities.

The age group classifications you've provided 0–12 years, 13–19 years, 20–35 years, 36–55 years, and 55+ years are commonly used in demographic studies and health research. While these age groupings may not be universally standardized, the study suggests that they align closely with classifications used by respectable organizations such as the World Health Organization (WHO) and the United Nations Statistics Division (UNSD).

On the other hand, this age grouping has been used in many studies related to the outdoor environment and wellbeing that can inspire use of the same division focusing on the studying of these samples and their interaction according to their growing physically and mentally. such as: Young Adults (18–35 years) :(Wood, 2023), Middle-Aged Adults (36–55 years) :(Mitchell & Popham, 2008), Older Adults (55+ years) (Zhao et al., 2024). The division of the earlier stages of human life into childhood and adolescence has been taken into consideration, as the study suggests that the results could be affected responses from children aged 12 or under may be limited, and the characteristics of the adolescent age period could significantly influence the findings.

3.2.2 Gender distribution:

Gender will be considered as a significant variable to analyze potential differences in psychological well-being and environmental engagement.

The female interaction with the outdoor environment may differ or be like the male one but it has always been interesting to investigate. Also, some of the participants may prefer not to include their gender as a value of their participation for many reasons. that they consider irrelevant.

3.2.3 Residence Background:

Participants will indicate their residential backgrounds, which are suggested as important to understand the influence of this on the experiences of outdoor environments. The categories will include:

1. Riyadh: Participants residing in the city, whose experiences are directly pertinent to the study's geographic focus.

2. Kingdom of Saudi Arabia (outside of Riyadh): Individuals from other urban centers may provide contrasting perspectives based on alternative environmental designs and cultural contexts.

3. Outside of the Kingdom of Saudi Arabia: This group would allow for an examination of how international experiences inform participants' perceptions and interactions with urban outdoor environments.

This information about the participants could either help or not contribute to a deeper understanding of the results. The data will be collected and evaluated later during the pre-analysis phase. Any distinct results will be discussed.

3.2.4 Visiting Frequency:

To evaluate engagement levels with the outdoor environment, participants will report their frequency of visits. The options for reporting visiting frequency are:

1. Daily

2. Weekly

3. Monthly

4. More than twice a year

5. Less than twice a year

These categories will facilitate an exploration of how the regularity of visits correlates with psychological well-being and interactions within outdoor settings.

As mentioned in the previous sample, the information regarding the participants may or may not aid in gaining a deeper understanding of the results. The data will be gathered and assessed during the pre-analysis phase, and any notable findings will be addressed.

3.2.5 Companionship:

The participants will be studied as per their family situation, as this factor can significantly influence their outdoor experiences. The categories will include:

1. Friends: Participants that visit with Friends

2. Family: Participants that visit with family members, parents, siblings, sons, daughters, and those who have family relations more than friendship or interests.

3. Both with family and friends: The option of having this is not to do the visit together with both families and friends but can mean that they do it at various times.

4. Alone: Solo visitors that prefer to come alone or have no other option with their unique experience of the outdoor environment

These divisions aim to provide a rich understanding of psychological well-being in outdoor environments, taken into consideration by that variety of visiting companions.

3.3 Methodology and Methods of investigation

This study adopts a mixed-methods approach to conduct an exploratory and descriptive investigation of well-being in the outdoor environment of Boulevard City. Creswell & Plano Clark (2018) suggest using a mixed approach when the research problem calls for both detailed numeric data and rich, contextual insights to understand the broader issue.

> "Mixed methods research can be used to verify results obtained through one method by using a second method for comparison or validation, increasing the reliability and depth of the findings." (Tashakkori and Teddlie, 2010)

> "Mixed methods research allows for the integration of quantitative data with qualitative data, providing a richer, fuller understanding of the research problem that neither approach alone can achieve." (Johnson and Onwuegbuzie, 2004)

Primarily, it applies to a quantitative approach integrated with a supportive limited qualitative method. As mentioned in the "2. Theoretical Background" the research is grounded in the Perceived Sensory Dimensions (PSDs) methodology, which provides a structured and empirically supported lens for understanding the psychological and sensory experiences of individuals in public outdoor spaces (Stoltz and Grahn, 2021).

Consequently, the survey primarily employed a quantitative approach, supplemented by qualitative parts, to ensure focused results while allowing for open-ended responses and deeper exploration and elaboration of specific study parts.

3.3.1 Survey

The primary method of data collection is a structured survey consisting of sixteen questions, targeting a minimum of twenty-five regular park visitors. As an exploratory master's-level study, the primary aim is to identify initial patterns and trends that could inform future research or methodological development. A

sample size of 25 participants is considered suitable for this purpose. Similar sample sizes have been used in prior exploration studies on PSDs, especially when the research focuses on concept testing or method refinement rather than statistical generalization (Stigsdotter and Grahn, 2011; Annerstedt van den Bosch, Ode Sang and Grahn, 2014).

Exploratory research typically prioritizes depth of understanding over breadth of representation, seeking to reveal trends that can guide subsequent investigations (Saunders, Lewis and Thornhill, 2019). Early-stage environmental psychology studies commonly adopt small sample sizes to refine theoretical frameworks such as the PSDs. The use of a validated, structured assessment tool in this study enhances the reliability and consistency of data collection, which helps mitigate some limitations associated with smaller samples (Stigsdotter and Grahn, 2011).

Furthermore, the participant group is expected to be relatively homogeneous with respect to their environmental exposures such as visitors to similar types of urban green spaces thereby reducing variability and enabling clearer interpretation of dimension-specific patterns (Bryman, 2016). Practical constraints typical of master's research projects, including limited time, ethical considerations, and restricted access to participants, also justify the use of a modest sample size (Creswell and Creswell, 2018).

Nevertheless, it is important to acknowledge that a sample size of 25 lacks the statistical power to detect small effects or fully represent the diversity of outdoor space users. Consequently, the findings should be treated as preliminary and exploratory rather than definitive or broadly generalizable. Future research involving larger and more diverse samples will be necessary to validate and expand upon these initial insights.

Despite these limitations, the sample size aligns well with the study's objectives. It allows for a focused investigation of the PSD framework and contributes to the growing understanding within environmental psychology of how specific spatial dimensions shape individuals' perceptions of outdoor environments.

The survey starts by asking participants some basic questions about themselves, like their age, gender, where they live, how often they visit the outdoor space, and whether they usually come alone or with others. Beginning with these kinds of background questions is a helpful way to ease people into the survey and gives important context for understanding their later answers (Fowler, 2014; Dillman, Smyth and Christian, 2014). It also lets the researcher see how different personal traits and habits might affect how people experience and perceive outdoor places. Previous research shows that things like age, gender, and visit frequency can really shape how someone relates to a green space (Peschardt and Stigsdotter, 2013; Annerstedt van den Bosch et al., 2014; Kaplan and Kaplan,

1989). On top of that, these background details can be connected to how participants respond to the Perceived Sensory Dimensions questions, giving more insight when analyzing the data (Hartig et al., 2014; Stigsdotter and Grahn, 2011).

Using clearly worded, consistent questions items in a survey is essential for collecting reliable responses and drawing meaningful conclusions. When questions are simple, focused, and easy to interpret, participants are more likely to answer thoughtfully and consistently. This strengthens the overall quality of the data and helps ensure that the results reflect real perceptions and experiences (Krosnick and Presser, 2010).

In this study, the survey items used to assess perception are adapted from previously validated tools in environmental psychology research. These instruments, originally developed by Stigsdotter and Grahn (2011) and later refined by Annerstedt van den Bosch et al. (2014), provide a strong theoretical foundation while remaining applicable to real-world contexts. More recently, Stoltz (2022) proposed a layered-habitats model that illustrates how these perceptual dimensions align with both evolutionary and restorative human needs, further reinforcing their relevance in contemporary environmental assessments. The questions are designed to be short, clear, and directly related to how people perceive specific environmental features, making them easier to interpret and answer accurately (Dillman, Smyth and Christian, 2014).

Each question is designed to reflect the perceptual aspects previously outlined in the study, using a 5-point Likert scale to measure the strength of perception. This consistent format helps avoid confusion and encourages honest responses by reducing the mental effort required to complete the survey. In survey research, simpler scales are often just as effective as more complex ones, and sometimes even more reliable, especially when used with diverse participant groups (Babbie, 2020; Schwarz and Hippler, 1995; Revilla, Saris and Krosnick, 2014).

By combining well-established methodology with practical survey design, this approach ensures that the collected data is both robust and meaningful. It reflects the actual experiences of participants in outdoor spaces and supports the study's goal of understanding how different individuals perceive the environment around them.

While a quantitatively driven, the study also incorporates limited qualitative elements to provide more space for participants to answer the questions fully. Two open-ended questions will capture participant perspectives that may not be fully expressed through fixed-choice formats. The first question is part of one of the quantitative dimensions, Diversity. It has been added with the aim of encouraging participants to provide broader and more thoughtful responses.

Participants are initially asked to measure the diversity in the study area on a scale from 1 to 5. This provides a starting point, where participants may suggest a number let us say 3. Following this, they are prompted with a qualitative question:

"If any, please write down some examples of diversity in the area." This encourages participants to think more deeply and generate specific examples of diversity, which could lead them to a more detailed response to their original evaluation. As they reflect, they may choose to increase or decrease their rating, offering a more thoughtful and nuanced response. However, the second part (qualitative) of this question is optional to guarantee the highest level of freedom in the participant's answer, while also preventing the question from becoming tedious or time-consuming.

The second qualitative question is separate, as it asks about the visitors' wishes for additional features in the place, or even for the entire city. This question is placed after the overall evaluation question in the survey to allow participants to reflect on the appeal of the place after answering a set of PSD-related questions.

On the other hand, the choice to include only two open-ended questions in the survey is deliberate and based on practical and methodological reasons. Too many open-ended questions can easily overwhelm participants, cause fatigue and lead them to provide shorter or less thoughtful answers, which lowers the overall quality of the data collected (Porter et al., 2019; Revilla, Saris & Krosnick, 2014). When surveys become too long or too complex, people might lose interest or rush through their responses, which risks missing the deeper insights these questions are meant to capture (Saunders, Lewis & Thornhill, 2019). Additionally, analyzing large amounts of qualitative data takes a lot of time and resources, something that's often beyond what's feasible in a master's-level study (Creswell & Poth, 2018). Keeping the qualitative part limited helps keep the survey manageable, focused, and more engaging for participants while still allowing the research to gain meaningful, richer insights (Dillman, Smyth & Christian, 2014).

By carefully selecting just a couple of open-ended questions, this approach complements the numerical data well and gives participants enough freedom to express their thoughts without making the survey feel overwhelming. This balance helps the study capture a more detailed and nuanced understanding of visitor experiences, without sacrificing clarity or risking a drop in participation (Bryman, 2016; Fetters, Curry & Creswell, 2013).

These aspects allow participants to share their experiences more openly, resulting in richer and more precise insights. The qualitative section is structured to provide clear and engaging survey experience by connecting the questions in a way that supports participants' understanding. By including only two open-ended questions, the survey remains focused and concise, which helps prevent participant fatigue and reduces the likelihood of confusion.

3.3.2 Procedures

Participants were recruited using a combination of social media platforms and email invitations, which is an effective and widely used approach for reaching diverse populations in online survey research (Evans & Mathur, 2018; Wright, 2017). After providing informed consent, each participant received a unique, secure link to access the questionnaire hosted on the Netigate platform. This ensured both data privacy and ease of access. Data collection took place over a two-week period, allowing sufficient time for participants to respond while maintaining momentum and relevance (Smith, 2020). All responses were automatically saved in a secure Netigate database, reducing the risk of data loss and ensuring confidentiality throughout the process (Qualtrics, 2022). This online recruitment and data collection method also helped streamline the process, minimize costs, and accommodate participant schedules flexibly (Bethlehem, 2019).

3.3.3 Ethical Considerations

The ethical considerations have been clearly outlined on the first page of the survey, where participants are informed that all information provided will be kept strictly confidential, and their identity or any personal information will not be disclosed (Davis, 2012). The data collected will be used solely for academic research purposes (Robson, 2011). By completing the survey, they provide their consent for the use of their responses as described (Bryman, 2016). Participants have the right to withdraw from the survey at any time without needing to provide any justification, and such withdrawal will not affect their relationship with the researcher (Mertens, 2014). All collected data will be securely stored to ensure confidentiality and protect it from unauthorized access (Cohen et al., 2018). The survey underwent translation validation to ensure that the translated version accurately reflects the original content and meaning. This process involved back-translation by bilingual experts to ensure linguistic and conceptual equivalence across languages (Behr, 2014). Following this, a pilot study was conducted to test the survey's clarity and functionality (Robson, 2011).

3.3.4 The Language of Survey

The English language served as the primary medium for the literature review and the overall structure of this study. However, since the study area is situated in a geographic and demographic context where Arabic is the dominant language, it was essential to incorporate Arabic into the research tool. Accordingly, the survey was translated into Arabic using dictionaries and guided by a thorough understanding of the original English literature and its contextual meaning.

To ensure the accuracy of the PSD and other parts of the survey transcript, the study employed translation validation as outlined by Brislin (1970). This process

involved two bilingual translators fluent in both Arabic and English. Additionally, the study incorporated several recommendations from Tyupa (2011) to address the complexities of meaning, context, and cultural nuance, and to ensure recognition of the dynamic and context-dependent nature of meaning during translation. The study also aimed to avoid literal translation by not assuming direct equivalence between the two languages.

Translation Validation

1. Forward translation: The first translator translated the original English survey into Arabic.

2. Back translation: A second translator performed a back-translation of the Arabic version into English.

3. Comparison: Then, a comparison and reconciliation process occurred between the original English and the final English translation provided by the second translator to identify any discrepancies or gaps in translation. Please refer to Appendix 1 for the translation validation work.

4. Revision: Then a simple revision of the language occurred, and further adjustments occurred.

Limited Pilot study:

A limited pilot study using cognitive pretesting techniques was conducted with three participants to assess their understanding of the survey questions and identify the most effective language for clarity. This method ensured that both the English and Arabic versions-maintained consistency and conveyed equivalent meanings (Behr, 2017; Willis, 2005).

The interviews or discussions with the three participants aimed to ensure accurate concept measurement. Since the study focuses on perceptions related to well-being, it is crucial that the survey questions accurately capture participants' experiences and understanding of the environment (Grahn & Stigsdotter, 2010; Korpela et al., 2014).

Additionally, the interviews were used to validate the bilingual versions of the survey, checking whether the translation retained the same meaning and if participants in both languages interpreted the questions similarly (Willis, 2005). The interviews also helped identify potential misunderstandings by detecting whether participants interpreted the questions differently, which could lead to biased data (Behr, 2017; Brislin, 1970).

After preparing the second draft of the survey, the study employed a pilot test on a small group of three people, asking them how they understood the questions and which language best served their understanding. Please refer to Appendix 2

for the survey questions provided in their final design on Netigate. This method helped verify the consistency and equivalence of meaning between the original and translated versions, a critical step in cross-cultural survey research (Behr, 2017; Brislin, 1970). The decision was made to create a dual-language survey, ensuring that the original English version was fully accurate and the Arabic version was validated using the method described above. This approach aimed to provide participants with the best possible opportunity to understand the questions, which is essential in assessing experiences in outdoor environments and well-being related to Perceived Sensory Dimensions (Grahn & Stigsdotter, 2010; Björk et al., 2008).

3.3.5 Expected Structure of Survey Results

The anticipated results from the survey will be organized into three main categories:

1. General Demographic and Behavioral Nominal (Johnson & Onwuegbuzie, 2004), Independent or Control (Tashakkori & Teddlie, 2010), binary (Field, 2013; Plano Clark & Ivankova, 2016) Variables:

   This includes responses related to participants' age, gender, frequency of park visits, and place of residence.

2. Evaluation of the Site Based on PSDs:

3. Participants' responses to questions aligned with the PSD framework will provide assessment of the sensory dimensions such as nature, social interaction, openness, and safety. Using Likert scales for ordinal levels of perceptions (DeVellis, 2016). On the other hand, DeVellis (2016) supports adapting scale points based on the dimension being measured, indicating the importance of clarity and appropriateness.

4. Overall Feedback on the Site and Reflections on Riyadh's Outdoor Future:

   General opinions and suggestions about the site and its role in shaping the future urban outdoor environment be gathered from open-ended responses on Boulevard City will. According to Dillman, Smyth, and Christian (2014) Open-ended questions give participants the freedom, which can increase satisfaction with the survey experience and provide more thoughtful data.

3.3.6 Data Analysis Approach

The data will be analysed using descriptive techniques, with Netigate serving as the primary tool for preliminary analysis. This will follow an initial pilot study to determine if any modifications to the questions are necessary to align with the expected outcomes. A more detailed descriptive analysis will then be conducted

using SPSS for deeper statistical insights (Field, 2013). This combined approach will help identify meaningful relationships and correlations between participant variables and perceptions of Public Space Design (PSDs). SPSS will also assist in calculating descriptive statistics, helping clarify the participant responses (Pallant, 2020).

Data Validity and reliability

A systematic approach to data preparation has been planned to ensure the accuracy and integrity of the dataset prior to conducting analysis in SPSS. This process will begin with a thorough review of the dataset to identify and correct any input errors, such as typographical mistakes, unrealistic values (e.g., negative age entries), and inconsistencies in the labelling of categorical responses (Field, 2018). Standardization of data formats will also be carried out to maintain uniformity across variables. Given the limited sample size, missing data will be assessed manually to determine the scope and potential impact. Based on this assessment, missing values will be addressed through appropriate methods such as deletion (either listwise or pairwise), basic imputation techniques (e.g., replacing with mean, median, or mode), or categorization when missingness carries analytical significance (Pallant, 2020). Each variable will be reviewed to confirm that it is correctly defined by its level of measurement nominal, ordinal, or scale to ensure suitability for statistical procedures (Dancey & Reidy, 2017).

Additionally, a detailed data log will be maintained to document all decisions, including variable definitions, coding, handling of missing data, and any transformations made. Preliminary descriptive statistics will be generated to provide an overview of data trends and to help identify any irregularities before proceeding with inferential analysis (Field, 2018).

Inferential Statistical Techniques: Hypothesis Testing, Correlation, and Regression Analysis

To explore significant differences between variables, a Chi-Square Test will be applied (Bryman & Cramer, 2011). Since the study involves a small sample size of 25 participants, Fisher's Exact Test will be used to ensure the accuracy of results (Field, 2013). These tests will focus on key demographic variables, such as gender and age, to understand their influence on perceptions of PSDs.

Furthermore, a One-Way ANOVA will be used to explore how demographic variables relate to perceptions of PSD alternatives, as these variables are grouped into several categories. A key focus will be on the language of participation, examining how various forms of participation how individuals perceive PSD alternatives. If significant differences are found using the One-Way ANOVA, post hoc tests (e.g., Tukey's HSD or Bonferroni) will be conducted to identify which specific groups exhibit differences. Post hoc tests are critical for comparing multiple groups means while controlling the risk of Type I errors that arise when

performing several comparisons (Field, 2013). Tukey's HSD is particularly useful for comparing all possible pairwise group differences, while the Bonferroni correction applies a stricter significance threshold to reduce the likelihood of Type I errors (Pallant, 2020).

Content Analysis

For the qualitative portion of the study, content analysis will be utilized to examine the small dataset of participant responses. Content analysis is well-suited for small datasets because it enables a thorough and systematic review of participant feedback. By categorizing responses into meaningful themes and patterns, content analysis will provide valuable insights into participants' experiences and their perceptions of PSDs. According to Krippendorff (2018), content analysis involves systematically coding textual data into distinct categories, which allows researchers to draw conclusions based on emerging patterns. This approach will complement the quantitative findings and provide a more comprehensive understanding of the participants' views.

Graphs

As part of the data visualization strategy in SPSS, graphs will be employed to support both descriptive and inferential statistical analyses. In the descriptive phase, graphical tools such as bar charts will be used to illustrate the frequency and distribution of categorical variables, allowing for a clearer understanding of group patterns and trends within the dataset (Pallant, 2020). These visual representations are particularly effective in presenting data summaries in an accessible and interpretable format. In the inferential phase, more complex visualizations such as interaction plots will be utilized, especially in the context of ANOVA, to explore and display how the effect of one independent variable may change depending on the level of another (Field, 2018). The use of graphs not only enhances the interpretability of statistical findings but also strengthens the presentation of results by providing visual evidence that complements numerical outputs.

As a conclusion, by integrating both quantitative methods (such as Chi-square, Fisher exact ANOVA and post hoc tests) and qualitative content analysis, the study aims to enhance research in environmental psychology, specifically in relation to public outdoor spaces in Riyadh, with a focus on Boulevard City.

3.3.7 Climate Consideration in Methodology

While Boulevard City remains open throughout the day and into the night for most of the year, the core aim of this study is not to evaluate its response to climate, but rather to understand how people perceive and interact with the space.

Given Riyadh's extreme desert climate with scorching summer days and relatively pleasant winters, seasonal conditions inevitably influence how and when visitors choose to use the space. People tend to come during cooler hours, particularly in the evening, or in milder months when the outdoor environment feels more comfortable. However, this study views climate as part of the background context rather than the central subject of investigation.

What truly matters here is how users experience Boulevard City on a personal and social level. That includes how they respond to the layout, whether they feel comfortable walking through different zones, how they engage with public squares and gathering spaces, and whether the environment supports a sense of ease, interaction, or belonging. It is about how space feels, not just how it functions.

Urban theorists such as Lynch (1960) have long emphasized that people form mental impressions of cities based on how readable and coherent their environments are. In a similar vein, Nasar (1998) explains that user experience is deeply emotional. Factors like beauty, atmosphere, and spatial clarity affect how people judge and remember a place. In the case of Boulevard City, features like shaded walkways, accessible pathways, and inviting gathering areas all play a role in shaping perception, regardless of the temperature at any given time.

Even though the desert climate influences patterns of use, the focus of this study remains on the human experience and how the design supports comfort, encourages activity, and builds a connection between people and place. According to Carmona et al. (2010), great public spaces are not just physically functional. They create a sense of welcome, foster social life, and make people want to return. By examining how users perceive and use Boulevard City, we gain insights into how urban spaces can be made more meaningful, inclusive, and enjoyable in any environment.

4. Results

These papers present the results from a survey conducted over an 8-day period. Out of 31 distributed surveys, 27 were fully completed, giving a high response rate of approximately 87%. The average response time was 2 minutes and 56 seconds. Following the results will be presented question by question as divided into groups see the material and method mentioned previously in this study. Thus, the results will be presented as tables of percentages for the quantitative questions and list of the qualitative oriented ones.

The results, as outlined in Section 3: Materials and Methods and published in the survey, will be presented in both English and Arabic.

4.1 Age Distribution of Survey Respondents

In Table 1, below shows the number and percentage of respondents within each age group based on a total of 31 completed surveys.

Table 1. Age distribution: frequency and percentage

Age Group	Number of Responses	Percentage
a. 12 years or younger (أقل من 12 سنة)	2	6%
b. 13–19 years (13-19 سنة)	1	3%
c. 20–35 years (20-35 سنة)	19	61%
d. 36–55 years (36-55 سنة)	8	26%
e. 55+ years (فوق 55 سنة)	1	3%
Total	31	100%

4.2 Gender Distribution of Survey Respondents

In Table 2, presents the gender breakdown of the 31 survey respondents.

Table 2. Gender distribution: frequency and percentage

Gender	Number of Responses	Percentage
a. Female (أنثى)	17	55%
b. Male (ذكر)	13	42%
c. Prefer not to say (أفضل أن لا أذكر)	1	3%
Total	31	100%

4.3 Residence Background of Participants

In Table 3, displays the current location of the 31 survey respondents at the time of participating in the survey.

Table 3. Residence background: frequency and percentage

Location	Number of Responses	Percentage
a. Riyadh (الرياض)	26	84%
b. KSA – Outside Riyadh (في المملكة العربية السعودية (خارج الرياض	5	16%
c. Tourist – Outside KSA (سائح من خارج المملكة (العربية السعودية	0	0%
Total	31	100%

4.4 Visit Frequency

In Table 4, illustrates how often the 31 respondents reported visiting the location.

Table 4. Visit frequency to the study area: frequency and percentage

Frequency of Visit	Number of Responses	Percentage
a. Daily (يوميا)	0	0%
b. Weekly (أسبوعيا)	3	10%
c. Monthly (شهريا)	3	10%
d. More than 2 times a year (أكثر من مرتين سنويا)	12	39%
e. Less than 2 times a year (أقل من مرتين سنويا)	13	42%
Total	31	100%

4.5 Companions During the Visit

In Table 5, shows with whom the respondents reported visiting the location.

Table 5. Visiting companions: frequency and percentage

Companion Type	Number of Responses	Percentage
a. Friends (الأصدقاء)	6	19%
b. Family (العائلة)	11	35%
c. Both friends and family (الأصدقاء و العائلة)	11	35%
d. By oneself (منفرداً)	3	10%
Total	31	100%

4.6 Perception of the study area 's Natural values

In Table 6, shows the respondents' perceptions of the location's attractiveness, ranging from "unnatural" to "natural."

Table 6. PSD-Natural value level: frequency and percentage

Natural value Level	Number of Responses	Percentage
1. Unnatural (غير طبيعي)	2	7%
2. (2)	8	29%
3. (3)	5	18%
4. (4)	5	18%
5. Natural (طبيعي)	8	29%
Total	31	100%

4.7 Perception of the Cultural Value of the study area

In Table 7, shows the respondents' perceptions of the cultural value of the location, ranging from "non-cultural" to "cultural."

Table 7. PSD-Cultural value level: frequency and percentage

Cultural Value Level	Number of Responses	Percentage
1. Non-cultural place (مكان فقير ثقافيا)	0	0%
2. (2)	4	14%
3. (3)	9	32%
4. (4)	4	14%
5. Cultural place (مكان غني ثقافيا)	11	39%
Total	31	100%

4.8 Perception of Openness in the study area

In Table 8, shows the respondents' perceptions of the level of openness in the location, ranging from "lacking openness" to "having great openness."

Table 8. PSD-Open value level: frequency and percentage

Openness Level	Number of Responses	Percentage
1. Place lacks openness (مكان تفتقر إلى الانفتاح بالفرص)	0	0%
2. (2)	2	7%
3. (3)	10	36%
4. (4)	6	21%
5. Openness in a place (مكان يفتح آفاق كبيرة)	10	36%
Total	31	100%

4.9 Perception of Social Interaction in the study area

In Table 9, shows the respondents' perceptions of the social nature of the location, ranging from "non-social" to "social."

Table 9. PSD-Social value level: frequency and percentage

Social Value Level	Number of Responses	Percentage
1. Non-social place (مكان غير اجتماعي)	1	4%
2. (2)	2	7%
3. (3)	4	14%
4. (4)	9	32%
5. Social place (مكان اجتماعي)	12	43%
Total	31	100%

4.10 Perception of the Cohesion of the study area

In Table 10, shows the respondents' perceptions of the cohesion of the location, ranging from "fragmented" to "cohesive."

Table 10. PSD-Cohesive value level: frequency and percentage

Cohesion Level	Number of Responses	Percentage
1. Fragmented place (بيئة مفككة)	0	0%
2. (2)	4	14%
3. (3)	9	32%
4. (4)	7	25%
5. Cohesive place (بيئة متكاملة)	8	29%
Total	31	100%

4.11 Perception of the Diversity of Experiences in the study area

In Table 11, table shows the respondents' perceptions of the diversity of experiences offered by the location, ranging from "limited" to "a place with a range of experiences."

Table 11. PSD-Diverse value level: frequency and percentage

Experience Variety Level	Number of Responses	Percentage
1. Limited place (مكان محدود)	0	0%
2. (2)	4	14%
3. (3)	8	29%
4. (4)	8	29%
5. Place with a range of experiences (مكان ذو بيئة متنوعة)	8	29%
Total	31	100%

4.12 Perception of Safety in the study area

In Table 12, shows the respondents' perceptions of safety in the location, ranging from "unsheltered" to "safe and sheltered."

Table 12. PSD-Sheltered value level: frequency and percentage

Safety Level	Number of Responses	Percentage
1. Unsheltered or unsafe place (مكان لا يشعر بالأمان)	0	0%
2. (2)	1	4%
3. (3)	6	21%
4. (4)	7	25%
5. Safe and sheltered place (مكان آمن ومحمي)	14	50%
Total	31	100%

4.13 Perception of Serenity in the study area

In Table 13, shows the respondents' perceptions of the serenity of the location, ranging from "non-serene" to "serene."

Table 13. PSD-Serene value level: frequency and percentage

Serenity Level	Number of Responses	Percentage
1. Non-serene place (مكان غير هادئ أو شاعري)	2	7%
2. (2)	3	11%
3. (3)	9	32%
4. (4)	3	11%
5. Serene place (مكان هادئ وشاعري)	11	39%
Total	31	100%

4.14 Overall Sentiment Towards the Study

In Table 14, shows the respondents' overall sentiment towards the location, ranging from "I do not like it" to "I love this place."

Table 14. Overall appealing value: frequency and percentage

Sentiment Level	Number of Responses	Percentage
1. I do not like it; but no other choices (لا أحبه؛ ولكن لا توجد خيارات أخرى)	0	0%
2. (2)	1	4%
3. (3)	8	29%
4. (4)	8	29%
5. I love this place (أحب هذا المكان)	11	39%
Total	31	100%

4.15 Additional Comments and Suggestions from Respondents:

The following points summarize additional feedback and suggestions provided by respondents. These responses highlight specific aspects of the location that could be enhanced to improve visitor satisfaction and experience.

1. More gardens, more playgrounds (حدائق أكثر، مناطق ألعاب أكثر)

2. Community attractions and physical interaction with the audience (أنشطة مجتمعية وتفاعل مادي مع الجمهور)

3. No missing dimensions, the place is perfect (لا يوجد ابعاد مفقودة المكان مثالي)

4. I don't know honestly (لا أدري صراحة)

5. I went there and found it difficult to park the car (ذهبت هناك ووجدت صعوبة في مكان مواقف السيارات)

6. Everything is perfect (كل شيء مثالي)

7. All activities are excellent (جميع الأنشطة ممتازة)

8. Various playgrounds for children (أماكن لعب للأطفال متنوعة)

9. The prices are exaggerated for restaurants, please consider this (الأسعار مبالغ فيها مطاعم يرجى مراعاة الموضوع)

10. Interactive children's games (ألعاب أطفال حركية)

4.16 Results of the PSD of Participants in Boulevard City

The survey data analyzed using SPSS as presented in table 15 revealed how participants rated each of the eight Perceived Sensory Dimensions (PSDs). The two highest-scoring dimensions were Sheltered (mean = 4.14) and Social (mean = 4.09), suggesting that people especially valued areas that felt safe, comfortable, and socially engaging. On the other end, the dimensions with the lowest average scores were Natural (mean = 3.28) and Serene (mean = 3.53). While these scores are still above the midpoint of the scale, they show that nature and calmness were less strongly perceived in this setting.

Table 15. PSDs assessments_ SPSS statistics table (SPSS outcome)

Statistics

		Natural	Cultural	Open	Social	Cohesive	Diversity	Sheltered	Serene
N	Valid	43	43	43	43	43	43	43	43
	Missing	3	3	3	3	3	3	3	3
Mean		3.28	3.79	3.88	4.09	3.67	3.77	4.14	3.53
Median		3.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00
Mode		2	5	5	5	3ª	4ª	5	5
Sum		141	163	167	176	158	162	178	152

a. Multiple modes exist. The smallest value is shown

Overall, all mean scores were above 3.0, which indicates that participants generally had a positive impression of the space across all dimensions. These findings are detailed in Table 15, which summarizes the statistical outcomes.

4.16.1 Natural

Feedback from 28 participants on how natural Boulevard City feels revealed a wide range of opinions. Using a scale from 1 (unnatural) to 5 (very natural), the average rating was 3.32, with a standard deviation of 1.34. This suggests that, overall, participants saw the space as somewhat natural, but not strongly so. Interestingly, nearly a third of respondents (29%) rated the space as very natural, while the same percentage gave it a low score of 2, closer to unnatural. These opposing views show that people had very different impressions of space's natural qualities.

Natural and age

To examine whether age influences how participants perceive the natural dimension of Boulevard City, several statistical tests were performed using SPSS. The Pearson Chi-Square test yielded a value of 11.745 with 16 degrees of freedom and a p-value of 0.761, which is well above the commonly accepted threshold of 0.05. This suggests that there is no statistically significant relationship between participants' age groups and their perception of naturalness. The Likelihood Ratio test showed consistent results, with a statistic of 11.066 (df = 16) and a p-value of 0.805, further confirming the absence of a meaningful association.

Table 16. Chi-Square Tests for the Association Between Age Groups and Ratings of the Natural Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	11.745[a]	16	.761	.869		
Likelihood Ratio	11.066	16	.805	.866		
Fisher-Freeman-Halton Exact Test	14.306			**.916**		
Linear-by-Linear Association	1.114[b]	1	.291	.348	.177	.046
N of Valid Cases	27					

a. 24 cells (96.0%) have expected count less than 5. The minimum expected count is .07.

b. The standardized statistic is 1.055.

However, it's important to acknowledge that 86.7% of the cells in the contingency table had expected counts below 5, and the minimum expected count was just 0.21. This violates a key assumption of the Chi-Square test, which requires sufficient expected frequencies in each cell. To account for this limitation, the Fisher-Freeman-Halton Exact Test was used as a more appropriate alternative for small sample sizes. This test produced a value of 14.306 with an exact p-value of 0.916, once again showing no significant association between age and the natural dimension.

The Linear-by-Linear Association test, which examines trends across ordered categories, returned a statistic of 1.114 (df = 1), with two-sided and one-sided p-values of 0.291 and 0.177 respectively. These values are also above the 0.05 threshold, suggesting no linear trend between increasing age and perception of naturalness.

Figure 8. Bar Chart of Age Groups and Ratings of the Natural Dimension (SPSS outcome)

Natural and Gender

To explore whether perceptions of the "Natural" dimension differ by gender, several statistical tests were conducted using SPSS. The Pearson Chi-Square test produced a value of 4.111 with 4 degrees of freedom and a p-value of 0.391, which is well above the typical significance threshold of 0.05. This indicates that there is no statistically significant relationship between gender and how natural space was perceived. Supporting this outcome, the Likelihood Ratio test yielded a similar result, with a value of 4.328 (df = 4) and a p-value of 0.363 again confirming the absence of a significant association.

Table 17. Chi-Square Tests for the Association Between Gender and Ratings of the Natural Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4.111[a]	4	.391	.484		
Likelihood Ratio	4.328	4	.363	.506		
Fisher-Freeman-Halton Exact Test	4.200			.418		
Linear-by-Linear Association	1.561[b]	1	.211	.256	.136	.053
N of Valid Cases	27					

a. 10 cells (100.0%) have expected count less than 5. The minimum expected count is .96.

b. The standardized statistic is -1.250.

However, the analysis also showed that all 10 cells (100%) in the contingency table had expected counts less than 5, with the smallest expected count being 0.96. This suggests a violation of the Chi-Square test's assumption regarding adequate expected frequencies. To address this, the Fisher-Freeman-Halton Exact Test was conducted, which is more suitable for small sample sizes. This test returned to a value of 4.200 with an exact p-value of 0.418, reinforcing the finding that gender is not significantly associated with perceptions of naturalness.

The Linear-by-Linear Association test was also applied to assess whether there is any trend between gender and the natural dimension. The test statistics were 1.561 with one degree of freedom, and p-values of 0.211 (two-sided) and 0.136 (one-sided). These results also fell well above the 0.05 cutoff, indicating no linear trend between the variables.

Figure 9. Bar Chart of Gender and Ratings of the Natural Dimension (SPSS outcome)

4.16.2 Cultural

Data from 28 participants who rated Boulevard City on a scale from 1 (non-cultural place) to 5 (cultural place) show a generally positive perception of its cultural character. The average score was 3.79, with a standard deviation of 1.11, indicating that most participants found the area to be culturally rich. Notably, 39% of respondents gave the highest possible score (5), and a significant portion rated it slightly above neutral (3 or 4). This suggests that while perceptions were generally favourable, not all participants viewed the space as equally rich in cultural features.

Cultural and Age

To determine whether perceptions of the cultural dimension in Boulevard City vary by age, a series of statistical tests were conducted using SPSS. The Pearson Chi-Square test produced a value of 11.835 with 12 degrees of freedom, resulting in a p-value of 0.459. As this value exceeds the conventional threshold of 0.05, the test suggests no statistically significant relationship between age and perceptions of the space's cultural qualities. '

Table 18. Chi-Square Tests for the Association Between Age and Ratings of the Cultural Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	11.835[a]	12	.459	.518		
Likelihood Ratio	12.200	12	.430	.394		
Fisher-Freeman-Halton Exact Test	13.398			.308		
Linear-by-Linear Association	1.033[b]	1	.310	.382	.191	.056
N of Valid Cases	28					

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .14.

b. The standardized statistic is -1.016.

The Likelihood Ratio test confirmed these results, yielding a value of 12.200 with a p-value of 0.430, which also indicates a non-significant association. However, it should be noted that 18 cells (90%) in the contingency table had expected counts less than 5, with the minimum expected count as low as 0.14. This raises concerns about the validity of the Chi-Square test due to violation of assumptions related to expected frequency distributions.

To account for these limitations, the Fisher-Freeman-Halton Exact Test which is more reliable for small sample sizes and sparse data was conducted. This test yielded a statistic of 13.398 and an exact p-value of 0.308, again indicating no significant association between age and the cultural dimension.

The Linear-by-Linear Association test also produced non-significant findings, with a test statistic of 1.033, 1 degree of freedom, and two-sided and one-sided p-values of 0.310 and 0.382, respectively. These results further confirm the absence of a linear trend or directional relationship. The standardized statistic (-1.016) and point probability (0.056) similarly suggest no significant correlation.
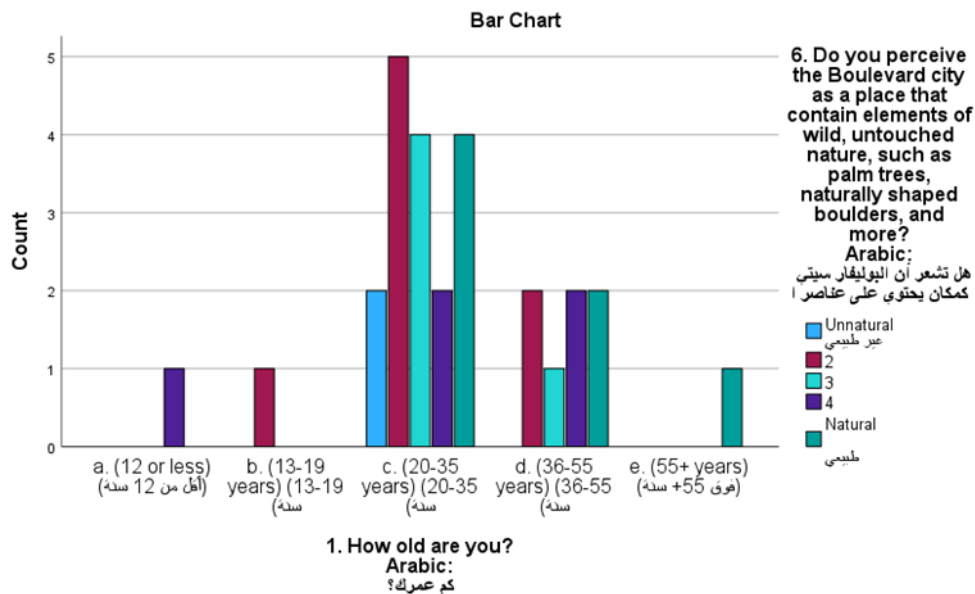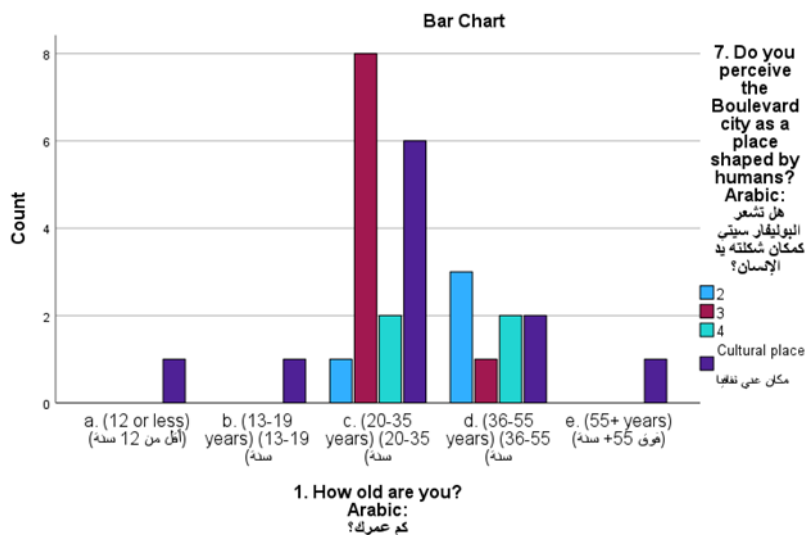

Figure 10. Bar Chart of Age and Ratings of the Cultural Dimension (SPSS outcome)

Cultural and Gender

To assess whether perceptions of the cultural dimension in Boulevard City differ by gender, a Chi-Square test of independence was conducted. The Pearson Chi-Square statistic was 3.755 with 6 degrees of freedom, resulting in a p-value of 0.710. Since this value is well above the 0.05 significance threshold, the test indicates no statistically significant association between gender and participants' perceptions of cultural richness in the space.

Table 19. Chi-Square Tests for the Association Between Gender and Ratings of the Cultural Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.755[a]	6	.710	.758		
Likelihood Ratio	4.094	6	.664	.738		
Fisher-Freeman-Halton Exact Test	4.500			**.798**		
Linear-by-Linear Association	.004[b]	1	.950	1.000	.534	.114
N of Valid Cases	28					

a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .14.

b. The standardized statistic is .063.

This finding is further supported by the Likelihood Ratio test, which produced a statistic of 4.094 (df = 6) with a p-value of 0.664, again suggesting no meaningful relationship. However, it is important to note that 10 cells (83.3%) in the contingency table had expected counts less than 5, with the lowest expected count being 0.14. This violates the assumptions of the Chi-Square test, particularly the requirement for sufficient expected frequencies in each cell.

To address this issue, the Fisher-Freeman-Halton Exact Test a non-parametric alternative suited for small or sparse datasets was applied. This test produced a result of 4.500, with an exact two-sided significance of 0.798, reaffirming the lack of a significant association between gender and the cultural dimension.

The Linear-by-Linear Association test also showed no significant trend, with a test statistic of 0.004, 1 degree of freedom, and a two-sided p-value of 0.950. The one-sided significance (1.000) and standardized statistic (0.063) further support the absence of any linear or directional association.
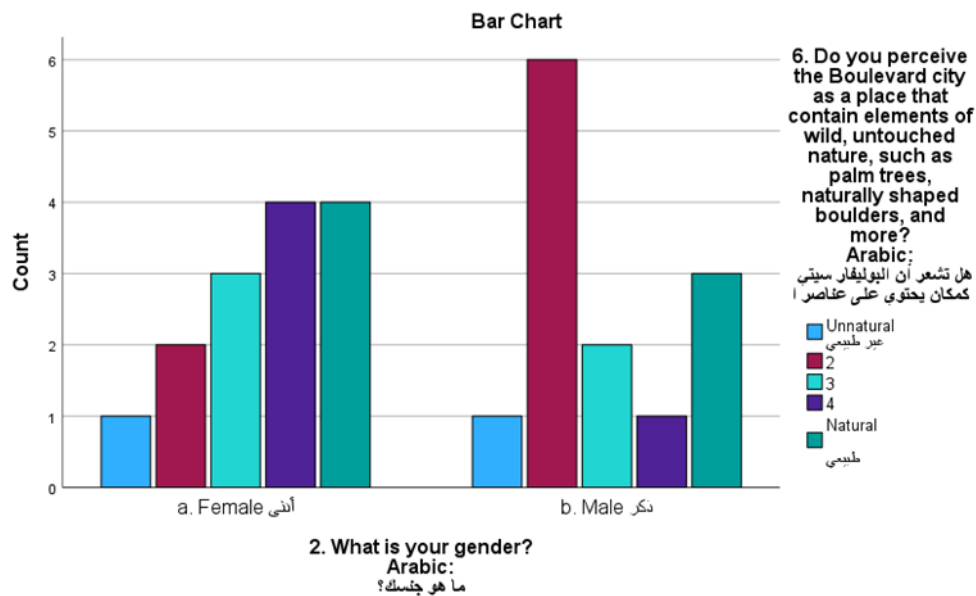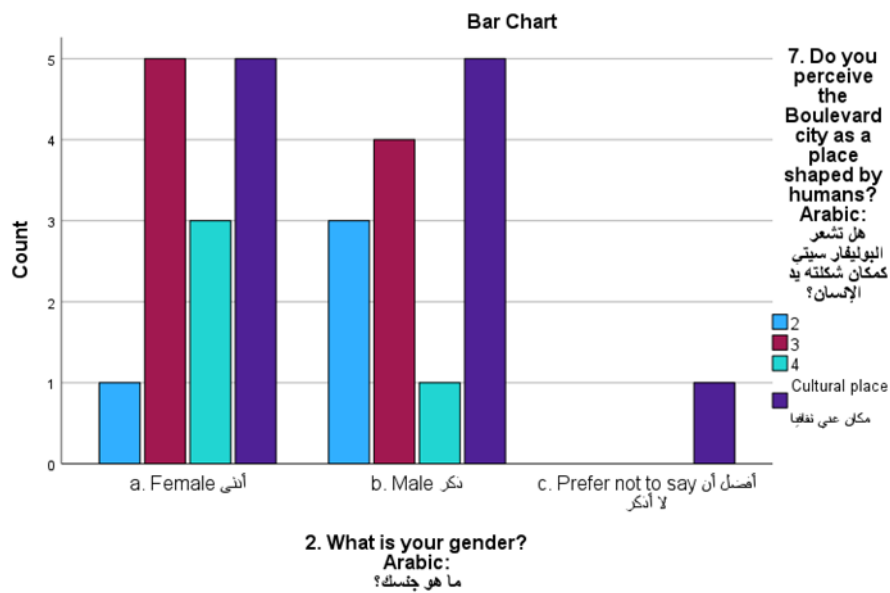
Figure 11. Bar Chart of Gender and Ratings of the Cultural Dimension (SPSS outcome)

4.16.3 Open

Data from 28 participants evaluating Boulevard City on a scale from 1 (place lacks openness) to 5 (place offers openness) revealed a generally positive perception of openness. The average score was 3.86, with a standard deviation of 0.99, indicating moderate variability in responses. Notably, 36% of participants rated space at the highest level of openness (5), while another 36% gave a moderate rating (3). Very few participants rated the area poorly in terms of openness, with 0% selecting 1, and only 7% selecting 2.

Open and Age

The statistical analysis investigated the relationship between participants' age groups and their perceptions of the openness in Boulevard City. The Pearson Chi-Square test produced a statistic of 14.288 with 12 degrees of freedom, yielding a p-value of 0.283. Since this value is well above the conventional significance level of 0.05, the result suggests no statistically significant association between age and perceived openness.

Table 20. Chi-Square Tests for the Association Between Age and Ratings of the Open Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	14.288[a]	12	.283	.272		
Likelihood Ratio	15.679	12	.206	.108		
Fisher-Freeman-Halton Exact Test	15.202			**.153**		
Linear-by-Linear Association	.065[b]	1	.799	.903	.450	.094
N of Valid Cases	28					

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .07.

b. The standardized statistic is .254.

The Likelihood Ratio test yielded a similar outcome, with a statistic of 15.679 and a p-value of 0.206, further supporting the Pearson result. Although slightly closer to significance, it still does not indicate a meaningful relationship.

Due to a violation of Chi-Square assumptions with 90% of cells having expected counts below 5 (minimum expected count = 0.07) the Fisher-Freeman-Halton Exact Test was employed. This test, more appropriate for small or sparse data, produced a statistic of 15.202 and an exact significance value of 0.153. While this value is somewhat lower, it remains non-significant.

Finally, the Linear-by-Linear Association test returned a statistic of 0.065 (1 degree of freedom), with two-sided and one-sided p-values of 0.799 and 0.903, respectively. The standardized statistics of 0.254 also support the absence of a linear relationship between age and perceptions of openness.
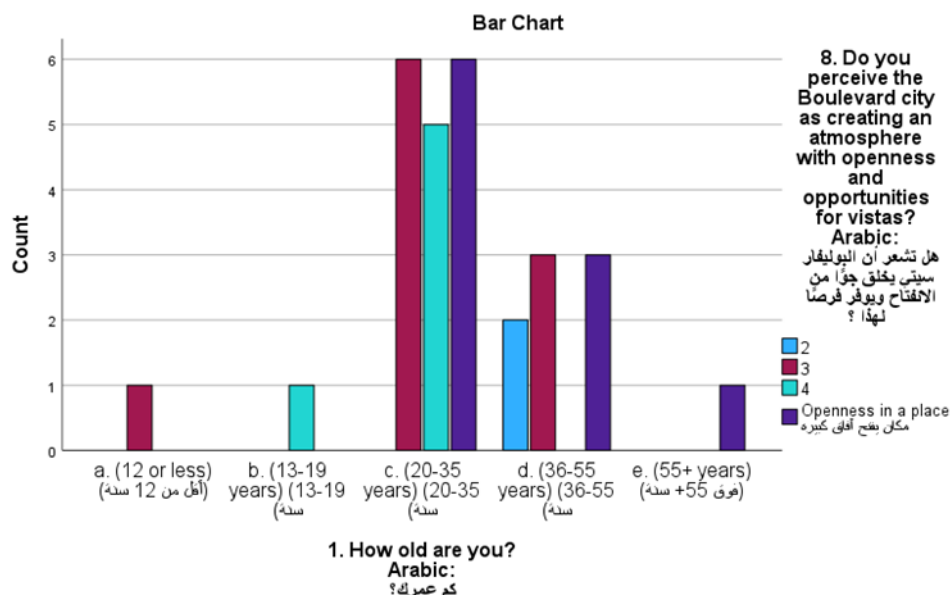
Figure 12. Bar Chart of Age and Ratings of the Open Dimension (SPSS outcome)

Open and Gender

The relationship between gender and the perceived openness of Boulevard City was examined using several statistical methods. The Pearson Chi-Square test shows a p-value of 0.383. Since this value exceeds the conventional significance threshold of 0.05, the test indicates that there is no statistically significant association between gender and openness ratings.

Table 21. Chi-Square Tests for the Association Between Gender and Ratings of the Open Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.369[a]	6	.383	.373		
Likelihood Ratio	7.299	6	.294	.301		
Fisher-Freeman-Halton Exact Test	6.859			**.354**		
Linear-by-Linear Association	.143[b]	1	.705	.747	.419	.121
N of Valid Cases	28					

a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .07.

b. The standardized statistic is .379.

The Likelihood Ratio test further supports this conclusion, yielding a statistic of 7.299 (df = 6) with a p-value of 0.294. These results consistently suggest that participants' gender does not meaningfully influence how they perceive the openness of the environment.

However, the assumptions underlying the Chi-Square test were not fully met, as 83.3% of cells (10 out of 12) had expected counts lower than 5. The minimum expected count was 0.07, which violates the test's assumption regarding minimum cell frequencies. Therefore, the Fisher-Freeman-Halton Exact Test done for small sample sizes or sparse data was conducted. It produced a test value of 6.859, with a two-sided exact significance of 0.354, reinforcing the initial findings of no statistically significant association.

The Linear-by-Linear Association test shows a two-sided p-value of 0.705, with a one-sided p-value of 0.747. These figures suggest no significant linear trend between gender and openness ratings. The standardized statistic of 0.379 further confirms the lack of any meaningful directional relationship.
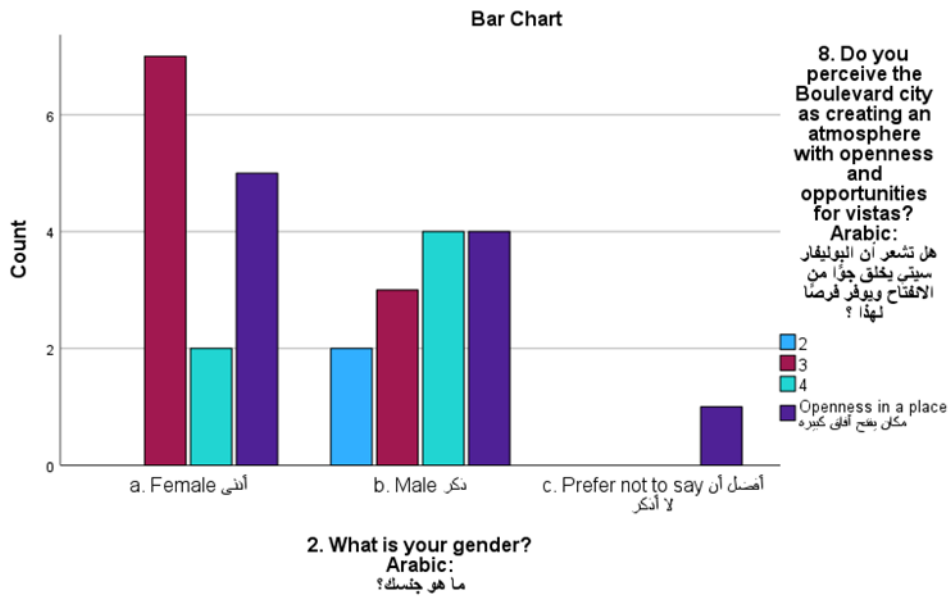
Figure 13. Bar Chart of Gender and Ratings of the Open Dimension (SPSS outcome)

4.16.4 Social

Out of 28 people who rated Boulevard City on how social it feels, using a scale from 1 (not social at all) to 5 (very social), most gave it a high score. The average rating was 4.04, which already suggests it's seen as a lively and social place. The most common rating was 5, chosen by 43 percent of participants, followed by 32 percent who gave it a 4. About 14 percent gave it a 3, right in the middle, and only 7 percent felt it was less social, giving it a 2. No one rated it as the lowest score of 1.

The responses show a clear trend. Most people see Boulevard City as a place where people connect, meet, and socialize. The standard deviation of 1.09 tells us there's some variation in opinions, but not a huge amount. Results tend to give a positive impression.

Social and Age

The analysis using the Pearson Chi-Square test yielded a statistic of 10.263 with 16 degrees of freedom, resulting in a p-value of 0.853. Since this value is much higher than the common threshold of 0.05, we can conclude that there is no statistically significant association between age and how participants rated the social nature of Boulevard City. Similarly, the Likelihood Ratio test returned a statistic of 11.693 with the same degrees of freedom and a p-value of 0.765, again well above 0.05. These is no meaningful relationship between these two variables in the study.

However, an important observation is that 23 out of 25 cells (92%) had expected counts less than 5, with the lowest expected count being 0.04. This is a concern because one of the assumptions of the chi-square test is that expected frequencies should generally be 5 or more to ensure accurate results.

Because of this, the Fisher-Freeman-Halton Exact Test was also used, which is more appropriate when expected frequencies are low or when the sample size is small. This test resulted in a value of 18.226, with an exact significance of 0.693. Again, this p-value suggests there is no significant relationship between age and the social dimension. Additionally, the Linear-by-Linear Association test showed a statistic of 0.055 with 1 degree of freedom, and p-values of 0.814 (two-sided) and 0.907 (one-sided). These values confirm that there is no linear trend or directional association between age and social perception.

Table 22. Chi-Square Tests for the Association Between Age and Ratings of the Social Dimension

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.263[a]	16	.853	.753		
Likelihood Ratio	11.693	16	.765	.670		
Fisher-Freeman-Halton Exact Test	18.226			**.693**		
Linear-by-Linear Association	.055[b]	1	.814	.907	.460	.092
N of Valid Cases	27					

a. 23 cells (92.0%) have expected count less than 5. The minimum expected count is .04.

b. The standardized statistic is -.235.
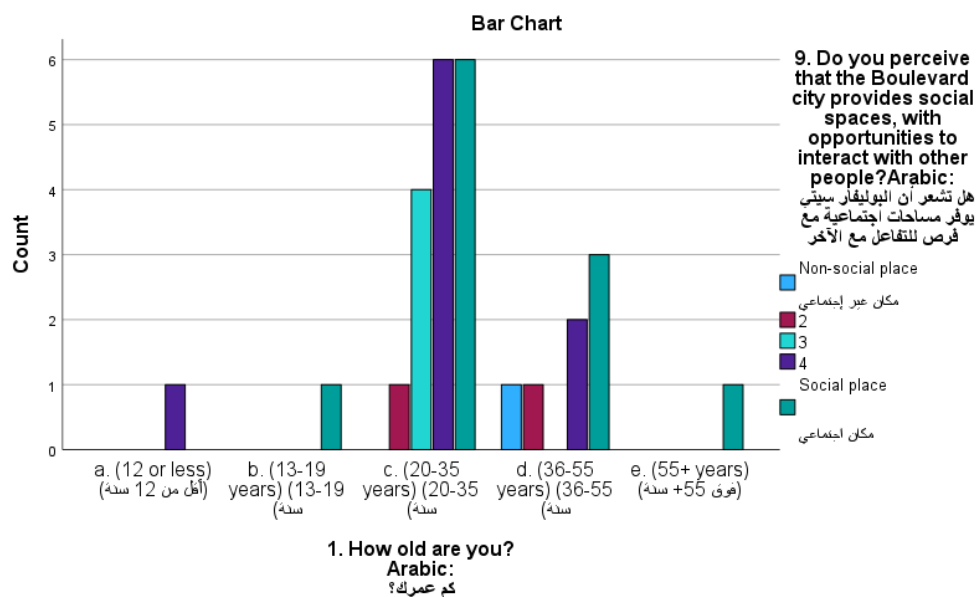
Figure 14. Bar Chart of Age and Ratings of the Social Dimension (SPSS outcome)

Social and Gender

The Pearson Chi-Square test resulted in a value of 4.171 with 4 degrees of freedom, and a p-value of 0.383. Since this p-value is much higher than the standard threshold of 0.05, it suggests there is no significant relationship between gender and how participants rated the social dimension of Boulevard City.

Similarly, the Likelihood Ratio test supports this result, with a statistic of 5.371 and a p-value of 0.251, also well above the 0.05 cutoff. This further confirms that gender does not appear to be meaningfully linked to participants' social perception of space.

8 out of 10 cells (80%) in the crosstab had counts below 5. The lowest count is 0.48. This raises a concern about violating one of the assumptions of the chi-square test, which expects most cells to have larger expected values.

The Fisher-Freeman-Halton Exact Test was conducted to solve this. This test is better suited for smaller sample sizes and when expected frequencies are low. It produced a test value of 3.732 with a significance level of 0.518, again showing no statistically significant link between gender and the social dimension.

Finally, the Linear-by-Linear Association test results a statistic of 0.121. It has a p-value of 0.728 (two-sided) and 0.867 (one-sided). These results further reinforce the conclusion, showing no meaningful linear trend or directional pattern between gender and social ratings.

Table 23.Chi-Square Tests for the Association Between Gender and Ratings of the Social Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4.171[a]	4	.383	.461		
Likelihood Ratio	5.371	4	.251	.438		
Fisher-Freeman-Halton Exact Test	3.732			**.518**		
Linear-by-Linear Association	.121[b]	1	.728	.867	.434	.127
N of Valid Cases	27					

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is .48.

b. The standardized statistic is .347.
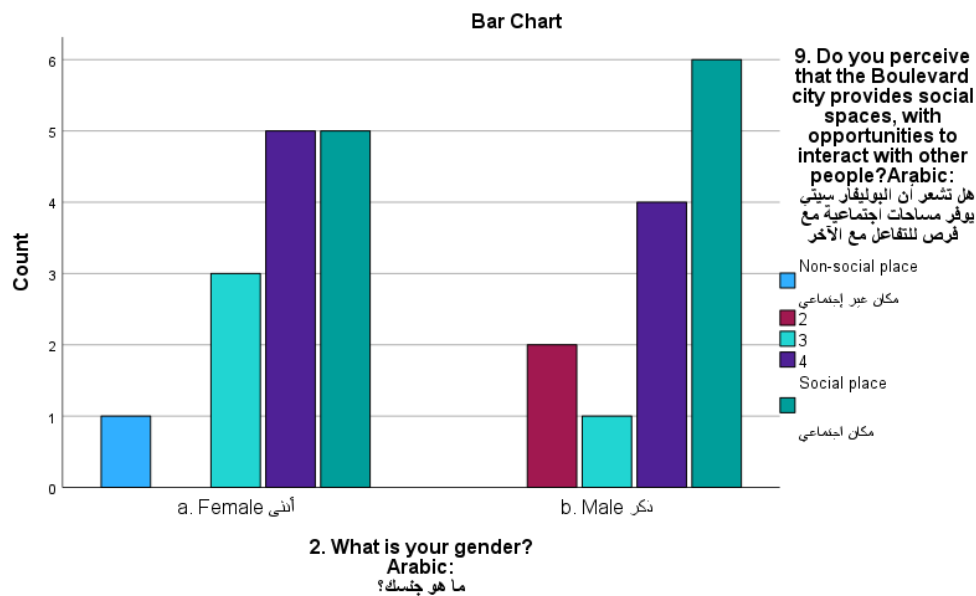
Figure 15. Bar Chart of Gender and Ratings of the Social Dimension (SPSS outcome)

4.16.5 Cohesive

Data collected from 28 participants rating Boulevard City on a scale from 1 (fragmented place) to 5 (cohesive place) reveals a moderately positive perception of spatial cohesion. The mean score is 3.68 and a standard deviation is 1.04. The largest proportion of responses (29%) rated Boulevard City as highly cohesive (score of 5), while 32% provided a moderate score (3), and 25% rated it somewhat cohesive (4). Only 14% of respondents rated it as lacking cohesion (score of 2), and no participants selected the lowest score (1).

Cohesive and Age

The relationship between participants' age and their perceptions of spatial cohesion in Boulevard City was tested using several statistical measures. The Pearson Chi-Square test resulted in a value of 10.666 with 12 degrees of freedom, and an asymptotic significance (two-sided) of 0.558. As this p-value is substantially higher than the conventional threshold of 0.05, it suggests no statistically significant association between age and ratings of the cohesive dimension.

Table 24. Chi-Square Tests for the Association Between Age and Ratings of the Cohesive Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.666[a]	12	.558	.668		
Likelihood Ratio	10.182	12	.600	.692		
Fisher-Freeman-Halton Exact Test	10.930			**.677**		
Linear-by-Linear Association	.092[b]	1	.762	.816	.430	.089
N of Valid Cases	28					

a. 19 cells (95.0%) have expected count less than 5. The minimum expected count is .14.

b. The standardized statistic is .303.

To validate this outcome, the Likelihood Ratio test was also conducted, yielding a statistic of 10.182 (df = 12) and a p-value of 0.600. This result aligns with the Pearson test, indicating that the distribution of cohesion ratings does not vary significantly by age group.

However, it is important to highlight that 95% of the cells (19 out of 20) had expected frequencies below 5, with the lowest expected count at 0.14. This constitutes a substantial violation of the Chi-Square test's assumptions, which can limit the validity of the results. To address this limitation, the Fisher-Freeman-Halton Exact Test more suitable for small and sparse datasets was performed. This test produced a result of 10.930, with an exact significance (two-sided) of 0.677, further reinforcing the conclusion that there is no significant relationship between age and perceived spatial cohesion.

In addition, the Linear-by-Linear Association test produced a test statistic of 0.092 with 1 degree of freedom. The two-sided p-value was 0.762, and the one-sided p-value was 0.816, with a standardized statistic of 0.303. These results also support the absence of a meaningful trend or linear relationship between age and perceptions of cohesion.
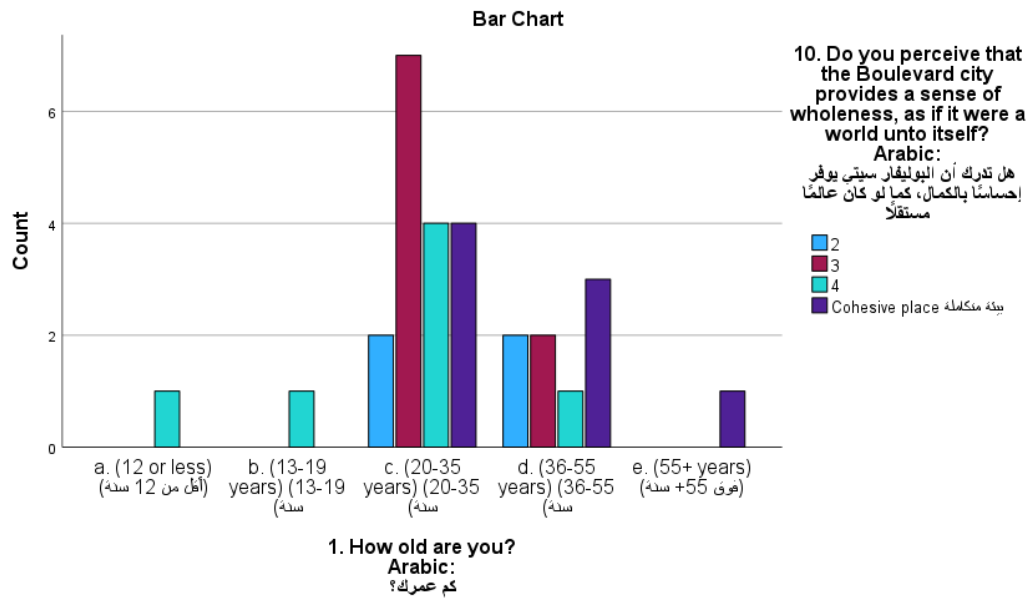
Figure 16. Bar Chart of Age and Ratings of the Cohesive Dimension (SPSS outcome)

Cohesive and Gender

To explore the relationship between gender and perceptions of spatial cohesion in Boulevard City, a series of statistical tests were conducted. The Pearson Chi-Square test gave a value of 3.995. It has 6 degrees of freedom with a p-value of 0.677. As this result exceeds the standard significance threshold of 0.05, it indicates that there is no statistically significant association between gender and participants' ratings of the cohesive dimension.

Table 25. Chi-Square Tests for the Association Between Gender and Ratings of the Cohesive Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.995[a]	6	.677	.782		
Likelihood Ratio	4.007	6	.676	.843		
Fisher-Freeman-Halton Exact Test	4.265			.852		
Linear-by-Linear Association	.003[b]	1	.955	1.000	.539	.123
N of Valid Cases	28					

a. 12 cells (100.0%) have expected count less than 5. The minimum expected count is .14.

b. The standardized statistic is -.056.

This finding is further supported by the Likelihood Ratio test, which returned a statistic of 4.007 (df = 6) and a p-value of 0.676, reinforcing the conclusion that gender does not significantly influence participants' perceptions of spatial cohesion in the given context.

However, an important caveat is the violation of the Chi-Square test's assumption regarding minimum expected frequencies. All 12 cells (100%) in the contingency table have counts below 5, and lowest value at 0.14. To address this issue, the Fisher-Freeman-Halton Exact Test, which is more appropriate for small or sparse datasets, was conducted. This test produced a result of 4.265 with an exact significance (two-sided) of 0.852, further confirming the absence of a significant relationship between gender and the cohesive dimension.

The Linear-by-Linear Association test reported a statistic of 0.003 (df = 1), with a two-sided p-value of 0.955 and a one-sided significance of 1.000. The probability was 0.123, and the standardized statistic was -0.056, all of which point to a very weak, non-significant relationship between gender and the cohesive dimension.
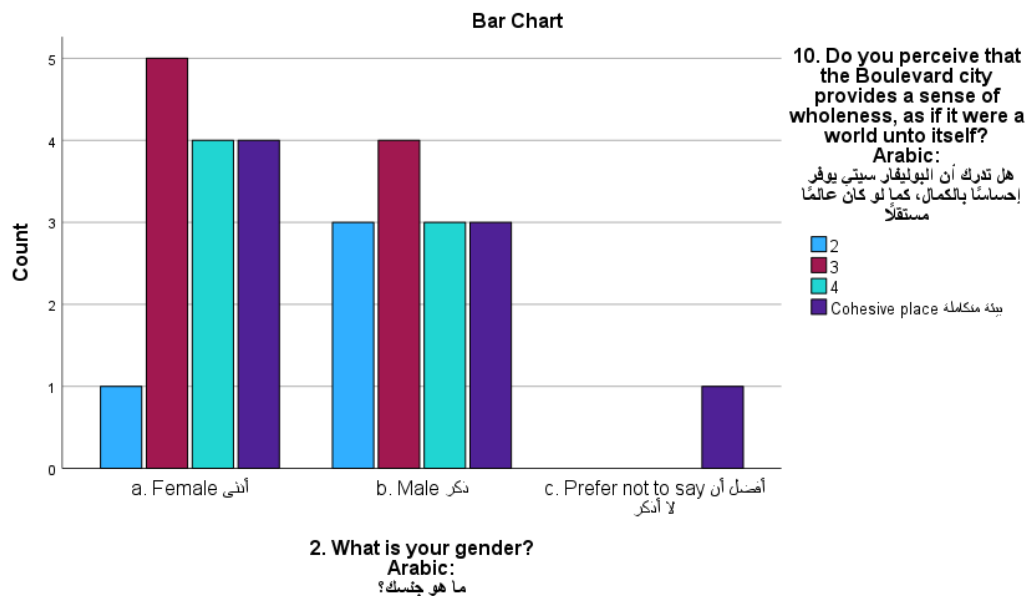
Figure 17. Bar Chart of Gender and Ratings of the Cohesive Dimension (SPSS outcome)

4.16.6 Diversity

The responses from 28 participants regarding whether Boulevard City feels like a "limited place" or a "place with a range of experiences" showed a moderately positive perception. The average rating was 3.71 out of 5, with a standard deviation of 1.03, indicating a generally favourable view with some variation. Notably, 29% of participants rated it a 3, and another 29% rated it a 5, reflecting a mix of opinions. A smaller portion (14%) gave it a score of 4, while no participant rated it a 0. These results suggest that, overall, participants view Boulevard City as offering a fair amount of variety in experiences. However, the spread of scores also indicates some disagreement while many see it as diverse and engaging, others may perceive it as somewhat limited or lacking in depth.

Diverse and Age

To assess whether participants' age influences their perception of diversity in Boulevard City, a series of statistical tests were conducted. The Pearson Chi-Square test yielded a value of 8.107 with 12 degrees of freedom, resulting in a p-value of 0.777. Since this value is well above the common significance threshold of 0.05, it indicates that there is no statistically significant relationship between age and participants' ratings of the diverse dimension.

Table 26. Chi-Square Tests for the Association Between Age and Ratings of the Diverse Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.107[a]	12	.777	1.000		
Likelihood Ratio	8.107	12	.777	1.000		
Fisher-Freeman-Halton Exact Test	9.043			**1.000**		
Linear-by-Linear Association	.953[b]	1	.329	.407	.204	.062
N of Valid Cases	28					

a. 20 cells (100.0%) have expected count less than 5. The minimum expected count is .14.

b. The standardized statistic is .976.

The Likelihood Ratio test mirrored this result exactly, with the same Chi-Square value (8.107), degrees of freedom, and p-value (0.777), further supporting the conclusion that age does not significantly affect perceptions of diversity in this context.

However, an important limitation is the violation of expected frequency assumptions: all 20 cells (100%) had expected counts below 5, with the smallest expected count being 0.14. To account for this, the Fisher-Freeman-Halton Exact Test which is more reliable for small or sparse samples was applied. This test produced a result of 9.043 with an exact significance of 1.000, again indicating no meaningful association between age and the diverse dimension.

Finally, the Linear-by-Linear Association test gives a statistic of 0.953 (df = 1). It has a two-sided p-value of 0.329 with a one-sided p-value of 0.407. These values, along with a low point probability of 0.062, suggest no linear or directional trend between age and perceptions of diversity.
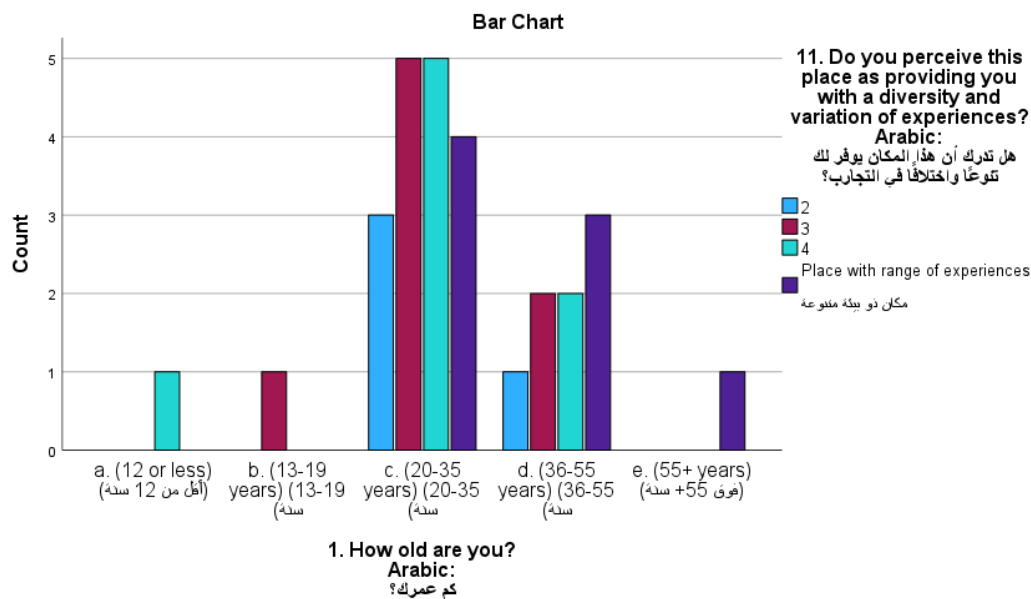
Figure 18. Bar Chart of Age and Ratings of the Diverse Dimension (SPSS outcome)

Diverse and Gender

To explore whether gender influences participants' perceptions of diversity in Boulevard City, a series of statistical tests were conducted. 3.731 is the value of the Pearson Chi-Square test. It has 6 degrees of freedom, giving a p-value of 0.713. As this p-value exceeds the standard significance threshold of 0.05, the result indicates that there is no statistically significant association between gender and ratings of the diverse dimension.

Table 27. Chi-Square Tests for the Association Between Gender and Ratings of the Diverse Dimension (SPSS outcome)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.731[a]	6	.713	.856		
Likelihood Ratio	3.717	6	.715	.886		
Fisher-Freeman-Halton Exact Test	4.104			.856		
Linear-by-Linear Association	.530[b]	1	.467	.533	.289	.098
N of Valid Cases	28					

a. 12 cells (100.0%) have expected count less than 5. The minimum expected count is .14.

b. The standardized statistic is .728.

This finding is supported by the Likelihood Ratio test, which reported a similar statistic of 3.717 (df = 6) and a p-value of 0.715, confirming the lack of a meaningful relationship between gender and the perception of diversity.

However, it's important to note a limitation in the data: all 12 cells (100%) in the contingency table had expected counts below 5, with the minimum expected

value at 0.14. This violates one of the assumptions of the Chi-Square test, potentially affecting the reliability of the outcome. To address this, the Fisher-Freeman-Halton Exact Test better suited for small or sparse samples was conducted. It yielded a result of 4.104 with an exact significance of 0.856, which aligns with the previous tests in indicating no statistically significant association.

The Linear-by-Linear Association test has a statistic of 0.530 (df = 1).It has a two-sided p-value of 0.467, a one-sided p-value of 0.533, and a point probability of 0.098. These results also show no evidence of a significant linear or directional trend between gender and perceptions of diversity.
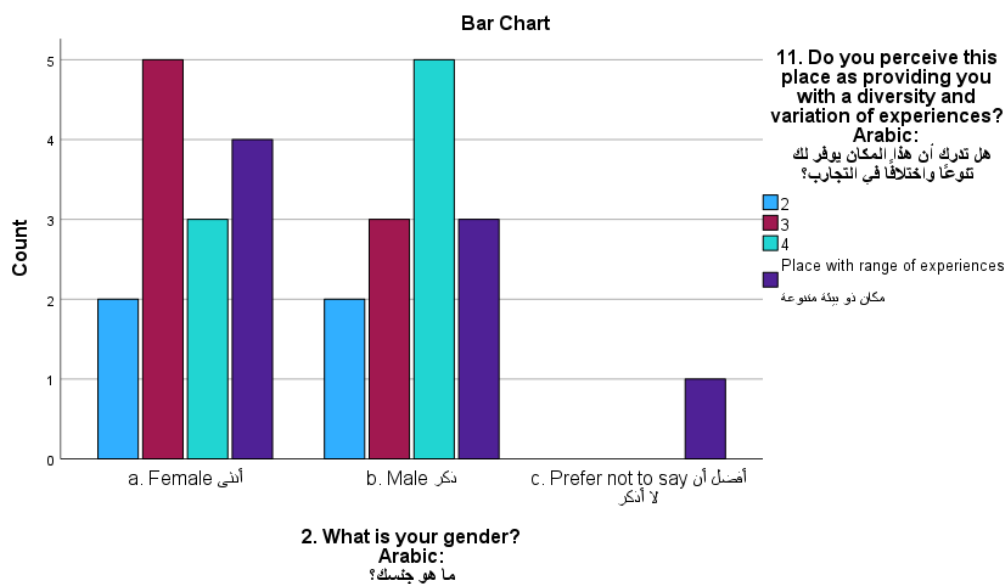
Figure 19. Bar Chart of Age and Ratings of the Diverse Dimension (SPSS outcome)

4.16.7 Sheltered

Data from 28 participants were collected to assess perceptions of the place as either "unsheltered or unsafe" versus "safe and sheltered." In the "unsheltered or unsafe place" category, no participants rated it at the lowest point (0), while 4% rated it as 1, 21% gave a mid-level rating of 3, 25% rated it as 4, and half of the participants (50%) rated it at the highest level of 5, indicating a safe and sheltered perception. The average rating was 4.2. And the standard deviation was 0.90.

Sheltered and Age

The relationship between age and perceptions of the sheltered dimension was analyzed using several statistical tests. The Pearson Chi-Square test produced a statistic of 8.452 with 12 degrees of freedom and a two-sided p-value of 0.749. Since this value exceeds the standard significance level of 0.05, it indicates no statistically significant association between age and the sheltered dimension.

Table 28. Chi-Square Tests for the Association Between Age and Ratings of the Sheltered Dimension

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.452[a]	12	.749	.695		
Likelihood Ratio	8.791	12	.721	.715		
Fisher-Freeman-Halton Exact Test	12.870			**.715**		
Linear-by-Linear Association	.001[b]	1	.975	1.000	.548	.109
N of Valid Cases	27					

a. 19 cells (95.0%) have expected count less than 5. The minimum expected count is .04.

b. The standardized statistic is -.031.

Similarly, the Likelihood Ratio test yielded a statistic of 8.791 (df = 12) with a p-value of 0.721, supporting the Pearson test's result and suggesting no meaningful relationship between age groups and how participants rated the sheltered dimension.

Notably, 95% of the cells (19 cells) had counts below 5. And it has a minimum expected count of 0.04. Because this violates assumptions of the Chi-Square test, the Fisher-Freeman-Halton Exact Test was used for a more reliable analysis with small, expected frequencies. This test resulted in a statistic of 12.870 with an exact significance of 0.715, reinforcing the absence of a significant association. The Linear-by-Linear Association test also confirmed no linear relationship, reporting a statistic of 0.001 (df = 1) and p-values of 0.975 (two-sided) and 1.000 (one-sided), indicating no directional trend between age and the sheltered dimension.

Figure 20. Bar Chart of Age and Ratings of the Sheltered Dimension (SPSS outcome)

Sheltered and Gender

To examine the relationship between gender and perceptions of shelter in Boulevard City, several statistical tests were conducted. The Pearson Chi-Square test yielded a value of 3.701 with 3 degrees of freedom and a p-value of 0.296. Since this p-value exceeds the standard threshold of 0.05, it indicates that there is no statistically significant association between gender and ratings of the sheltered dimension.

Table 29. Chi-Square Tests for the Association Between Gender and Ratings of the Sheltered Dimension

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.701[a]	3	.296	.284		
Likelihood Ratio	4.146	3	.246	.284		
Fisher-Freeman-Halton Exact Test	3.600			**.284**		
Linear-by-Linear Association	3.394[b]	1	.065	.093	.051	.032
N of Valid Cases	27					

a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .48.

b. The standardized statistic is -1.842.

The Likelihood Ratio test provided a similar result, with a test statistic of 4.146 (df = 3) and a p-value of 0.246. This supports the findings from the Pearson test, further indicating no significant relationship between gender and perceived safety or shelter.

It is important to note that 6 of the 8 cells (75%) in the contingency table had expected counts below 5, with the lowest expected count being 0.48. This violates one of the assumptions of the Chi-Square test regarding minimum expected frequencies. Fisher-Freeman-Halton Exact Test was conducted to solve the limitation issue. The test yielded a value of 3.600 with an exact significance of 0.284, confirming the absence of a statistically significant relationship.

The Linear-by-Linear Association test produced a statistic of 3.394 with 1 degree of freedom. The two-sided p-value was 0.065, and the one-sided p-value was 0.051. While these values do not meet the conventional 0.05 significance threshold, they do suggest a possible, though weak, directional trend in how gender might relate to perceptions of shelter.
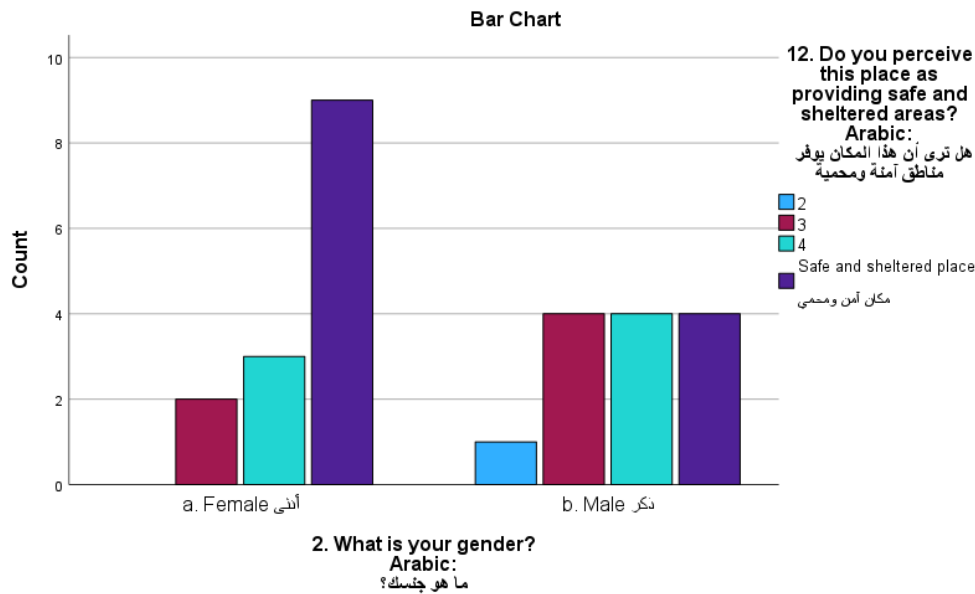
Figure 21. Bar Chart of Gender and Ratings of the Sheltered Dimension (SPSS outcome)

4.16.8 Serene

The responses from 28 participants on the perception of Boulevard City as either a "non-serene" or "serene" place show a general leaning toward serenity. In terms of ratings, 7% of participants gave it a score of 2, 11% scored it a 3, 32% rated it a 4, and the largest group 39% gave it a 5, indicating they found it highly serene. The average score across all responses was 3.64, with a standard deviation of 1.29. This distribution suggests that most participants view the space as relatively peaceful and serene. The average being above the midpoint of the scale reinforces this positive trend, while the standard deviation indicates a moderate range of perspectives.

Serene and Age

To examine whether age influences perceptions of serenity in Boulevard City, a series of statistical tests were conducted. The Pearson Chi-Square test produced a value of 21.025 with 16 degrees of freedom, resulting in a p-value of 0.178. Since this p-value is above the conventional threshold of 0.05, the test indicates no statistically significant association between age and the serene dimension.

Table 30. Chi-Square Tests for the Association Between Age and Ratings of the Serene Dimension

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	21.025[a]	16	.178	.235		
Likelihood Ratio	14.911	16	.531	.365		
Fisher-Freeman-Halton Exact Test	18.271			**.433**		
Linear-by-Linear Association	.787[b]	1	.375	.439	.222	.054
N of Valid Cases	27					

a. 23 cells (92.0%) have expected count less than 5. The minimum expected count is .07.

b. The standardized statistic is .887.

The Likelihood Ratio test gave a statistic of 14.911 (df = 16) with an asymptotic significance of 0. 531.Therefore, the Pearson test shows that there is no meaningful relationship between participants' age and how serene they perceive the city to be.

However, it's worth noting that 92% of the cells in the cross-tabulation had expected counts lower than 5, which violates one of the key assumptions of the Chi-Square test. To account for this limitation, the Fisher-Freeman-Halton Exact Test was conducted, which is more reliable for small sample sizes. This test yielded a result of 18.271 with an exact p-value of 0.433, again suggesting no significant association between age and serenity.

Lastly, the Linear-by-Linear Association test gave a value of 0.787 (df = 1). It has a two-sided p-value of 0.375 and a one-sided p-value of 0.439. These values, along with a point probability of 0.222, indicate no significant linear trend between age and ratings on the serene dimension.

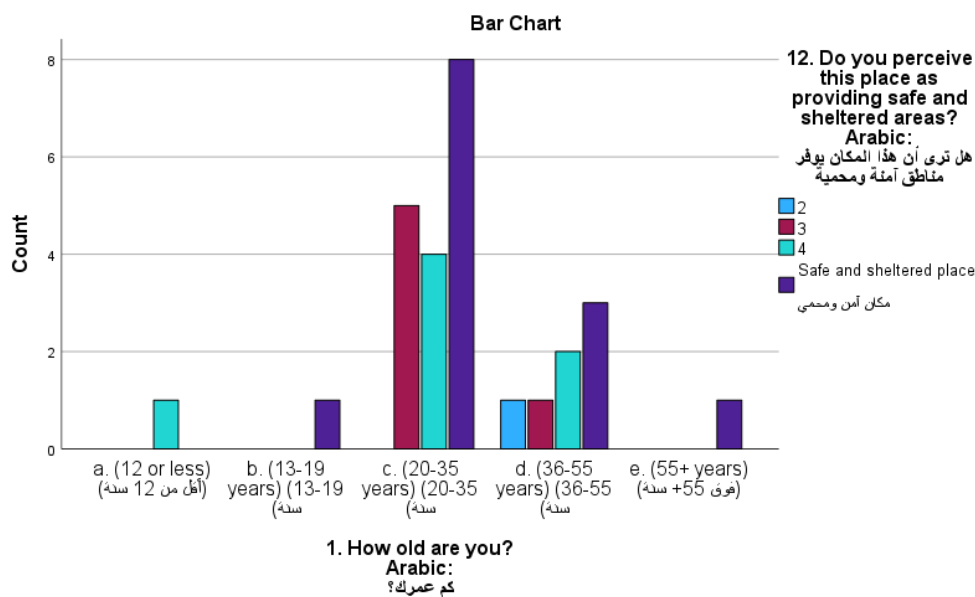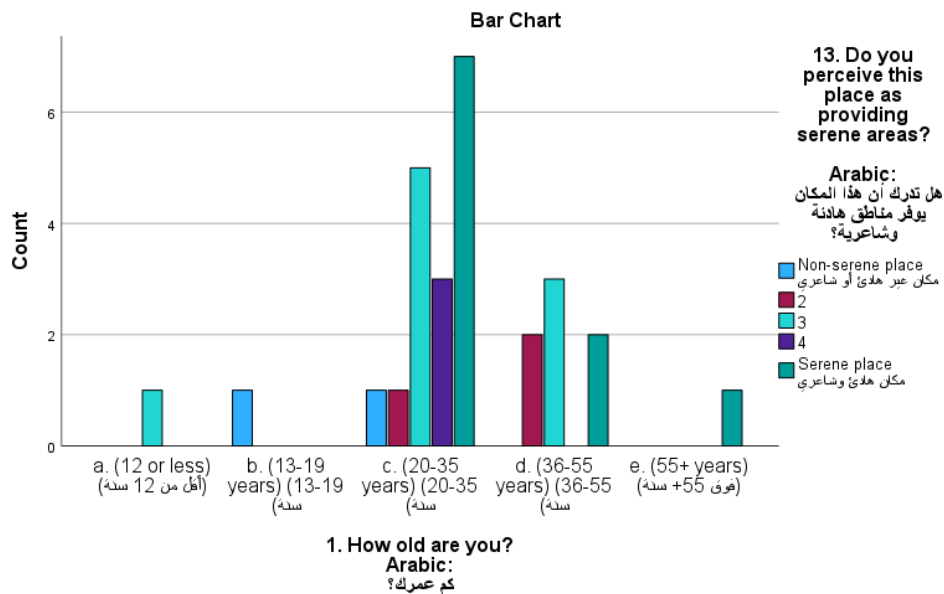*Figure 22. Bar Chart of Age and Ratings of the Serene Dimension (SPSS outcome)*

Serene and Gender

To assess the relationship between gender and perceptions of serenity in Boulevard City, several statistical tests were conducted. The Pearson Chi-Square test yielded a value of 7.907 with 4 degrees of freedom and a p-value of 0.095. While this p-value does not reach the standard significance threshold of 0.05, it does suggest a weak trend toward a possible association between gender and serenity ratings.

Table 31. Chi-Square Tests for the Association Between Gender and Ratings of the Serene Dimension

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.907[a]	4	.095	.092		
Likelihood Ratio	9.899	4	.042	.089		
Fisher-Freeman-Halton Exact Test	7.099			**.098**		
Linear-by-Linear Association	3.894[b]	1	.048	.055	.033	.017
N of Valid Cases	27					

a. 9 cells (90.0%) have expected count less than 5. The minimum expected count is .96.

b. The standardized statistic is -1.973.

In contrast, the Likelihood Ratio test produced a statistic of 9.899 (df = 4) with a p-value of 0.042, which is below 0.05. This indicates a statistically significant relationship between gender and the serene dimension based on this test.

However, it's important to highlight that 9 out of 10 cells (90%) had expected counts less than 5, with the minimum expected count at 0.96. This violates the assumptions of the Chi-Square test, potentially impacting its reliability. To address this, the Fisher-Freeman-Halton Exact Test was used, which is better suited for small sample sizes and sparse data. This test yielded a value of 7.099 with an exact significance of 0.098 again suggesting a weak trend but falling short of statistical significance.

The Linear-by-Linear Association test gave in a statistic of 3.894. It gives 1 degree of freedom. And results a two-sided p-value of 0.048. This result is just below the 0.05 threshold, suggesting a significant linear trend between gender and serenity. The one-sided p-value of 0.033 further supports the existence of a directional relationship.
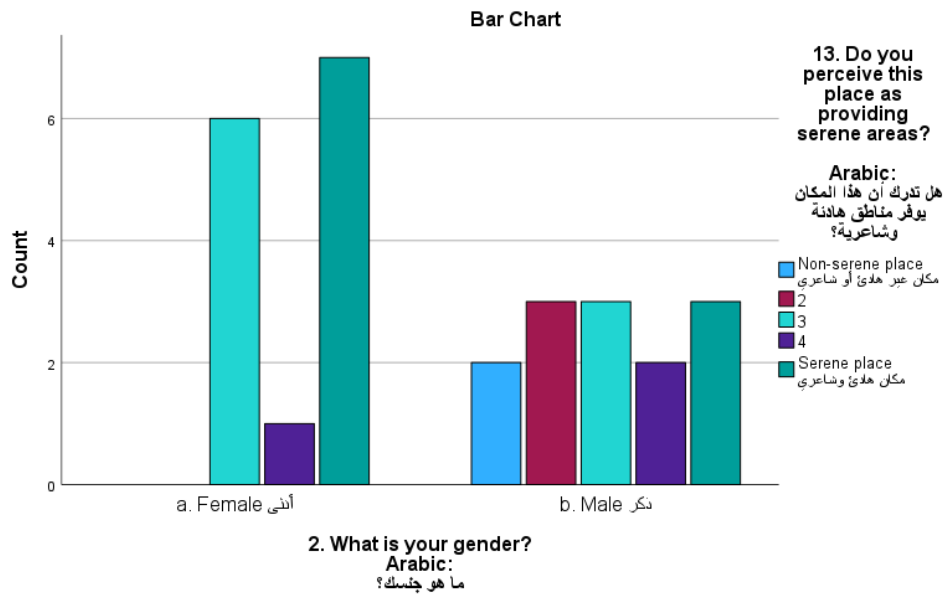
Figure 23. Bar Chart of Gender and Ratings of the Serene Dimension (SPSS outcome)

4.17 Results on Residence Background and PSDs

A One-Way ANOVA was conducted to explore how participants' residence background influences their perceptions of various Perceived Sensory Dimensions (PSDs) in Boulevard City. The analysis revealed statistically significant differences across several PSD categories:

1. Wild nature: $F (1, 26) = 6.101$, $p = .020$

2. Openness and vistas: $F (1, 26) = 7.429$, $p = .011$

3. Wholeness (a world unto itself): $F (1, 26) = 9.649$, $p = .005$

4. Diversity and variation of experiences: $F (1, 26) = 9.117$, $p = .006$

5. Serene areas: $F (1, 26) = 5.907$, $p = .022$

These p-values, all below the 0.05 threshold, indicate that perceptions of these PSDs differ significantly depending on the participants' residence background. Meanwhile, no significant differences were found in the perception of:

6. Human-shaped elements: $F (1, 26) = 1.915$, $p = .178$

7. Social spaces for interaction: $F (1, 26) = 2.024$, $p = .167$

Additionally, a marginally significant difference was observed in perceptions of:

8. Safe and sheltered areas: $F (1, 26) = 3.777$, $p = .063$

This suggests a possible trend that might become significant with a larger sample size.

Table 32. One-Way ANOVA of PSDs by Residence Background (SPSS Output)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Natural	Between Groups	9.524	1	9.524	6.101	**.020**
	Within Groups	40.583	26	1.561		
	Total	50.107	27			
Cultural	Between Groups	2.381	1	2.381	1.915	.178
	Within Groups	32.333	26	1.244		
	Total	34.714	27			
Open	Between Groups	6.095	1	6.095	7.429	**.011**
	Within Groups	21.333	26	.821		
	Total	27.429	27			
Social	Between Groups	2.381	1	2.381	2.024	.167
	Within Groups	30.583	26	1.176		
	Total	32.964	27			
Cohesive	Between Groups	8.149	1	8.149	9.649	**.005**
	Within Groups	21.958	26	.845		
	Total	30.107	27			
Diverse	Between Groups	7.714	1	7.714	9.117	**.006**
	Within Groups	22.000	26	.846		
	Total	29.714	27			
Sheltered	Between Groups	2.881	1	2.881	3.777	.063
	Within Groups	19.833	26	.763		
	Total	22.714	27			
Serene	Between Groups	8.595	1	8.595	5.907	**.022**
	Within Groups	37.833	26	1.455		
	Total	46.429	27			
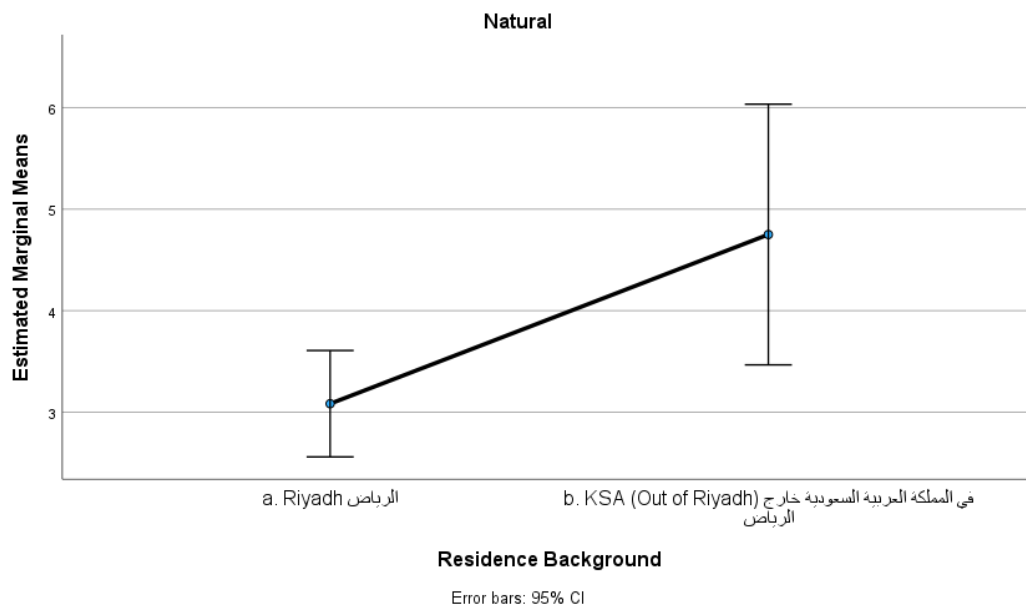
Figure 24. Interaction Plot, Natural and Residence Background, (SPSS outcome)
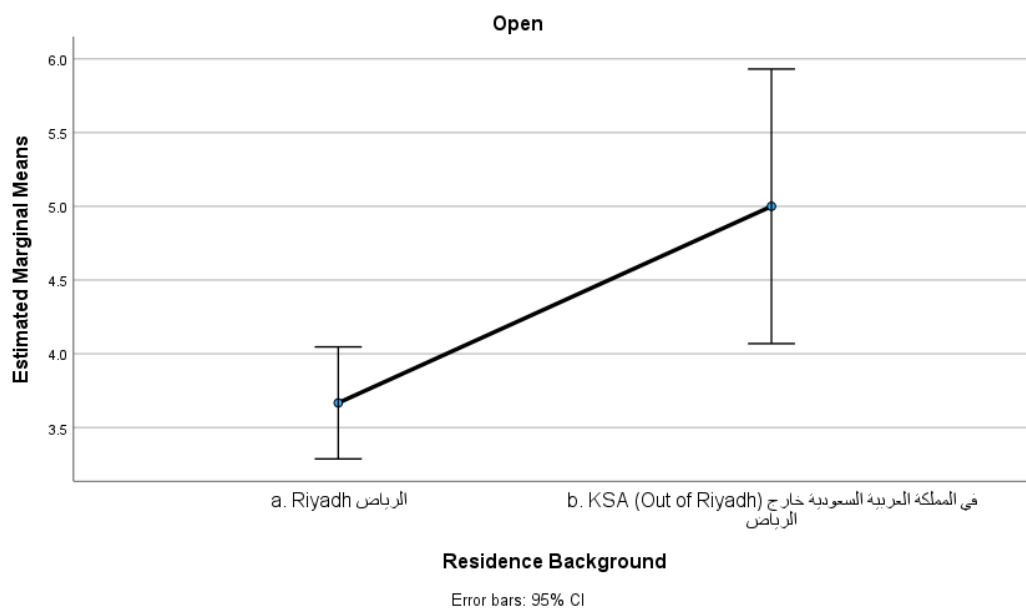
Figure 25. Interaction Plot, Open and Residence Background, (SPSS outcome)
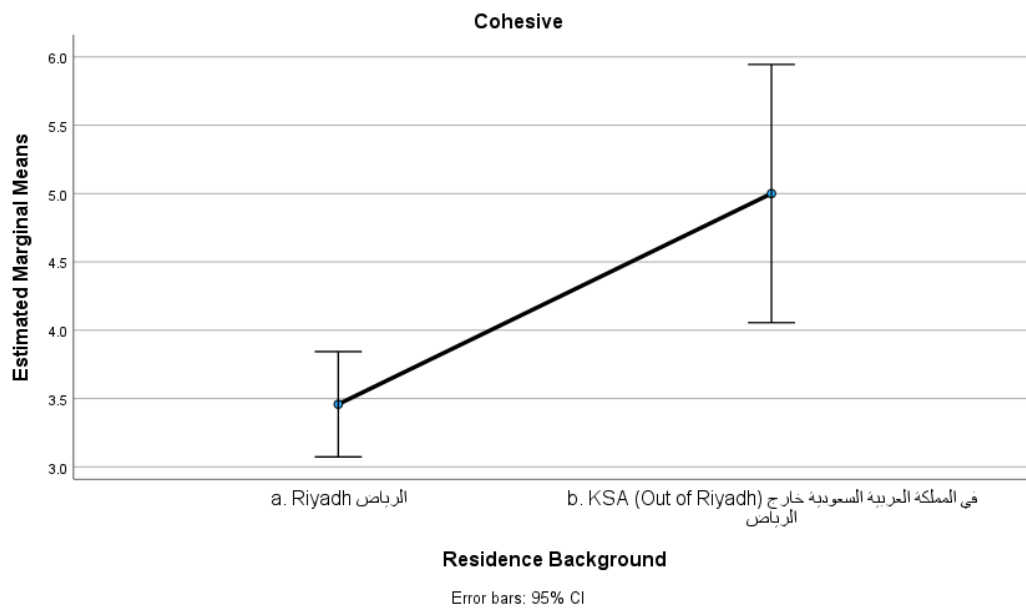
Figure 26. Interaction Plot, cohesive and Residence Background, (SPSS outcome)
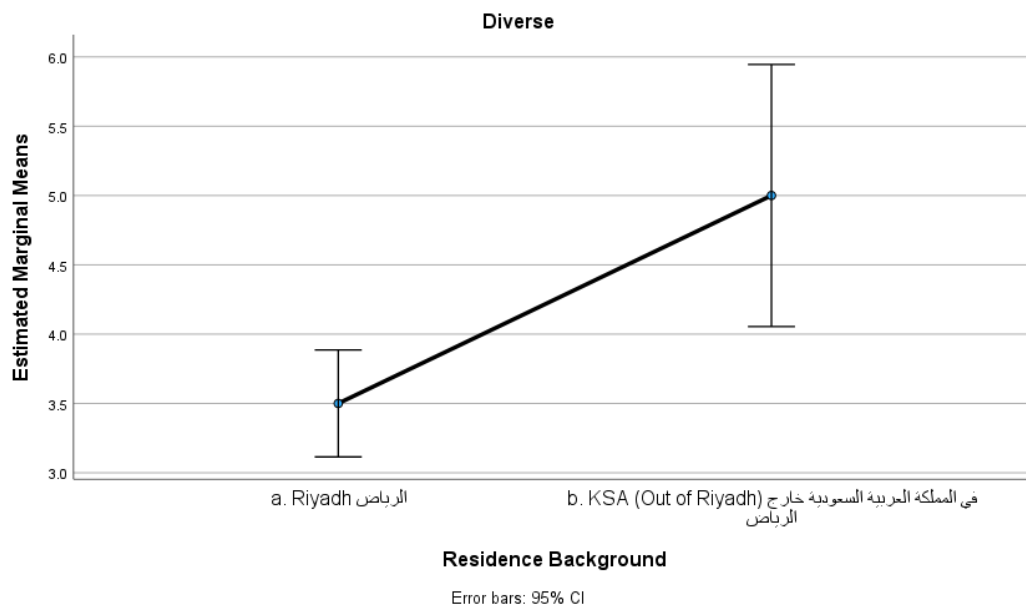
Figure 27. Interaction Plot, Diverse and Residence Background, (SPSS outcome)
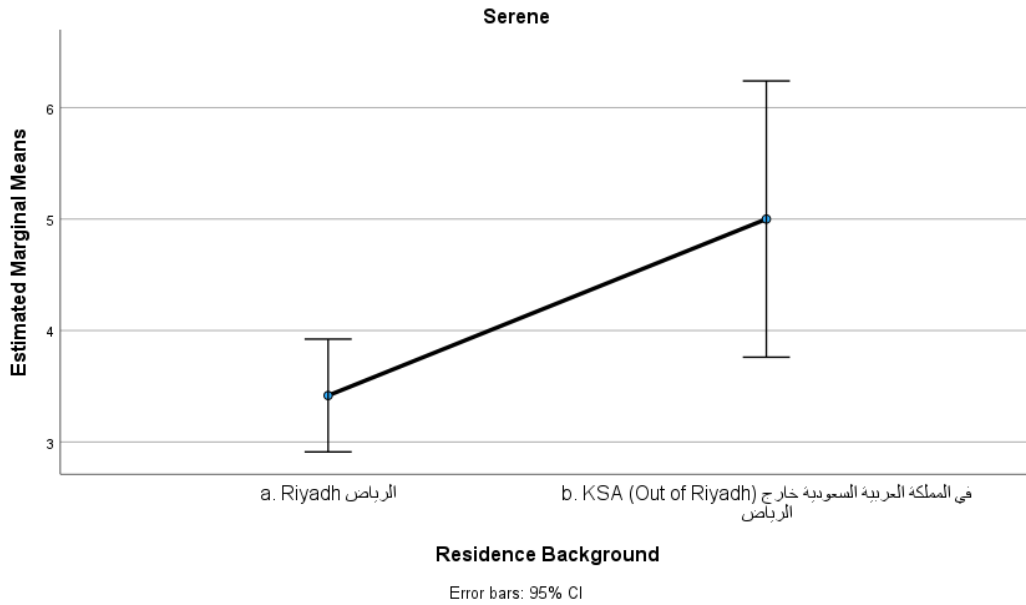
Figure 28. Interaction Plot, Serene and Residence Background, (SPSS outcome)

4.18 Results on Visiting Frequency

A one-way ANOVA was conducted to assess whether visit frequency used here as a demographic indicator has an influence on participants' ratings across the Perceived Sensory Dimensions (PSDs) of Boulevard City. Where significant differences were detected, Tukey's HSD post hoc tests were employed to identify which specific groups differed, while controlling for Type I errors.

The ANOVA results revealed statistically significant differences in two PSD categories:

1. Cultural dimension: $F (1, 26) = 3.328$, $p = .037$

2. Social dimension: $F (1, 26) = 4.079$, $p = .018$

These findings indicate that perceptions of the cultural and social qualities of Boulevard City significantly vary depending on how frequently participants visit the site.

In contrast, the following PSDs did not show significant differences across visit frequency groups:

3. Natural ($F = 2.600$, $p = .076$)

4. Open ($F = 2.491$, $p = .084$)

5. Cohesive ($F = 2.777$, $p = .063$)

6. Diverse ($F = 2.195$, $p = .115$)

7. Sheltered (F = 2.003, p = .140)

8. Serene (F = 1.792, p = .176)

While a few of these p-values approach significance (notably Cohesive and Open), they remain above the 0.05 threshold, and thus no statistically reliable differences were observed for these dimensions.

Table 33. One-Way ANOVA of PSDs by Visit Frequency (SPSS Output)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Natural	Between Groups	12.290	3	4.097	2.600	.076
	Within Groups	37.817	24	1.576		
	Total	50.107	27			
Cultural	Between Groups	10.198	3	3.399	3.328	**.037**
	Within Groups	24.517	24	1.022		
	Total	34.714	27			
Open	Between Groups	6.512	3	2.171	2.491	.084
	Within Groups	20.917	24	.872		
	Total	27.429	27			
Social	Between Groups	11.131	3	3.710	4.079	**.018**
	Within Groups	21.833	24	.910		
	Total	32.964	27			
Cohesive	Between Groups	7.757	3	2.586	2.777	.063
	Within Groups	22.350	24	.931		
	Total	30.107	27			
Diverse	Between Groups	6.398	3	2.133	2.195	.115
	Within Groups	23.317	24	.972		
	Total	29.714	27			
Sheltered	Between Groups	4.548	3	1.516	2.003	.140
	Within Groups	18.167	24	.757		
	Total	22.714	27			
Serene	Between Groups	8.495	3	2.832	1.792	.176
	Within Groups	37.933	24	1.581		
	Total	46.429	27			

4.18.1 Post Hoc Comparisons: Tukey's HSD

Table 35. Tukey's HSD multiple comparisons of PSDs by Visit Frequency (SPSS Output)

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) 4. How often do you visit the Boulevard? Arabic: كم مرة تزور البوليفارد؟	(J) 4. How often do you visit the Boulevard? Arabic: كم مرة تزور البوليفارد؟	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Cultural	b. Weekly أسبوعيا	c. Monthly شهريا	.333	.825	.977	-1.94	2.61
		d. More than 2 times a year أكثر من مرتين سنويا	1.200	.665	.296	-.64	3.04
		e. Less than 2 times a year أقل من مرتين سنويا	1.750	.652	.059	-.05	3.55
	c. Monthly شهريا	b. Weekly أسبوعيا	-.333	.825	.977	-2.61	1.94
		d. More than 2 times a year أكثر من مرتين سنويا	.867	.665	.570	-.97	2.70
		e. Less than 2 times a year أقل من مرتين سنويا	1.417	.652	.160	-.38	3.22
	d. More than 2 times a year أكثر من مرتين سنويا	b. Weekly أسبوعيا	-1.200	.665	.296	-3.04	.64
		c. Monthly شهريا	-.867	.665	.570	-2.70	.97
		e. Less than 2 times a year أقل من مرتين سنويا	.550	.433	.590	-.64	1.74
	e. Less than 2 times a year أقل من مرتين سنويا	b. Weekly أسبوعيا	-1.750	.652	.059	-3.55	.05
		c. Monthly شهريا	-1.417	.652	.160	-3.22	.38
		d. More than 2 times a year أكثر من مرتين سنويا	-.550	.433	.590	-1.74	.64
Social	b. Weekly أسبوعيا	c. Monthly شهريا	.667	.779	.827	-1.48	2.81
		d. More than 2 times a year أكثر من مرتين سنويا	.500	.628	.855	-1.23	2.23
		e. Less than 2 times a year أقل من مرتين سنويا	1.667	.616	.056	-.03	3.37
	c. Monthly شهريا	b. Weekly أسبوعيا	-.667	.779	.827	-2.81	1.48
		d. More than 2 times a year أكثر من مرتين سنويا	-.167	.628	.993	-1.90	1.57
		e. Less than 2 times a year أقل من مرتين سنويا	1.000	.616	.385	-.70	2.70
	d. More than 2 times a year أكثر من مرتين سنويا	b. Weekly أسبوعيا	-.500	.628	.855	-2.23	1.23
		c. Monthly شهريا	.167	.628	.993	-1.57	1.90
		e. Less than 2 times a year أقل من مرتين سنويا	1.167*	.408	**.040**	.04	2.29
	e. Less than 2 times a year أقل من مرتين سنويا	b. Weekly أسبوعيا	-1.667	.616	.056	-3.37	.03
		c. Monthly شهريا	-1.000	.616	.385	-2.70	.70
		d. More than 2 times a year أكثر من مرتين سنويا	-1.167*	.408	**.040**	-2.29	-.04

*. The mean difference is significant at the 0.05 level.

Social dimension

Significant differences were found between:

- "Less than 2 times a year" and "More than 2 times a year" (Mean difference = -1.167, p = .040)

- A near-significant difference between "Less than 2 times a year" and "Weekly" (Mean difference = -1.667, p = .056)

Table 34. Tukey's HSD Cultural by Visit Frequency (SPSS Output)

Social

Tukey HSD[a,b]

4. How often do you visit the Boulevard? Arabic: كم مره تزور البوليفارد؟	N	Subset for alpha = 0.05 1
e. Less than 2 times a year أقل من مرتين سنويا	12	3.33
c. Monthly شهريا	3	4.33
d. More than 2 times a year أكثر من مرتين سنويا	10	4.50
b. Weekly أسبوعيا	3	5.00
Sig.		.059

Means for groups in homogeneous subsets are displayed.

  a. Uses Harmonic Mean Sample Size = 4.706.

  b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
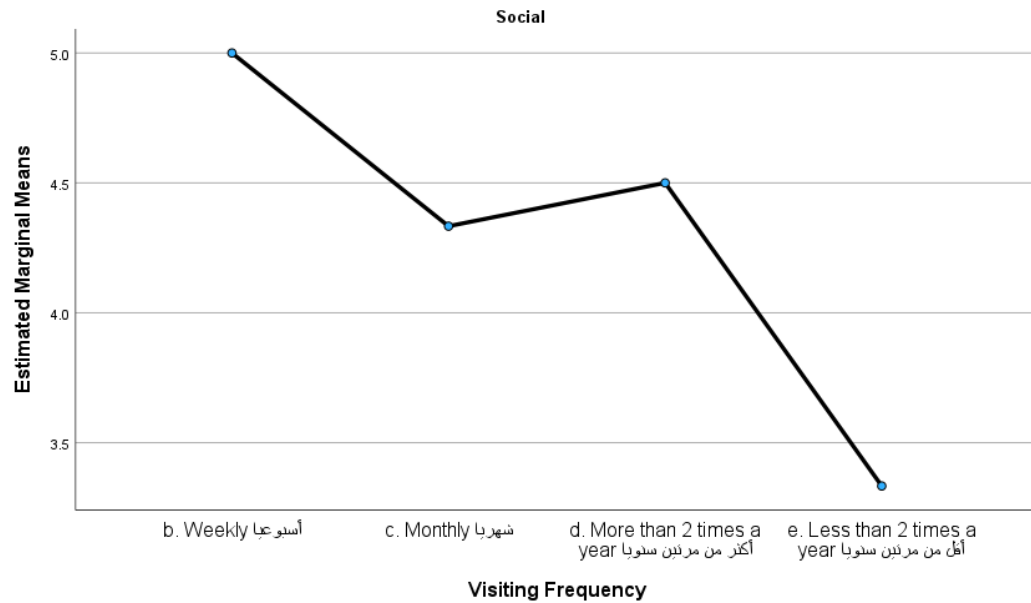
Figure 29. Interaction Plot, Cultural and visiting Frequency, (SPSS outcome)

Cultural dimension

A marginally significant difference was found between:

- "Less than 2 times a year" and "Weekly" (Mean difference = -1.750, p = .059)

These results suggest that participants who visit more frequently (weekly or monthly) tend to rate social and cultural dimensions more highly than those who visit less often.

Table 37. Tukey's HSD Cultural by Visit Frequency (SPSS Output)

Cultural

Tukey HSD[a,b]

4. How often do you visit the Boulevard? Arabic: كم مره تزور البوليفارد؟	N	Subset for alpha = 0.05
		1
e. Less than 2 times a year أقل من مرتين سنويا	12	3.25
d. More than 2 times a year أكثر من مرتين سنويا	10	3.80
c. Monthly شهريا	3	4.67
b. Weekly أسبوعيا	3	5.00
Sig.		.062

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 4.706.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
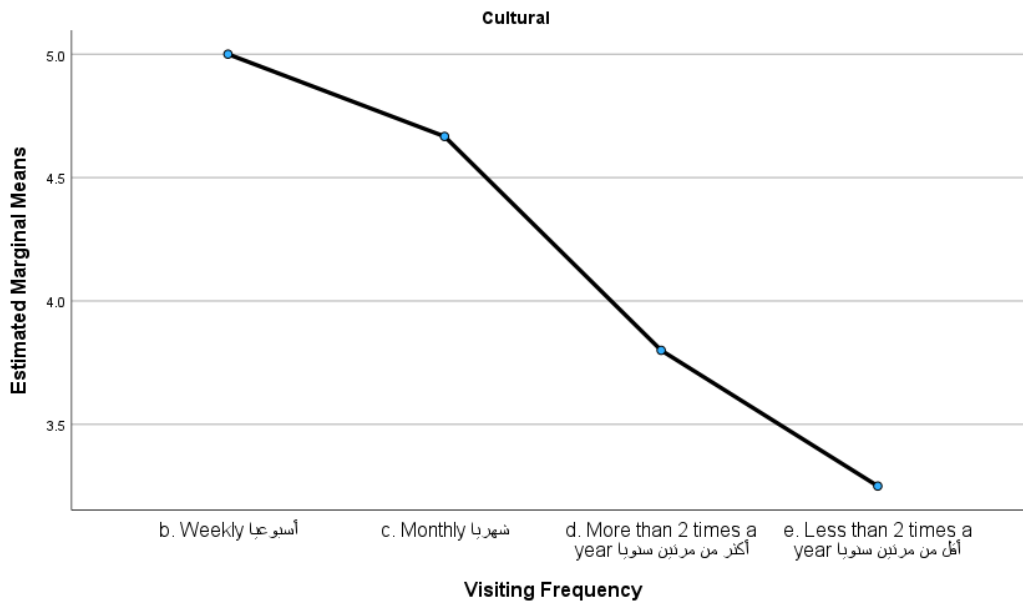
Figure 30. Interaction Plot, Cultural and visiting Frequency, (SPSS outcome)

4.19 Results on Visiting Companions

A one-way ANOVA was conducted to assess whether participants' visiting companions such as visiting alone, with family, friends, or children had any influence on their perceptions of the Perceived Sensory Dimensions (PSDs) of Boulevard City. When the ANOVA identified significant or near-significant

differences, Tukey's HSD post hoc tests were planned to further examine specific group differences, while minimizing the risk of Type I errors.

The results indicate that most PSD factors do not show statistically significant differences across different types of visiting companions. Specifically, the following dimensions had p-values greater than 0.05, indicating no significant differences: Natural, Cultural, Open, Cohesive, Sheltered and Serene.

This suggests a relative consistency in how participants experience these environmental qualities, regardless of whom they visit the site with.

Table 35. One-Way ANOVA of PSDs by Visit Frequency (SPSS Output)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Natural	Between Groups	2.062	3	.687	.343	.794
	Within Groups	48.045	24	2.002		
	Total	50.107	27			
Cultural	Between Groups	5.703	3	1.901	1.573	.222
	Within Groups	29.011	24	1.209		
	Total	34.714	27			
Open	Between Groups	5.417	3	1.806	1.969	.146
	Within Groups	22.011	24	.917		
	Total	27.429	27			
Social	Between Groups	7.862	3	2.621	2.506	.083
	Within Groups	25.102	24	1.046		
	Total	32.964	27			
Cohesive	Between Groups	3.698	3	1.233	1.120	.361
	Within Groups	26.409	24	1.100		
	Total	30.107	27			
Diverse	Between Groups	7.764	3	2.588	2.829	.060
	Within Groups	21.951	24	.915		
	Total	29.714	27			
Sheltered	Between Groups	4.078	3	1.359	1.751	.184
	Within Groups	18.636	24	.777		
	Total	22.714	27			
Serene	Between Groups	.008	3	.003	.001	1.000
	Within Groups	46.420	24	1.934		
	Total	46.429	27			

However, two dimensions exhibited p-values approaching statistical significance, suggesting possible but not definitive group differences:

1. Social dimension: p = 0.083

2. Diverse dimension: p = 0.060

Although these values do not meet the conventional 0.05 threshold for significance, they indicate potential variation in how different visiting groups engage with or perceive social interaction opportunities and the variety of experiences available.

4.20 Overall Appealing Results

The responses from participants highlighted both positive aspects and areas that could be improved within the study area. Many visitors appreciated the wide range of activities available and expressed overall satisfaction with their experience. There was praise for facilities aimed at children, including playgrounds and recreational games, which many felt added significant value to the space. However, some recurring concerns were also noted. Participants mentioned the need for more green spaces, gardens, and attractions that foster community interaction. Parking was a common challenge, with several respondents describing difficulties in finding available spots. Another issue raised was the high cost of dining, as many felt the restaurant options were not affordable for all visitors.

Although the survey did not break down companion types by gender, the high proportion of female respondents (55%) provides some context. Among all participants, 35% reported visiting the area with family, and another 35% visited with both friends and family. This trend suggests a strong preference for group or family-oriented visits. In line with this, several respondents particularly females highlighted the importance of facilities for children, such as playgrounds and gardens, indicating a clear interest in family-friendly features. The chi-square analysis (Table 39) showed the distribution of appeal ratings by gender, with no statistically significant difference. Still, the visual representation (Figure 30) illustrates a general trend of positive perception among both male and female respondents.

Table 36. Chi-Square Tests for the Association Between Gender and Ratings of the Overall appealing of the study area

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.581[a]	6	.024
Likelihood Ratio	16.509	6	.011
Linear-by-Linear Association	.133	1	.715
N of Valid Cases	43		

a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .14.
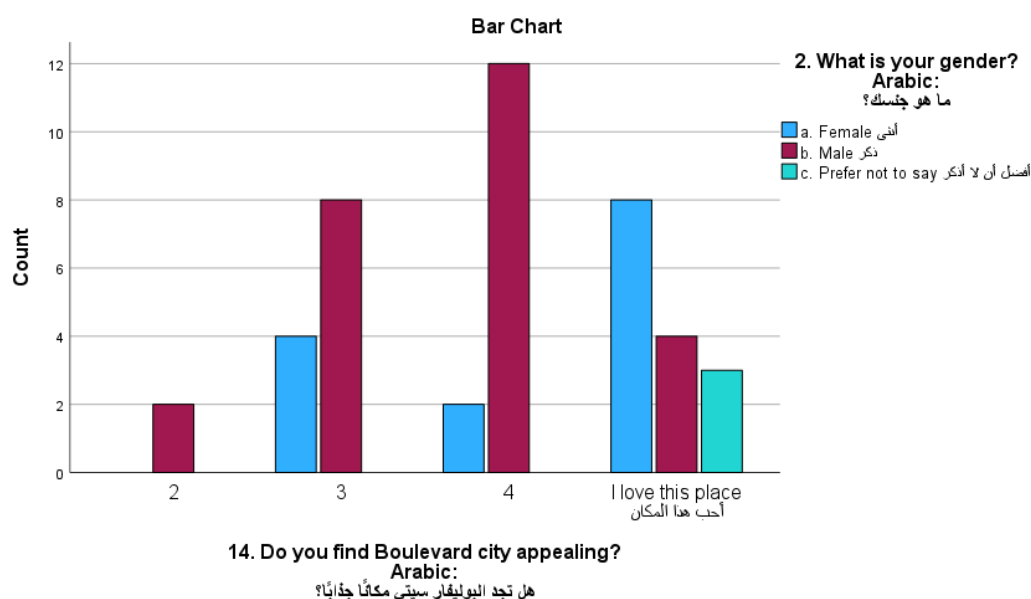
Figure 31. Bar Chart of Gender and Ratings of the Overall appealing of the study area (SPSS outcome)

4.21 Language Used in the Survey

The following table shows the language used by respondents in the survey:

Table 37. Language of Survey Participation: frequency and percentage

Language Option	Number of Responses	Percentage
1. English (إنجليزي)	4	15%
2. Arabic (عربي)	19	70%
3. Both English and Arabic (الإنجليزي والعربي)	4	15%
Total	27	100%

The analysis of responses to the language preference question revealed that most participants 70% preferred Arabic as the language for participation. This suggests that Arabic is the most understood and preferred language among respondents. Additionally, 15% of participants chose both Arabic and English, indicating a degree of bilingualism among respondents. A smaller portion, another 15%, indicated a preference for English only. These figures point to a diverse linguistic landscape within the study area, with Arabic as the dominant language but with a noticeable presence of bilingual and English-speaking individuals. These patterns are illustrated in Table 40 and the corresponding bar chart in Figure 31.

Table 38. Descriptive frequency analysis of the language of participation (SPSS outcome)

16. I have read and answered this survey in:

...

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a. English	4	14.3	14.8	14.8
	b. Arabic	19	67.9	70.4	85.2
	c. Both English and Arabic	4	14.3	14.8	100.0
	Total	27	96.4	100.0	
Missing	System	1	3.6		
Total		28	100.0		

16. I have read and answered this survey in:
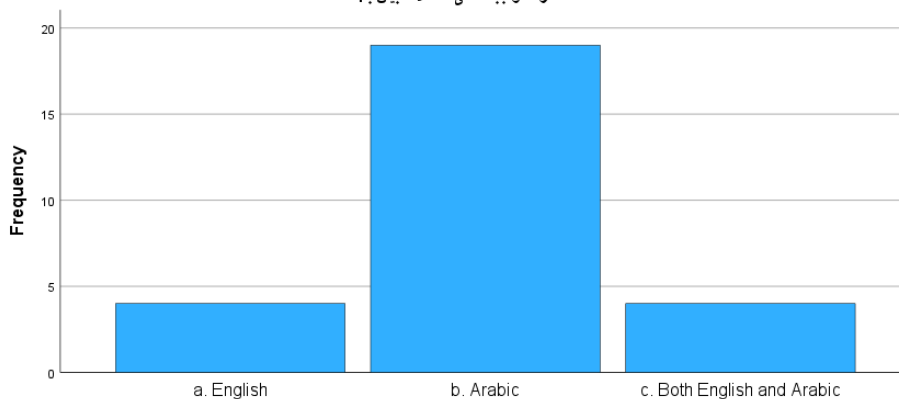
قرأت وأجبت على هذا الاستبيان بـ:

Figure 32. Bar Chart of the language of participation (SPSS outcome)

4.21.1 Language used in the survey and the PSDs

A One-Way ANOVA was conducted to examine differences in how participants of different language backgrounds Arabic, English, and both perceive the various Perceived Sensory Dimensions (PSDs) of Boulevard City. Due to the unequal group sizes, the harmonic mean was considered to help ensure statistical balance (Hochberg & Tamhane, 1987), though it's noted that this does not eliminate the risk of Type I errors (Field, 2013). The analysis showed no significant differences across language groups for most PSD dimensions: Nature (F = 0.739, p = 0.488), Human-Shaped (F = 1.045, p = 0.367), Open (F = 1.023, p = 0.375), and Cohesive (F = 1.490, p = 0.246). However, the Social dimension revealed a statistically significant difference between groups (F = 6.149, p = 0.007), indicating variation in how different language groups perceive the social and interactive qualities of the space.

Table 39. One-way Anova test PSDs and language of participation, (SPSS outcome)

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Natural	Between Groups	2.738	2	1.369	.739	.488
	Within Groups	44.447	24	1.852		
	Total	47.185	26			
Cultural	Between Groups	2.659	2	1.329	1.045	.367
	Within Groups	30.526	24	1.272		
	Total	33.185	26			
Open	Between Groups	2.048	2	1.024	1.023	.375
	Within Groups	24.026	24	1.001		
	Total	26.074	26			
Social	Between Groups	10.842	2	5.421	6.149	.007
	Within Groups	21.158	24	.882		
	Total	32.000	26			
Cohesive	Between Groups	3.125	2	1.563	1.490	.246
	Within Groups	25.171	24	1.049		
	Total	28.296	26			
Diverse	Between Groups	4.816	2	2.408	2.493	.104
	Within Groups	23.184	24	.966		
	Total	28.000	26			
Sheltered	Between Groups	.048	2	.024	.026	.974
	Within Groups	22.026	24	.918		
	Total	22.074	26			
Serene	Between Groups	1.137	2	.568	.314	.733
	Within Groups	43.382	24	1.808		
	Total	44.519	26			

Language used in the survey and the Social Dimension

A Post Hoc Tukey HSD test was conducted following the significant One-Way ANOVA result for the Social dimension to determine which language groups (Arabic, English, or both) differed significantly from one another in their perceptions. The analysis revealed that bilingual respondents those who selected both Arabic and English rated Boulevard City significantly higher in terms of offering social spaces and interaction opportunities compared to both the English-only and Arabic-only groups. Notably, there was no significant difference between the English-only and Arabic-only respondents (p = 0.842). The largest gap in perception was observed between the bilingual and English-only groups, highlighting a key distinction in how the city's social dimension is experienced across language backgrounds.

Table 40. Post-Hoc Tests, Tukey HSD Multiple Comparisons Test Between Language Groups for Social Dimension (Dependent Variable), (SPSS outcome)

Multiple Comparisons

Dependent Variable: 9. Do you perceive that the Boulevard city provides social spaces, with opportunities to interact with other people?

Tukey HSD

(I) 16. I have read and answered this survey in: ...	(J) 16. I have read and answered this survey in: ...	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
a. English	b. Arabic	.289	.517	.842	-1.00	1.58
	c. Both English and Arabic	2.000*	.664	.016	.34	3.66
b. Arabic	a. English	-.289	.517	.842	-1.58	1.00
	c. Both English and Arabic	1.711*	.517	.008	.42	3.00
c. Both English and Arabic	a. English	-2.000*	.664	.016	-3.66	-.34
	b. Arabic	-1.711*	.517	.008	-3.00	-.42

*. The mean difference is significant at the 0.05 level.

Table 41. Tukey HSD Homogeneous Subsets Language Groups for Social Dimension (Dependent Variable), (SPSS outcome)

Social

Tukey HSD[a,b]

16. I have read and answered this survey in: ...	N	Subset for alpha = 0.05	
		1	2
c. Both English and Arabic	4	2.50	
b. Arabic	19		4.21
a. English	4		4.50
Sig.		1.000	.868

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.429.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
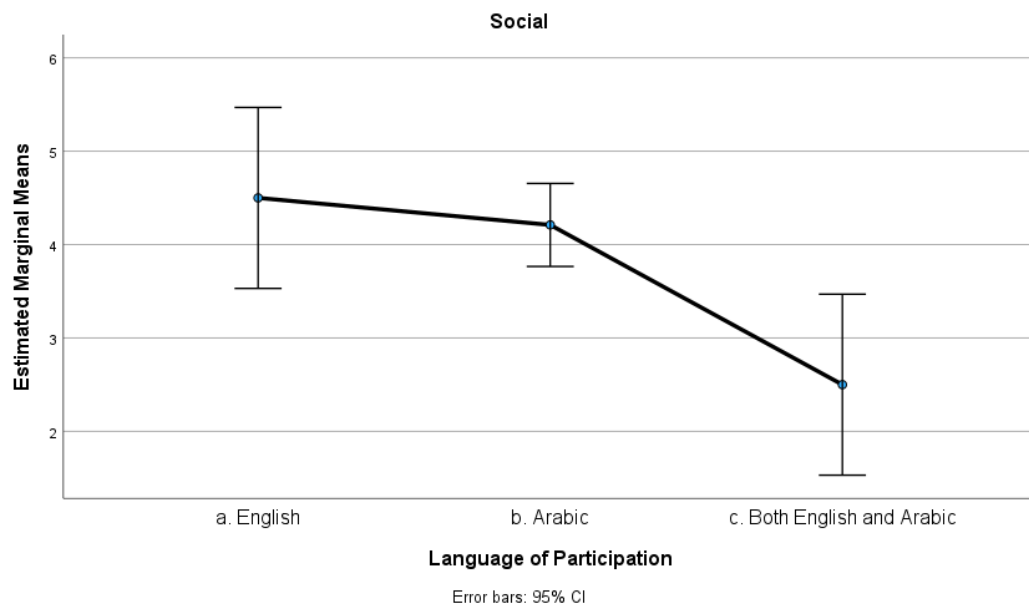

Figure 33. Interaction Plot, Social and Language of Participation, (SPSS outcome)

5. Discussion

The results were deemed sufficient, as they met the initial target of 25 participants or more. However, there is still a need for a more effective distribution method to obtain a larger and more diverse sample in terms of demographic variation. It is worth noting that by conducting various descriptive analyses of the data using Netigate and SPSS, the results demonstrate a sufficient distribution, allowing for the possibility of answering the study questions. However, there are limitations regarding precision and the ability to fully capture all demographic aspects. See Appendix 2: Survey report (Netigate extract).

Regarding the data handling process, incomplete responses specifically those missing answers to three questions were excluded from the dataset. Furthermore, a single response, which addressed all questions except for the final one in language, was retained. All other responses, including both nominal and ordinal data, were considered valid for analysis. In some cases, small groups of repeated answers were omitted to streamline the analysis or because this was required by the test's specifications to avoid violating assumptions.

However, the following discussion of the results and data analysis aims to answer the study questions using the analysis strategy outlined in previous sections of this study, while seeking any significant relationships between the different variables. The qualitative approach will partially support the discussion and outcomes.

5.1 Discussion of the Demographic Variables

The results from this survey show interesting results into the demographic and behavioural patterns of the participants. The clearest finding is the huge representation of individuals between the ages of 20 and 35, with 19 participants (61%), suggesting that this age group is more likely to engage in the activity or context being surveyed. This could indicate that the survey or study is more attractive to the younger adults, who may have more leisure time or greater interest in the subject. The smaller representation of age groups like those under 12 and over 55 (each with 1 participant, 3%) might point to limited relevance or engagement from these age groups, which could be explored in further surveys.

On the other hand, the gender distribution, with 17 females (55%) and 13 males (42%), shows that the survey could be more attractive to females, although the gender balance is still notable. Most respondents from Riyadh (26 participants, 84%) are also significant, highlighting the centralization of the activity in the same city. This could be reflective of the greater availability of the service or event in Riyadh compared to other regions, where 5 participants (16%) were from other parts of Saudi Arabia.

In terms of visit frequency, most participants being infrequent visitors suggests that the activity or venue is more of a special or occasional interest rather than a daily or weekly routine for most people. That can be noticed by finding, 42% of respondents visit less than twice a year, while 39% visit more than twice a year. Only 10% visit monthly, and another 10% visit weekly, with no participants reporting daily visits (0%).

The companion's aspect of the visits, with 35% of participants visiting with family and another 35% visiting with both friends and family, highlight the importance of communal experiences in this study. Overall, these results give valuable results into the demographic profile, frequency of visits, and the companions status of the participants in the activity.

5.2 Discussion of the PSD of Participants in Boulevard City

The high scores for Sheltered and Social dimensions reflect the strengths of Boulevard City as a space where people can feel both physically comfortable and socially connected. These results may highlight how well space responds to urban needs, such as shade, structure, and areas for gathering. In contrast, the lower ratings for Natural and Serene suggest that participants felt a lack of greenery, quiet, or restorative elements features that are increasingly recognized as essential for well-being in city environments. This presents an opportunity for urban designers to introduce more natural elements and peaceful zones into the area. To explore these differences more deeply, the study looks at whether factors like gender and age influence how people perceive these dimensions. By using Chi-square tests, the analysis aims to uncover whether specific groups experience space differently, which can support more inclusive and user-sensitive design strategies moving forward. Subgroups within the sample.

5.2.1 Natural

The split-in responses suggest that Boulevard City gives off mixed signals when it comes to naturalness. Some parts of the space may include greenery or natural features that appeal to certain users, while others might be more built-up or artificial, which could explain the lower scores. From an environmental psychology perspective, this inconsistency weakens the overall sense of natural connection that many people seek in urban spaces. To improve this, future design efforts might focus on strengthening the natural feel of the area by increasing vegetation, using more organic materials, or reducing visual and auditory distractions. Creating a more unified natural experience could help make the space feel more inviting and restorative to a wider range of visitors.

Figure 34. "Natural landscape in Boulevard City" by Waddah Alnajjar (CC BY-NC 2.0)

Natural and Age

Taken together, the statistical results consistently indicate that age does not appear to significantly influence how participants perceive the natural elements in Boulevard City. Whether looking at general association, exact probability, or trend analysis, the findings all point in the same direction: no meaningful link. This could be due to several factors. First, the relatively small sample size (n = 28) limits the strength and reliability of statistical conclusions. Second, participants across all age groups may have shared a similar experience of the space perhaps due to a balanced mix of natural and artificial elements, or because the participant's individual perception of nature are not related strongly to again with this condition.

Nonetheless, this result is informative. It suggests that future efforts to enhance the natural aspects of urban spaces like Boulevard City could benefit all age groups equally, rather than needing to target specific age demographics. However, future studies with a larger and more diverse sample would provide a clearer picture and help determine whether more subtle patterns might emerge with greater statistical power.

Natural and Gender

Across all tests, the results consistently show no significant link between gender and how natural the space is perceived. Whether looking at standard Chi-Square methods, exact tests, or linear trends, the conclusion remains the same: participants' gender did not meaningfully influence how they evaluated the natural features of Boulevard City. This might suggest that men and women share similar expectations or impressions regarding natural environments in this context.

However, it's important to approach these findings cautiously due to the small sample size and the violation of assumptions in the Chi-Square test. A larger and more balanced dataset could provide a more accurate picture and potentially uncover differences that this analysis could not detect. For now, the results suggest that gender does not play a major role in shaping perceptions of naturalness within this setting.

5.2.2 Cultural

The results point to a broadly positive perception of cultural richness in Boulevard City, with many participants recognizing cultural elements in the space. The relatively high mean (3.79) reflects this shared impression. However, the moderate standard deviation (1.11) signals that there is still some variability in how individuals define or recognize cultural aspects within the space. This may be due to differing expectations or understandings of what makes a place "cultural" such as the presence of art, heritage architecture, public events, or cultural symbolism.

Figure 35. "Wall of Fame with Celebrities' Handprints in Boulevard City" by Waddah Alnajjar (CC BY-NC 2.0)

To reduce such variability in future studies, researchers may consider providing a clearer definition or examples of "cultural features" in the survey. Similarly, urban designers could consider integrating more visible or diverse cultural markers in public spaces to foster a stronger, more consistent sense of cultural identity among visitors.

Cultural and Age

Across all statistical tests, the findings indicate that age does not have a meaningful influence on how participants perceive the cultural richness of Boulevard City. Participants from different age groups generally rated the space,

similarly, suggesting a relatively shared understanding or experience of cultural features in the environment.

That said, the high number of low expected counts and the small sample size (N = 28) limit the generalisability and statistical power of these results. These factors may obscure subtle associations that could emerge with a larger or more demographically diverse sample. As such, future research should seek a broader participant pool, allowing for more robust testing and subgroup analysis that could uncover generational or age-related trends in the perception of cultural environments.

Cultural and Gender

Based on the results from multiple statistical tests, there is no evidence to suggest that gender influences how participants perceive the cultural dimension of Boulevard City. Both men and women responded similarly to questions about cultural richness, indicating a shared or consistent perception across gender lines in this setting.

Nevertheless, caution is warranted in interpreting these results. The small sample size (N = 28) and the high proportion of low expected cell counts reduce the statistical power and may obscure subtler differences. These limitations highlight the need for future research involving a larger and more demographically diverse sample. Expanding the dataset could improve the robustness of findings and help uncover any nuanced gender-based differences in environmental perception.

5.2.3 Open

These findings suggest that Boulevard City is broadly perceived as a space that supports openness and opportunity, aligning with the psychological dimension related to perceived spatial freedom and accessibility. The relatively high mean score reflects a favourable view of how open and inviting the space feels to most users. Meanwhile, the moderate standard deviation implies that while there is general agreement, some variation in individual interpretation still exists perhaps due to differing expectations, prior experiences, or spatial preferences.

This variation also highlights the subjective nature of environmental perception, where openness may be influenced not only by physical characteristics but also by social or cultural contexts. As openness is often linked to freedom of movement, visual transparency, and inclusivity, urban planners could build on this strength by ensuring unobstructed views, welcoming entry points, and adaptable public areas.

Figure 36. "Square in Boulevard City " by Waddah Alnajjar (CC BY-NC 2.0)

Open and Age

Across all statistical tests, the findings consistently indicate that age does not significantly influence how participants perceive openness in Boulevard City. Despite slight variation in the significance levels, none fall below the 0.05 threshold, suggesting that the sense of openness is relatively uniformly experienced across different age groups.

However, it's important to interpret these findings cautiously. The high proportion of low expected counts signals that the dataset may not be robust enough to detect more subtle relationships. The small sample limits generalizability. Future studies with a larger and more age-diverse sample may yield more definitive conclusions regarding how age influences the perception of spatial openness in urban environments.

Open and Gender

Taken together, these findings indicate that participants' gender does not significantly affect their perception of openness in Boulevard City. Responses appear uniformly across gender groups, with no evident bias in how openness is experienced or rated.

However, it is essential to consider the limitations of the dataset. With a small sample size and a high proportion of low expected frequencies, the reliability of the statistical tests is reduced. Such conditions can mask subtle associations that might become apparent with a larger or more diverse sample.

In future research, expanding the participant pool and ensuring more balanced gender representation would strengthen the validity and generalizability of the findings. Doing so may also reveal more nuanced insights into how different demographic groups perceive and interact with elements of public space, such as openness.

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5.2.4 Social

These numbers paint a clear picture. Participants think that Boulevard City is generally a social place. Whether it's the design, the atmosphere, or the kinds of activities happening there, something about it encourages interaction. The average score of just over 4 shows that many people share this view. With three-quarters of participants giving it a 4 or 5, it's clear that it's doing something right.

That said, not everyone saw it the same way. A few participants gave lower scores, like 2 or 3. This could mean they visited at a quieter time, didn't feel connected to space, or simply have a different idea of what makes a place feel social. The variation in scores, while moderate, highlights that individual experiences can differ.

In general, the feedback suggests that Boulevard City is working well as a social space, even if not every person experiences it in exactly the same way.

Figure 37. "Social perception in Boulevard City " by Waddah Alnajjar (CC BY-NC 2.0)

Social and Age

Across all statistical tests conducted, there is consistent evidence that age does not have a significant impact on how social participants perceive Boulevard City to be. Both the Pearson and Likelihood Ratio tests showed high p-values, indicating no strong link between age and social dimension. The same applies to the exact test and linear trend analysis.

That said, the fact that most of the expected counts were low highlights a limitation in the dataset. When expected frequencies are this small, the reliability of chi-square results becomes questionable. For such a small sample Fisher-Freeman-Halton test helped to emphasize the findings.

In short, based on this survey data, age doesn't seem to play a role in shaping how social people find the space. Still, it would be helpful to conduct this analysis with a larger sample size in the future to strengthen the validity of the conclusions.

Social and gender

All the statistical tests used in this analysis lead to the same general conclusion: there is no significant association between gender and how social participants perceive Boulevard City to be. Whether through the Pearson test, the likelihood ratio, the exact test, or the linear trend analysis, none of the p-values fell below the 0.05 threshold for significance.

That said, a limitation of this analysis is the small sample size, which led to many low expected counts in the table. This makes traditional chi-square tests less reliable. Fortunately, the use of the Fisher-Freeman-Halton test helped confirm the results under conditions better suited to this kind of data.

In summary, based on the current dataset, gender does not appear to influence how social Boulevard City is perceived. However, to draw stronger conclusions, future studies should aim for a larger and more balanced sample to improve the reliability of the findings.

5.2.5 Cohesive

These results suggest that, on average, participants perceive Boulevard City as relatively cohesive, although responses indicate a degree of variability in how individuals interpret its spatial integration. The mean score approaching 4.0 reflects a generally favourable view, while the moderate standard deviation implies differing levels of agreement among participants.

This variation may reflect differing expectations or personal experiences within the space. For instance, while some participants may have experienced Boulevard City as well-organized and interconnected, others may have encountered visual or spatial inconsistencies that affected their perception of cohesion. These findings point to a broadly positive yet nuanced view of the space's design, indicating that while the area is largely functional and connected, there may be opportunities to enhance coherence, particularly for users with different movement patterns, cultural backgrounds, or accessibility needs.

Cohesive and Age

Overall, the statistical analysis across all tests suggests that age does not play a significant role in shaping participants' perceptions of spatial cohesion in Boulevard City. While this consistency strengthens the reliability of the conclusion, it is important to note that the small sample size (N = 28) and the high number of low expected cell counts limit the robustness of the findings. Future research with a larger and more demographically diverse sample is recommended

to further explore whether age-related differences in perception may emerge in broader populations.

Cohesive and Gender

The Taken together, the statistical tests strongly indicate that gender does not have a significant influence on how participants perceive the cohesiveness of Boulevard City. Despite slight variations in individual responses, no clear pattern or trend emerges that would suggest a gender-based difference in the interpretation of spatial cohesion.

However, these findings should be interpreted with caution due to the small sample size (N = 28) and the extensive violations of expected frequency assumptions. For more reliable and generalizable conclusions, future studies with larger and more balanced samples are necessary. Such efforts would help clarify whether gender-related perceptions of spatial cohesion exist in more diverse or representative populations.

5.2.6 Diversity

Participants' perceptions appear to reflect their exposure to a range of amenities within Boulevard City. In open-ended responses, several individuals described the area as dynamic and multi-functional, citing features such as restaurants, playgrounds, entertainment venues, exhibitions, and electronic games. These responses paint a picture of a space designed to appeal to varied age groups and interests, including families, youth, and children.

The use of terms like "multi-use," "vibrant evenings," and "cultural entertainment" points to an environment that aims to blend leisure, culture, and social interaction. Despite this, the range in scores suggests that not all visitors experience this richness equally. Some may feel that certain elements perhaps green spaces or quieter areas are missing or underdeveloped, contributing to a sense of fragmentation.
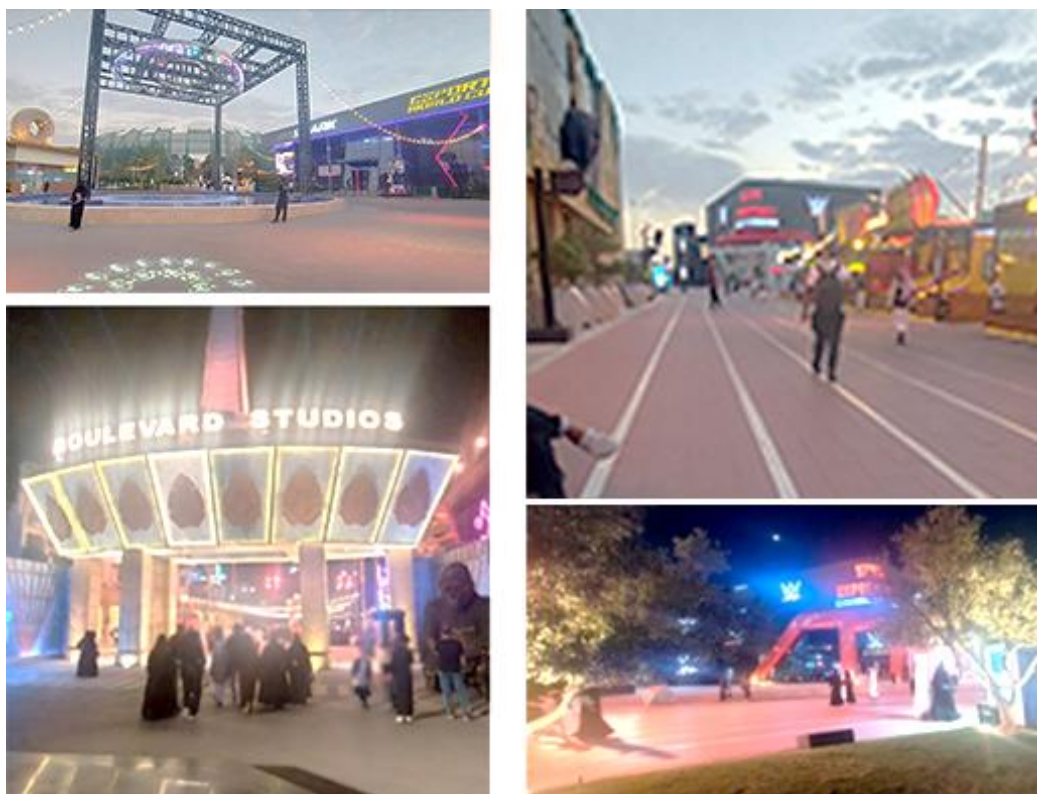
Figure 38. "Cluster of figures, Diversity in Boulevard City " by Waddah Alnajjar (CC BY-NC 2.0)

This variation in perception reinforces the importance of inclusive urban design that responds to diverse user needs. While Boulevard City appears to successfully engage many users through its programming and layout, further efforts may be needed to enhance the sense of coherence and ensure that diversity of experiences is felt by all who use the space.

Diverse and Age

Based on the statistical results, age does not appear to play a significant role in shaping participants' views on how diverse Boulevard City feels. Across all tests, there was no evidence of a strong relationship or consistent pattern that would suggest older or younger individuals perceive the range of experiences in space differently.

That said, while the data supports the absence of a significant association, it's important to interpret these findings carefully. The analysis was based on a small sample size (N = 28) and violated key assumptions of the Chi-Square test, particularly due to the low number of expected responses in each age category. These limit the reliability level.

For a more accurate understanding of how age may influence perceptions of diversity in public spaces, future studies should aim for a larger and more evenly

distributed sample. Doing so would strengthen statistical power and allow for more robust comparisons across demographic groups.

Diverse and Gender

The analysis shows that gender does not appear to influence how participants perceive the diverse nature of Boulevard City. Across all statistical tests conducted, no significant relationship was identified between gender and the diversity dimension, suggesting that perceptions of the city's range of experiences are relatively consistent across male and female participants.

That said, the strength of these conclusions is limited by the small sample size (N = 28) and violations of key statistical assumptions, particularly the low expected frequencies across all response categories. These factors can reduce the robustness of the Chi-Square results and should be carefully considered when interpreting the findings.

To enhance the reliability and generalizability of future analyses, larger and more demographically balanced samples are recommended. This would allow for more confident conclusions about how gender may or may not relate to perceptions of diversity in urban environments like Boulevard City.

5.2.7 Sheltered

These results suggest that the majority of participants view the place as safe and well sheltered. The fact that 50% gave the highest rating shows a strong perception of safety. The relatively low standard deviation indicates that participants largely agreed in their assessment, with most responses clustered toward the positive end of the scale.

Overall, safety and shelter appear to be central to how people experience this place, with very few ratings it as unsafe or unsheltered. This consensus points to the environment being perceived positively in terms of personal security and protection.

Sheltered and Age

The Overall, the statistical evidence suggests that age does not play a significant role in shaping perceptions of how sheltered the place is. Across multiple tests, no significant differences or trends emerged when comparing responses from different age groups.

However, the small sample size and the violation of expected frequency assumptions highlight the need for cautious interpretation. Future studies with

larger, more diverse samples would help to better understand whether age might influence perceptions of safety and shelter in different contexts.

Sheltered and Gender

Overall, the results indicate that gender does not significantly influence participants' views on how sheltered or safe Boulevard City feels. Both the Chi-Square and Fisher-Freeman-Halton tests confirm that gender-based differences in perception are minimal or non-existent in this dataset.

However, the Linear-by-Linear Association test suggests a potential weak trend that may warrant further exploration. Although not statistically significant, the proximity of the p-values to the 0.05 threshold implies that with a larger or more balanced sample, a clearer relationship might emerge.

Due to the small sample size (N = 28) and the high number of cells with low expected counts, caution should be used when interpreting these findings. Future studies with broader and more representative samples would offer more robust conclusions about how gender might relate to perceptions of safety and shelter in urban environments.

5.2.8 Serene

The data reflects a generally favorable perception of serenity within Boulevard City. Many participants experienced it as calm and tranquil, likely to appreciate features that support a peaceful environment. However, the moderate variability in responses also shows that not everyone shares this view. A noticeable portion of participants gave mid- to low-range scores, suggesting that for some, aspects of the environment may feel less serene perhaps due to noise, crowding, or lack of green spaces.

This variation underlines that while serenity may be a common experience, it is not uniform. Individual perceptions may depend on factors like the time of visit, specific location within the city, or personal expectations of what makes a place feel serene. For future exploration, it may be helpful to investigate what specific elements contribute to or detract from the sense of serenity in Boulevard City.

Figure 39. "Serene in Boulevard City " by Waddah Alnajjar (CC BY-NC 2.0)

Serene and Age

The statistical tests consistently show that age does not have a significant impact on how participants perceive the serenity of Boulevard City. While some minor variations in scores exist across different age groups, there is no clear pattern or strong statistical relationship to suggest that one age group sees the city as more or less serene than another.

However, the reliability of these results is affected by the small sample size (N = 28) and the high number of cells with very low expected counts. These limitations reduce the robustness of the Chi-Square analysis and underscore the importance of using exact tests in small datasets.

In future research, increasing the sample size and ensuring more even representation across age groups would help clarify whether any real age-related trends exist in how people experience serenity in urban spaces.

Serene and Gender

The results offer a mixed picture regarding the relationship between gender and perceptions of serenity in Boulevard City. While the Pearson Chi-Square test did not show statistical significance, both the Likelihood Ratio test and the Linear-by-Linear Association test suggest that there may be a meaningful association, particularly in terms of a directional trend.

These findings imply that gender could play a role in shaping how participants experience serenity in the city, with some variation potentially linked to different expectations or sensitivities to environmental qualities.

However, the small sample size (N = 28) and the high proportion of low expected counts present limitations. The Fisher-Freeman-Halton Exact Test, which adjusts for these constraints, did not confirm significance, suggesting the need for caution

when interpreting these results. This discrepancy among tests highlights the importance of using a larger, more balanced dataset in future research to confirm whether gender truly influences perceptions of serenity.

5.3 Discussion on Residence Background and PSDs

These results suggest that a participant's residence background potentially reflecting urban or non-urban upbringing or current living environment influences how they perceive specific sensory aspects of Boulevard City.

Participants from different residential backgrounds perceived natural features (such as wild nature, openness, and serene areas) and environmental coherence (like wholeness and diversity) differently. This could reflect differing expectations or familiarity with such characteristics based on their day-to-day surroundings. For instance, those from more natural or rural settings might be more attuned to or critical of urban representations of nature, whereas urban dwellers may find these same features more novel or refreshing.

The absence of significant differences in perceptions of human-shaped elements and social interaction spaces may indicate that such features are perceived similarly across residence backgrounds, possibly because they are more universally experienced in public urban settings, regardless of origin.

The near significance in the perception of safety and shelter suggests a potential difference that warrants further exploration. A larger sample may confirm whether certain groups perceive the urban environment as more or less safe or protected.

In summary, the findings highlight the importance of considering residential context when designing or evaluating urban environments. People lived experiences significantly shape how they perceive sensory and emotional qualities in a cityscape.

5.4 Discussion on Visiting Frequency

The findings suggest a notable relationship between visit frequency and how participants experience the cultural and social dimensions of Boulevard City. Participants who visit more regularly tend to perceive the space as being more socially engaging and culturally rich compared to those who visit infrequently.

For the social dimension, this likely reflects greater familiarity with the site's community aspects, such as social events, gathering spaces, or interactions that occur more naturally through repeated visits. Similarly, frequent exposure may heighten awareness or appreciation of cultural features, such as performances, exhibitions, or design elements that support identity and heritage.

Interestingly, no significant differences were found in participants' perceptions of naturalness, openness, cohesion, diversity, serenity, or shelter, though some trends toward significance were observed, particularly in the Cohesive and Open dimensions. This might suggest that while these aspects are noticed, they are not strongly attached to the frequency of visits or may require more targeted features to be perceived differently across groups.

The Tukey HSD grouping plots support this interpretation, showing that visitors who attend monthly or weekly generally rate the social and cultural qualities of the space higher than those visiting less frequently. Although not all results reached conventional levels of statistical significance, the consistent pattern across means suggests a clear directional trend.

5.5 Discussion on Visiting Companions

Overall, the results suggest that companionship has limited influence on how visitors perceive most sensory and spatial qualities of Boulevard City. Regardless of whether individuals visited alone or in groups, with family, children, or friends, their ratings across the Natural, Open, Sheltered, Serene, Cohesive, and Cultural dimensions remained largely consistent.

However, the Social and Diverse dimensions showed emerging trends that may be worthy of further exploration. These findings hint that the social atmosphere and range of activities in public spaces might be perceived differently depending on the social context of the visit. For example, individuals visiting with family or friends might be more attuned to opportunities for interaction, or to the variety of offerings that can engage different age groups and interests.

While these differences did not reach statistical significance, they point to an important design consideration: public spaces should be adaptable and inclusive, allowing various types of visitors to feel socially engaged and stimulated by diverse experiences.

5.6 Discussion on Overall Appealing

The findings suggest that while the area is generally well regarded and meets many users' expectations, there is still room for improvement to enhance the overall experience. The positive feedback about variety and family-friendly amenities reflects successful aspects of space's design and programming. At the same time, the suggestions for more greenery and social spaces point to a desire for environments that are not only entertaining but also relaxing and inclusive. Addressing practical concerns such as parking availability and high restaurant prices could help make the area more accessible and appealing to a broader

audience. By considering these comments, planners and designers can take meaningful steps to improve the functionality and inclusivity of the space.

5.6.1 Gender and Overall Appealing in Boulevard City

The relatively high number of female participants may help explain the emphasis on child- and family-related feedback. Content analysis of open-ended responses revealed that several women specifically requested additional child-friendly features in future developments. Terms like "play areas," "safety," and "child-oriented design" appeared frequently and were grouped under the category of "child-focused" (Krippendorff, 2013). These responses suggest a meaningful, though not overwhelming, interest in improving the family experience within the space. While not conclusive due to the small sample size, these patterns point to the potential value of incorporating more inclusive, child-friendly elements in future urban design strategies.

5.7 Language of Participation

The findings emphasize the importance of prioritizing Arabic in any future communications, surveys, or services aimed at residents and visitors in Riyadh and specifically in the study area. However, the data also highlights the relevance of offering bilingual options. The 15% of respondents who selected both Arabic and English may represent younger generations, expatriates, or internationally educated locals who navigate both languages with ease. Meanwhile, the 15% who preferred English alone though a minority are still a valuable part of the community and should not be overlooked. Providing both language options would enhance inclusivity, accessibility, and engagement for a wider audience, aligning with best practices for multilingual contexts (Van de Vijver and Leung, 1997).

5.7.1 Language and Perceived Sensory Dimensions

The results suggest that perceptions of Boulevard City's natural, man-made, open, and cohesive qualities are largely consistent across linguistic groups, implying a shared understanding or experience of the physical and environmental aspects of the space. However, the significant difference in the social dimension indicates that language may play a role in shaping how participants experience or engage with social aspects of public space. This could be influenced by cultural differences linked to language preference, such as comfort levels with public interaction, use of communal areas, or expectations of sociability. For example, Arabic-speaking participants might have different social norms or expectations for gathering spaces compared to bilingual or English-speaking users. This insight points to the importance of considering linguistic and cultural diversity when designing public spaces intended to foster inclusive social interaction.

Language and the Social Dimension

The findings suggest that bilingual individuals perceive the social environment of Boulevard City more positively than monolingual participants. This may be attributed to the cognitive or cultural flexibility associated with bilingualism, allowing individuals to engage with and interpret public spaces through multiple cultural lenses. The absence of a significant difference between the English-only and Arabic-only groups suggests that the elevated perception is not merely a linguistic preference, but rather a reflection of how bilingualism may enhance one's social engagement and awareness in a diverse urban setting. From a design or communication standpoint, these insights underline the importance of fostering multilingual inclusivity in both planning and promotional strategies. Emphasizing features that appeal to culturally and linguistically diverse groups may enhance perceptions of sociability and inclusiveness in public spaces like Boulevard City...

6. Summary and Conclusions

This study examined how the outdoor environment of Boulevard City in Riyadh affects human well-being through the lens of Perceived Sensory Dimensions (PSDs). It highlights how demographic factors influence perceptions of public entertainment spaces. The majority of participants were young adults aged 20 to 35, with a slight female majority. Most respondents were Riyadh residents, showing strong local engagement. Visits tended to be occasional rather than regular, with social interaction playing a central role, as many attended with family or friends.

Overall, the space received positive evaluations across PSDs, particularly for sheltered and social dimensions, which suggest the area provides comfort and supports social engagement. However, natural and serene qualities were rated lower, indicating opportunities for improvement. Statistical analysis revealed no significant effects of age or gender on perceptions of natural, sheltered, social, or serene dimensions. In contrast, place of residence influenced views on naturalness, openness, cohesion, diversity, and serenity. Frequent visitors showed stronger attachments to cultural and social aspects, while the presence of companions did not significantly affect perceptions.

The study also emphasized the role of linguistic context; bilingual participants viewed Boulevard City as offering a broader social space. This suggests bilingualism facilitates navigation and engagement in multicultural settings beyond language use alone. The study indicates that the PSD framework may be suitable for Riyadh's context, as participants engaged meaningfully with the questions. For international use, PSDs should be applied clearly and directly to ensure consistent understanding. However, broader research is needed to confirm the framework's reliability across diverse settings.

These findings have important implications for urban planners and policymakers seeking to enhance the inclusivity and sensory richness of public spaces. The study recommends expanding future research with refined methods and larger, more diverse samples, both within Riyadh and elsewhere. Investigating bilingual and multicultural influences further will advance understanding of how cultural and linguistic diversity shape spatial perception, contributing to theoretical refinement.

These results show an alignment with Saudi Arabia's Vision 2030. Enhancing public spaces like Boulevard City supports the vision's goals of creating vibrant, accessible, and healthy urban environments that foster well-being and cultural engagement. Incorporating diverse user perspectives into urban design is thus essential for achieving equitable and sustainable city growth in the Kingdom.

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Popular science summary

A recent study examined the effects of Boulevard City 's outdoor environment in Riyadh, Saudi Arabia, on individuals' well-being. The research employed a framework known as Perceived Sensory Dimensions (PSDs), which analyzes how we perceive and assess spaces through our senses.

The findings revealed that people's impressions of Boulevard City were influenced by various factors, such as age, gender, and visitation frequency. For instance, younger adults (ages 20–35) represented most visitors, and most people attended with family or friends. While space was largely viewed as safe and inviting, it was noted that incorporating more natural and tranquil elements could enhance the experience.

An interesting discovery was that bilingual individuals those fluent in both Arabic and English perceived Boulevard City as offering a more expansive social space. This perception wasn't solely due to language differences but rather because bilinguals are typically more adept at navigating multicultural environments, which helps them engage with a broader range of people.

The study proposes that future research should include larger and more diverse participant groups to better understand how various factors influence our interaction with public spaces. This could provide valuable insights for urban planners and policymakers to create more inclusive and enjoyable spaces for all.

Appendix 1: Translation Validation

This appendix on translation validation outlines the steps described in Section 3.3.4, The Language of the Survey. Each page is divided into two parts to clearly show the comparison between the different translation steps. Colour is used to highlight identical or similar phrases, with the focus of the translation being the meaning of the sentences, while also attempting to use literal words if it gives the required meaning.

Translation validation

The first Translation (1) Translation to arabic

The survey:

Ethical Considerations

I appreciate your interest in participating in this survey. Before proceeding, we would like to clarify some terms regarding confidentiality and security. Your identity or any personal information associated with you will not be disclosed. The data collected will be used solely for academic research and not for any other purpose. We kindly ask that you read all the questions carefully. Your participation constitutes your consent to the use of your responses in accordance with the stated terms. You have the right to withdraw from the survey at any time without the need to provide any justification. Your data will be securely stored.

Arabic translation:

الاعتبارات الأخلاقية

أقدر اهتمامك بالمشاركة في هذا الاستبيان، وقبل المتابعة نود توضيح بعض الشروط المتعلقة بالسرية والأمان. لن يتم الكشف عن هويتك أو أي معلومات شخصية مرتبطة بك. البيانات التي يتم جمعها ستُستخدم فقط لأغراض البحث الأكاديمي وليس لأي غرض آخر. نرجو منك قراءة جميع الأسئلة بعناية. مشاركتك تُعد موافقة ضمنية على استخدام إجاباتك وفقاً للشروط المذكورة. لك الحق في الانسحاب من الاستبيان في أي وقت دون الحاجة إلى تقديم أي مبرر. سيتم تخزين بياناتك بشكل آمن.

Translation validation

The first Translation (1) Translation to arabic

The survey:

Ethical Considerations

Arabic translation:

الاعتبارات الأخلاقية

أقدر اهتمامك بالمشاركة في هذا الاستبيان، وقبل المتابعة نود توضيح بعض الشروط المتعلقة بالسرية والأمان. لن يتم الكشف عن هويتك أو أي معلومات شخصية مرتبطة بك. البيانات التي يتم جمعها ستُستخدم فقط لأغراض البحث الأكاديمي وليس لأي غرض آخر. نرجو منك قراءة جميع الأسئلة بعناية. مشاركتك تُعد موافقة ضمنية على استخدام إجاباتك وفقاً للشروط المذكورة. لك الحق في الانسحاب من الاستبيان في أي وقت دون الحاجة إلى تقديم أي مبرر. سيتم تخزين بياناتك بشكل آمن.

The original English text will be compared with the back-translated English version.

The second Translation (2) Back-Translation into English

'Ethical considerations الاعتبارات الأخلاقية"

Thank you for your willingness to participate in this survey. Before starting to answer the questions. We would like to inform you of certain conditions. All the information you provide will be kept strictly confidential. Your identity and any personally identifiable information will not be revealed. The collected data will be used for academic research purposes only. And it will not be used for any other purpose. Please make sure to read all the questions carefully. Your participation is considered implicit consent to the use of your responses in accordance with the stated terms. You may withdraw from the survey at any time without the need to provide any reason. Your data will be stored in a secure manner.

1. How old are you?

Arabic translation: كم عمرك؟

1. (12 or less) (أقل من 12 سنة)
2. (13-19 years) (13-19 سنة)
3. (20-35 years) (20-35 سنة)
4. (36-55 years) (36-55 سنة)
5. (55+ years) (أكثر من 55 سنة)

2. What is your gender?

Arabic translation: ماهو جنسك؟

1. Male ذكر
2. Female أنثى
3. Prefer not to say أفضل أن لا أقول

3. Where do you live?

Arabic translation: أين تعيش؟

1. Riyadh الرياض
2. KSA (Out of Riyadh) في المملكة العربية السعودية خارج الرياض
3. Tourist (Out of KSA) سائح خارج المملكة العربية السعودية

4. How often do you visit the Boulevard?

Arabic translation: كم مرة تزور البوليفارد؟

1. Daily يومي
2. Weekly أسبوعي
3. Monthly شهري
4. More than 2 times a year أكثر من مرتين في السنة
5. Less than 2 times a year أقل من مرتين في السنة

5. Usually, I visit Boulevard city with my:

Arabic translation: عادة، أزور البوليفارد مع

1. Friends الأصدقاء
2. Family العائلة
3. Both 1 and 2 الأصدقاء والعائلة
4. By oneself بمفردي

Arabic translation: كم عمرك؟

How old are you?

Under 12 years.
(13 – 19 years)
(20 – 35 years)
(36 – 55 years)
(over 55 years)

Arabic translation: ماهو جنسك؟

What is your gender?

male
female
prefer not to say.

Arabic translation: أين تعيش؟

where do you live?

1- Riyadh
2-In the Kingdom of Saudi Arabia outside Riyadh
3- Tourist in the Kingdom of Saudi Arabia

Arabic translation: كم مرة تزور البوليفارد؟

I used to visit Boulevard City

1-daily
2-weekly
3monthly
4. More than twice a year.
5. Less than twice a year.

Arabic translation: عادة، أزور البوليفارد مع

I often visit Boulevard City with:

1. Friends
2. Family
3- Friends and family.
4. alone.

Analysis Summary

The segments highlighted in green match in meaning, wording, and textual structure.

The segments highlighted in orange correspond in meaning but differ in wording or phrasing.

The segments highlighted in red may differ in meaning and require further interpretation.

6. Do you perceive the Boulevard city as a place that contains elements of wild, untouched nature, such as palm trees, naturally shaped boulders, and more?

Arabic translation: هل تعتبر أن مدينة البوليفارد مكان يحتوي على عناصر من الطبيعة البرية غير المتأثرة مثل أشجار النخيل والصخور المشكلة بشكل طبيعي وغيرها؟

1 = Unnatural غير طبيعي
2
3
4
5 = Natural طبيعي

7. Do you perceive the Boulevard city as a place shaped by humans?

Arabic translation: هل تعتبر أن مدينة البوليفارد مكان تم تشكيله بواسطة الإنسان؟

1 = Non-cultural place مكان غير ثقافي
2
3
4
5 = Cultural place مكان ثقافي

8. Do you perceive the Boulevard city as creating an atmosphere with openness and opportunities for vistas?

Arabic translation: هل تعتبر أن مدينة البوليفارد تخلق أجواء تتسم بالانفتاح والفرص؟

1 = Place lacks openness مكان يفتقر إلى الانفتاح
2
3
4
5 = Openness in a place مكان يتسم بالانفتاح

Note that the original text is shaded in light grey. This text will be compared with the back-translated version into English.

- Do you feel that Boulevard City as a place contains elements of wild and pure nature such as palm trees / natural rocks, etc...?

Arabic translation: هل تعتبر أن مدينة البوليفارد مكان يحتوي على عناصر من الطبيعة البرية غير المتأثرة مثل أشجار النخيل والصخور المشكلة بشكل طبيعي وغيرها؟

1= Unnatural غير طبيعي
2
3
4
5= natural طبيعي

Arabic translation: - Do you think that Boulevard City was shaped by human hands?
هل تعتبر أن مدينة البوليفارد مكان تم تشكيله بواسطة الإنسان؟

1= Poor place culturally مكان غير ثقافي
2
3
4
5= Rich place Culturally. مكان ثقافي

Arabic translation: -Do you feel/think that Boulevard City creates an atmosphere of openness and provides opportunities for this?
هل تعتبر أن مدينة البوليفارد تخلق أجواء تتسم بالانفتاح والفرص؟

1= A place that lacks openness in opportunities. مكان يفتقر إلى الانفتاح في الفرص
2
3
4
5= A place that opens many horizons. مكان يفتح آفاق كثيرة

Original questionnaire (shaded)

9. Do you perceive that the Boulevard city provides social spaces, with opportunities to interact with other people?

Arabic translation: هل تشعر أن مدينة البوليفارد توفر مساحات اجتماعية مع فرص للتفاعل مع الأخرين؟

1 = Non-social place مكان غير اجتماعي
2
3
4
5 = Social place مكان اجتماعي

10. Do you perceive that the Boulevard city provides a sense of wholeness, as if it were a world unto itself?

Arabic translation: هل تشعر أن مدينة البوليفارد توفر شعوراً بالاكتمال كما لو كانت عالماً بحد ذاته؟

1 = Fragmented place مكان مجزأ
2
3
4
5 = Cohesive place مكان متماسك

11. Do you perceive this place as providing you with a diversity and variation of experiences?

Arabic translation: هل تشعر أن هذا المكان يوفر لك تنوعاً واختلافاً في التجارب؟

1 = Limited place مكان محدود
2
3
4
5 = Place with range of experiences مكان بمجموعة متنوعة من التجارب

- If any, please share some of the varieties you've noticed.

Arabic translation: إذا كان هناك أي تنوع، يرجى مشاركة بعض الأنواع التي لاحظتها.

Analysis Summary
The segments highlighted in green match in meaning, wording, and textual structure.
The segments highlighted in orange correspond in meaning but differ in wording or phrasing.

Back-translated version (handwritten)

Note that the original text is shaded in light grey. This text will be compared with the back-translated version into English.

- Do you think/feel that Boulevard City Provides Social Spaces with opportunities to interact with others?

Arabic translation: هل تشعر أن مدينة البوليفارد توفر مساحات اجتماعية مع فرص للتفاعل مع الأخرين؟

1 = Unsocial place. مكان غير اجتماعي
2
3
4
5 = Social place مكان اجتماعي

Do you realize/think/feel that Boulevard City an Sense of completeness as it were a world in itself?

Arabic translation: هل تشعر أن مدينة البوليفارد توفر شعوراً بالاكتمال كما لو كانت عالماً بحد ذاته؟

1 = The place feels disjointed مكان مجزأ
2
3
4
5 = The place is integrated. مكان متماسك

- Do you realize/think/feel that the place Provides a Variety and diversity of experiences?

Arabic translation: هل تشعر أن هذا المكان يوفر لك تنوعاً واختلافاً في التجارب؟

1 = A place limited. مكان محدود
2
3
4
5 = A place with a diverse environment that offers various experiences مكان بمجموعة متنوعة من التجارب

If there are any, Please share Some examples of the spatial you observed.

12. Do you perceive this place as providing safe and sheltered areas?

Arabic translation: هل تشعر أن هذا المكان يوفر مناطق آمنة ومحمية؟

1 = Un sheltered or safe place — مكان غير محمي أو آمن

2

3

4

5= Safe and sheltered place — مكان آمن ومحمي

13. Do you perceive this place as providing serene areas?

Arabic translation: هل تعتبر أن هذا المكان يوفر مناطق هادئة؟

1 = Non-serene place — مكان غير هادئ

2

3

4

5= Serene place — مكان هادئ

14. Do you find Boulevard city appealing?

Arabic translation: هل تجد مدينة البوليفارد جذابة؟

1 = I do not like it; but no other choices. — لا أحب المكان ولكن لا يوجد خيارات أخرى

2

3

4

5 = I love this place — أحب هذا المكان

15. What dimensions or features are lacking in Boulevard city that should be integrated into Riyadh's future development?

Arabic translation: ما الأبعاد أو الميزات المفقودة في مدينة البوليفارد والتي يجب دمجها في التطوير المستقبلي للرياض؟

NOTE:

The verb "perceive" has been translated using other verbs such as "feel", "think" or "realize".

Analysis Summary

The segments highlighted in green match in meaning, wording, and textual structure.

The segments highlighted in orange correspond in meaning but differ in wording or phrasing.

(Handwritten back-translation)

- Do you think/feel this place provides safe and sheltered environment?

Arabic translation: هل تشعر أن هذا المكان يوفر مناطق آمنة ومحمية؟

1= Unsafe/feel place مكان غير محمي أو آمن

2

3

4

5= Safe and shelterd place. مكان آمن ومحمي

Arabic translation: هل تعتبر أن هذا المكان يوفر مناطق هادئة؟

Do you realize that this place offers quietness and serene?

1= Not a quiet and serene place. مكان غير هادئ

2

3

4

5= Quiet and Serene place.

Arabic translation: هل تجد مدينة البوليفارد جذابة؟

Do you find Boulevard City an attractive place?

1= I don't like it but there are not other options. لا أحب المكان ولكن لا يوجد خيارات أخرى

2

3

4

5= I like this place أحب هذا المكان

Arabic translation: ما الأبعاد أو الميزات المفقودة في مدينة البوليفارد والتي يجب دمجها في التطوير المستقبلي للرياض؟

What are the missing dimensions or features in Boulevard City that should be integrated into the future development of Riyadh?

Appendix 2: The Survey Report

This appendix includes the final survey questions, design, and answers as extracted from Netigate.

The results presented in this report reflect the answers provided by the participants, without any validation, verification, or refinement.

SLU

My Personal Experience at the BOULEVARD CITY... تجربتي الشخصية في البوليفارد سيتي

⊡ Survey information

💬	✓	📅	⏱	
31	**27 / 31**	**8 / 8**	**02:56**	
ANSWERS	COMPLETED	DAYS LIVE	RESPONSE TIME	

✓

N/A

RESPONSE RATE
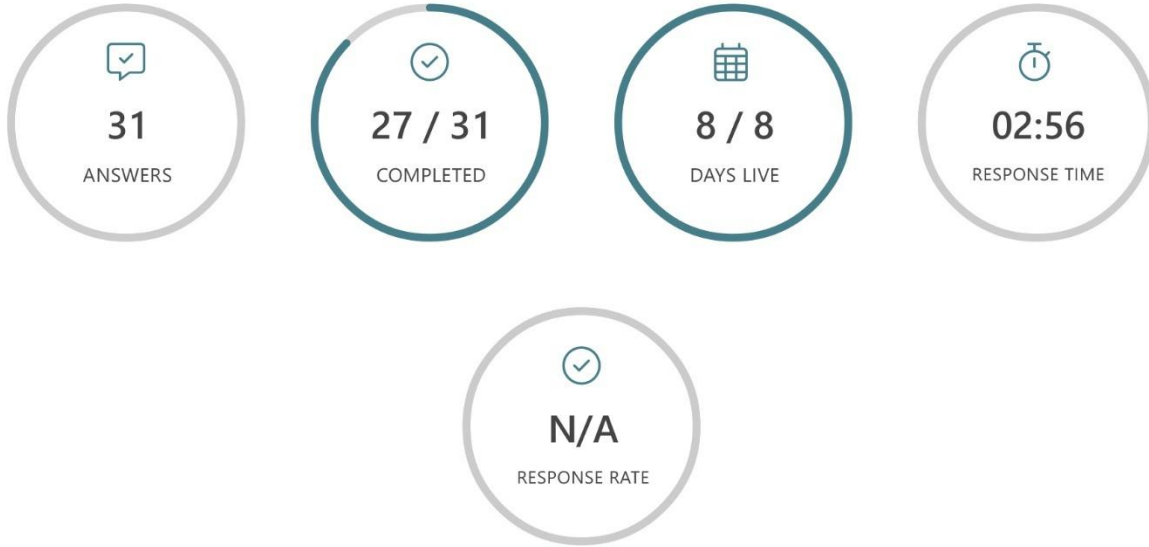
Information text
Page 1 - Question 1

Ethical Considerations

I appreciate your interest in participating in this survey. Before proceeding, we would like to clarify some terms regarding confidentiality and security: All information you provide will be strictly confidential. Your identity or any personal information associated with you will not be disclosed. The data collected will be used solely for academic research and not for any other purpose. We kindly ask that you read all the questions carefully. Your participation constitutes your consent to the use of your responses in accordance with the stated terms. You have the right to withdraw from the survey at any time without the need to provide any justification. Your data will be securely stored.

Information text
Page 1 - Question 2

الاعتبارات الأخلاقية

نشكركم على رغبتكم في المشاركة في هذا الاستبيان. قبل الشروع في الإجابة على الأسئلة، نود أن نوضح لكم بعض الشروط المتعلقة بالسرية والأمان: جميع المعلومات التي ستقدمونها ستكون سرية تمامًا. لن يتم الكشف عن هويتكم أو أي معلومات شخصية ترتبط بكم. كما أننا لن نجمع أي معلومات يمكن ربطها بفرد معين. سُتستخدم البيانات المجمعة لأغراض البحث الأكاديمي فقط، ولن تُستخدم لأي غرض آخر. نرجو منكم قراءة جميع الأسئلة بعناية. تعتبر مشاركتكم بمثابة موافقة ضمنية على استخدام إجاباتكم وفقًا للشروط الموضحة. يحق لكم الانسحاب من الاستبيان في أي وقت ودون الحاجة إلى تقديم أي مبرر. سيتم تخزين بياناتكم بشكل آمن
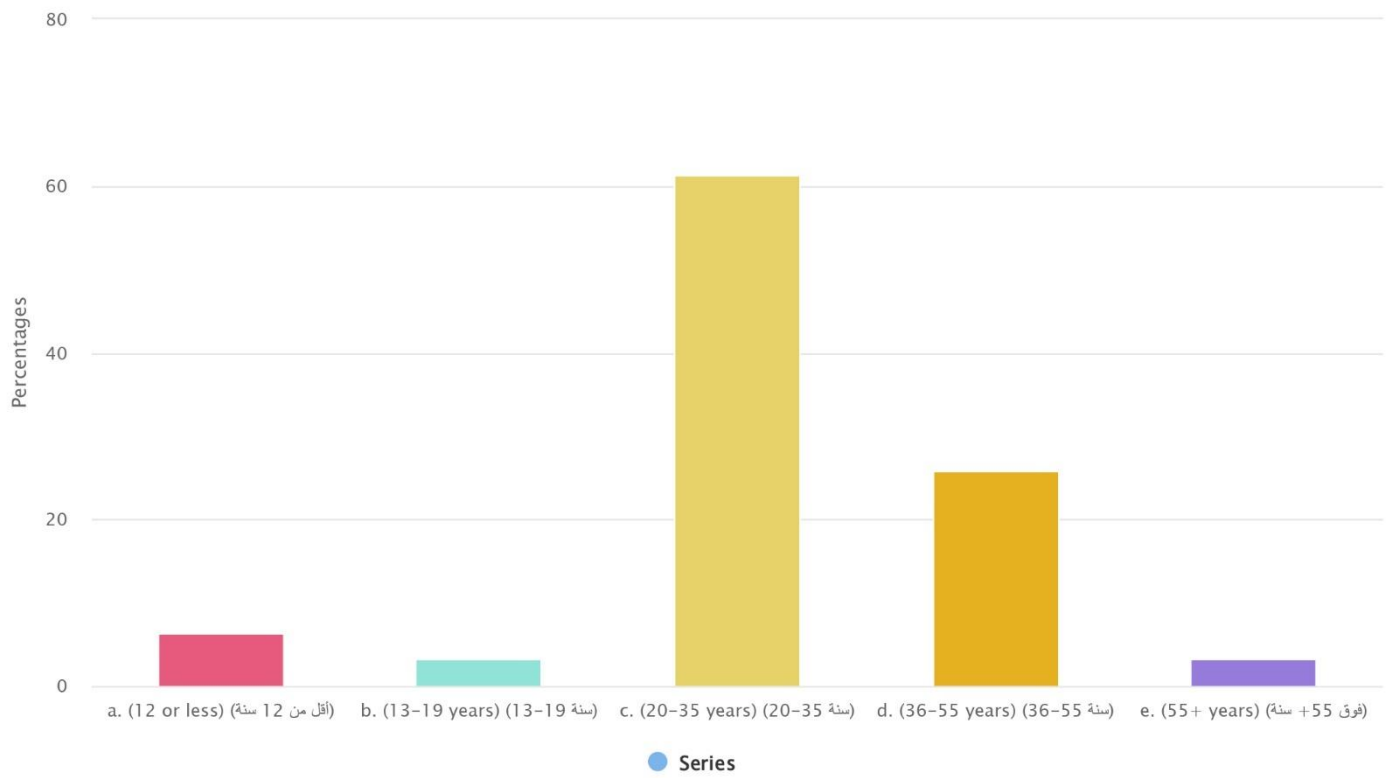
1. How old are you?
Arabic:

كم عمرك؟

Page 2 - Question 2

1 a. (12 or less) (أقل من 12 سنة)		2 (6%)
2 b. (13-19 years) (13-19 سنة)		1 (3%)
3 c. (20-35 years) (20-35 سنة)		19 (61%)
4 d. (36-55 years) (36-55 سنة)		8 (26%)
5 e. (55+ years) (فوق 55+ سنة)		1 (3%)
Answers		31

Chart 1 — Age groups with bars:
- a. (12 or less) (أقل من 12 سنة): ~6
- b. (13–19 years) (13–19 سنة): ~3
- c. (20–35 years) (20–35 سنة): ~61
- d. (36–55 years) (36–55 سنة): ~25
- e. (55+ years) (فوق 55+ سنة): ~3

● Series

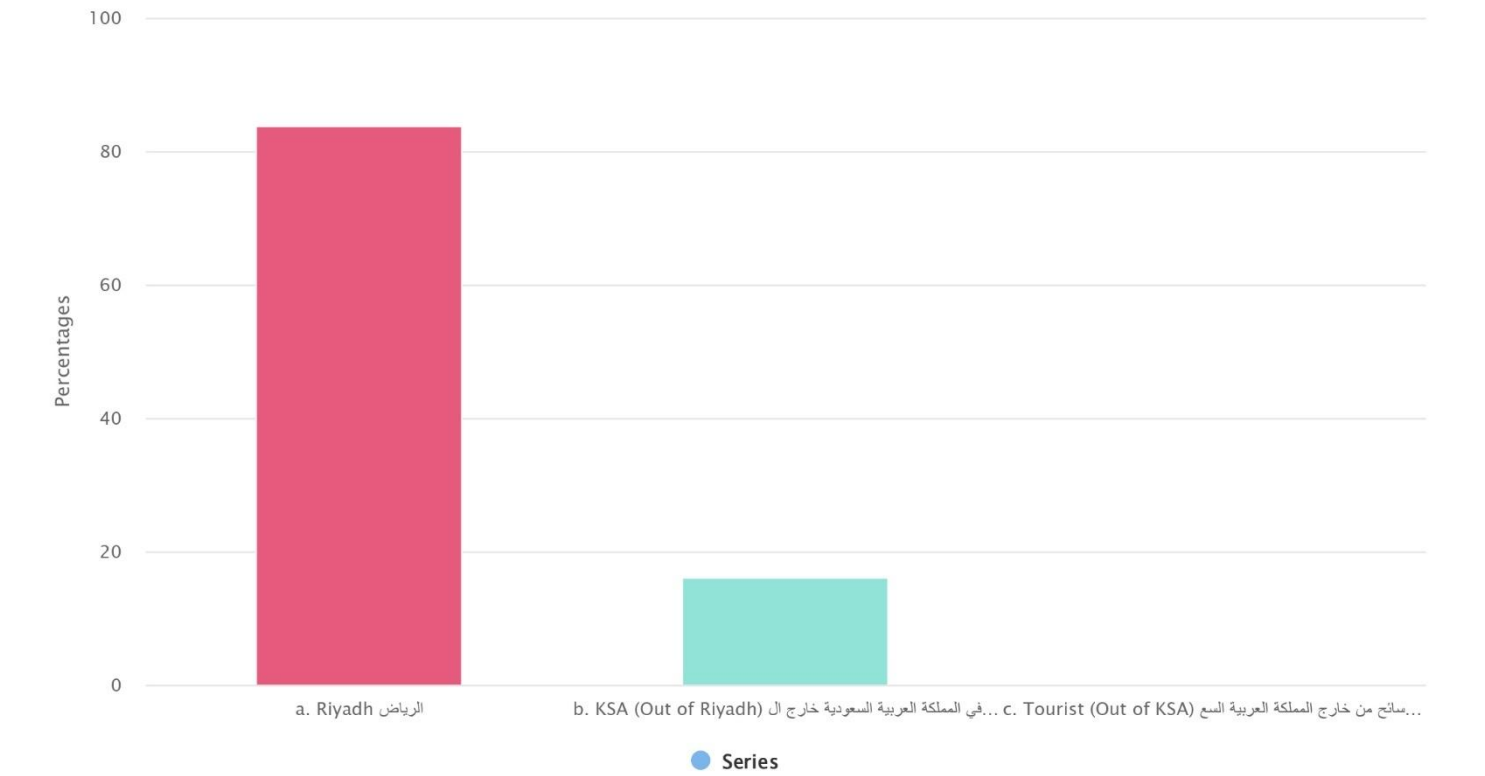## 2. What is your gender?
Arabic:
ما هو جنسك؟
Page 2 - Question 3

Chart 2 — Gender with bars:
- a. Female أنثى: ~53
- b. Male ذكر: ~42
- c. Prefer not to say أفضل أن لا أذكر: ~3

● Series
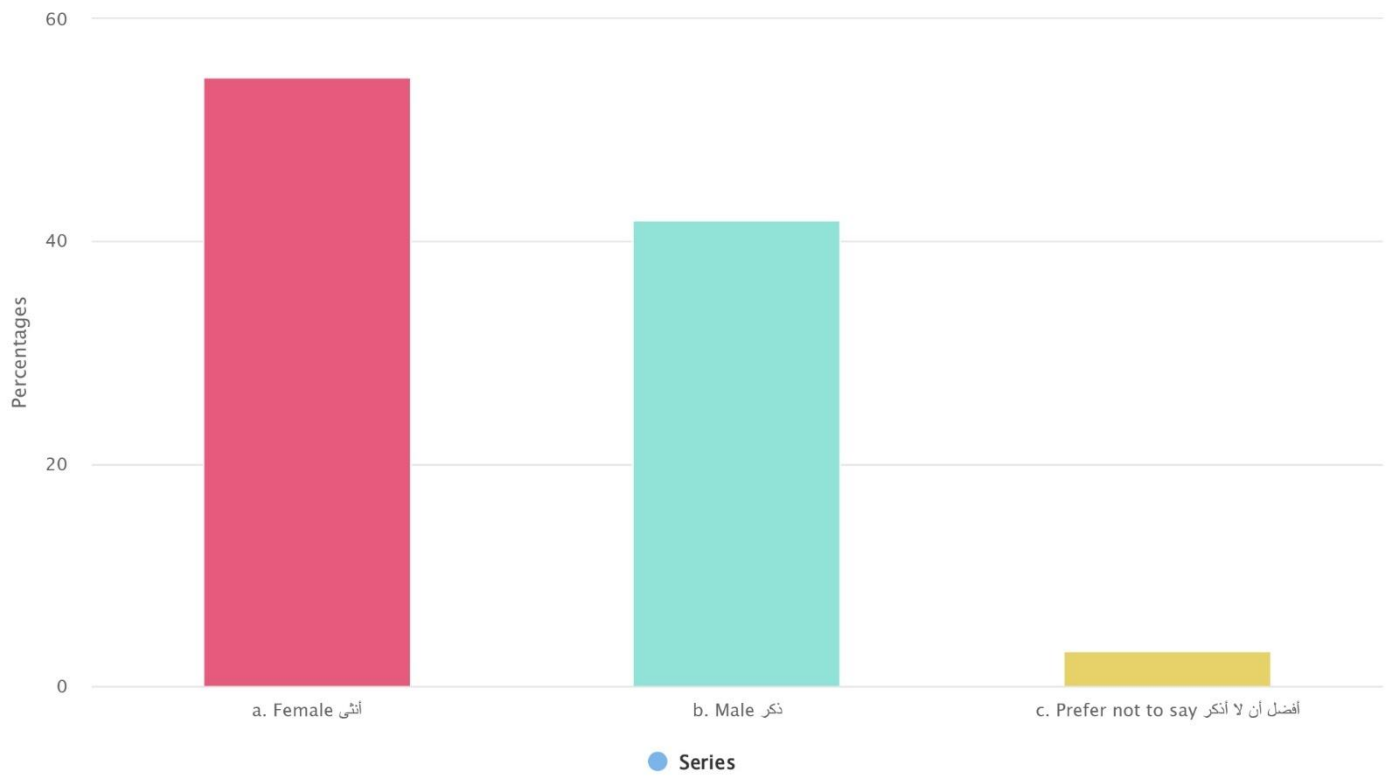
1 a. Female أنثى	17 (55%)	
2 b. Male ذكر	13 (42%)	
3 c. Prefer not to say أفضل أن لا أذكر	1 (3%)	
Answers	31	

3. Where do you live?
Arabic:
أين تقيم؟
Page 2 - Question 4
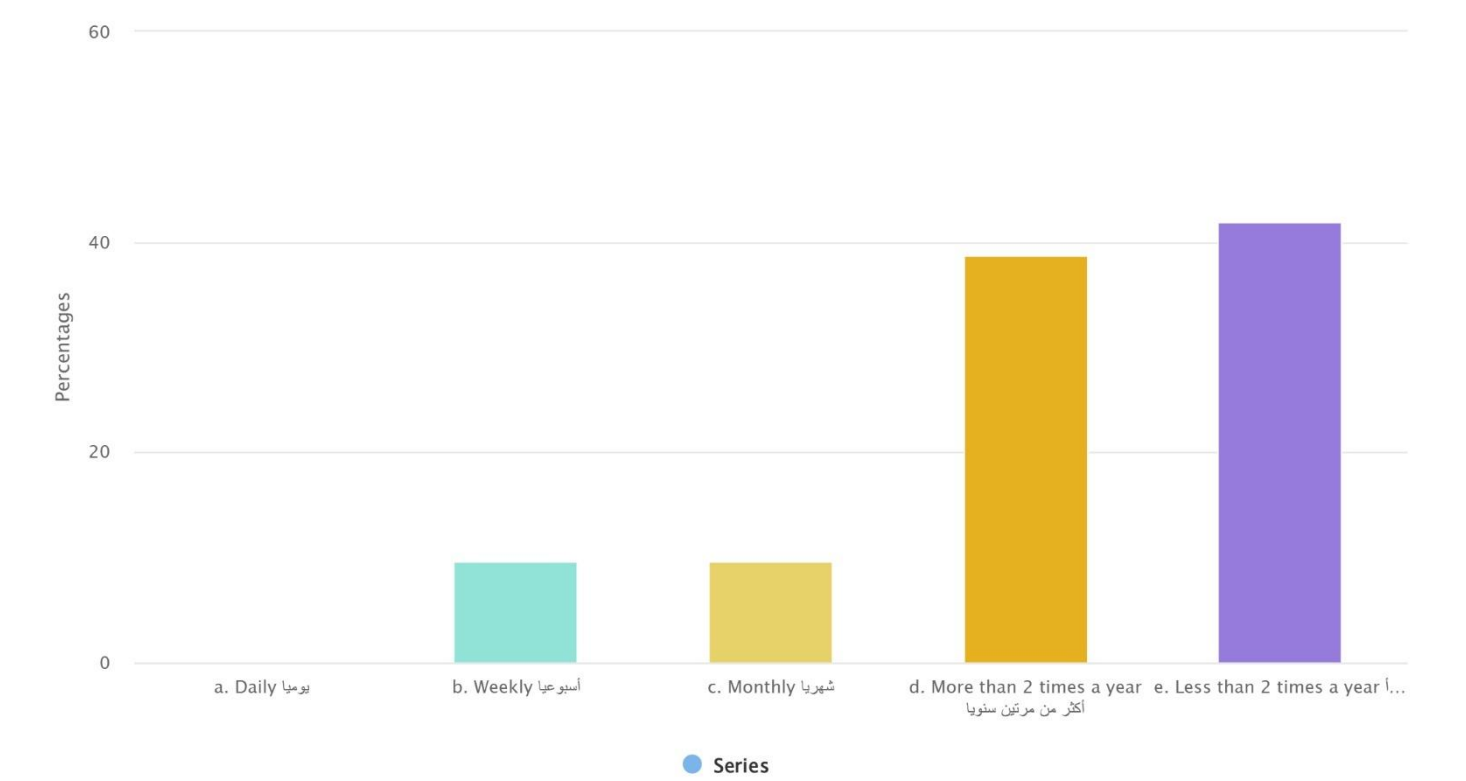

1 a. Riyadh الرياض	26 (84%)	
2 b. KSA (Out of Riyadh) في المملكة العربية السعودية خارج الرياض	5 (16%)	
3 c. Tourist (Out of KSA) سائح من خارج المملكة العربية السعودية	0 (0%)	
Answers	31	

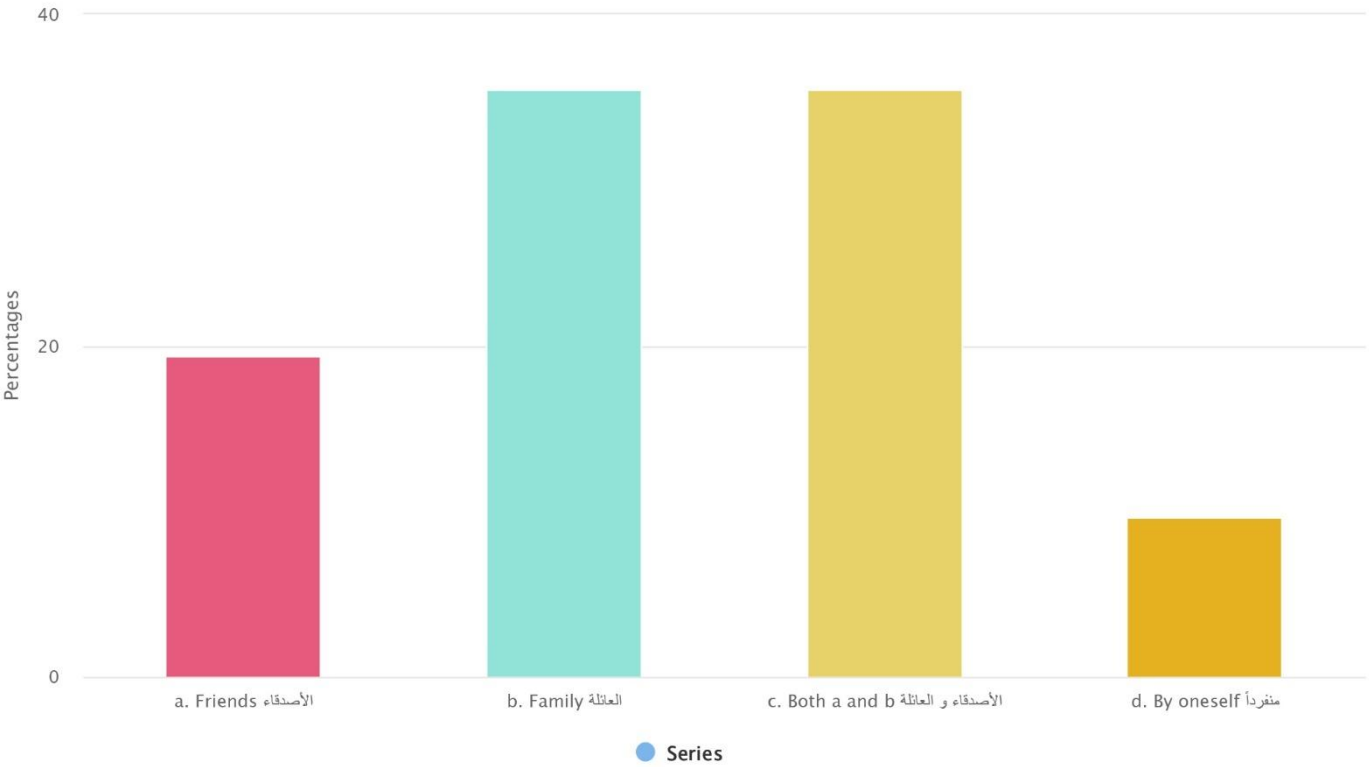# 4. How often do you visit the Boulevard?
Arabic:

كم مرة تزور البوليفارد؟

1 a. Daily يوميا		0 (0%)
2 b. Weekly أسبوعيا		3 (10%)
3 c. Monthly شهريا		3 (10%)
4 d. More than 2 times a year أكثر من مرتين سنويا		12 (39%)
5 e. Less than 2 times a year أقل من مرتين سنويا		13 (42%)
Answers		31

5. Usually, I visit Boulevard city with my:

Arabic:

عادة ما أزور البوليفارد مع

1	a. Friends الأصدقاء	6 (19%)
2	b. Family العائلة	11 (35%)
3	c. Both a and b الأصدقاء و العائلة	11 (35%)
4	d. By oneself منفرداً	3 (10%)
Answers		31

6. Do you perceive the Boulevard city as a place that contain elements of wild, untouched nature, such as palm trees, naturally shaped boulders, and more?
Arabic:

هل تشعر أن البوليفار سيتي كمكان يحتوي على عناصر الطبيعة البرية وغير الملوثة، مثل أشجار النخيل والصخور الطبيعية، وغيرها؟
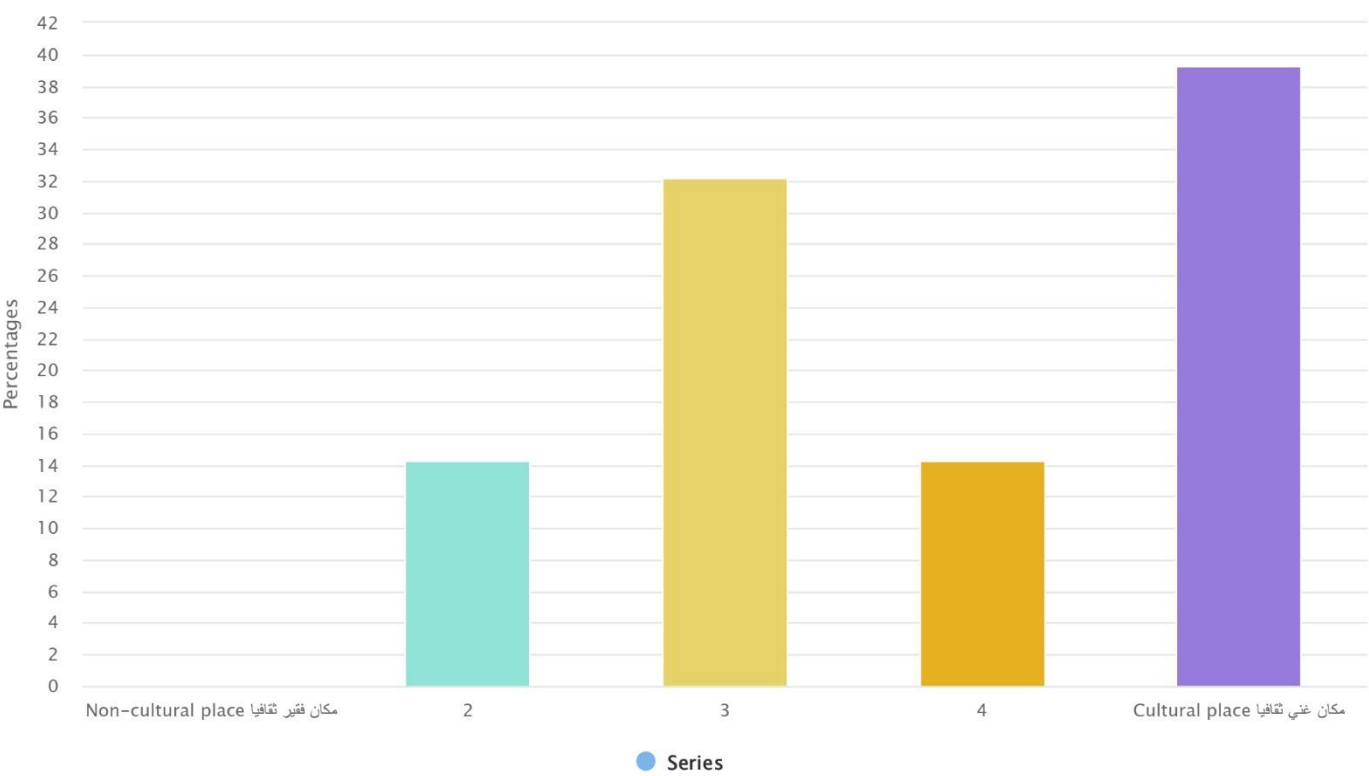
Page 3 - Question 1
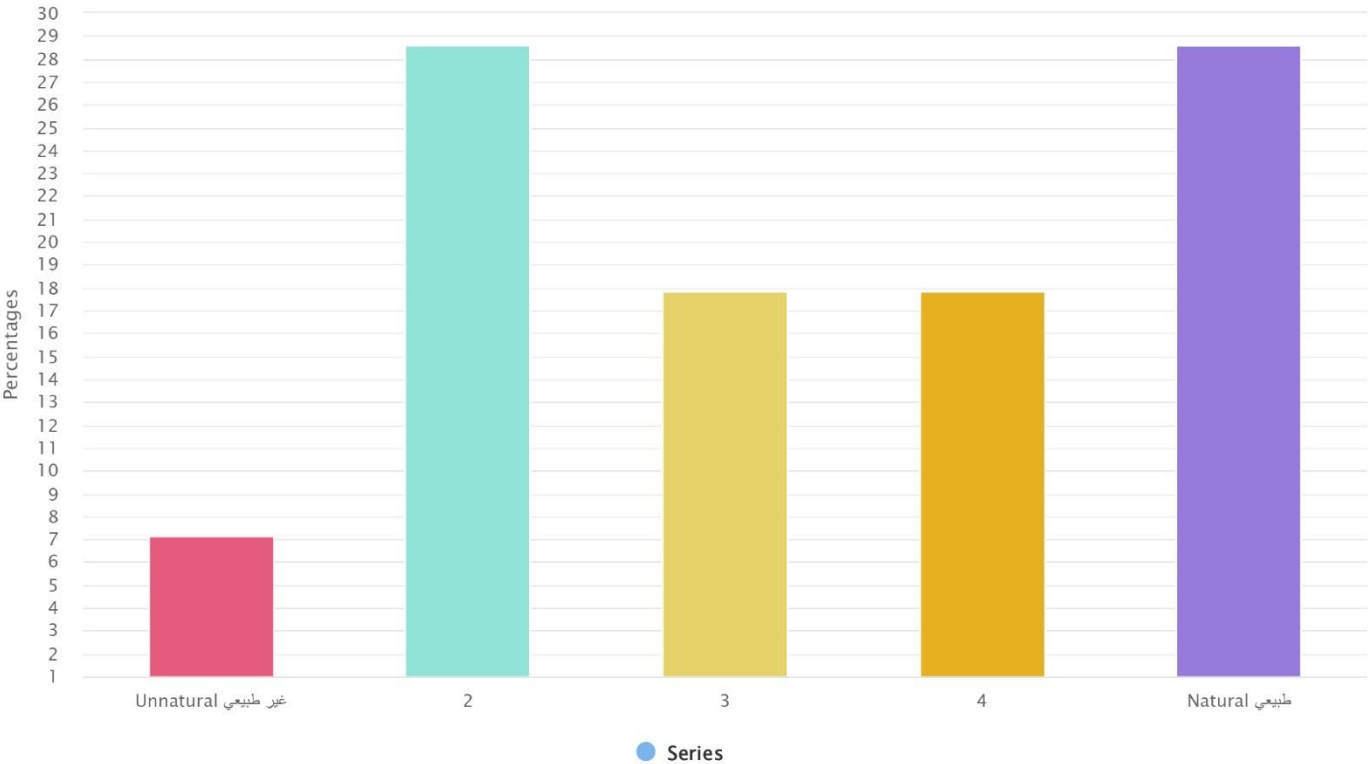
1 Unnatural غير طبيعي		2 (7%)
2 2		8 (29%)
3 3		5 (18%)
4 4		5 (18%)
5 Natural طبيعي		8 (29%)
Average		3.32
Standard deviation		1.34
Answers		28

7. Do you perceive the Boulevard city as a place shaped by humans?
Arabic:

هل تشعر البوليفار سيتي كمكان شكلته يد الإنسان؟

Page 3 - Question 2

1 Non-cultural place مكان فقير ثقافيا		0 (0%)
2 2		4 (14%)
3 3		9 (32%)
4 4		4 (14%)
5 Cultural place مكان غني ثقافيا		11 (39%)
Average		3.79
Standard deviation		1.11
Answers		28

8. Do you perceive the Boulevard city as creating an atmosphere with openness and opportunities for vistas?
Arabic:

هل تشعر أن البوليفار سيتي يخلق جوًا من الانفتاح ويوفر فرصًا لهذا ؟
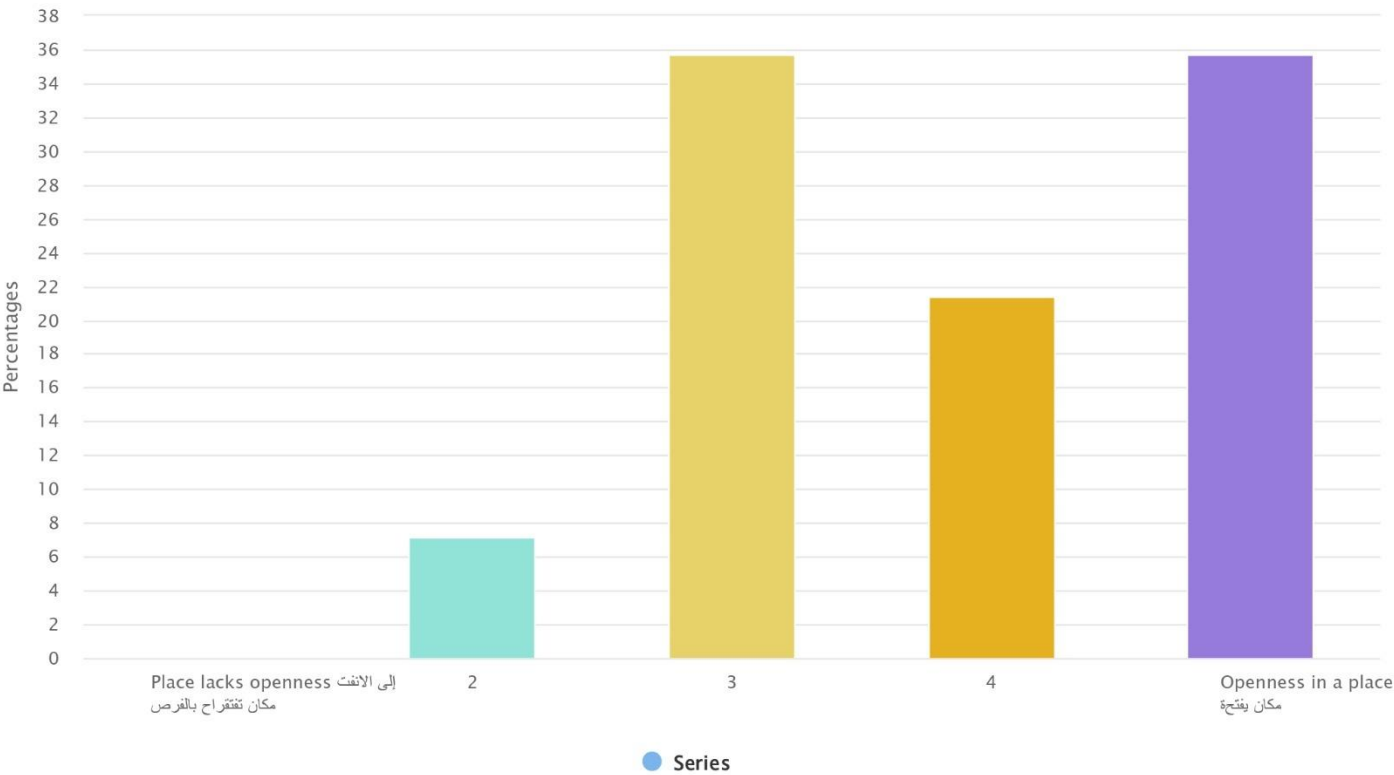
|		
1 Place lacks openness مكان تفتقر إلى الانفتاح بالفرص		0 (0%)
2 2		2 (7%)
3 3		10 (36%)
4 4		6 (21%)
5 Openness in a place مكان يفتح آفاق كبيرة		10 (36%)
Average		3.86
Standard deviation		0.99
Answers		**28**

9. Do you perceive that the Boulevard city provides social spaces, with opportunities to interact with other people?Arabic:

هل تشعر أن البوليفار سيتي يوفر مساحات اجتماعية مع فرص للتفاعل مع الآخرين؟
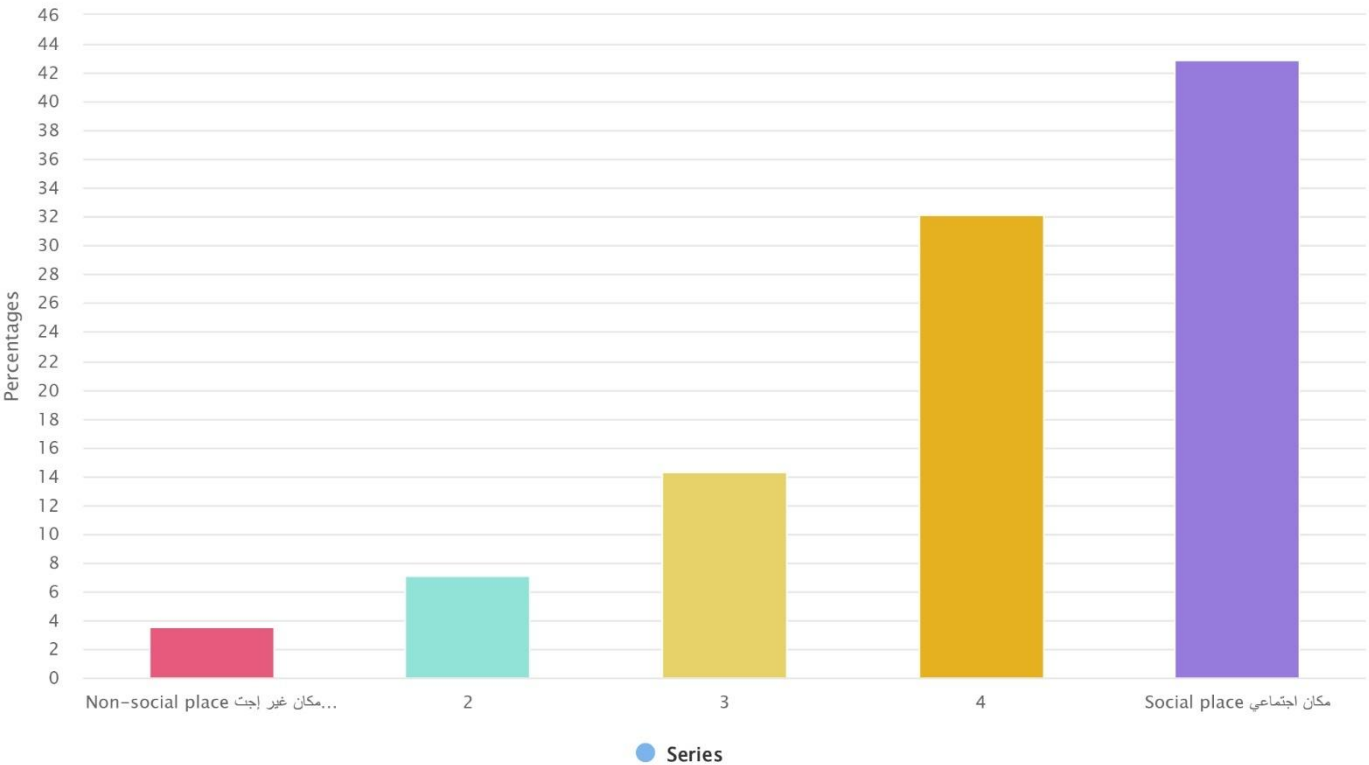
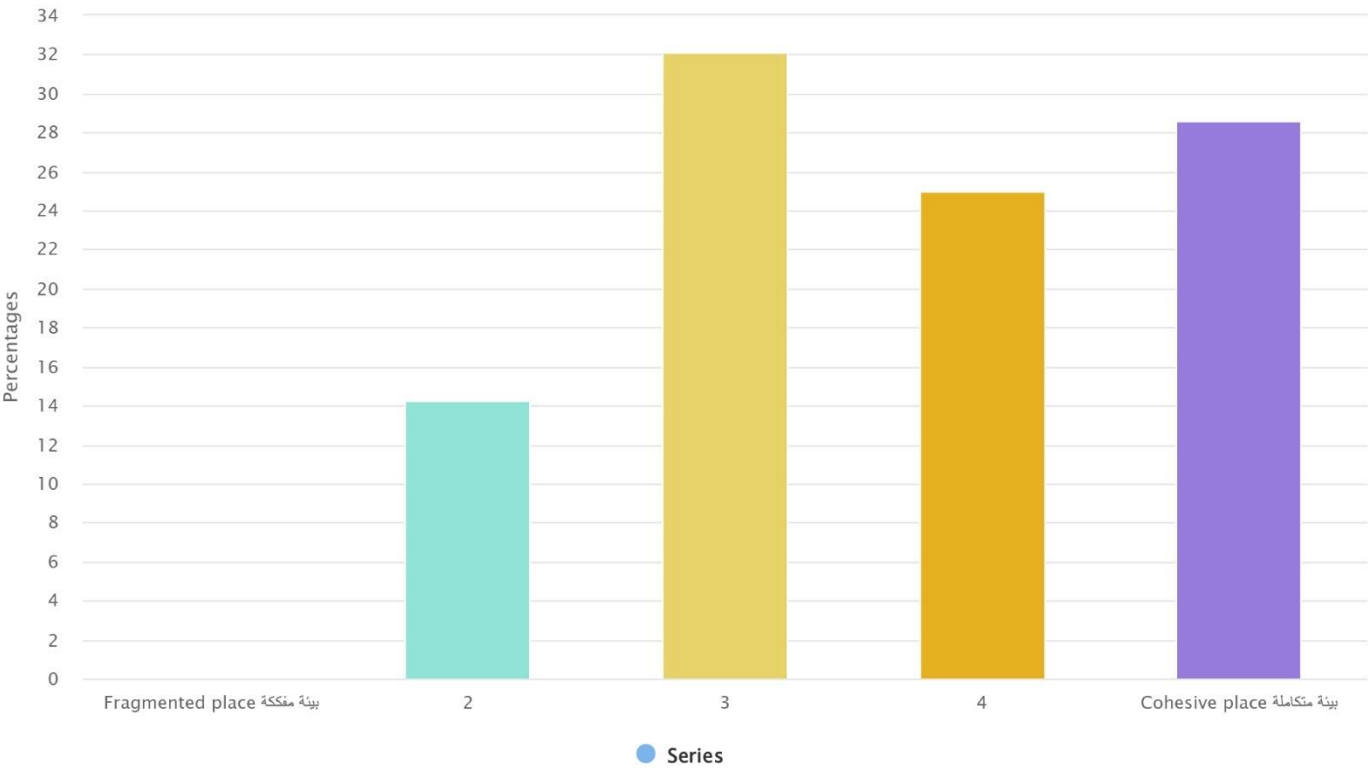|		
1 Non-social place مكان غير إجتماعي		1 (4%)
2 2		2 (7%)
3 3		4 (14%)
4 4		9 (32%)
5 Social place مكان اجتماعي		12 (43%)
Average		4.04
Standard deviation		1.09
Answers		28

10. Do you perceive that the Boulevard city provides a sense of wholeness, as if it were a world unto itself?

Arabic:

هل تدرك أن البوليفار سيتي يوفر إحساسًا بالكمال، كما لو كان عالمًا مستقلًا بذاته

Page 3 - Question 5

1 Fragmented place بيئة مفككة	0 (0%)
2 2	4 (14%)
3 3	9 (32%)
4 4	7 (25%)
5 Cohesive place بيئة متكاملة	8 (29%)
Average	3.68
Standard deviation	1.04
Answers	28

- If any, please share some of the varieties you've noticed.
Arabic:

إذا كان هناك، يرجى مشاركة بعض الأمثلة على التنوع المكاني الذي لاحظته

والنساء
والرجال الأطفال والعوائل
ماتوعه ذات الكاروانية من
تمارين اقسام اشغال بيئه اوفر
التنقل مطاعم الباب محلات
البادئ الباب ساعات د
ممشى تجارية الجديد
معارض انشطات متاحنه
وجود

12. Do you perceive this place as providing safe and sheltered areas?
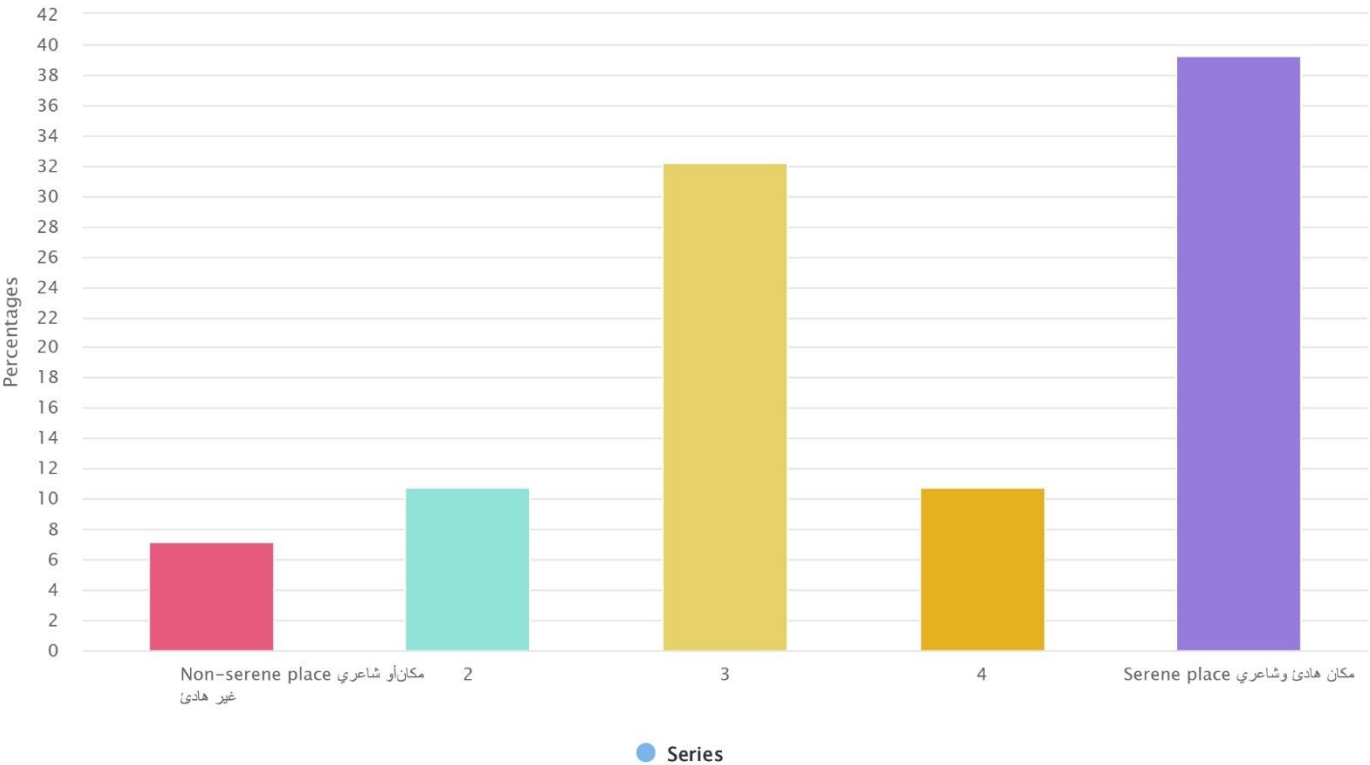Arabic:

هل ترى أن هذا المكان يوفر مناطق آمنة ومحمية

Page 3 - Question 8
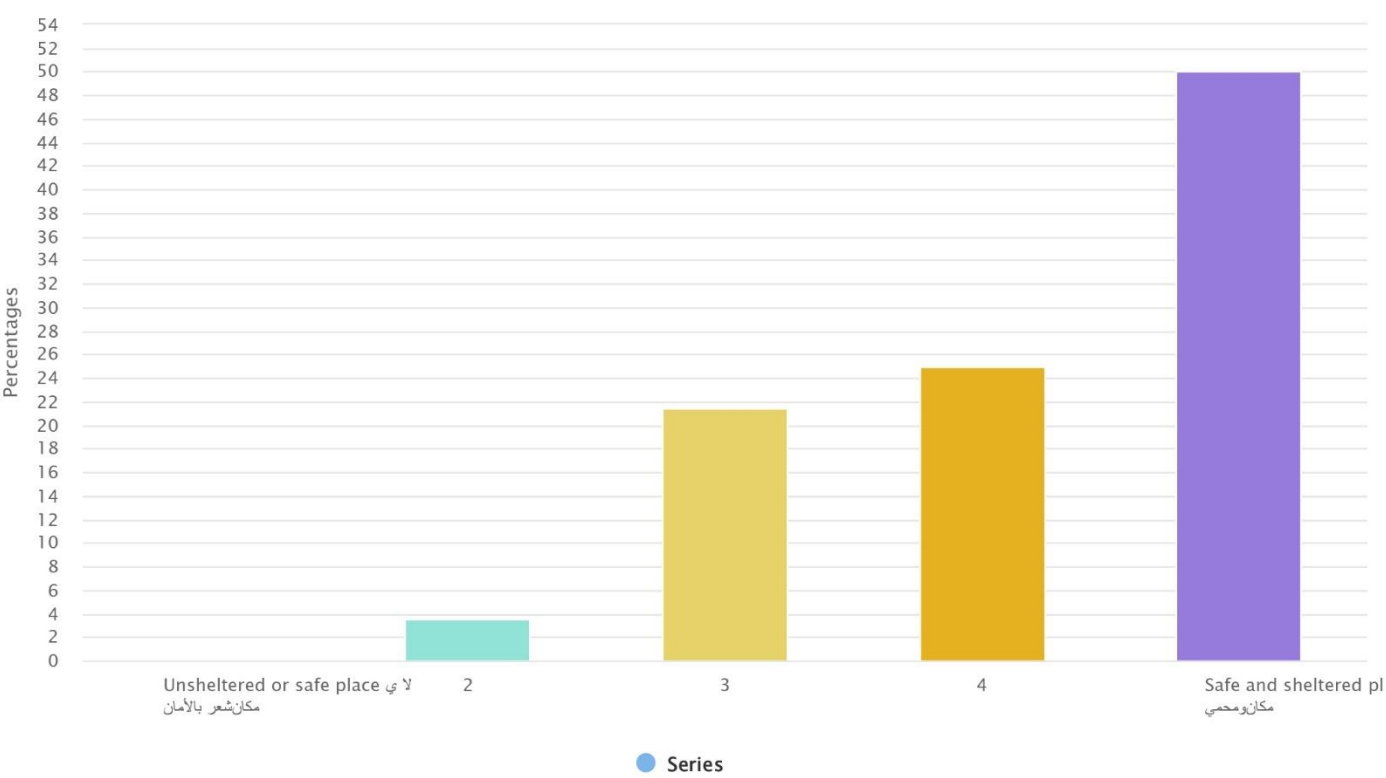
- Series

1 Unsheltered or safe place مكان لا يشعر بالأمان	0 (0%)	
2 2	1 (4%)	
3 3	6 (21%)	
4 4	7 (25%)	
5 Safe and sheltered place مكان آمن ومحمي	14 (50%)	
Average	4.21	
Standard deviation	0.90	
Answers	28	

13. Do you perceive this place as providing serene areas?

Arabic:
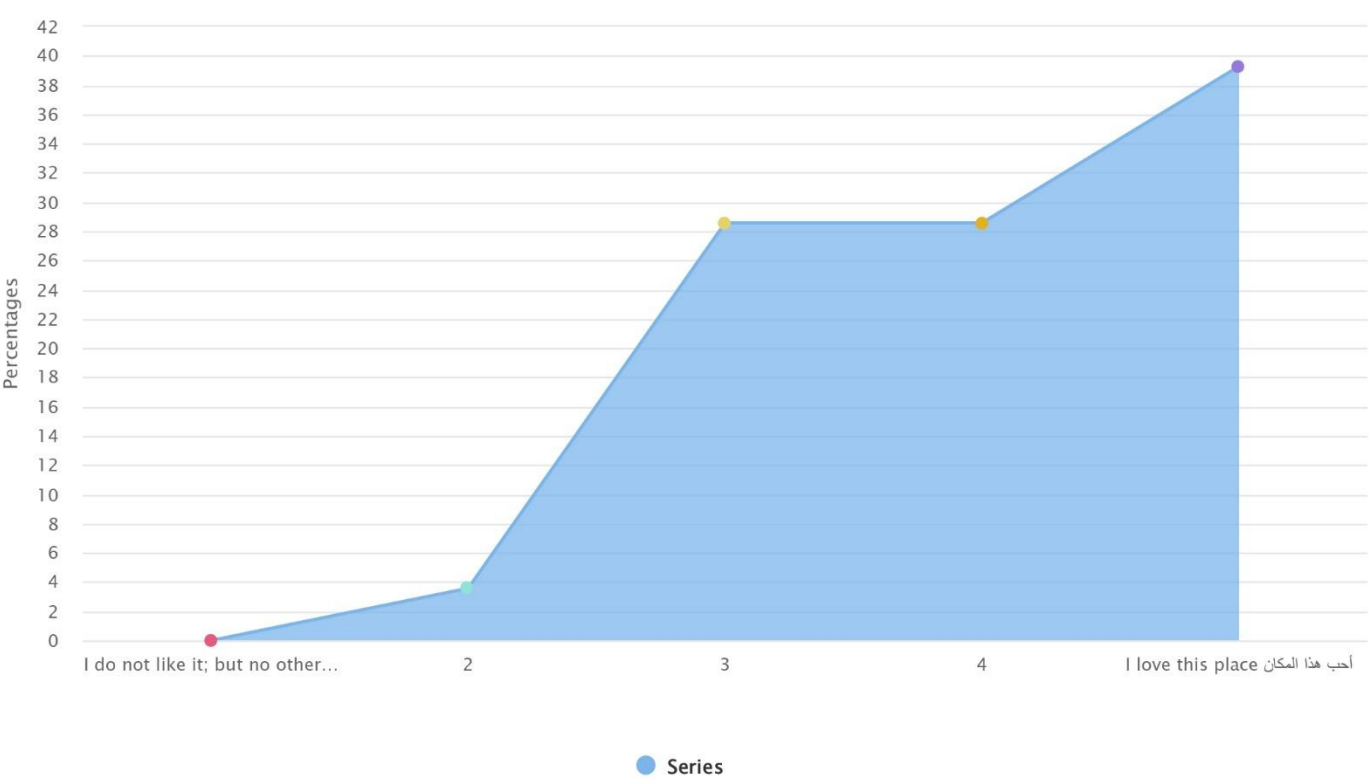هل تدرك أن هذا المكان يوفر مناطق هادئة وشاعرية؟

1 مكان غير هادئ أو شاعري Non-serene place	2 (7%)	
2 2	3 (11%)	
3 3	9 (32%)	
4 4	3 (11%)	
5 مكان هادئ وشاعري Serene place	11 (39%)	
Average	3.64	
Standard deviation	1.29	
Answers	28	

14. Do you find Boulevard city appealing?
Arabic:

هل تجد البوليفار سيتي مكانًا جذابًا؟

1	**I do not like it; but no other choices.** لا أحبه؛ ولكن لا توجد خيارات أخرى	0 (0%)
2	2	1 (4%)
3	3	8 (29%)
4	4	8 (29%)
5	I love this place أحب هذا المكان	11 (39%)
Average		4.04
Standard deviation		0.91
Answers		28

16. I have read and answered this survey in:

قرأت وأجبت على هذا الاستبيان بـ:
Page 3 - Question 12

c. Both English and Arabic: 15%
a. English: 15%
b. Arabic: 70%
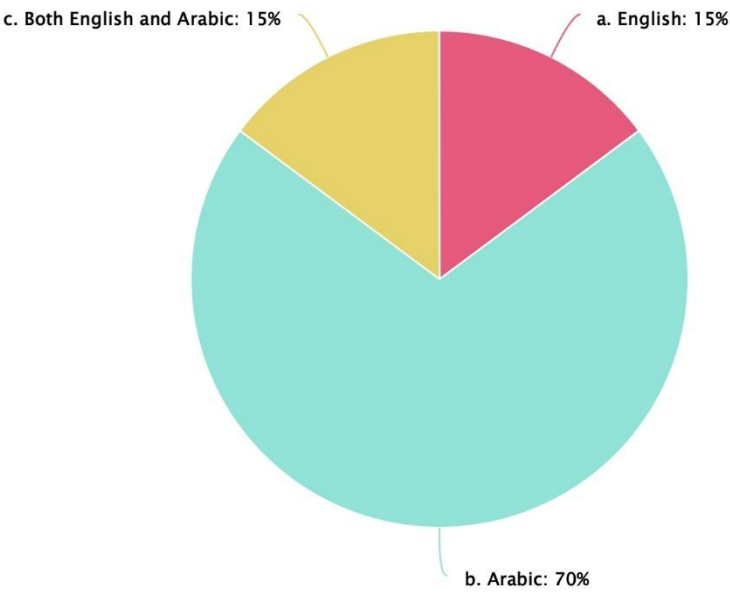
1 a. English		4 (15%)
2 b. Arabic		19 (70%)
3 c. Both English and Arabic		4 (15%)
Average		—
Standard deviation		—
Answers		27

16. I have read and answered this survey in:

قرأت وأجبت على هذا الاستبيان بـ:
Page 3 - Question 12

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