Article

Pedestrian Walkways for Health in Shiraz, Iran, the Contribution of Attitudes, and Perceived Environmental Attributes

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Abstract: Walking is important for improving physical activity and public health. The pedestrian walkways called Walkways for Health in Shiraz, Iran, present a high standard of aesthetic and design features which attract many people for the purpose of recreation. In addition, a significant percentage of Iranians suffer from mental disorders. The contribution of aesthetic and design features toward walking for recreation as well as mental health has been demonstrated in previous studies, which have focused on either one or the other of these aspects. This interdisciplinary research study aims to evaluate both of these aspects simultaneously. A quantitative approach including a survey questionnaire and multiple regression analysis was used to examine the objectives. The contributions of walking attitudes and several perceived environmental attributes to the attractiveness for walking and to general/mental health were determined, which suggested the need for new arrangements of the visual sequences and social setting along these walkways. In addition, the observation that younger people suffer are more affected by mental health disorders was one of the most challenging findings. The policy makers of this city could apply the findings of this study to these pedestrian walkways in order to improve the attractiveness for walking as well as general and mental health.

Keywords: attractiveness for walking; mental health; perceived environmental attributes; walking with others; walking attitudes; walking for recreation

1. Introduction

Walking is important as a form of physical activity and for improving public health. Studies have indicated that sedentary people make up 18% of the population in developing nations [1]. Given this situation, walking is the most sustainable form of physical activity in our everyday lives [2,3]. According to ecological models, walking is influenced by a variety of factors, including socio-economic factors, built environment attributes, and others [4]. The contributions of numerous built environmental factors to walking behavior have been demonstrated by previous studies [5–8] (Section 2.1). These studies also showed the contribution of personal and demographic factors, as well as walking attitudes on walking behavior [9–11].

The pedestrian walkways called Pedestrian Walkways for Health in Shiraz, Iran, were created some years ago in order to create a recreational and healthy environment for inhabitants. Today these walkways have become the main spaces of recreation for the majority of the city's inhabitants. These pedestrian walkways were mostly created in the district of the city which has a reputation for numerous gardens and natural elements, and this situation may enrich the recreational walking

experiences. The influence of environment-related attributes on walking for recreation as one of the main types of walking has been demonstrated by previous studies [12–17] (Section 2.2). In addition, the contribution of socio-demographic factors such as age and gender, as well as walking with others when walking for recreation, have also been demonstrated [12,16,17].

Moreover, according to our observations, these pathways offer many natural and man-made aesthetic- or design-related attributes as the main reason for which they attract many people from different parts of the city to these areas for the purpose of recreation. Thus, the relationships between walking for recreation and these aesthetic and design related attributes need to be examined, especially given the presence of a high percentage of these aesthetic-related attributes along these walkways. In this regard, Southworth [18] stated that the path network must engage the interest of the user. The impacts of path surroundings and aesthetics as well as design-related attributes, such as the scale of street space, the presence of landscape elements like trees, visible activity, and certain urban design qualities such as the sense of progression on walking behavior have all been demonstrated [19–21] (Section 2.3). According to picturesque theory, some compositions of spatial form and specific design features will invoke a more intense aesthetic experience than other compositions and may increase pedestrian activity [22]. Studies on visual landscape preferences support this relationship, in which certain landscape features such as vegetation as well as certain visual qualities such as legibility and mystery contributed to visual landscape preferences (Section 2.3) In addition, these environmental characteristics play a critical role in the environmental factors associated with walking for recreation. From the previous studies on walking for recreation, it can be inferred that this assessment relies more on the role of perceived environmental factors than their objective assessment [23]. It can also be inferred that focusing on the attractiveness for walking is more critical than walking behavior itself in such a context.

Furthermore, the rapid urbanization in recent decades in Iran has had a considerable impact on people's mental health and on psychiatric care [24]. Previous studies have revealed that a significant percentage of Iranians suffer from mental disorders and psychological conditions [25–27] (Section 2.4). In this regard, the effects of walking-related environmental factors such as neighborhood quality, the amount of green space, land-use mix, traffic volume, and social factors such as friendship and neighborhood social cohesion on anxiety and mental health have been indicated by previous studies [28–31] (Section 2.5). Thus, the selected pedestrian walkways in this study could improve the general and mental health of inhabitants, since they provide a significant number of green spaces as well as other aesthetic and design-related attributes.

Previous studies have paid less attention to evaluating the simultaneous impact of environmental attributes—especially aesthetic- and design-related attributes—on walking for recreation and physical as well as mental health. Indeed, the contribution of aesthetic and design features toward walking for recreation as well as mental health has been demonstrated in previous studies, which have only focused on either one or the other of these aspects. The context of this study provides the best opportunity to evaluate both of these aspects simultaneously. Accordingly, this interdisciplinary study investigates the association between perceived environmental attributes and the attractiveness for walking as well as general and mental health in the aforementioned pedestrian walkways. On this basis, the questions of this research are as follows (Figure 1 shows the conceptual framework of this study as well).

Do socio-demographic factors, walking attitudes, perceived environmental attributes, and walking with others contribute to the attractiveness for walking in this context?

Do socio-demographic factors, perceived environmental attributes, walking attitudes, and walking with others influence general and mental health in this context?

What new perceived environmental attributes contribute to an improvement in the attractiveness for walking and general/mental health in this context?
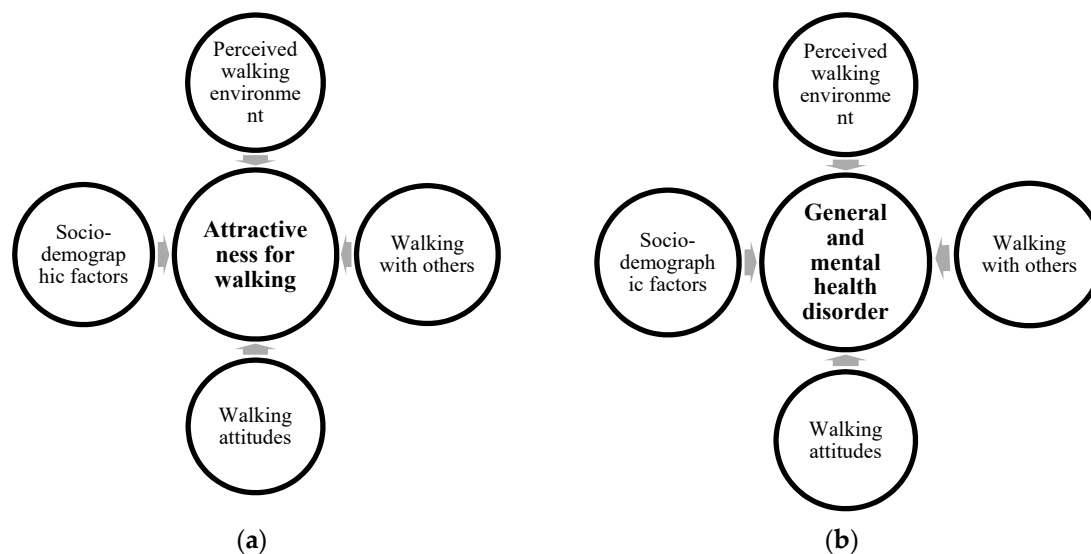
Figure 1. (**a**) The conceptual framework regarding the factors influencing attractiveness for walking; (**b**) The conceptual framework regarding the factors influencing general and mental health.

2. Literature Review

2.1. Walking Behavior and Its Contributing Factors

Bentley et al. [32] found that at least one measure of the features used, including design, safety, destinations, and aesthetics, were associated with more time spent walking. Likewise, Hahm [9] found that all of the four categories of built environment, including accessibility, diversity, design—including shaded streets and openness—and density, affected pedestrians' choices of walking route. According to the review study of Handy [23], the relationship between walking and the perceived neighborhood aesthetics, as well as the reported presence of sidewalks, are consistent among the reviewed studies [23]. Alfonzo [33] suggested a socio-ecological model comprising a hierarchy of five levels of needs in the decision-making process regarding walking, namely: feasibility, accessibility, safety, comfort, and pleasurability. Southworth [18] suggested six criteria for the design of a successful pedestrian network and walkable cities, including connectivity, linkage with other modes of transport, fine-grained land use patterns, safety, quality of path, and path context. According to the review study of Zapata-Diomedi and Veerman [11], there are consistent and convincing associations between walking as a physical activity and features including land use mix, neighborhood composite walkability indices, access to a variety of destinations, and distance to transit. According to the review study of Saelens and Handy [34], there is an association between walking behavior and features of built environment including accessibility based on distance to destinations, mixed land use, density, aesthetic qualities (the attractiveness of the environment), and pedestrian infrastructure, including the presence of a well-maintained sidewalk, street connectivity, safety-related attributes, and neighborhood walkability index. Furthermore, the contribution of socio-demographic variables such as age and gender and walking attitudes such as enjoyment, importance, and positive experience of walking behavior in the past were indicated as well [10,12,35,36].

2.2. Walking for Recreation and Its Associated Factors

Previous studies have shown the association between walking for recreation and environmental factors, including low land use mix and low institutional land [37], the presence of walking trails [16], infrastructure for walking (such as the footpath condition and the quality of its surface) [8,13,38], the proximity of recreational facilities [16,38], perceived neighborhood accessibility as well as the presence of accessible destinations (mostly services) such as stores, parks, and beaches [8,12,13,15,39], the presence of public transit facilities such as proximity to public transport/bus stops [15,17],

nearby nonresidential locations, and non-park physical activity destinations in the context of China [14], perceived traffic safety as well as actual safety, including factors such as the percentage of street length with speed limits [15,16,40], personal security including less concern about crime [13,16,41], and perceived neighborhood aesthetics as well as the presence of aesthetic features such as the percentage of tree canopy coverage, the maintenance of sidewalks, cleanliness, and the view of the architecture [8,12,13,16,40]. From the few studies on walking behavior in Shiraz, Iran, the impact of certain environmental factors, including comfort, safety, and aesthetics on walking for recreation have been demonstrated by Bahrainy et al. [42]. In addition, walking for recreation was also associated with certain socio-demographic factors, such as income level [17], and social factors such as walking with others, especially for women [12,16,17].

2.3. The Contribution of Path Context and Landscape Visual Preference to Enrich Walking Experiences

Numerous environment/behavior studies have provided evidence for the positive impact of the design and quality of the pedestrian environment on walking behavior [19–21]. The various aspects of path surroundings in these studies include visual interest, visibility of landmarks along the pathways, view of public gardens, transparency of fronting structures, visible activity, street trees, and lighting [18,43,44]. According to Southworth [18], there is no general theory of spatial design for the pedestrian environment that applies everywhere, but a few attributes are likely to contribute to the quality of path surroundings in most urban and suburban settings, including the scale of street space, presence of street trees and other landscape elements, visible activity as well as transparency, and coherence of built form. According to picturesque theory, some compositions of spatial form and specific design features invoke a more intense aesthetic experience than other compositions [22]. Isaacs supported this theory, as he found the relationships between heightened aesthetic experience and certain design features, such as the variety of open spaces connected by narrow and bending streets, controlled view of the spaces, sense of enclosure, landmark objects as visual focal points, and complexity in the surfaces and details.

The relationship between design aspects of the environment and walking experiences could also be considered in the studies on visual landscape preferences. Information-processing theory, as one of the most significant theories in visual landscape preference research [45,46], suggests that preference for a scene is dependent upon two basic human responses to an environment, including the need to understand and a desire to explore. According to Kaplan and Kaplan [47], visual landscape preference depends on four key information variables, including complexity, coherence, mystery, and legibility. Zhang [48] found that certain landscape features such as vegetation including trees, seasonal flowers, and open grassland, as well as certain components of perceived landscape aesthetics such as legibility and coherence contribute to the most preferred visual scenes in public places. Cheng [49] found that perceived landscape aesthetics through four components—complexity, mystery, coherence, and legibility—contributed to visual landscape preference.

2.4. The Situation of Mental Disorder in Iran

The rapid urbanization of Iran, in less than five decades, during more than two thirds of the population have come to live in city dwellings, has had a considerable impact on people's mental health and psychiatric care [24]. Previous studies have revealed that a significant percentage of Iranians suffer from mental disorders and psychological conditions [25]. A study showed that mental disorders ranked second, involving 16% of the overall burden of diseases after unintentional injuries in Iran [26]. In another study, the lifetime occurrence of psychological disorders was 10.8%, which was followed by anxiety disorders, with an occurrence of 8.4% in Iran [27].

2.5. The Impact of Walking, Walking Environment and Social Factors on General and Mental Health

Research findings indicate that walking can lessen signs of depression and anxiety, resulting in improvements in individual quality of life [50]. With regard to the influence of the urban environment

on health, while much of the literature has focused on physical health, less attention has been paid to the mental and psychological impact of the urban environment [29]. However, the contributions of different aspects of the walking environment toward mental health have been indicated by previous studies. Walking in green spaces contributed to the decrease of anger and depression by enhancing emotional wellbeing through both exposure to nature and participation in exercise [51]. Song et al. [52,53] found that the pedestrians who walked in a park as well as the forest exhibited significantly lower levels of negative emotions, depression, and anxiety. Houlden et al. [54] found associations between the amount of local-area green space and mental wellbeing. In addition, while Berke et al. [55] found a significant correlation between poor walkability and depression in the US, Saarloos et al. [31] did not find any significant correlation between these two variables in Australia. Yang and Matthews [56] found that increased traffic volume was correlated with increased psychological distress. Lower perceived neighborhood crime was associated with depression reduction [30]. The density of industrial activities in the neighborhood had a negative effect on inhabitants' psychological distress [56]. Higher degrees of mixed land use were associated with higher likelihoods of depression [31]. Living in neighborhoods with a poor quality of urban environment contributed to higher occurrence of depression [57]. Sarkar et al. [58] found that having higher local-level street-network accessibility was associated with reduced distress, while a hillier topography with higher slope variability was associated with increased levels of distress. In addition, housing with porches which promote visibility was associated with reduced depression and anxiety [58,59]. Finally, friendship and neighborhood social cohesion were positively associated with mental health and wellbeing [28,60].

3. Materials and Methods

Shiraz is a historic city with a temperate climate, that has evolved over different periods and is currently divided into three separate parts: the central business district (CBD), the sub-center districts, and the inner suburban areas. There are certain sectors of the city which contain a high level of greenery and natural landscape elements such as gardens, trees, and flowers (Figure 2). In recent years, the municipality has tried to create special pedestrian walkways in these sectors and called them Pedestrian Walkways for Health. Many people from different sectors of the city walk along these walkways as part of their recreational activity. The three main walkways out of these pedestrian walkways have been selected for this study. These pedestrian walkways are called Chamran, Behesht, and Hoseini al Hashemi, as shown in Figure 2. The lengths of these pathways are approximately 4, 2, and 1 km for Chamran, Behesht, and Hoseini al Hashemi respectively. Figure 3 shows some pictures from these walkways.

| (a) | (b) |

Figure 2. (**a**) Map of Shiraz and its sectors containing greenery and natural landscape elements; (**b**) The location of the selected pedestrian walkways, including (1): Hoseini al Hashemi pedestrian walkway; (2): Chamran walkway; and (3): Behesht walkway.
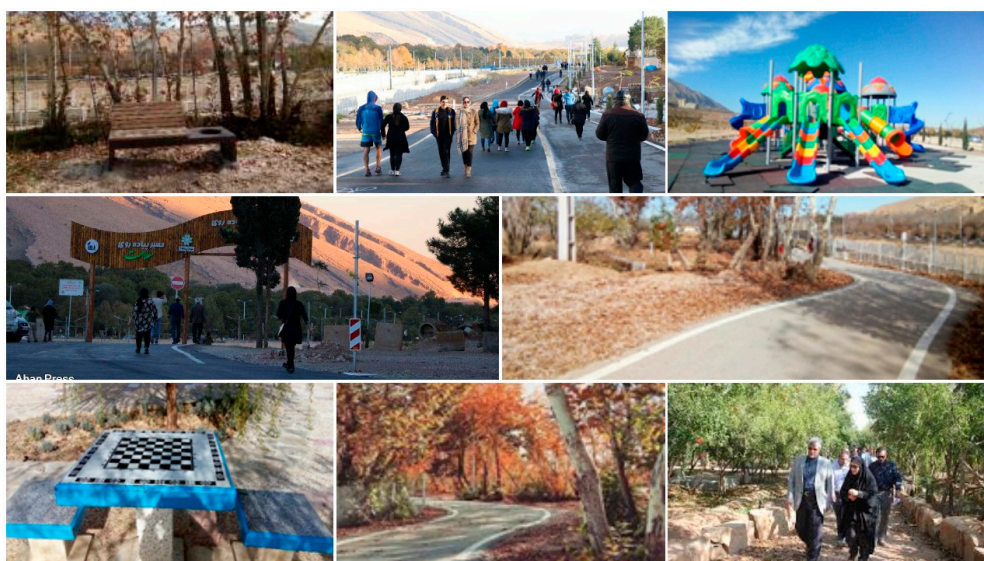
Figure 3. Some pictures of the selected pedestrian walkways.

A sample of 355 people was determined by counting the total numbers of people who entered the area and used the selected walkways during the days of the week and using the Morgan Table [61]. Table 1 shows the average number of pedestrians who were counted entering each of the selected areas during a day and the determined number of respondents for each selected pedestrian walkway. The calculation of the number of users was done before the time of data collection. As shown in Table 1, the majority of the respondents were in Chamran pathway. This pathway is better known by the inhabitants of this city, and it is the longest one compared with the rest of the selected pathways. Data collection took place in May and June, which are relatively warm months of the year, during which a significant number of citizens use these walkways for leisure. Due to the relative heat in Shiraz and the fact that most citizens use these walkways before sunset, the maximum possible amount of data collection was done between 4 and 8 pm. However, due to the use of these walkways at all times of the day at the weekend, data collection was done on weekends both in the morning and in the evening. The respondents were found in each of the selected walkways. Then, if they accepted to participate in the study, they were followed by the research team, so that the questionnaires were completed in the presence of the research team. The respondents were also over 16 years of age, both male and female.

Table 1. Total number of pedestrians who entered the selected areas during one day and the determined number of respondents on each pedestrian walkway.

The Pedestrian Pathways	Total Number of Pedestrians Who Entered the Selected Areas in a Day	The Selected Numbers of Respondents
Chamran pathway	420–460	209
Behesht pathway	80–90	73
Hoseini al Hashemi pathway	80–90	73
All the selected pathways	500–550	355

A questionnaire survey was used to measure the socio-demographic factors, perceived environmental attributes, level of walking with others, walking attitudes, and level of interest in walking on a 5-point Likert scale (from 1 = strongly disagree to 5 = strongly agree). The Neighborhood Environment Walkability Scale (NEWS) was used to measure the environmental attributes [62]. Selected items were modified to make them more applicable to the context of this city. In fact, they were revised according to the design attributes and qualities presented in the context. In this regard, certain questions regarding path surroundings, design qualities, and visual preferences were added, and some questions were

omitted because they were not relevant in this context. For instance, the selected pathways do not have traffic safety issues; thus, the related factors were deleted. The content validity of the survey questionnaire was examined by some experts in the field, after which adjustments were made based on their feedback. Finally, perceived environmental characteristics were measured for personal security, the functional aspects of walking, the aesthetic aspects of the walking environment, accessibility, and certain urban design qualities related to the context, such as the composition of visual sequences along the path. Walking attitudes were measured using a 5-item scale extracted from previous studies in the field [23,35].

The General Health Questionnaire (GHQ-28) was used to measure general/mental health disorders. The GHQ-28, created as a screening tool by Goldberg and Hillier [63] to identify those who are likely to have, or are at risk of developing, psychological disorders. It is a 28-item instrument for assessing emotional distress in a medical setting. GHQ-28 has been classified into four subscales including somatic symptoms (items 1–7); anxiety/insomnia (items 8–14); social dysfunction (items 15–21); and severe depression (items 22–28). The respondents were asked to score the items on a 4-point scale ranging from "not at all" to "more than usual" to "very much". The questionnaire had seven reverse items as well. The reliability of this survey questionnaire was examined and confirmed by previous studies [63–65]. The thresholds in Table 2 were assumed as indicating likelihood to have, or to be at risk of developing, psychiatric disorders [64].

Table 2. The scoring threshold of GHQ-28 subscales and total scale (Taken from Bahrami et al. [64]).

Disorder Level	Subscales' Scores	Total Score
No/very low disorder	0–6	0–22
Low disorder	7–11	23–40
Moderate disorder	12–16	41–60
Severe disorder	17–21	61–84

SPSS software version 23.0 was used to analyze the data. To measure the questionnaire's reliability, Cronbach's Alpha was used. The Cronbach's Alpha reliability coefficient was 0.755, which shows a desirable rate of questionnaire reliability. It is also to be noted that the three selected pathways in this study have many similarities in terms of aesthetic- and design-related attributes, due to being located in the area of the city which displays these common attributes, as well as being part of a single project called Pedestrian Walkways for Health. Such similarities allow for the aggregation and analysis of the data taken from all three selected pathways. Confirmatory factor analysis was used to identify the latent factors behind the groups of items which measured the environmental attributes. Finally, to predict a dependent variable from the independent variables, multiple regression analysis was applied and it was adjusted for socio-demographic variables as potential confounders.

4. Results

4.1. Factor Analysis of Perceived Environmental Attributes and Descriptive Statistics

Confirmatory factor analysis was used to identify the latent factors behind groups of items which measured the environmental attributes (maximum likelihood, 66.73% variance explained, KMO = 0.624). These factors and their inclusive items are shown in Table 3. As a result, six main perceived environmental factors were identified: (1) "Personal security"; (2) "Comfort mostly due to lack of other vehicles"; (3) "Arrangement of visual sequences along with landscape"; (4) "Arrangement of social setting along with landscape"; (5) "Comfort considering quality of surfaces and public transport availability"; (6) "Accessible stores and coffee shops".

Table 3. Factor analysis of perceived environmental attributes.

Loadings	Environmental Attributes	Components
Personal security	I feel secure from crime while walking along this path during the day	0.869
	Walkers on this pathway can be easily seen by people from surrounding areas, which increases personal security	0.855
	I see and speak to other people when I am walking on this pathway, which increases its security	0.829
	I feel secure from crime at night while walking on this pathway	0.781
	This pathway is well lit at night.	0.748
	There are sufficient parking spaces.	0.625
Comfort mostly due to lack of other vehicles	Low presence of cyclists provides more comfort along the path	0.782
	Lack of motorcyclists along this path provides a more comfortable environment	0.757
	Lack of physical obstacles caused by cars and motorcycles along the path made walking easier	0.576
	Good shading along this path makes walking comfortable, especially during the hot season	0.558
	Less noise due to lack of other vehicles makes walking more pleasant along this path	0.524
	The width of this walkway is suitable for walking.	0.521
Arrangement of visual sequences along with landscape	The maze along the path makes it more interesting	0.746
	Some level of visibility of the surrounding areas and elements such as mountains made the walking more enjoyable.	0.683
	There are many interesting natural things to look at while walking on this pathway	0.554
Arrangement of social setting along with landscape	There are enough seating areas and benches along the path.	0.667
	There are attractive parks and social spaces along the path or near to it.	0.556
	The presence of natural landscape elements including trees and flowers along this path makes it more attractive.	0.492
	The presence of elements which include water, such as fountains, ponds, and rivers along this path makes it more attractive.	0.438
	The presence of children's playgrounds along the path makes it attractive.	0.478
	There are enough trash bins along the path.	0.444
Comfort considering quality of surfaces and public transport availability	The slope along this path is suitable for walking.	0.740
	This pathway is well maintained (paved and not a lot of cracks).	0.671
	Less uneven floor surfaces make it easier to walk on this pathway.	0.455
	Public transport such as trains or buses are easily accessible around this pathway.	0.340
Accessible stores and coffee shops	Stores are easily accessible from this path.	0.702
	The presence of coffee shops along the path makes it more interesting.	0.537
	The path is generally free from litter.	0.483

"Personal security" includes the items which relate to the sense of security on these pathways. "Comfort mostly due to lack of other vehicles" includes the items which relate to two aspects of physical as well as mental comfort, mostly due to a lack of vehicles, and thermal comfort, due to a good level of shading along the path. "Arrangement of visual sequences along with landscape" includes the attractiveness of the visual sequences due to the maze along the path, along with the presence of aesthetic attributes. "Arrangement of social setting along with landscape" consists of the items which relate to the presence of activities as well as social places along the path, along with the presence of aesthetic attributes such as trees and flowers." Comfort considering quality of surfaces and public transport availability" includes the items on the quality of surfaces, along with accessible public transportation around the walkway. Finally, "Accessible stores and coffee shops" consists of the items concerning the presence of stores and coffee shops along the walkway, as well as the absence of litter.

Furthermore, the descriptive statistics of the selected variables of this study are shown in Table 4. In regard to socio-economic characteristics, most of the respondents (57.2%) are between 19 and 29 years old. Most of the respondents are male (59.5%) as compared to female (40.5%). Likewise, most of the respondents belong to a low-income group, since 53.8% of the respondents receive less than ten million Rials (Currency of Iran). Finally, in regard to education, most respondents were Bachelor's degree graduates (43.1%).

Table 4. Descriptive statistics of socio-demographic variables, level of interest in walking, walking attitudes, level of walking with others, general health disorder, and related components (N = 355).

Variables	Description of Variable	Frequency	Percentage	Mean
Age (years old)	1 = 16–18 2 = 19–29 3 = 30–39 4 = 40–49 5 = 50–59 6 = 60–69 7 = More than 70	25 203 89 24 9 2 3	7 57.2 25.1 6.8 2.5 0.6 0.8	2.46
Gender	1 = Male 2 = Female	211 144	59.5 40.5	1.42
Monthly income (Rial, currency of Iran)	1 = Less than ten million 2 = Ten–twenty 3 = Twenty–thirty 4 = Thirty–forty 5 = More than forty million	191 110 33 9 12	53.8 31 9.3 2.5 3.4	1.71
Education	1 = High school 2 = Diploma 3 = Bachelor 4 = Master 5 = Ph.D.	11 72 153 90 29	3.1 20.3 43.1 25.3 8.2	3.15
Level of interest in walking along this pathway	1 = Not at all interested 2 = Not very interested 3 = Neutral 4 = Somewhat interested 5 = Very interested	29 31 64 128 103	8.2 8.8 18 36 29	3.83
You usually walk along this route with others.	1 = Strongly disagree 2 = Disagree 3 = Neither agree nor disagree 4 = Agree 5 = Strongly agree	47 34 45 124 105	13.2 9.6 12.7 34.9 29.6	3.78
Walking attitudes: I enjoy walking In general, my walking experience is positive I walk because it is good for my healthI walk because it is good for the environment I walk because it involves no monetary costs	1 = Strongly disagree 2 = Disagree 3 = Neither agree nor disagree 4 = Agree 5 = Strongly agree			4.11
General health disorder	0–22 = No/very low disorder 23–40 = Low disorder 41–60 = Moderate disorder 61–84 = Severe disorder			23.00
Somatic symptoms	0–6 = No/very low disorder 7–11 = Low disorder 12–16 = Moderate disorder 17–21 = severe disorder			7.10
Anxiety and insomnia	0–6 = No/very low disorder 7–11 = Low disorder 12–16 = Moderate disorder 17–21 = Severe disorder			7.85
Social dysfunction	0–6 = No/very low disorder 7–11 = Low disorder 12–16 = Moderate disorder 17–21 = Severe disorder			7.52
Severe depression	0–6 = No/very low disorder 7–11 = Low disorder 12–16 = Moderate disorder 17–21 = Severe disorder			4.56

In addition, most of the respondents walked with others (64.5%), and the average mean of the inclusive items of the walking attitudes (4.11) shows that a majority of the respondents have the tendency to walk. In regard to attractiveness for walking as the dependent variable, most of the people (65%) showed interest in their walking trips along these walkways. In regard to the variables on general health disorder and its related components, using Table 2, general health disorder (23) and

three of its related components—including somatic symptoms (7.10), anxiety and insomnia (7.85), and social dysfunction (7.52)—showed low disorder levels among the respondents. Severe depression (4.56) showed no/very low disorder levels.

4.2. The Factors Influencing Attractiveness for Walking

Table 5 shows the results of the multiple regression analysis between the attractiveness for walking and the selected independent variables of this study (Figure 1). The results indicate that the model is adequate to explain the relationship. R2 (0.255) shows that the independent variables of this study exhibit an explicative power of almost 0.255 to predict the dependent variable (attractiveness for walking). Walking attitudes showed the highest significant positive correlation with attractiveness for walking among the independent variables ($\beta = 0.196$, $p = 0.001$).

Table 5. The results of adjusted multiple regression analysis in regard to attractiveness for walking (N = 355).

Variables	Standard Coefficient	t	*p*-Value
Socio-demographic variables			
Gender (1.male 2.female)	−0.040	−0.840	0.40
Age (1–5, from young to elderly)	0.029	0.569	0.56
Monthly income (1–4, from low to high)	−0.027	−0.540	0.59
Education (1–4, from low (before diploma) to high (doctor))	−0.052	−1.022	0.30
Walking with others			
Do you usually walk with friends or family?	0.058	1.034	0.30
Attitudes toward walking	0.196	3.496	0.001 **
Perceived environmental components			
Comfort mostly due to lack of other vehicles	0.119	1.935	0.05 *
Arrangement of visual sequences along with landscape	0.132	2.156	0.03 *
Arrangement of social setting along with landscape	0.133	2.043	0.04 *
Comfort considering quality of surfaces and public transport availability	0.166	2.799	0.005 **
Accessible stores and coffee shops	−0.067	−1.087	0.278
Personal security	−0.155	−0.990	0.32

* $p < 0.05$; ** $p < 0.01$; Dependent variable: Attractiveness for walking; R^2: 0.255.

In regard to the perceived environmental attributes of attractiveness for walking, the majority of these factors (four from six extracted factors) showed a significant correlation with attractiveness for walking. "Comfort mostly due to lack of other vehicles" ($\beta = 0.119$, $p = 0.05$), "Arrangement of visual sequences along with landscape" ($\beta = 0.132$, $p = 0.03$), "Arrangement of social setting along with landscape" ($\beta = 0.133$, $p = 0.04$), and "Comfort considering quality of surfaces and public transport availability" ($\beta = 0.166$, $p = 0.005$) showed significant positive correlations with walking behavior. These associations show that the increases/decreases in these factors contribute to an increase/decrease in attractiveness for walking in the selected areas.

4.3. The Effective Factors on General Health Disorder and Its Components

Table 6 shows the results of five models on the multiple regression analyses among general health disorders, as well as their components, and the selected independent variables of this study (Figure 1). The R2 of all the five models (Model 1: General health disorder, R2: 0.115; Model 2: Somatic symptoms, R2: 0.072; Model 3: Anxiety and insomnia, R2: 0.085; Model 4: Social dysfunction, R2: 0.073 and Model 5: Severe depression, R2: 0.113) generally show a rather low total contribution of the independent variables to the dependent variables. However, the correlations identified among some of the independent variables with general health disorder, as well as its components, are considerable.

Table 6. The results of adjusted multiple regression analysis in regard to mental health disorder and its components (N = 355).

Variables	Standard Coefficient [1]	*p*-Value	Standard Coefficient [2]	*p*-Value	Standard Coefficient [3]	*p*-Value	Standard Coefficient [4]	*p*-Value	Standard Coefficient [5]	*p*-Value
Socio-demographic variables										
Gender (1.male 2.female)	0.075	0.14	0.057	0.28	0.087	0.098	0.00	0.99	0.076	0.14
Age (1–5, from young to elderly)	−0.015	0.008 **	−0.089	0.12	−0.115	0.044 *	−0.123	0.033 *	−0.141	0.013 *
Monthly income (1–4, from low to high)	−0.086	0.12	−0.048	0.39	−0.083	0.13	−0.094	0.097	−0.051	0.35
Education (1–4, from low (before diploma) to high (doctor))	0.049	0.374	0.034	0.55	−0.015	0.813	0.034	0.551	0.063	0.25
Walking with others										
Do you usually walk with friends or family?	−0.081	0.189	−0.059	0.35	−0.127	0.042 *	0.082	0.19	−0.112	0.05 *
Attitudes toward walking	−0.126	0.39	−0.098	0.11	−0.015	0.81	−0.182	0.004 **	−0.119	0.05 *
Perceived environmental factors										
Comfort mostly due to lack of other vehicles	−0.091	0.174	−0.141	0.040 *	−0.043	0.53	−0.094	0.169	−0.024	0.71
Arrangement of visual sequences along with landscape	0.078	0.243	−0.121	0.05 *	−0.142	0.036 *	0.053	0.43	−0.057	0.39
Arrangement of social setting along with landscape	−0.118	0.05 *	−0.013	0.854	−0.140	0.05 *	−0.073	0.31	−0.130	0.05 *
Comfort considering quality of surfaces and public transport availability	−0.057	0.381	−0.128	0.05 *	−0.043	0.51	−0.057	0.38	0.032	0.62
Accessible stores and coffee shops	0.30	0.65	0.042	0.54	−0.042	0.53	0.072	0.29	0.034	0.60
Personal security	0.010	0.95	0.044	0.80	0.072	0.68	−0.066	0.70	−0.028	0.87

* $p < 0.05$; ** $p < 0.01$; [1]: Model 1: Dependent variable: General health disorder; R^2: 0.115; [2]: Model 2: Dependent variable: Somatic symptoms; R^2: 0.072; [3]: Model 3: Dependent variable: Anxiety and insomnia; R^2: 0.085; [4]: Model 4: Dependent variable: Social dysfunction; R^2: 0.073; [5]: Model 5: Dependent variable: Severe depression; R^2: 0.113.

There are significant negative correlations between age and general health disorder (β = −0.015, *p* = 0.008) and three of its components, including anxiety and insomnia (β = −0.115, *p* = 0.044), social dysfunction (β = −0.123, *p* = 0.033), and severe depression (β = −0.141, *p* = 0.013). This shows that younger people suffer from more general health disorders, anxiety, social dysfunction, and severe depression. Walking with others shows significant negative correlations with anxiety (β = −0.127, *p* = 0.042) and severe depression (β = −0.112, *p* = 0.05). This shows that people who walk with others in these walkways feel less anxiety and severe depression. Attitudes toward walking showed significant negative correlations with social dysfunction (β = −0.182, *p* = 0.004) and severe depression (β = −0.119, *p* = 0.05), which shows that walking attitudes contributed to a decrease in social dysfunction and severe depression.

In regard to the perceived environmental attributes, four of these factors showed a contribution to general health disorder or at least one of its components. All of these correlations are negative, which shows that increasing these factors contributed to a decrease in mental health disorder or its respected components. "Comfort mostly due to lack of other vehicles" showed a significant negative correlation with somatic symptoms (β = −0.141, *p* = 0.040). "Comfort considering quality of surfaces and public transport availability" exhibited a significant negative correlation with somatic symptoms (β = −0.128, *p* = 0.05). "Arrangement of visual sequences along with landscape" showed a significant negative correlation with somatic symptoms (β = −0.121, *p* = 0.05) and anxiety (β = −0.142, *p* = 0.036). Finally, "Arrangement of social setting along with landscape" showed a significant negative correlation with general health disorder (β = −0.118, *p* = 0.05), anxiety (β = −0.140, *p* = 0.05, and severe depression (β = −0.130, *p* = 0.05).

5. Discussion

5.1. The Factors Influencing Attractiveness for Walking

The contribution of walking attitudes to walking behavior were indicated by previous studies [10,13] and supported by this study as well. Physical as well as mental comfort due to lack of vehicles is counted as a basic function of these walkways. It can be inferred that people come to use these pathways basically in order to escape from vehicle congestion in other parts of the city. In addition, the shading provided by vegetation and trees plays an important role in attractiveness for walking, due to the long hot season of the city, and leads to greater use of the walkways during this season. The importance of shading for walking has been demonstrated by previous studies [9,66].

The association between "Arrangement of visual sequences along with landscape", which includes three items (Table 3), and attractiveness for walking was found in this research. Some level of visibility of the surrounding areas is the factor relating to less enclosure and more openness (open vistas) along the walkways [67]. The association between the level of enclosure and walking has been indicated by the previous studies [68,69]. Previous studies have also indicated the association between legibility and visual connectivity to surrounding elements as one of its indicators along the walkways [43,49,68]. On the other hand, the path with a maze made it interesting for users, and this shows that some level of mystery is also necessary to make the path interesting for users. The association between some level of mystery due to a maze along the path and the attractiveness for walking has been indicated by previous studies [22,70]. This finding was expected, considering that most of the respondents were young. But the emergence of both items shows that a balance between legibility and mystery is required to make the path attractive for users. Previous studies showed the necessity of both visual qualities along the pathways [47–49]. In this study, a balance between these two visual qualities was emphasized. Moreover, another item emerging from this group: the presence of many natural landscape elements, shows that this balance between legibility and mystery along the walkway should be accompanied by the presence of different landscape elements in order to be preferable to pedestrians. The contribution of aesthetic natural landscape elements to walking has been widely demonstrated by previous studies [8,23,32,34,40,71]. In fact, this finding shows the effectiveness of the composition of the

balance between legibility and mystery within visual sequences along the path, the presence of some level of openness (open vistas), and the presence of aesthetic landscape elements on attractiveness for walking rather than the individual contribution of each of these items. And this is considered as one of the novelties of this research.

"Arrangement of social setting along with landscape", which includes six items (Table 3), showed a significant positive correlation with attractiveness for walking. The influence of the presence of trees and flowers as well as benches on walking has been demonstrated by previous studies [12,13,16,40,66,72]. Likewise, the relationship between places linked to activities and walking has been demonstrated as well [73,74]. In addition, the presence of water-related elements in relation to walking behavior has been demonstrated by previous studies as well [70,75]. The importance of such water-related elements in the creation of thermal and climate comfort for pedestrians was also indicated [76,77]. This is more important when taking into account the long hot season of the city. In fact, this novel finding showed that the presence of activities and social places is associated with attractiveness for walking when it is combined with aesthetic-related elements such as the presence of trees and flowers, the presence of water-related elements, and the existence of trash bins in these social places. This is applicable to the planning and design of social places by policy makers along these walkways.

Finally, "Comfort considering quality of surfaces and public transport availability" is another factor which correlated positively with attractiveness for walking. This factor refers to the quality of the surfaces, including the suitability of the slope and the quality and evenness of the paving on the surfaces. This result supports the finding of the previous studies, which indicated the role of quality of the surfaces, including pavement and steps, on walking behavior, including walking for recreation [13,18,21,38]. The available public transport as one of the sub-criteria of this factor also supports the findings of previous studies regarding the impact of public transport availability on walking for recreation [15,17]. Thus, appropriate paving materials and the improvement of public transport availability contribute toward improving the attractiveness for walking along these pathways.

5.2. The Factors Affecting General Health Disorders and Their Components

Although a low contribution of the selected independent variables toward general health disorders and their components was found, the contributions of several of these independent variables are considerable. Younger people suffer more physical and mental health disorders. According to most of the previous studies, mental health decreases with increasing age [78–80]. However, Barahmand et al. [81] found no relationship between age and mental health. Generally, a positive relationship between age and declining mental health is to be expected, as older people may feel physically and mentally unhealthier. But this finding is contrary to such an expectation, as well as the findings of the previous studies. This is very significant, and it is indeed a warning message to policy makers in this city to make efforts to change the situation. As far as the authors know, young people in this country encounter many economic and social problems in their life, and providing a better economic situation may help them to feel physically and mentally better. Future research could focus in more detail on this subject.

People who walk with others on the pathway feel less anxiety and severe depression. Friendship and the social cohesion of the neighborhood were positively associated with mental health and wellbeing [28,60,82], as supported by the findings of this study. Friendship is important to health and wellbeing, and group walking schemes in natural environments are an important public health intervention for promoting mental health [28,83]. In fact, walking with relatives and friends provides a feeling of support which contributes to less anxiety and severe depression. In this regard, places for social gatherings should be improved along these walkways. In addition, walking attitudes contributed to a decrease in social dysfunction and severe depression. To our knowledge, previous studies did not consider the former relationship; thus, this is reckoned to be one of the novelties of this research.

Four of the factors extracted from perceived environmental attributes showed a contribution to mental health disorder or at least one of its components. "Comfort mostly due to lack of other vehicles" showed a significant negative correlation with somatic symptoms. As stated before, this factor includes

the items which affect two aspects: physical and mental comfort due to a lack of vehicles, as well as thermal comfort due to a good level of shading along the path. It can be inferred that the items of this factor which make the greatest contribution toward physical and thermal comfort achieve such a status due to their likely interaction with the physical conditions of the users. These items include a lack of barriers, good shading, and the suitable width of the pathway.

Likewise, "Comfort considering quality of surfaces and public transport availability" showed a significant negative correlation with somatic symptoms. This shows that the factors related to the quality of the floor surfaces, including the suitability of the slope along the path, less uneven surfaces, and lack of cracks, as well as public transport availability, contributed to less somatic symptoms. Steep slopes, unsuitable and uneven surfaces as well as the presence of cracks may contribute toward higher physical demand and therefore increased somatic symptoms of the users. However, a fuller explanation of these effects could be further investigated by future studies.

Furthermore, "Arrangement of visual sequences along with landscape", which includes three items (Table 3), showed a significant negative correlation with somatic symptoms and anxiety. The effect of landscape elements on a decrease in anxiety has been widely demonstrated by previous studies [51–54]. But this finding showed that—as stated before—the composition of the balance between legibility and complexity within the visual sequences along the path, some level of openness (open vistas), and a greater presence of landscape elements contributed to less anxiety along these walkways rather than their individual contributions. In addition, such a composition contributed to fewer somatic symptoms as well. This novel method of arranging the visual sequences along the path could be applied by policy makers in order to reduce anxiety and somatic symptoms. However, future studies should carry out further investigation into the composition of visual sequences and their inclusive elements in relation to mental and physical health.

Finally, "Arrangement of social setting along with landscape", which includes six items (Table 3), showed a significant negative correlation with general health disorder, anxiety and severe depression. This factor showed the highest level of importance among the other perceived environmental attributes due to its significant correlations with three dependent variables in three models. In fact, this factor indicated the importance of planning and designing social areas, along with providing enough benches and trash bins, landscape elements like trees and flowers, and water-related elements inside these social areas in order to influence mental health. As stated before, the importance of landscape elements such as trees and flowers in regard to mental health has been widely demonstrated [51–54]. Likewise, the impact of water-related elements on mental health has been demonstrated by the few studies which considered such a relationship [84,85]. In addition, the importance of social interaction and therefore of the social spaces that encourage such interaction in order to enhance mental health and reduce anxiety has been indicated as well [28,60]. However, the result of the combination of the aforementioned factors which contribute to a decrease in anxiety and depression is a new method of arranging social spaces along these walkways.

6. Conclusions

This study investigated the association between perceived environmental factors and the attractiveness for walking as well as general and mental health in the pedestrian walkways of Shiraz called Walkways for Health. The contributions of walking attitudes and the majority of the perceived environmental attributes to attractiveness for walking as well as general and mental health were found. In addition, the impact of age and walking with others on general and mental health were also demonstrated. As expected, people who walk with others on these walkways suffer less from anxiety and severe depression. Likewise, attitudes toward walking showed a significant correlation with social dysfunction and severe depression. According to one of the most contentious findings of this research, younger people suffer from more physical and mental health disorders. This serves as a warning for policy makers in this city to seek to change this situation. In addition, the perceived environmental factors including "Comfort mostly due to lack of other vehicles" and

"Comfort considering quality of surfaces and public transport availability" showed a significant correlation with attractiveness for walking as well as somatic symptoms. Thus, the indicators of these factors need to be improved along these pedestrian walkways.

Furthermore, two factors: "Arrangement of visual sequences along with landscape" and "Arrangement of social setting along with landscape" presented two different formulations for the composition of physical attributes along the walkways to enhance the attractiveness for walking and reduce anxiety. The first factor indicates a formula for the composition of physical attributes regarding the arrangement of visual sequences along the pedestrian walkways. The second factor indicated a formula for arranging the social setting along these walkways. These findings, which are the novelties of this research, could be applied by the policy makers of this city in order to improve the attractiveness for walking as well as mental health.

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