The Walkability of Thessaloniki: Citizens' Perceptions

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Abstract. This paper aims to assess the walkability of Thessaloniki, Greece, via individuals' perceptions about the influence of the environmental factors of functionality, safety, aesthetic, and points of interest on their pedestrian behavior. The survey's participants were 117 men and 152 women, from 15 to 78 years old, who came from 12 municipalities of the greater Thessaloniki area. The participants responded to a questionnaire which was based on valid and reliable previous respective questionnaires and walkability audits. The questionnaire was formulated on an online Internet platform and the data were collected in October 2017. The results revealed a variability of the assessment results among the different municipalities of Thessaloniki. Since the data were analyzed on the detailed level of postal codes, many differences were also found even between different postal code areas. Almost all areas were found to be insufficient in terms of functional characteristics. The suburban areas suffer from lack of pedestrians' facilities, while urban areas from many obstacles on the existing facilities. In contrast, the proximity of points of interest was found to be very satisfactory. Regarding the safety of the pedestrians' environment, it was perceived as of medium level whereas it was higher in the Thessaloniki city center. The pedestrians reported dysphoria from air pollution, mostly in neighborhoods with high density and vehicle traffic. Dirty pavements, lack of greenery, and ugly buildings bother citizens while walking. The findings are discussed with respect to practical implications in urban planning and people's quality of life.

Keywords: Walkability · Thessaloniki · Perception · Questionnaire
Audit

1 Introduction

Active modes of transport benefit both society and individuals' health and prosperity [1]. Walking is the fundamental mode of mobility and the way that every route begins and ends [2]. In order to encourage walking, it is crucial to determine those factors that influence pedestrian behavior in each environment and scientifically document the current condition. Therefore, the present investigation focused on the factors that affect pedestrian behavior in a specific area.

Many researchers have developed methods on assessing the walking conditions, like e.g. the Australian Method [3]. Most of them use indices such as the Level of

Service (LOS). The most generally approved LOS method is the Highway Capacity Manual's [4] where the approach is similar to the one for the vehicular traffic [5].

However, the last two decades another group of assessment methods has been gaining ground, those that examine the "walkability" of an area. Many definitions have been proposed for walkability and all of them have as a common base the way that the built environment encourages walking. The term "environment" is a multidimensional construct, including not only the physical elements but also the perception for the environment, the social environment, and pedestrians' safety [6]. Pedestrians' safety, specifically, is not defined merely by road safety but correlates with the sense of protection from any external factor [7]. Walkability has been defined as "the extent to which the built environment is walking friendly" [8]. The walkability index is being utilized by many scientific fields [9]. This arises the need to increase walkability as a vital step towards achieving healthy, livable, and interactive cities [10].

In the Greek environment, there are rare research examples [e.g. 11] which examine walkability. The aim of the present paper is to assess the walkability of Thessaloniki, Greece, via individuals' perceptions about the influence of the environment qualities on their pedestrian behavior.

1.1 Assessing Walkability

It is considered that three categories of factors affect people when they decide to commence a walking route. The first category includes cultural and socio-demographic characteristics [12]. The second one contains the travel characteristics, like the aim and frequency [13]. The third category refers to the attributes of the walking environment [14, 15]. Whereas it is difficult to change the first two groups of factors, the third one is not fixed [16]. This is the reason why the relevant literature, and this research, attempts to assess the pedestrians' environment. Moudon and Lee (2003) conducted an in-depth literature review and appointed many methods on assessing walkability of an area, all of which can be separated in subgroups according to the procedure of data collection [17]. Jensen et al. (2017) distinguish two groups of factors: the perceived and the objectively-assessed walkability. More specifically, perceived walkability comprises self-reported perceptions while objectively-assessed walkability is measured through audit tools and Geographic Information System (GIS) databases [18]. Other researchers, pointed out that the perception of the people on the built environment can be gathered with self-administered questionnaires and telephone interviews [19]. The most broaden used questionnaire is the Neighborhood Environment Walkability Scale (NEWS) [20] and its abbreviated version NEWSA [21]. In Europe, the ALPHA program team, developed another questionnaire which was considered to respond more precisely to the typical European context [22].

1.2 Environmental Factors of Walkability

Differentiation exists not only regarding the data collection methods but also to the selected elements of the urban environment that are thought to influence walking. Pikora et al. (2003) found four categories of such elements; (a) functional characteristics, (b) safety, (c) aesthetic, and (d) points of interest. Functional characteristics

contain features of the physical environment like material and width of infrastructures and motorized traffic. Safety is divided into personal safety and protection from traffic. Air pollution, greenery and more, are important for aesthetic evaluation [14]. Lee and Moudon (2006) proposed the 3DS + R; Density, Diversity, Design, and Route, measures and encouraged the 1 km buffer for capturing neighborhood walkability [23]. The 1 km represents the distance that people are willing to walk and is supposed to be a proper distance to evaluate walkability around one point [24]. A team which developed the Systematic Pedestrian and Environmental Scan (SPACES) in Australia, used the 400 m distance from home location to determine neighborhood walkability. The same team pointed difficulty on evaluating attributes such as aesthetic, due to the entrance of subjectivity of the experts who report the conditions [25]. Moreover, many environmental features and qualities such as pedestrians' traffic lights and obstacles on pavements have been included in walkability assessment methods [26].

1.3   Aim and Hypothesis

This research aimed at assessing the walkability in the urban environment of Thessaloniki, Greece, via individuals' perceptions about the impact of the environment qualities of functional characteristics, safety, aesthetic, and points of interest on their pedestrian behavior. It is hypothesized that the higher the perceptions of the environmental qualities are the higher the pedestrian behavior is.

2   Method

This research is a primary effort to estimate the encouragement of walking in the city of Thessaloniki, Greece. Therefore, it was considered important to analyze the perspective of pedestrians towards the current situation of walkability. The main research instrument was a questionnaire developed in the frame of this research and consequently this research belongs to the perceived walkability methods, as defined by Jensen et al. (2017) [18]. The questionnaire was formed according to the literature review. The characteristics, which are under investigation, follow the categorization of Pikora et al. (2003) [14]. Thus, four categories of factors which influence pedestrians are assessed; functional characteristics, safety, aesthetic, and points of interest. The aim of the questionnaire is to record and make clear the citizens' opinion on the condition of the walking environment in their neighborhood. This could contribute to fulfill the initial target of this research; the specification and nomination of those features that could improve the walkability of the specific area. Moreover, since the research examines a broader geographical area, specifically all the municipalities of Thessaloniki, it also targets to the recognition of the most problematic areas where reformation is urgent. The questionnaire is a synthesis of numerous questions utilized in former tools, adapted to the Greek urban and suburban environment, in coherence with the characteristics of the study area. It is mainly based on NEWS and ALPHA questionnaires due to the high accuracy and development in a European environment, respectively. It was developed using Google Forms and it consists of three sections.

The first section contains questions on the personal and demographic characteristics of the participants. In this section the participants specify their home location in the detail level of postal codes. The answers are either in form of multiple choice (gender, walking disability, and usage of supporting equipment), or numerical text (age and postal code) and short text (municipality of residence). In the last question (frequency of 30 min' walk) the answer is given in a Likert scale.

The second section is the core body of the research, and within 25 questions, it examines the perspective of the individual towards the walkability of his or her home neighborhood. Answers are only possible in a Likert scale, with distinguished grades from 1 to 5, like in other walkability questionnaires [20–22]. All questions are formed in a way that 1 is the least and 5 the most positive evaluation. The first seven questions examine the functional characteristics such as adequacy of pavement's width, existence of incline, and the degree it bothers pedestrians. The following 10 questions refer to the sense of safety while walking. It provides questions in which the residents describe how safe they feel during day and night. The questionnaire continues with the assessment of aesthetics asking the pedestrians about the dysphoria level from air pollution, the beauty of the buildings, the disturbance from stray animals, and more. Finally, the participants describe the proximity of points of interests within a 1 km distance, as proposed by Oliver, Schuurman, and Hall (2007) [24]. The total score from the answers in this section is the assessment of each postal code area. The final grade is the average of the rates of the people who inhabit in the same postal code area.

In the third section, residents name the problems and dangers that they rate as the most significant.

Overall, there were no weights used and the metric for Walkability was the average score of the following factors: "Functional characteristics", "Safety", "Aesthetics", and "Points of Interest".

3   Procedure

The collection of the answers was realized through the Internet. This method was preferred due to the possibility it provides for simultaneous multiple answers at the same time from various locations. The questionnaire was published and disseminated through social media (viz. Facebook and LinkedIn) and remained open for answers from Saturday 7th October 2017 12.30 p.m. until Wednesday 11th October 12.30 p.m. In addition, to ensure the participation of elderly people, on-site interviews took place on Sunday 8th and Monday 9th October between 9 a.m. and 3 p.m. in the main square of Thessaloniki, the Aristotelous Square. A tablet device was used for these interviews.

In total 300 people filled the form. Analyzing the validity of the homes' location and postal codes that were recorded, 31 answers were characterized as invalid. An answer was considered to be invalid when the postal code was not found in the Hellenic Post database or there was no agreement between the postal code and the municipality in which the home was reported to be located. Aiming to achieve a comprehensible view of the results it was decided to utilize a map depiction. This map was constructed by the authors as a file in QGIS and the postal code areas were formulated as polygons.

4   Results

There were partial imbalanced responds from men and women, 45.3% and 54.7% respectively. Most of the participants were either 15–28 or 34–47 years old (150 answers). However, there were people that responded up to 78 years old. Only eight people revealed that they face mobility difficulties during walking. Apropos the walking habits, only 0.05% of the sample never walks for 30 min whereas, 106 people said that they walk daily. The participants reported their home location in 58 different postal codes and almost 2/3 were residents of the Municipality of Thessaloniki. Eleven more municipalities were covered by the sample.

The results regarding the functional characteristics showed that the participants mostly graded the pavement infrastructures as adequate (>3), in terms of cover of the area and width. However, they seem disappointed from the number of pedestrian ramps on them. In seven areas people said there are no ramps at all. Additionally, the inhabitants who responded to the survey declared that most of the times it is impossible to use the existing pedestrian ramps. Participants reported that in most of the neighborhoods there are obstacles across the pavements. The residents of the Municipality of Oraiokastro reported the least barriers on the pavements. The incline of the ground bothers residents from some postal codes areas. All the inhabitants of the Municipality of Neapoli-Sykeon reported that face difficulties during walking because of gradient. For these characteristics the Municipality of Kalamaria gathered an average grade over 3 which is a good one. On the contrary, the surrounding eastern areas received the most negative evaluation; around 1.9. Close rates were also received by two suburban municipalities on the west site of the survey area, specifically, the Municipalities of Oraiokastro and Pylaia-Chortiatis.

Moving on to the safety at the pedestrians' environment, none of the postal codes received the maximum 5 for the velocity of the vehicular traffic. However, 14 codes received an average score close to 4, which means that the pedestrians judge that the vehicles run relatively slow across these neighborhoods. The results were similar for the disturbance from the traffic volume. During the day the average grade of all participants is high (≈4). In contrast, the pedestrians reported that they feel less safe at night and the road lighting was reported as insufficient in many suburban areas. Only the 5% of the participants feel fully protected from the vehicles. Simultaneously, around 40 people considered the frequency of pedestrian crossings and those with pedestrian traffic lights as inadequate.

The participants reported that they do not see beautiful buildings while walking in their neighborhood. Moreover, almost half of them think that the pavements are at least dirty. The postal code areas at the periphery of the city center obtained higher rate. Referring to the green spaces, the residents from the western areas stated that they are insufficient. A positive graduation is highlighted while moving from the west to the east side of the city. Furthermore, participants reported that air pollution is medium to significantly sensed for pedestrians in their neighborhood. Only in the Municipalities of Thermaikos and Thermi, the pedestrians said that they do not feel much discomfort from the air pollution. Most participants (63%) answered that stray animals do not repel them from walking.

In the Thessaloniki city center, residents stated that their points of interest and connection with the public transportation are within a walkable distance

The grade for each postal code area that was evaluated is depicted in Fig. 1. This final grade is the average sum of the individual questions and it is the rate for each area according to the method of assessment of the walkability of the urban and suburban environment which was developed in the frame of this research. On this map the darker the color the more positive the evaluation is.
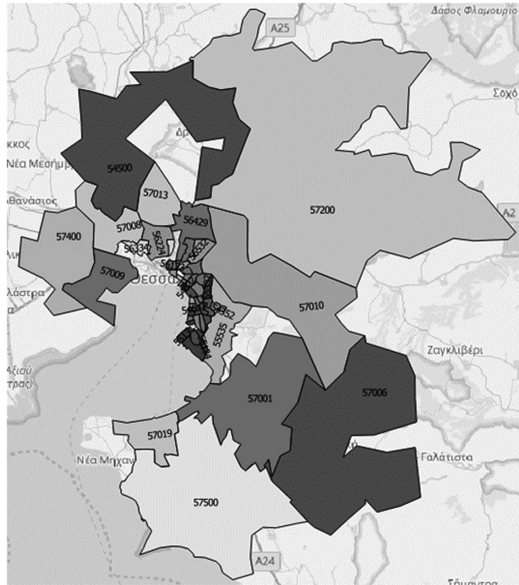

Fig. 1. Spatial depiction of the assessment of walkability in Thessaloniki, Greece.

5   Discussion

The present research aimed to examine the citizens' perceived influential urban environment factors on their walking and pedestrian behavior.

Although, different people provide different evaluation of the same condition, probably depending on their personal needs and personality, trends appear among habitants of the same or close neighborhoods. The present research shows interesting results by considering the average rate of the answers. Comparing the assessment of the four groups of factors which were investigated, the functional characteristics received the lowest evaluation. This contrasts with results from previous surveys, in the European environment [27], where the functional characteristics were rated almost excellent. In contrast, in the investigated area of this research, the proximity of points of interest received the highest evaluation. In the city of Thessaloniki, the pedestrian facilities are often inaccessible and useless because of obstacles or damages, whereas most peripheral areas lack in infrastructures. The incline of the ground influences the pedestrians in the city of Thessaloniki and this should be taken into consideration in

urban design. The sense of safety was the characteristic with the higher agreement between residents of close neighborhoods. This paces with the fact that pedestrians care about the environment of their whole route and not only about the points of origin and destination, as the drivers and passengers do. In addition, discomfort from air pollution and low aesthetics of the surrounding environment are mentioned by most residents in Thessaloniki. Surveillance, cleanliness, and maintenance of infrastructures together with adequate urban planning, which protects pedestrians from vehicles, could significantly improve the walkability. Since multiple factors have proved to interact in pedestrian behavior and encouragement of walking, a multidisciplinary cooperation is essential to achieve a proper walkability level in Thessaloniki.

This research faces some limitations that future investigation needs to overcome. For instance, the number of participants and the participation among the postal code areas is imbalanced. However, despite this limitation, the present findings underline the role of all four categories of factors towards enhancing walkability in an urban environment and stress the necessity of considering citizens' opinion during urban planning.

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