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Design Characteristics, Visual Qualities, and Walking Behavior in an Urban Park Setting

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Abstract: The design characteristics of urban parks' pathways are important in facilitating leisure walking and maintaining the minimum rate of physical activity, thus improving public health. This study examined and explored the relationships between design characteristics as well as certain visual qualities of Cautin Park, the biggest urban park in the Araucanian Region of Chile, and the tendency for walking as well as walking behavior. A mix of quantitative and qualitative methods was used to examine the objectives. Several design attributes were found to be related to the tendency for walking and the walking behavior in this urban park, including greater pathway width, more vegetation, tranquility along the pathways, and more comfortable pathway environments for pets. Additionally, these correlations were assessed based on gender and age, and it was found that adolescents showed the greatest difference from other groups. For instance, adolescents walk significantly more along pathways with more connectivity to activity zones. Among the visual qualities, only legibility shows a significant correlation with the number of all types of pedestrians, as well as subgroups of adolescents, adult men, and adult women. These results were reviewed, and their implications were discussed. Urban planners and designers could apply these findings when designing future urban parks in this context.

Keywords: urban park; pedestrian mobility; design attributes; visual qualities; Temuco; Isla Cautin Park

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1. Introduction

Chile is a country with a high sedentary rates [1]. Nearly 35% of people aged >15 years in Chile are living with obesity [2,3]. Obesity-related health conditions are the top risk factor for death and disability [4]. Meanwhile, regular physical activity has multiple health benefits [5]; thus, the level of physical activity should be improved in this country. Practiced by people of all ages worldwide, walking is an easily accessible physical activity [6] that contributes to maintaining the minimum rate of physical activity and improving physical health [7]. For instance, it is the most popular leisure-time physical activity among US adults [8]. According to ecological models, the built environment is an important factor that influences walking behavior [9,10]. Among the factors of the built environment, the presence of urban parks is an important factor in improving walking behavior, especially walking for recreation on the neighborhood scale [11,12].

Walking in parks is primarily considered a type of leisure walking [13]. Recreational walking is closely related to the characteristics of the immediate environment [14]. Accordingly, the design characteristics of urban parks' pathways are important in facilitating leisure walking. In addition, previous studies have raised the importance of both Attractiveness for walking and Walking behavior while considering leisure walking [15]. Thus, both of these aspects could be important when considering the association between the design-related attributes along the pathways and walking in the urban park's pathways.

Age and gender are frequently found to be connected to walking when socio-demographic factors are taken into account [9,16–18]. Prior research has mainly focused on the relationship between various design elements along pathways and the walking behavior of people of a specific age, particularly older seniors [19], with reference to walking behavior along the pathways of urban parks. However, because age and gender are important factors, it is possible to evaluate this association simultaneously based on different age and gender groups. In addition, affordance theory contends that public spaces should be designed in a way that meets the needs of different users from different categories, including those based on age and gender, while taking related theories into account. It is important to understand the needs of these users of different ages and genders to design urban park pathways that can appropriately satisfy the expectations of different users.

In addition, the criteria of landscape design give significant weight to the concepts of visual quality and visual preference [20]. According to Daniel [21], landscape quality is a result of the interactions between a landscape's features and how they affect people. The most important factor regarding the natural environment is its visual and/or landscape quality, and the attractiveness of recreational areas offered by urban parks is directly related to their visual quality [20,22]. Visual preference for a landscape is influenced by four main information variables, complexity, coherence, mystery, and legibility, according to Kaplan and Kaplan [23]. In natural or semi-natural settings, like urban parks, these attributes represent visual preferences along the routes. These elements also show up in the literature on urban design as characteristics of urban design that influence general walkability and walking behavior [24]. These four characteristics, which are crucial to the visual preference for a landscape, may therefore also be linked to walking behavior. Therefore, it is necessary to assess these key visual characteristics to comprehend the relationship between visual preference and walking behavior (Figure 1).

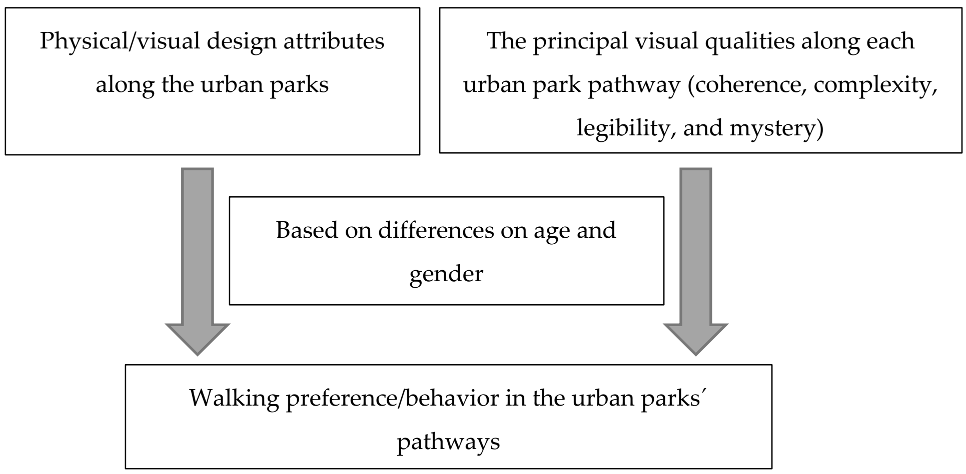

Figure 1. The conceptual framework.

It is also hypothesized that age and gender may have an impact on how visual characteristics contribute to walking behavior. For instance, women typically steer clear of situations where crime is a possibility, and certain visual characteristics, such as legibility and mystery, may be linked to the probability of crime. Additionally, compared to other age groups, adolescents have a greater desire to explore their surroundings, and some visual elements, such as mystery, may better meet this need by increasing the likelihood that they will explore the paths. The link between visual preferences and walking behavior must therefore take into account the roles of age and gender (Figure 1).

Cautin Park, with an area of 27.7 hectares, is the biggest urban park in Temuco and the region of Araucania, Chile. It attracts people from different parts of the city, who spend part of their recreational time in this park. As stated previously, the design aspects of the pathways in this park could play an important role in the improvement in the tendency to walk, as well as the walking behavior of the inhabitants in this park, due to the importance of this park as the biggest park and the only urban park of this type in this city and the region. The local population's health and level of physical activity would benefit from this.

The impacts of both design characteristics and visual qualities on improving walking behavior in urban parks have rarely been examined simultaneously in previous studies. The main objective of this study is to evaluate the relationship between design characteristics (as well as visual qualities) and pedestrians' walking behavior (as well as their tendency to walk) in Cautin Park. This evaluation was carried out based on differences in age and gender. On this basis, the respondents were classified into the categories of adolescents, adults (male and female), and older adults (male and female). The conceptual framework of this study is shown in Figure 1. The main research questions of this study are as follows:

- What pathway design characteristics are associated with the tendency to walk/walking behavior of pedestrians in Cautin Park? And how do age and gender affect these associations?
- What visual qualities are associated with the walking behavior of pedestrians in Cautin Park? And how are these associations influenced by age and gender?

2. Literature Review

2.1. Walking for Recreation and Its Associated Built Environmental Factors

Previous studies on the neighborhood scale have demonstrated the relationship between walking for recreation and environmental factors, including land use mix [25]; the presence of walking trails [26]; infrastructure for walking, including the state of the footpath and the standard of its surface [27,28]; the proximity of recreational facilities [26,28]; the presence of accessible destinations (mostly services) like shops, parks, and beaches [27,29]; the availability of public transit services, including factors like proximity to bus stops and public transportation [29,30]; nearby non-residential locations [31]; and perceived and actual traffic safety, including elements like the percentage of street length with speed limits [26,29]; personal security, including less concern about crime [27,32]; and perceived neighborhood aesthetics, as well as the existence of aesthetic elements like the proportion of tree canopy coverage, the upkeep of walkways, cleanliness, and the view of the architecture [26,27,33]. In addition, Borst et al. [15] evaluated the relationships between the perceived attractiveness of streets for walking and (physical) street characteristics. They found that three main aspects affect the perceived attractiveness of streets for walking, namely the tidiness of the street, its scenic value, and the presence of activity or other people along the street [15].

2.2. The Contribution of Age and Gender to Walking Behavior

Age and gender are directly associated with walking behavior, sometimes through the impact on the association between the built environment and walking behavior [17,34–36]. Due to health and mobility problems that develop as people age, aging is inversely correlated with walking [17,18,34]. However, Paydar et al. [37] found a negative relationship between age and walking behavior in Temuco, Chile. According to studies by Harrison et al. [34] and Krogstad et al. [9], men walk much more than women. Giles-Corti and Donovan [38], for instance, discovered that women engage in less physical activity than men. Older women were less physically active, according to Mesters et al. [18], who sought to uncover socio-demographic and social-cognitive determinants of physical activity among Dutch women. Van Cauwen-berg et al. [39] examined the contribution of gender to the association between walking behavior and the built environment and discovered that women described their preference for walking more frequently and intensely when they found the environment more familiar and safer from crime.

2.3. Walking Behavior and Its Contributing Factors in the Urban Park Environment

Most design aspects related to walking behavior along pathways have been explored and examined on the neighborhood scale. Concerning the urban park setting, although park pathways have been identified as important settings to encourage physical activity and walking [40], the relationships between the characteristics of the park pathways and walking behavior have rarely been considered in previous studies [19]. Compared with the neighborhood pathways, the aesthetics and comfort-related aspects were highlighted more than other aspects in the design of urban park pathways. Kaczynski et al. [40] found that parks with paved trails are more likely to be used for physical activity than those without paved trails. Zhai and Korca [19] evaluated the impacts of park design characteristics along the walkways on the walking behavior of older adults. They found that seniors prefer pathways that have soft and even pavement, benches, flowers, and light fixtures. Trails with soft pavement, the level of shade, the pathway width, the presence of benches, and the presence of flowers and trees contribute to improving walking behavior in the urban park setting [19,41,42].

In addition to the physical attributes along the pathways, the aspects related to pathway surroundings were also important to improve walking behavior on the neighborhood scale, as well as in the urban park setting [19,43]. The various aspects of path surroundings in these studies include visual interest, lateral visibility, the scale of street space, the visibility of landmarks along the pathways, the view of public gardens, the transparency of fronting structures, visible activity, street trees, the coherence of the built forms, and lighting [43–45]. The enclosure type along the pathways contributes to improving walking behavior in natural and urban park settings [19,46]. Water has a positive impact on observers' emotional state and the preference for walking as well [47]. According to Lynch [44], visual connection with landmarks may influence people's walking movement [44,48]. Finally, the pathway's connection with activity zones also influences the level of walking in the park environment [49].

2.4. The Contribution of Path Context and Landscape Visual Preference to Enriching Walking Experiences

The picturesque theory asserts that some spatial compositions and particular design elements elicit a more vivid aesthetic experience than other compositions [48]. The relationships between heightened aesthetic experience and specific design elements, such as the variety of open spaces connected by narrow and bending streets, the controlled view of spaces, the sense of enclosure, landmark objects as visual focal points, and complexity in the surfaces and details, were discovered by Isaacs, who supported this theory.

The relationship between the design aspects of the environment and walking experiences could also be considered in studies on visual landscape preferences [50]. Information-processing theory, one of the most significant theories in research on visual landscape preferences [51,52], suggests that the preference for a scene is dependent upon two basic human responses to an environment: the need to understand and a desire to explore. Information can be derived immediately from an environment or it can be inferred. According to Kaplan and Kaplan [23], the four primary information variables, complexity, coherence, mystery, and intelligibility, influence preferences for visual landscapes. Coherence, complexity, legibility, and mystery—the four significant environmental preference predictors—provide the knowledge to comprehend why people choose such places and how comfortable people are in one place [53]. Cheng [54] found that perceived landscape aesthetics contribute to visual landscape preference through four components: complexity, mystery, coherence, and legibility. Zhang [53] discovered that the most favored visual landscapes in public spaces include a combination of particular landscape elements, such as vegetation, trees, seasonal flowers, and open grassland, as well as the elements of perceived landscape aesthetics, such as intelligibility and coherence. According to Polat and Akay [20], water surface area, widths of pedestrian walkways, the function of recreational areas, plant composition, plant color composition, and plant species diversity can positively affect the visual quality of a landscape area. Kaplan and Kaplan [23] defined complexity as "the number of different visual elements in a scene". According to Ewing and Handy [24], complexity is a measure of a location's visual richness and is based on how many distinguishable differences a viewer is exposed to in a given amount of time. Duarte [55] discovered that complexity (more distinct types of landscape elements) implies a strong preference for the streetscape in the built environment.

Coherence in a scene refers to its structure and organization, as well as its patterns of brightness, size, and texture. Mystery relates to a scene's depth and the hidden qualities that may draw one closer to explore and gain more information. In earlier investigations of the natural environment, mystery and coherence were scored highly as predictors of preference [53]. However, Herzog and Kropscott [56] found that mystery is negatively correlated with preference in forest settings. Legibility helps people to understand an environment and "to comprehend and to function effectively" when the environment provides cues and landmarks that assist, for example, with wayfinding. These four variables are sometimes called "information variables" and have been suggested as predictors of landscape visual preferences [57–59]. These four variables have also been highlighted in the urban design literature as urban design qualities [24]. According to Lynch's research [44], legibility in urban environments can be defined as how easily a city's components can be identified and arranged into a logical pattern. In the context of the city, he contends that legibility is essential [44]. According to Isaacs [48], it is more effective to improve pedestrians' visual preferences when the pathway offers a balance between clarity, a variety of components, and interesting visual exploration. According to Ewing and Handy [24], these visual and perceptual aspects of urban design are also related to general walkability and walking patterns. Therefore, these key features, including coherence, complexity, legibility, and mystery, which are engaged in the pedestrians' visual preference along each pathway, may also be related to the walking behavior along parks' paths.

2.5. The Contribution of Age and Gender in the Association between Visual Qualities along Pathways and Walking Behavior

Previous research on visual preferences has demonstrated that age and gender also play a role in the relationship between physical characteristics and visual preferences. Balling and Falk [60] discovered a significant relationship between the age component and various preferences. High naturalism was determined to be an essential landscape component for young (age 12–19) and middle-aged adults (age 19–65) but less so for elderly (age above 65) persons, according to Zube et al. [61]. They claimed that young and older persons valued the complexity of landforms more than other age groups, making it a significant landscape feature. Additionally, the relationship between visual attributes and visual preference varies according to age and gender. Women, more than men, are sensitive to spatial conditions that evoke fear and react more strongly to it [62]. For instance, several academics have claimed that dense vegetation serves as a meeting place for criminals and fosters conditions that encourage criminal activity [63,64], which may go against women's aesthetic preferences. This lets us also infer that visual qualities such as legibility and mystery, due to their relationships with fear, may function differently for visual preference, as well as the walking behavior of women. Additionally, compared to adults, adolescents are more curious to learn about their surroundings [65]. This could lead to the conclusion that the visual quality that would encourage more curiosity—such as mystery—could be more consistent with the visual preferences and walking habits of adolescents along the pathways of urban parks.

3. Methods

3.1. Case Study

Temuco, the capital of the Araucania region, is a medium-sized southern city with a population of about three hundred thousand people, according to the 2017 census. The study was conducted in Cautin Park, which has an area of 27.7 hectares, making it the biggest urban park in Temuco and the region of Araucania (Figure 2). The park was developed within the framework of Chile's Green Area Plan between 2015 and 2016, aiming to improve the quality of life of the inhabitants by improving the quality of public spaces in terms of their ecological, cultural, and social values. This urban park attracts people of different ages from different parts of the city who spend part of their daily time on recreation. According to Paydar et al. [37], Temuco lacks several parks and plazas, and this urban park, which was inaugurated in 2022, was created in response to the lack of urban parks in Temuco.

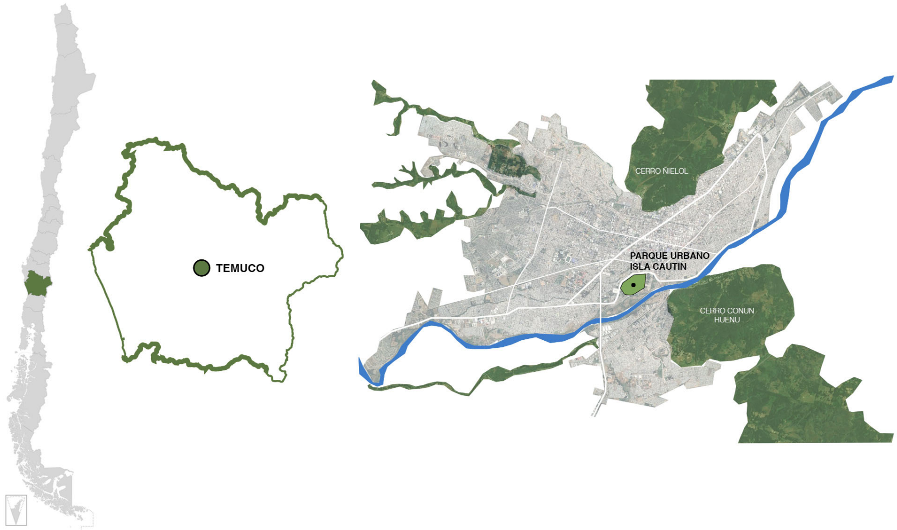

Figure 2. Location of the park in Temuco and in the Araucanía region.

This park is situated close to the city's historic core and is organized as a ring of six thematic squares connected by a central esplanade with views of the surrounding natural landmarks, like Ielol Hill. Plaza del Encuentro, which features an amphitheater for large gatherings; Plaza de las Tradiciones, which consists of a multipurpose esplanade and a soccer field; Plaza de la Infancia, which is intended for children in their various developmental stages; the Memorial of Human Rights, which serves as a place to remember the political executions that took place under the military dictatorship; Plaza Del Medio Ambiente, which has picnic areas and a flood area in case the river rises; and Plaza de los Deportes Urbanos, home to a BMX track, skatepark, and skating rink (Figure 3). These plazas are linked with a main circulation that surrounds the central esplanade, made up of a wetland, designed as a mitigation measure against eventual flooding and that serves as a birdlife habitat. Additionally, the park's core area (near to Plaza de la Infancia) has a place that resembles a native forest thanks to the abundance of native trees there. Figure 4 shows some images from different parts of this urban park.

3.2. The Quantitative Approach

This study includes all the pathways in the park, except for pathways that are too short (less than 3 m). A pathway segment, which is defined as an individual pathway that begins from one intersection to another intersection and with no other intersections on it, is used as the unit of analysis. To avoid any kind of bias, the path segments related to the entrances were eliminated. In total, 39 pathway segments were recognized in Cautin Park. The gate method was used during our on-site observation to collect the walking behavior data [66]. The researcher stood in the middle of a pathway segment during the observations and counted the number of park visitors who crossed an imaginary line at the researcher's position, which was perpendicular to the pathway's direction [67]. Digital counters were utilized by the observer to keep track of how many people were passing the "gate." We conducted the on-site observations over two months in November and December of 2022. Four randomly chosen weekdays and two weekend days were chosen each week for observations. For management convenience, we divided observations into two sessions, the morning period and the evening period. We conducted 30 rounds of observations in Cautin Park. Each pathway segment was observed for two minutes in each observation round. Thus, each pathway segment was observed 30 times, each time for two minutes.

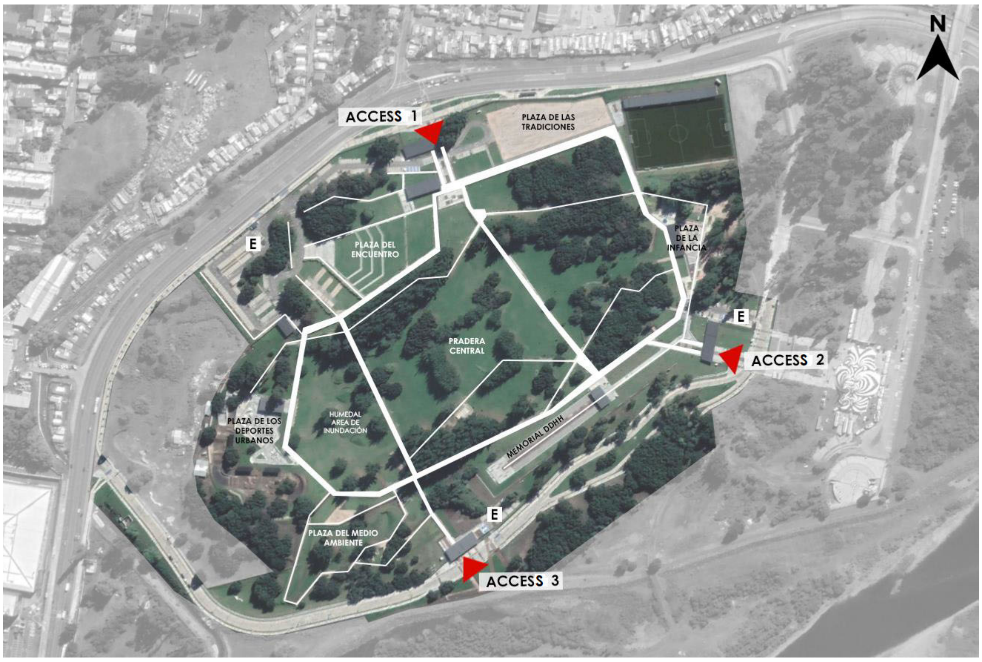

Figure 3. Isla Cautín Urban Park with its different areas.

Figure 4. Images of the urban park of Cautín Island (including the Memorial of Human Rights).

Seniors are easier to identify compared to other age groups since they typically have more face wrinkles, slower walking speed, and shorter step length [68]. Seniors also have unique facial features, such as noticeable lateral pouches, according to Pitanguy et al. [69]. Therefore, during the on-site observations, we identified seniors using the following criteria: the existence of prominent facial wrinkles, the appearance of white hair, short steps, or impaired motor skills.

In this study, park design characteristics refer to all spatial and physical attributes that shape a park environment. The physical/visual attributes were selected based on the literature review. Pathway attributes refer to the features of the pathway itself within or along its boundaries, such as pavement, width, and the presence of benches. Pathway surroundings include the park environment around the pathway, comprising spatial and physical dimensions, such as the degree of enclosure and visual connections with water. The pathway connection with activity zones refers to whether the pathway segment can direct users toward an activity zone. The activity zones are the places where pedestrians can engage in activities, such as activities at the child playground plaza and the activities in the food feria.

Data on pathway design characteristics were collected through on-site observations. The protocol for measuring pathway characteristics was developed based on several existing measurement tools for park environments [70–72]. Each section of the pathway was traversed by the observer, who noted its characteristics. Every pathway segment was seen twice, and the outcomes of the two observations were compared. If the measurements from the first two rounds of observations were not consistent, a third round of observations was made. The same observer made all the observations. The pathway length was calculated in AutoCAD 2019 (Version 23.0) software. In the final process of the selection of design features, after the measurement of all variables along the park's pathways, the design features, including the level of cleanness along the pathways, the type of pavement material, the pavement quality in terms of its maintenance, slope or stairs along the park pathways, the presence of obstacle/s along the pathways, and the level of graffiti, did not show variability along the different pathways of Cautin Park. For instance, all the pathways have the same pavement material, and there are no slopes or stairs along any of the pathway segments from our observations. Likewise, the two variables related to water elements, "water on the side" and "visual connection with water", showed a lack of variability along the different pathways of Cautin Park due to the observation of just one waterfall along one pathway, which is visible just along the same pathway. Thus, all the aforementioned variables were excluded from further evaluation in the statistical process, since the variability is the prerequisite for the selection of the variables in our statistical models. In this way, the only remaining variable related to the pathway surfaces is the pathway pavement type, in terms of pathways with pavement (concrete) and unpaved pathways (covered by sand). The remaining 12 design features (variables), which showed variability along Cautin Park´s pathways, entered the statistical analysis. These pathway design characteristics, along with their types and measurements, are shown in Table 1.

We discussed the description of the urban design qualities and the criteria to measure them with three experts from the field of urban design concerning the measures of the four main visual qualities along the routes (legibility, coherence, complexity, and mystery). The consensus standards for each aspect of urban design are listed in Table 2 [73,74]. Then, based on the criteria for each visual quality, we asked these three experts to walk along each pathway and rate its level. These three experts' average measurements throughout each pathway served as the basis for determining the final level of each visual quality.

3.3. The Qualitative Approach

Regarding the qualitative approach of the study, we conducted 60 face-to-face interviews with five groups of users—adolescents (12 persons), adult men (12 persons), adult women (12 persons), older adult men (12 persons), and older adult women (12 persons)—in Cautin Park to inquire about their preferred and disliked pathway design characteristics for walking. The main criterion for selecting the participants for the interview was that they should have a habit of leisurely walking in the park and thus that they can answer the questions based on their experience. One person from the research team approached the people present in the park based on the specified number in each group and, while introducing himself and the summary of this research, asked if that person was willing to be interviewed. He also asked about the possibility of audio recording from the respondent and performing the interview.

The interview consisted of five questions: (1) Could you please show me where you usually walk? (2) What are the characteristics of these pathways that you like? (3) Which pathways in the park do you not use for walking? (4) Why? and (5) Would you please tell me your age? Participants were given colored maps showing images taken along various park pathways to assist them in deciding which park places and pathways they liked and disliked. Each interview lasted between 10 and 15 min, and the data were entered using a data entry form.

Table 1. Measurement of Park Pathway Design Characteristics.

No	Physical/Visual Design Attribute	Type	Measurements
1	Pathway pavement	Categorical	a. Pathway with Pavement (concrete) b. pathway without any specific pavement (with sand)
2	Pathway form	Categorical	a. Curving b. Straight (Curving pathways are those that are straight in direction but have curved boundaries.)
3	Presence of Benches	Categorical	a. No Benches b. 1–3 Benches c. 4–7 Benches
4	Presence of flowers	Categorical	a. No flowers b. Have flowers on he sides (Flowers planted in any form; any amount was considered.)
5	Degree of shade	Categorical	a. Shade is less than 30% of the pathway b. Shade is between 30% and 70% of the pathway c. Shade is more than 70% of the pathway (The degree of shade is measured by the percentage of shade (projected on the ground) to the total area of the pathway segment for all the pathways between 10:00 a.m. and 11:00 a.m. on sunny days.)
6	Presence of light fixtures	Categorical	a. No lights b. Have lights on sides
7	Pathway width	Categorical	a. <2 m, b. ≥ 2 m, <3 m c. ≥ 3 m, <4 m d. ≥ 4 m, <5 m e. 5 m and wider
8	Pathway length	Numerical	Measured in meters based on master plan and satellite images
9	Enclosure type	Categorical	a. Tall objects on neither side b. Tall objects on one side c. Tall objects on both sides (The enclosure type, which is dominant in the longest proportion of the pathway, was used to represent the whole pathway.)
10	Degree of Enclosure	Categorical	a. No lateral visibility (The entire lateral sightlines are blocked on both sides) b. Moderate lateral visibility (The lateral sightlines are interrupted at some parts of the pathway on both sides.) c. Continuous lateral visibility (The lateral sightlines are not interrupted on the whole pathway on both sides.)
11	Visual connection with landmark	Categorical	a. No visual connection with landmark b. Landmark can be seen in the background c. Landmark can be seen in the foreground/middle ground (Landmarks refer to the canopy structures in different parts of the park.)
12	Pathway connection with activity zones	Categorical	a. No connection with activity zones b. Have connection with 1 activity zone c. Have connection with 2 or more activity zones (The connection with activity zones is determined by pathway's immediate neighboring areas in four directions, including its two ends and two sides.)

Table 2. The indicators for measurements of the visual qualities.

The Visual Quality	The Indicators for Measurements
Coherence	Unity or harmony in color and texture along the pathways
Complexity	Variety of objects, shapes, colors, and textures along the pathways
Legibility	Visual access along the pathways and the visibility of the landmarks along the pathways
Mystery	Limitations regarding visual and physical accessibility with surroundings along the pathways that may arouse curiosity and lead to surprise in pedestrians

3.4. Analysis

For categorical pathway design characteristic variables, we applied ANOVA analysis to explore the differences in the average number of observed pedestrians on pathways with different characteristics. For continuous pathway design characteristic variables (i.e., pathway length) and visual qualities, correlation analyses were used to investigate the relationships between the average number of observed pedestrians and the pathway's design characteristics. Finally, content analysis was performed to explore the interview data. In this regard, the factors were coded based on two major categories of pathways for walking, liked and disliked characteristics, as the responses to two consequent questions during the interview. Then, the number of repetitions of each factor and its frequency concerning each category were calculated for all respondents, as well as each subcategory, based on age and gender differences [19]. The comparison between the results of statistical and content analyses helped us to have a more credible understanding of the connections between pathway design characteristics and seniors' walking behavior.

4. Results

4.1. Descriptive Statistics

At the overall park level, a total of 7018 walkers we observed in Cautin Park, including 1385 pedestrians as adolescents, 5423 adult pedestrians, and 210 older adult pedestrians. The evening period is the peak period, whereas considerably fewer pedestrians were observed in the morning period. At the pathway segment level, the average number of observed pedestrians in all observations was calculated for each segment (30 rounds of observations for each segment) to represent the usage of each pathway segment (Figure 5). The average maximum number of users observed on a pathway segment (for two minutes) was 5.82 pedestrians per segment.

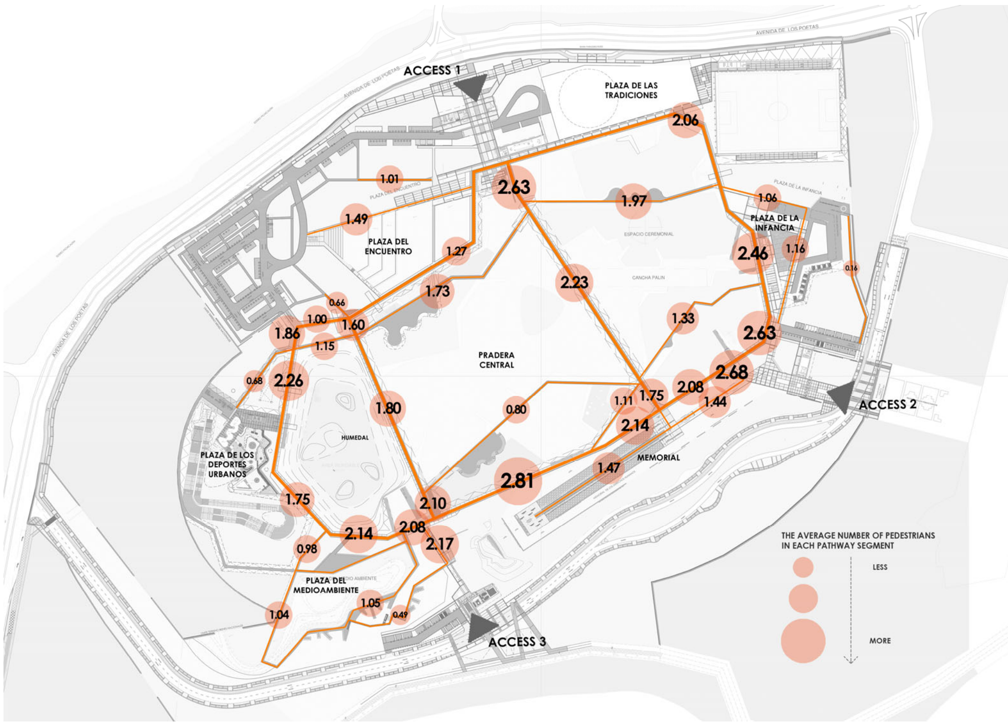

Figure 5. Average number of pedestrians on road segments (number of road segments: 39).

Concerning the physical/visual design attributes along the pathways, the majority of the pathways (69.2%) have pavement, as compared to unpaved pathways (covered by sand) (30.8%). The curving form (66.7%) is more common than the straight form (33.3%). The majority of the pathways have between four and seven benches (51.3%). "Less than 30% shade" was observed along the majority of the pathways (64.1%). There are more pathways with light fixtures (59%) than pathways without light fixtures (41%). The pathways with more than 5 m (33.3%) are the most common type of pathways in terms of pathway width. The average length of the pathways is 91.77 m, which shows that pedestrians face rather long pathways to walk in this urban park. In terms of enclosure, the majority of pathways (61.5%) show moderate lateral visibility compared to "no lateral visibility" (12.8%) and "continuous lateral visibility" (25.6%). This shows that a medium degree of enclosure is observed along most of the pathways, and this enclosure is due to both "tall objects on one side" (46.2%) and "tall objects on both sides" (41%). Landmarks (as certain canopy structures in the parks) could be observed along most of the pathways (66.6%). In addition, most of the pathways are connected to one activity zone (46.2%) or do not have any connection to activity zones (48.7%). Finally, in terms of visual qualities, legibility shows higher values (mean: 3.97) than other visual qualities, including coherence (mean: 2.95), complexity (mean: 2.36), and mystery (mean: 1.82). This shows that the pathways, on average, show the highest value concerning legibility and the lowest values concerning mystery.

4.2. The Findings of the Quantitative Approach

4.2.1. The Associations between Walking Behavior and Park Pathway Design Characteristics (While Taking into Account the Age and Gender Subgroups)

Consistently, the results show that the average number of observed pedestrians is significantly larger on pathways with certain design characteristics. These pathway design characteristics include pathway pavement and pathway width. More specifically, the results indicate that the pedestrians significantly walk along the pathways with pavement compared to unpaved pathways (Table 3). Pedestrians also walk significantly more along pathways that are more than 2 m wide (all types which cover more than 2 m width) rather than the pathways less than 2 m wide (Table 4).

Table 3. One-Way Analysis of Variance of Average Number of Observed Pedestrians (for all pedestrians and adolescents) (Number of pathway segments: 39).

		All Pedestrians				**Adolescent**			
		df	**MS**	**F**	**Sig.**	**df**	**MS**	**F**	**Sig.**
1. Pathway pavement	Between Groups	1	4.880	16.693	0.000 **	1	2.697	7.542	0.009 **
2. Pathway form	Between Groups	1	0.430	1.043	0.314	1	0.017	0.040	0.843
3. Presence of Benches	Between Groups	2	0.845	2.171	0.129	2	0.906	2.311	0.114
4. Presence of flowers	Between Groups	1	0.001	0.002	0.968	1	0.079	0.185	0.669
5. Degree of shade	Between Groups	2	0.902	2.337	0.111	2	1.171	3.105	0.057
6. Presence of light fixtures	Between Groups	1	0.023	0.054	0.817	1	0.334	0.792	0.379
7. Pathway width	Between Groups	4	2.091	9.700	0.000 **	4	1.698	6.321	0.001 **
8. Enclosure type	Between Groups	2	0.463	1.127	0.335	2	0.603	10.475	0.242
9. Degree of Enclosure	Between Groups	2	0.535	1.317	0.281	2	1.244	3.331	0.047 **
10. Visual connection with landmark	Between Groups	2	0.807	2.063	0.142	2	1.893	5.612	0.008 **
11. Pathway connection with activity zones	Between Groups	2	0.519	1.275	0.292	2	2.010	6.080	0.005 **

Notes. ** Sig. < 0.05.

Table 4. ANOVA Post Hoc test (LSD) analysis of the Average Number of Observed Pedestrians (all pedestrians, as well as pedestrians separated based on age and gender) (N: 39) (only for the design features that showed the overall significance ($p < 0.05$) and have more than two values, which is the prerequisite of the post hoc test) (just the significant relationships are shown).

	(I)	(J)	Mean Difference (I–J)	SE	Sig.	Overall Sig.
Pathway width (all pedestrians)	<2 m	Between 3 and 4 m	−0.88735 *	0.23399	0.005	0.000
		Between 4 and 5 m	−1.27295 *	0.24472	0.000	
		More than 5 m	−1.08824 *	0.20134	0.000	
Pathway width (Adolescents)	<2 m	Between 3 and 4 m	−1.05590 *	0.26119	0.002	0.001
		Between 4 and 5 m	−1.12319 *	0.27316	0.002	
		More than 5 m	−0.88477 *	0.22474	0.003	
Pathway width (Adults)	<2 m	Between 3 and 4 m	−1.59075 *	0.48704	0.020	0.000
		Between 4 and 5 m	−2.52657 *	0.50936	0.000	
		More than 5 m	−2.17423 *	0.41908	0.000	
Pathway width (Adults Men)	<2 m	Between 3 and 4 m	−1.54175 *	0.44120	0.011	0.000
		Between 4 and 5 m	−2.51691 *	0.46142	0.000	
		More than 5 m	−2.01250 *	0.37964	0.000	
Pathway width (Adults Women)	<2 m	Between 3 and 4 m	−1.63975 *	0.55252	0.041	0.000
		Between 4 and 5 m	−2.53623 *	0.57784	0.001	
		More than 5 m	−2.33597 *	0.47542	0.000	
Degree of Enclosure (Adolescents)	Moderate lateral visibility	Continuous lateral visibility	−0.57447 *	0.22996	0.044	0.047
Visual connection with landmark (Adolescents)	No visual connection with Landmark	Landmark can be seen in the background	−0.58711 *	0.22777	0.037	0.008
		Landmark can be seen in the foreground/middle ground	−0.71572 *	0.22777	0.009	
Pathway connection with activity zones (Adolescents)	No connection with activity zones	Has a connection with 1 activity zone	−0.52547 *	0.18748	0.022	0.004
		Has a connection with 2 or more activity zones	−1.19565 *	0.42372	0.021	

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

Regarding the categories based on variations in gender and age, the findings are consistent with the findings regarding all pedestrians in terms of the kinds of routes, whether they are paved or unpaved (tables 3, 5 and 6). As compared to unpaved routes, all age groups walk more frequently along paved pathways (tables 3, 5 and 6). The routes with a greater width also result in significantly greater walking by all groups, except for older adults (tables 3, 5 and 6). The routes with width of more than 2 m (all varieties that cover more than 2 m) are significantly more frequently used for walking by adolescents, adults, adults (men), and adults (women) than the pathways with less than 2 m wide (Table 4). In addition, only older adults (men) walk significantly more along the pathways with the curb type (Table 6) as compared to other groups. The greatest differences between the subgroups of pedestrians were found for adolescents as compared to other groups. Adolescents walk significantly more along pathways with less enclosure, greater visibility of landmarks, and more connection to activity zones (Table 3). More specifically, adolescents walk significantly more along pathways with continuous lateral visibility rather than moderate lateral visibility (Table 4). They also walk significantly more along pathways that provide visibility to landmarks even in the background or foreground/middle ground rather than the pathways with no visual connection with landmarks (Table 4). Finally, adolescents walk significantly more along pathways with one, two, or more connections with activity zones rather than pathways with no connection to activity zones (Table 4).

Table 5. One-Way Analysis of Variance of Average Number of Observed Pedestrians (For Adults with gender separation as well) (number of pathway segments: 39).

		Adults				Adults (Men)				Adults (Women)			
		df	**MS**	**F**	**Sig.**	**df**	**MS**	**F**	**Sig.**	**df**	**MS**	**F**	**Sig.**
1. Pathway pavement	Between Groups	1	19.851	16.247	0.000 **	1	18.589	18.051	0.000 **	1	21.155	13.964	0.001 **
2. Pathway form	Between Groups	1	2.099	1.234	0.274	1	2.317	1.576	0.217	1	1.893	0.930	0.341
3. Presence of Benches	Between Groups	2	3.059	1.868	0.169	2	2.894	2.047	0.144	2	3.236	1.647	0.207
4. Presence of flowers	Between Groups	1	0.033	0.019	0.892	1	0.001	0.001	0.977	1	0.159	0.076	0.784
5. Degree of shade	Between Groups	2	3.154	1.933	0.159	2	3.642	2.654	0.084	2	2.715	1.362	0.269
6. Presence of light fixtures	Between Groups	1	0.004	0.002	0.963	1	0.033	0.021	0.885	1	0.003	0.002	0.968
7. Pathway width	Between Groups	4	8.326	8.914	0.000 **	4	7.658	9.992	0.000 **	4	9.084	7.557	0.000 **
8. Enclosure type	Between Groups	2	1.732	1.012	0.374	2	2.064	1.414	0.256	2	1.429	0.692	0.507
9. Degree of Enclosure	Between Groups	2	1.506	0.874	0.426	2	1.423	.951	0.396	2	1.597	0.777	0.467
10. Visual connection with landmark	Between Groups	2	2.079	1.229	0.305	2	2.268	1.566	0.223	2	1.972	0.969	0.389
11. Pathway connection with activity zones	Between Groups	2	0.998	0.570	0.571	2	1.389	0.927	0.405	2	0.688	0.326	0.724

Notes. ** Sig. < 0.05.

Table 6. One-Way Analysis of Variance of Average Number of Observed Pedestrians (For Older Adults with gender separation as well) (number of pathway segments: 39).

		Older Adults				Older Adults (Men)				Older Adults (Women)			
		df	**MS**	**F**	**Sig.**	**df**	**MS**	**F**	**Sig.**	**df**	**MS**	**F**	**Sig.**
1. Pathway pavement	Between Groups	1	0.060	6.992	0.012 **	1	0.030	4.518	0.040 **	1	0.102	6.334	0.016 **
2. Pathway form	Between Groups	1	0.016	1.598	0.214	1	0.033	5.090	0.030 **	1	0.005	0.257	0.615
3. Presence of Benches	Between Groups	2	0.020	2.170	0.129	2	0.011	1.579	0.220	2	0.033	1.871	0.169
4. Presence of flowers	Between Groups	1	0.001	0.056	0.814	1	0.000	0.011	0.916	1	0.002	0.080	0.779
5. Degree of shade	Between Groups	2	0.004	0.378	0.688	2	0.001	0.186	0.831	2	0.010	0.522	0.598
6. Presence of light fixtures	Between Groups	1	0.001	0.085	0.772	1	0.001	0.102	0.752	1	0.001	0.053	0.818
7. Pathway width	Between Groups	4	0.017	1.860	0.140	4	0.013	1.978	.120	4	0.034	2.081	0.105
8. Enclosure type	Between Groups	2	0.001	0.061	0.941	2	0.001	0.093	0.911	2	0.001	0.066	0.936
9. Degree of Enclosure	Between Groups	2	0.004	0.349	0.708	2	0.002	0.289	0.751	2	0.006	0.323	0.726
10. Visual connection with landmark	Between Groups	2	0.017	1.798	0.180	2	0.012	1.706	0.196	2	0.027	1.519	0.233
11. Pathway connection with activity zones	Between Groups	2	0.008	0.833	0.443	2	0.001	0.153	0.858	2	0.024	1.344	0.274

Notes. ** Sig. < 0.05.

There are no more significant associations between the number of all pedestrians (and the number of pedestrians based on age and gender) and the other physical/visual features along the pathways. Furthermore, the result of the correlational analysis shows that there is no association between the number of pedestrians (and the number of pedestrians based on age and gender) and pathway length (coefficient: 0.004; p: 0.983).

4.2.2. The Association between Visual Qualities and the Length of the Pathways and Walking Behavior

According to the correlational analysis (Table 7), among the visual qualities along the pathways and the length of the pathways, only legibility shows a significant correlation with the number of all pedestrians (coefficient: 0.477; *p*: 0.002). In terms of the subgroups based on age and gender, again, legibility is the only variable that shows a significant correlation with the number of pedestrians concerning adolescents (coefficient: 0.403; *p*: 0.011), adults (coefficient: 0.466; *p*: 0.003), adults (men) (coefficient: 0.475; *p*: 0.002) and adults (women) (coefficient: 0.449; *p*: 0.004).

Table 7. Correlational Analysis (N: 39) (only the factor of legibility showed significant correlations with the whole number of pedestrians and certain subgroups based on age and gender).

	Legibility Coefficient	*p*
Number of all pedestrians in each path segment	0.477 **	0.002
Number of adolescents in each path segment	0.403 *	0.011
Number of adults pedestrians in each path segment	0.466 **	0.003
Number of adult men pedestrians in each path segment	0.475 **	0.002
Number of adult women pedestrians in each path segment	0.449 **	0.004
Number of older adult pedestrians in each path segment	0.255	0.117
Number of older adult men pedestrians in each path segment	0.241	0.140
Number of older adult women pedestrians in each path segment	0.226	0.167

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

4.3. The Findings of the Qualitative Approach

4.3.1. The Associations between Tendency to Walk and Park Pathway Design Characteristics

The results of the qualitative approach added valuable insights to the findings of the quantitative approach (Table 8). The respondents included 30 males (50%) and 30 females (50%). It was found that a higher number of trees (50%), more green spaces and vegetation (43.3%), the presence of shade (31.6%), paved pathways (28.3%), connection with program and activity zones (28.3%), tranquility along the pathways especially in terms of number of people (16.6%), and presence of benches along the walkways (10%) were important for the walking of the pedestrians.

Table 8. Results of interviews based on age and gender groups in Cautin Park (Number of total interviews: 60).

Pathway Characteristics	Characteristics Preferred and Disliked	Number of Repetition						Sum (For all)	Frequency N (%) (For All)
		All Pedestrians	Adolescent	Adults		Older Adults			
				Men	Women	Men	Women		
1. Higher number of trees	Higher number of trees	25	4	7	3	7	4	30	50%
2. Green spaces (Vegetation)	More green spaces and vegetation	22	6	7	4	2	3	26	43.3%
	Low green spaces is disliked	4	1	1	1	1	-		
3. Shade	Having shade	14	3	5	1	4	1	19	31.6%
	Little shade is disliked	5	1	1	2	1	-		
4. Pathways with the pavement	Hard pavement	13	4	2	3	3	1	17	28.3%
	The unpaved pathways are disliked	4	2	1	-	-	1		
5. Connection to programs and activity zones	Connection to programs and activity zones	17	2	3	6	3	2	17	28.3%

Table 8. *Cont.*

Pathway Characteristics	Characteristics Preferred and Disliked	Number of Repetition						Sum (For all)	Frequency N (%) (For All)
		All Pedestrians	Adolescent	Adults		Older Adults			
				Men	Women	Men	Women		
6. Tranquility	Tranquility	8	2	2	2	1	1	10	16.6%
	Much people is disliked	1	-	-	-	-	1		
	Being noise is disliked	1	1	-	-	-	-		
7. Furniture, benches (the places for rest)	The pathways with more benches	5	3	1	-	1		6	10%
	Lack of benches is disliked	1	1	-	-	-	-		
8. Width of the pathway	Wider pathways	3	2	-	-	1	-	5	8.3%
	Narrow pathways are disliked	2	-	1	1	-	-		
9. More comfortable pathway environments for pets	More green spaces for pets	2	-	-	1	1	-	5	8.3%
	Less people for more comfortable walking with pets	1	1	-	-	-	-		
	Clear path to guide pets	1	-	-	1	-	-		
	More observing animals	1	-	-	1	-	-		
10. Better connection with different parts of the parks	More connection between different parts of the parks	1	-	1	-	-	-	4	6.6%
	Being far from other places in the park is disliked.	3	-	1	-	2	-		
11. Security	More security along the pathway	1	-	1	-	-	-	3	5%
	More number of people to provide security for children	1	-	-	1	-	-		
	Lack of security, especially for children, is disliked	1	-	-	1	-	-		
12. More active environments	The pathways with more number of people (more active environments)	3	3	-	-	-	-	3	5%
13. Bird sound	The pathways with more bird sounds	3	-	-	-	-	-	3	5%
14. Not visually attractive	Not visually attractive, which is disliked	3	-	2	1	-	-	3	5%
15. Places which remind the history "Memorial"	It reminds people of bad memories, especially for children	3	-	1	-	1	1	3	5%

Wider pathways (8.3%), more comfortable pathway environments for pets (8.3%), better connections with different parts of the parks (pathways that provide better connectivity) (6.6%), more security along the pathways (5%), more active environments with a greater number of people (5%), more bird sounds (5%) and not being visually attractive (5%) also showed relative importance for the walking of the pedestrians. In addition, the places that remind pedestrians of history (referring to the special design and location called the Memorial) showed confusing performance with respect to improving the attractiveness for walking. Some people mentioned their tendency to walk there (3.3%) and some people mentioned avoiding walking in this place due to unpleasant memories that some people were killed during the dictatorship.

Furthermore, factors such as cleanliness (3.3%); light (3.3%); "not getting attention" (3.3%); uncomfortable walking due to cement, which provides more heat (3.3%); and circulation around wetlands (3.3%) could also be taken into account as relevant factors to enhance the attractiveness for walking in this urban park.

The respondents were also requested to mention if any special parts of the park are more attractive for walking. In this regard, the "plaza de infancia" (43.3%), Native Forest (31.6%), and "skatepark" (23.3%) are the locations with the highest tendency for walking. "Memorial" is the location with the medium tendency for walking (16.6%), and "wetland circulation" is among the locations with the lowest tendency for walking (5%).

4.3.2. The Associations between Pathway Characteristics and the Tendency for Walking There, Based on Age and Gender

The majority of the pathway characteristics show similarities among the different age and gender groups (Table 8). However, two differences were found. First, adolescents like to walk along the pathways with more active environments (more number of people) as compared to other age groups. Furthermore, bird sounds have a relatively important role only for older adults' walking (women) as compared with other groups. This could be related to both their gender (woman) as well as their age (older adult).

In terms of the most preferred locations in Cautin Park to walk based on age and gender, most of the adolescents (50% of adolescents) prefer to walk around the skatepark. Most adult men prefer to walk in both the Childhood Square (Plaza de la Infancia) (50% of adult men) and the Native Forest (50% of adult men). The Childhood Square is the location where most adult women prefer to walk (75% of adult women). Older adult men prefer to walk in the Native Forest (41.6% of older adult men) and the Childhood Square (33.3% of older adult men). Finally, most older adult women prefer to walk in the Childhood Square (50% of the older adult women) and the Native Forest (33.3% of older adult women).

5. Discussion

5.1. The Associations between Design Characteristics and Walking Behavior, as Well as the Tendency to Walk

The contributions of different design aspects to walking behavior were found. The pathways with pavement significantly contribute to improving walking behavior as compared to unpaved pathways. In addition, pathways wider than 2 m significantly contribute to improving the walking behavior of pedestrians. According to the results of the interviews, narrow pathways contribute to less comfortable and less expedited walking movement. These findings are supported by previous studies to improve walking behavior in urban parks [19,40]. The unpaved narrow pathway type is a common design feature in the urban parks of different cities in Chile. According to the findings of this study, such pavements are not congruent with the improvement of walking behavior in urban parks. This should be considered by urban planners while designing new parks in this context.

Other important factors to improve walking are a greater number of trees and more green spaces. These factors have been frequently mentioned in previous studies to improve walking on the neighborhood scale, as well as in the urban park setting [19,26,27]. In this park, the section of Native Forest is one of the attractive parts for walking. However, unpaved narrow pathways in this section may function negatively in improving walking behavior. Thus, while designing such spaces with dense trees and green spaces, the type of pathways should be wider (with pavement) to enhance the attractiveness for walking. This is another finding that is applicable for urban planners and designers to improve the walking behavior in urban parks. It should be noted that while defining such natural areas inside an urban park, the function changes from a native natural area to a part of the urban park that needs to attract more people to walk. In this sense, preserving the ecological aspects of such natural areas requires certain policies that are different from those with less intervention in such natural areas. In this regard, if it is assumed that having paved pathways in these native natural places may hurt ecological values, increasing the width of the pathways is required at the very least to increase pedestrian mobility in these native natural areas.

The presence of shade is another important factor in improving walking. This is supported by a variety of studies that identified the importance of shade in improving walking behavior [19,42]. In addition, the greater presence of benches is another important factor in improving walking behavior. This is also supported by previous studies on the neighborhood scale and in the urban park setting to improve walking behavior [42].

The connection to program and activity zones is the next important factor for improving the tendency to walk in this urban park. This is supported by previous studies that showed the importance of access to activity zones in improving walking behavior in urban parks [19,49]. Temporal events such as temporary commercial ferias are also effective in enhancing park visitors' walking habits. Therefore, creating spaces that incorporate these temporal activities is crucial to the process of creating urban parks. In addition, a better connection with different parts of the parks (the pathways that provide better connectivity between different parts of the park) is another relevant factor that contributes to more attractiveness for walking. While considering and comparing this factor with more access to activity zones, it is inferred that the main activities in different parts of the park should be designed in a way that is accessible and integrated with the main pathway network of the urban park to enhance the attractiveness of walking. The circulating pathway around the wetland, for example, is one of the places with the least allure for walking, which may be related to the fact that this circulating pathway is a bit far and inaccessible compared to the main pathway network in this urban park. This could be applied by urban planners and designers to design future urban parks in this context.

Tranquility along the pathways, especially in terms of the number of people, is another important aspect to improve the attractiveness of walking in this urban park. In addition, the sense of security is another important factor that contributes to reducing the attractiveness of walking along the pathways of Cautin Park. This factor is one of the main factors that negatively influence the walking behavior of pedestrians in urban settings [37]. However, its importance in improving walking has been rarely explored in the urban park setting. The presence of other people is one of the features (found in this research) that contribute to reducing the sense of insecurity [75]. The presence of people helps to lessen the feeling of insecurity by acting as natural monitoring along the pathways [76]. Greater tranquility is also related to the lower presence of others as well. While considering and comparing tranquility with security as two relevant factors to enhance the attractiveness of walking in Cautin Park, it can be inferred that the presence of people functions positively to improve walking behavior until it generates crowded environments, in which case it becomes a barrier to walking in the urban parks. Therefore, tranquility in this context refers to less crowded areas rather than a smaller population. The wider pathways, as mentioned earlier, could help to maintain pathway environments with tolerable density for pedestrians to walk in. In addition, however, more trees are preferred for walking, but due to the importance of the sense of security, these trees should be designed in a way to reduce the sense of insecurity. For instance, the trees are to be located in a way that not provide hidden places along the urban park's pathways.

In addition, "more comfortable pathway environments for pets" was found to be one of the relevant factors in enhancing the attractiveness of walking. It contains features such as having more green spaces for pets to play and clear path to guide pets. Greater widths of the pathways also contributes to more comfortable walking with pets. Walking with dogs and its contributing factors has been mostly investigated in the urban setting (neighborhood scale) rather than in urban park environments [77]. For instance, walkability and aesthetics were positively associated with the likelihood of walking with dogs in urban settings [78]. Higher population density, more connected and integrated street layouts, and better availability of sidewalks and destinations support engaging in dog walking on the neighborhood scale [79]. The availability of parks is also associated with dog-walking behaviors in neighborhoods [80,81]. Since considerable numbers of people usually walk with their dogs in urban parks, a better understanding of the design features that contribute to walking behavior with dogs in urban park environments seems important to improve walking behavior in this context. This could be one of the valuable lines of research in the future that could contribute to improving walking behavior and public health in this context.

Moreover, cleanliness also relates to the attractiveness of walking, according to a few respondents. This factor was removed in the quantitative approach due to not showing any variability along the different pathway segments. Cleanliness was mentioned in previous studies as one of the relevant factors to walking behavior [27].

Furthermore, the length of the pathways came up as a barrier to walking in this park. The average length of the pathway segments in this park is 91.77 m, which is almost high enough for pedestrians to walk there. Future urban park pathways are to be designed with a lower average length. Finally, a few respondents perceived that the cement, as the common pavement of the pathways, reflects the natural light and creates heat and an uncomfortable environment for walking. Regardless of how true this claim is, it is suggested that different materials be used for pathway pavements in future urban park projects.

5.2. The Associations between the Visual Qualities and Walking Behavior

Among the visual qualities, only legibility shows significant correlations with the number of pedestrians along the pathways, as well as the number of pedestrians, based on adolescents, adults, adults (men), and adults (women). The studies on visual preference also found the importance of legibility for visual preferences, especially in the natural environment [53,54]. Legibility is also an important factor in the urban design literature [82]. However, in the context of urban parks, it has rarely been taken into account. According to this finding, future park environments should be designed in a way that improves legibility among urban parks pathways. Visual access could be enhanced, and the factors that impede visual connectivity could be reduced. In addition, both the visual access and the visibility of the landmarks, as different indicators of legibility, could be improved along urban park pathways. The improvement in legibility through increased visibility of the landmarks along the pathways, however, could be more strongly emphasized in the design of future urban parks in this context due to the finding that there is a significant correlation between the number of adolescents and the visibility of the landmarks within the quantitative approach.

5.3. The Association between the Design Characteristics (as Well as the Visual Qualities) and Walking Behavior (as Well as the Tendency to Walk) Based on the Subgroups of Age and Gender

Significant variations in terms of the association between pathway characteristics and walking behavior based on age and gender were discovered for adolescents and older women compared with other subgroups when both quantitative and qualitative findings were compared.

Regarding adolescents, three design elements—degree of enclosure, visible link to landmarks, and visual connection to activity zones—also greatly influence their walking behavior. The results of the qualitative approach also highlighted the importance of pathways with more access to activity zones and more populated areas for adolescents' greater tendency to walk. Adolescents prefer to walk in more active places. This is the main difference between adolescents and other groups in terms of the association between design characteristics and walking behavior. A more active environment contributes to more active transportation among adolescents [83]. This finding—as one of the novelties of this article—is to be investigated in urban parks in future studies.

Although legibility is crucial for people of all ages and genders, it may be particularly important for adolescents, since they are more likely than people of other ages to be able to see landmarks, which is one of the indications of legibility. This demonstrates that, in comparison to other groups, adolescents' walking ability is more dependent on the obvious landmarks along the park's routes. As a result, the pathways that are more closely tied to the activities of adolescents, like skateparks, should be structured in a way that makes it easier for them to be seen. This could be applied by the urban planners and designers of urban parks in this context.

Adolescents also walk significantly along the pathways with less enclosure and more visibility of surroundings. In this light, it is possible to understand the behavior of adolescents as an attempt to practice autonomous walking while still being controlled by their parents. As a result of their increased confidence (and decreased fear), while engaging in exploratory activities outside, they require the visibility of their surroundings while strolling. This could be more investigated in future studies.

Based on the results of the qualitative approach, birdsongs also demonstrated a relative value for the older adults' (women's) tendency to walk. This is not evident when looking at other age and gender categories. Birdsongs were found to be a type of natural sound most commonly associated with perceived stress recovery and attention restoration [84]. However, according to Franěk et al. [85], there is no evidence concerning the effect of gender on noise sensitivity. Meanwhile, natural elements play an important role in older individuals' perceptions of restorativeness and emotional well-being [86,87]. Less research has been performed on the effects of birdsong on older people's walking experiences in urban parks. Future research may look at this issue more.

6. Conclusions

The design characteristics of urban parks' pathways are important in facilitating leisure walking and maintaining the minimum rate of physical activity. This study examined and explored the relationships between design characteristics (as well as visual qualities) and walking behavior (as well as the tendency to walk) in Cautin Park, the biggest urban park in the Araucania region of Chile. These relationships were evaluated based on the differences in age and gender.

In this urban park, a number of design elements were discovered to be connected to walking propensity and behavior. Compared to walking on dirt roads, there is considerably increased walking on paved walkways. Compared to routes less than 2 m, those wider 2 m are likewise favored for walking. This demonstrates that unpaved, narrow paths that are typically seen in urban parks are not consistent with the development of walking habits in this context.

The contributions of several design attributes to the tendency for walking were also found, including a greater (denser) number of trees, more green spaces and vegetation, connections with programs and activity zones, tranquility along the pathways, more shade along the pathways, pathways that provide better connectivity between different parts of the park, and the presence of benches along the urban park's pathways. These results were reviewed, and their implications were discussed as well. These findings could be applied by urban planners and designers for the design of future urban parks in this context.

Given that activities further from the main pathway network have a lower propensity to encourage walking, one conclusion of these findings is that different areas of the parks should be built so that they connect with the main pathway network in the urban park pathway. Another implication is that the pathways in urban parks should be designed in a way that always provides the natural circulation of pedestrians to reduce the sense of insecurity. At the same time, crowded spaces contribute to lower attractiveness for walking. Thus, the flow of pedestrians should be controlled in a way that does not lead to creating overcrowded pathways.

Furthermore, another interesting finding of this study is that more comfortable pathway environments for pets correspond to the attractiveness of walking. Since many people walk with their pets along urban park pathways in this context, considering what characteristics contribute to more walking of these people is raised as an important issue. This should be surveyed in future studies to enhance walking in the urban park setting. Another aspect is the importance of a more legible pathway to improve walking behavior. Urban park paths should be designed to provide visual connectedness to the surroundings, particularly to prominent monuments.

Adolescents showed the greatest difference from other groups when age and gender variables were taken into account. According to both qualitative and quantitative methods, adolescents are more likely to stroll in urban parks when there is a more active environment and greater access to activity areas. Less enclosure and more exposure to landmarks along pathways are also related to a higher number of adolescents using the routes in the urban park. In addition, birdsong is related to more walking among older adults (women) in urban parks. The designers of urban parks could use these findings to improve walking behavior based on the age and gender variations of users in this context.

The findings of this study could contribute to improving walking behavior and maintaining the minimum rate of physical activity for pedestrians based on age and gender differences in urban parks. These findings could therefore help to create a healthier and sustainable urban environment. In addition, the importance of evaluating both aspects of design characteristics and the visual qualities concerning walking behavior—two important aspects for designing the urban park pathways—as well as performing this evaluation based on age and gender differences, lets us state that the results of this study could be used by urban policymakers to develop urban parks, green spaces, and future sustainable development in this region.

Finally, utilizing the results from both the quantitative and qualitative methods can greatly improve the credibility of our findings. However, this study has some limitations as well. First of all, because the data are cross-sectional, causal inferences cannot be made from them. Second, the data were gathered in the spring's last weeks and early summer. Thus, it limits the generalizability of the findings to other seasons.

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