THE ROLE OF HEALTHY URBAN PERFORMANCE ON WALKABILITY: BROADENING THE THEORY OF PLANNED BEHAVIOUR

ABSTRACT

This study aims to broaden Theory of Planned Behaviour (TPB) by inclusion of healthy urban performance attributes of the residential neighbourhoods as an additional predictor for walking behaviour. First, the study reviews the literature on TPB and walkability in residential environments, then construct a TPB model based on walkability to set the hypotheses. The study will explore the correlations through a survey of residents in Ankara, Turkey (n= 220). To analyse the data, first confirmatory factor analysis and later, structural equation modelling will be used. The findings of the study highlights two aspects of planning for a walkable neighbourhood: (i) a walkability model based on the three constructs of TPB should not neglect the measured and experienced urban performance; (ii) utilizing pedestrian environment for walking as fully as possible requires a collaborative and experiential approach and a multi-parameter decision-making process, which are all closely related with observations of walking behaviours both in the present day and future.

Key words: Theory of Planned Behaviour (TPB); healthy urban performance; walking; walkability in residential environments

1. INTRODUCTION

Over the last decade, the design research community has become increasingly interested in promoting more sustainable behaviours through the design of new urban environments, buildings, products and services. The quality of life in residential neighbourhoods and walkability in residential communities are necessary to enhance an effective urban performance and positive behavioural intentions for liveable communities. Walkability is a new term to describe how friendly a city and healthy an urban space (Zuniga-Teran et al., 2017). Walkable urban spaces increase secure social interaction, physical fitness and wellness, while promoting an accessible and sustainable urban experience. However, walkability is now fractured and redevelopment efforts in urban environments target toward automobile-dependent and more stable residential neighbourhoods with a limited mobility (Marquet and Miralles-Guasch, 2015). A walkable experience and walkability require behavioural change in urban life.

Although there is an extensive literature related to the development of walkability audits, models and frameworks (Lee and Talen, 2014), where a variety of parameters that influence walking is considered, most of these studies evaluates the walkability features of case urban spaces. There are only few studies that examine the influences of the urban environment on walking motivation, but none of the studies analysed walkability behaviour through the correlations among attitudes, subjective norms, perceived behavioural controls, healthy urban performance, behaviours and intentions.

The current paper contributes to this stream of research by broadening the role of the Theory of Planned Behaviour (TPB) (Ajzen, 1991) in understanding the associations between the healthy attributes of the residential neighbourhoods and the promotion of walkability intention to perform walkability behaviour. According to the theory, stronger the intention to engage in behaviour, the more likely is its performance. In TPB, attitudinal factors, normative factors and perceived behavioural control could predict behaviour. This study aims to broaden TPB by inclusion of healthy attributes of the residential neighbourhoods as an additional predictor for walking intention (Figure 1). The research question that will be analysed throughout the paper is how a healthy urban performance in residential neighbourhoods shapes our walking behaviour? In the study, a healthy urban performance is identified as the degree of the availability of the following walkability categories within an urban environment that are also defined by World Health Organization's (WHO) to improve human health; connectivity, density, land use, traffic safety, surveillance, experience and greenspace (Zuniga-Teran et al., 2017).

2. THEORY OF PLANNED BEHAVIOUR (TPB)

Explaining human behaviour is both complex and difficult. Various theories and predictive models are proposed to explain and predict physiological and psychological processes involved (Ajzen, 1991). During the last decade, TPB has been well supported in a wide range of fields to explain environmental intentions and behaviours, such as recycling (Nigbur, Lyons and Uzzell, 2010), transportation use (Bamberg and Schmidt, 2003), water conservation (Clark and Finley, 2007), workplace intentions (Greaves, Zibarras and Stride, 2013), ecological awareness (Mancha and Yoder, 2015), green consumer behaviour (Taufique and Vaithianathan, 2018) etc. TPB is an extension of the theory of reasoned action (Ajzen and Fishbein, 1980), but differs in its addition of perceived behavioural control. Theory of reasoned action predicts behavioural intention and discusses the factors that limit the intention of the behaviour (Ajzen and Fishbein, 1980). In TPB, intention is still a central factor of a

behaviour, but shaped by the following three core constructs; attitudes, subjective norms and perceived behaviour control. Attitude is defined as the degree to which a person has favourable or unfavourable appraisal of the behaviour and its outcome. Subjective norm refers how a social pressure is received to perform or not to perform the behaviour (Ajzen, 1991). Perceived behavioural control is the reflection of past experience in terms of reflection ease or difficulty of the behaviour. These factors influence behaviours through their impact upon intentions to behave (Knussen et al., 2004). According to TPB, perceived control plays an important role and could have a direct impact to predict behavioural achievement, particularly when behaviour is perceived as difficult.

Recently, TPB has been criticized for its focus on only three above-defined predictors (Hagger, 2010). Thus, researchers have incorporated additional predictors in the context of TPB. Murtagh et al. (2012) found that the TPB significantly predicts children's active school travel (walking and cycling), and the school travel is controlled by both intentional and habitual processes. Chan and Bishop (2013) found that intention-behaviour relationship was challenged by moral norm with respect to recycling behaviour. Niaura (2013) used TPB to examine the gap between the environmental attitudes and the actual behaviour of young people. According to the study, the relationship between the respondents' behaviour and intentions was twice as strong as the relationship between their behaviour and attitudes. Mancha and Yoder (2015) developed an environmental TPB to predict environmentally–friendly intentions of both American and Indian students and added the role of self-identity. Gao et al. (2017) have used an extended TPB to understand individual's energy saving behaviour in workplaces. The extension was done by adding descriptive norm and personal moral norm. They found descriptive norm as the most powerful variable along subjective norm. Bird et al. (2018) extended TPB including a measure of habit and visibility to predict walking and cycling behaviour. They found that habit strength and visibility of cycling, such as trip distance, bicycle availability and cycling infrastructure, could predict changes in time spent for walking and cycling.

Based on these arguments, the potential effects of TPB on walking are examined in this study. Although the predictive ability of TPB in respect of walking behaviour have been often analysed, there is a lack of consensus in their reported mixed findings. Some studies found perceived behaviour control as the strongest predictor (Lee and Shepley, 2012), some reported attitude as the strongest predictor (Rhodes et al., 2007). Since walking behaviour is closely related with the changes made in the design elements of the urban environments, there is a need of further extended TPB studies to elaborate deeply the walking behaviour and its

relationship along with healthy urban performance and related categories within an urban neighbourhood. The following sections address walking and its relationships with a healthy urban performance.

3. WALKING AND WALKABILITY

Walking is the simplest form of human transportation and a low-cost physical activity. Studies have indicated the strong influence of urban neighbourhoods on human transportation and physical activities (Lee and Dean, 2018). World Health Organization (2007) has highlighted the importance of walking activity and creating walkable neighbourhoods to enable healthy lifestyles. Each individual should obtain at least 30 minutes of physical activity with a moderate-intensity on five or more days a week (United States Department of Health and Human Services, 2008). Furthermore, active transportation (walking and cycling) has a positive impact on the urban environment in terms of sustainability as well. Walking leads to less carbon emissions and less air pollution with reduction of motorized transportation. According to Frank et al. (2010), there is a significant positive association between energy expanded from walking and increasing transit accessibility, residential density, and street connectivity.

However, lack of walking is considered as a global public health problem that should be solved through change in human behaviours, urban patterns and sustainable walkability models (Saelens and Handy, 2008). The streets and neighbourhoods are less walkable and primarily served as roads for automobiles (Kerr et al., 2012) so that people are largely dependent on the automobiles and discouraged from walking behaviour (Lee and Dean, 2018). There are strong correlations between healthy urban performance of neighbourhoods, such as street connectivity, overall access to services and the likelihood of an individual participating in walking (Cerin et al. 2017). Thus, it is necessary to investigate how to make possible for people's behaviour to walk more and how intention and availability of walkability features of a neighbourhood mediates the relationship between the walking habit and walking behaviour.

In the last decade, there are a large number of studies exploring the relationship between physical and social environmental qualities of urban spaces and walking behaviour. Most studied environmental qualities are greenery (Lu, Sarkar and Xiao, 2018), aesthetic pleasantness (Rhodes et al., 2007), safety (2016) and social control with the neighbourhood (Comstock et al., 2010). Patterson and Chapman (2004) found positive associations among walking behaviour, close retail destinations and safe walking paths. Rhodes et al. (2007)

highlighted the effects of neighbourhood aesthetics on walking behaviour. Sundquist et al. (2011) explored associations between neighbourhood walkability and walking the Swedish neighbourhood. In the Swedish context, they found positive associations between walkability and physical activity outcomes, similar to findings from U.S., Australia and Belgium. Lee (2016) implemented an extended TPB model by adding neighbourhood safety and quality to predict older Korean adults' walking behaviour. The inclusion of these two environmental variables in the TPB model resulted in an increase in the variance of walking intention and behaviour compared to TPB alone. Ferreira et al. (2016) enlarged TPB and emphasized the direct and indirect effects of emotional relationships with the residential neighbourhood on walking intention and behaviour. Wasfi et al. (2016) conducted a longitudinal study investigating the effects of walkable neighbourhoods on Canadian walking behaviours and reported that walking-friendly neighbourhood increased utilitarian walking. Lindelow et al. (2017) compared residential neighbourhood designs in terms walking preference and mentioned the significance of heterogeneity of preferences and walking behaviours during pedestrian planning.

Reviewing the walking and walkability literature showed that research on the relationship between both physical and social characteristics of urban environments and walking behaviour has been given increased attention. However, behavioural studies on the implementation of TPB in the context of walking in Turkey are rare (Nordfjaern and Simsekoglu, 2013). Most of the studies are focused on pedestrian behaviours (Sumer, 2003). Thus, this study is an initial step to add healthy urban neighbourhood characteristics as an additional behavioural predictor to TPB and to gain a deeper understanding of correlations between this extended TPB and walking behaviour of Turkish people.

4. ASPECTS OF WALKABILITY FOR HEALHTY URBAN PERFORMANCE

Walkability is the measure of how walking-friendly an environment is (Speck, 2012). Walkability variables are addressed in various studies. Alfonzo (2005) developed a hierarchical walkability model. In this model, pleasurability, comfort, safety, accessibility and feasibility are defined as the variables that affect people's decision to walk. Saelens and Handy (2008) identified two key categories for walkability; recreation and transportation. Recreation variables are related simple recreation facilities, whereas transportation elements are referred to being reached a destination. Ewing and Handy (2009) dealt with subjective qualities of the urban street environment and identified five design qualities to measure walkability in an urban environment; imageability, enclosure, human scale, transparency and

complexity. According to Hosking et al. (2011), poor pedestrian environments, including non-existent sidewalks or lack of sidewalk connectivity, obstacles on sidewalks and poor signalling or design of street crossings, not only create severe barriers to walking for healthy adults, but also those negative conditions even create larger risks and inequity for children and elderly in the neighbourhood. Speck (2012) identified four characteristics of walk to create a more walkable city; the useful walk, the safe walk, the comfortable walk and the interesting walk. According to Cubukcu (2013), there are seven aspects of an urban environment that makes it walking-friendly; land use safety, traffic, crime rate, ease in walking and cycling, accessibility and environmental aesthetics. Giles-Corsi et al. (2015) suggested that a healthy urban planning provides a physical activity supportive transportation network, local access to shops, services and transit, access to sport and recreational facilities, a network of public open spaces and crime prevention through environmental design. Stockton et al. (2016) suggested a walkability model for London, which was based on the connectivity, residential density and land use mix as the key aspects. Zuniga-Teran (2015) developed the Walkability Framework. Later, Zuniga-Teran et al. (2016) implemented this framework identifying nine walkability categories: connectivity, land-use, density, traffic safety, surveillance, parking, experience, greenspace and community. These nine categories address not only the perspective of sustainable architecture and urban design, but also physical activity, land planning, transportation and health. More recently, this walkability model was also applied in four neighbourhood designs, which were traditional development, suburban development, enclosed community and cluster housing (Zuniga-Teran et al., 2017a). The model proved useful in identifying walkability categories and provided an empirical evidence of the significance of greenspace to encourage walking behaviour. A follow-up study by Zuniga-Teran et al. (2017b) identified greenspace, traffic safety, density and land use as the most influential aspects of walkability.

In this study, a walkability model with reference to the study of Zuniga-Teran et al. (2017a) was applied as the variables of healthy urban performance. Thus, the nine categories of this model were taken as the variables of healthy urban performance, and different from previous studies they were integrated as additional predictors to TPB, directly to behaviour, in the context of Turkish walkability.

5. METHOD OF THE STUDY

The method of the study is developed on investigating walking behaviour in a selected residential neighbourhood through broadening TPB with the above-mentioned nine healthy urban performance variables. In this context, the study has two hypotheses: (H1) Both intention and healthy urban performance variables strongly mediate the relationship between the core TPB constructs and walking behaviour; (H2) All the effects of the three core constructs of TPB, attitude, subjective norm and perceived behaviour control, on walking intention, and healthy urban performance variables on walking behaviour are statistically significant; (H3) Healthy urban performance variables have larger direct effect on walking behaviour than their indirect effect on walking behaviour, mediated by intention. Figure 1 illustrates the hypothesized structural equation model of the broadened TPB.

Insert Figure 1 here.

Figure 1. *The hypothesized structural equation model of the broadened TPB.*

5.1. PARTICIPANTS AND THE SETTING

A total of 220 Turkish people participated to the study voluntarily; of these, 113 were female, 103 were male, and their mean age was 46.48 (Table 1). The average length of living of all participants in the selected residential neighbourhood was over 10 years to ensure that participants represented a broad range of views. All the participants asked to sign the informed consent, stating the purposes of the study, their involvement, risks and emergency procedures. After they signed, they were enrolled to the study. They were also informed about the confidentiality of the study and their right to terminate their participation in the study at any time.

Table 1. Demographics of the participants.

Characteristics	n	% Percentage
Gender		
Female	113	51.4
Male	107	48.6
Age		
18-29	35	15.9
30-39	48	21.8
40-49	51	23.2
50-59	33	15
60-69	34	15.5
70-79	10	4.5
80+	9	4.1
Education		
Less than middle school	3	1.4
High school	78	35.5
College graduate	139	63.1
Marital Status		
Married	123	55.9
Unmarried	97	44.1

The case setting was chosen from the most popular residential neighbourhood area in Ankara, Turkey, which was Ayranci neighbourhood of Cankaya District (Figure 2). The planning history of Ayranci neighbourhood goes back to the early 1950s, when radical urban transformations occurred in Ankara based on Jansen master plan with the founding of Republic in 1923, and later after the Second World War (Aslanoglu, 2001). In the late 19th century, Ankara was a small size city, and Ayranci neighbourhood was covered with vineyards. There were one-story houses with two bedrooms (Aslanoglu, 2001). After the founding of the Republic of Turkey in 1923, Ankara became urbanized, and its population increased rapidly. Şumnu (2014) stated that in 1950s, the built environment in Ayrancı evolved from a few number of detached houses to mass-produced apartment houses.

This neighbourhood was selected as the survey area for several reasons. First reason is its neighbourhood design type, which consists of residential block of apartments with housing backyard arrangements (Karaibrahimoglu, 2006). The common use of these housing

backyards, their connections to sidewalk, street and land use system are coherent. Moreover, the urban quality of the housing blocks in this residential neighbourhood have similar characteristics regarding horizontal and vertical rhythms, locations of windows and doors, garden walls, materials and colour, which strongly affect comfort and safety of the walkability (See Figure 3). Thirdly, it is the oldest, densest and most populous in terms of residential living, and is within approximately fifteen-twenty minutes walking distance to the city centre, Kizilay. Finally, residents in this neighbourhood could experience more urban facilities compared to other suburban, enclosed or cluster housing neighbourhoods (such as different vehicular and pedestrian traffic patterns, access points to public transport, pedestrian facilities, access to shops and cafes, See Figure 4).

Insert Figure 2,3,4 here.

Figure 2. *Aerial view of Ayranci neighbourhood area taken from www.maps.google.com.*

Figure 3. *Exemplary windows, garden walls, materials and colour of residential buildings in Ayranci neighbourhood.*

Figure 4. *An exemplary café located on the pedestrian walking in Ayranci neighbourhood.*

5.2. INSTRUMENTS

A validated TPB questionnaire (Ajzen, 1991; Fishbein and Ajzen, 2010) was translated to Turkish, and a formative research was conducted to make the questionnaire suitable for the walking behavior and population of interest (See Appendix A for the questionnaire). The first part of the questionnaire included demographic questions of age, gender, education and marital status. The second part had total 42 items. Four items measured intention (e.g. "I intend to walk in my neighbourhood for at least 30 minutes, 5 times per week (school, shopping, leisure, work"); five related to attitudes (e.g. "I find it desirable to walk in my neighbourhood"); four related to subjective norm (.e.g. "People I care about encourage me to walk in my neighbourhood for at least 30 minutes, 5 times per week"); five related to perceived behavioural control (e.g. "If I wanted to, I could easily walk in my neighbourhood for at least 30 minutes, 5 times per week); twenty-one items related to healthy urban performance (e.g. "There are sidewalks on most of the streets in my neighbourhood") and three items to behaviour (e.g. "I walk in my neighbourhood totally automatically without

thinking"). Twenty-one items of healthy urban performance were adapted from nine walkability categories defined by Zuniga-Teran et al. (2017b). Table 2 illustrates healthy urban performance questionnaire items and their related variables and walkability categories. Participants were asked to rate each item listed under on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The data were collected during face-to-face surveys with people in a public seating area. To avoid any biases, participants were not allowed to listen to others being surveyed.

Table 2. Healthy urban performance questionnaire items and their related variables and walkability categories adapted from Zuniga-Teran et al. (2017b).

Walkability Category	Variable	Questions
Connectivity	Barriers	There are major barriers to walking in my neighbourhood.
	Small blocks	The distance between intersections is usually short (90m) in my neighbourhood.
	Multiple routes	There are many alternative routes for getting from place to place in my neighbourhood.
Land use	Proximity of services	There are services that are located within a 10-min walk from my home: Bus stop, gym, post office, bank, supermarket, hair salon, barber, school, police station, food store with produce, laundry / dry cleaner, theatre / cinema, restaurant / cafe / diner, medical clinic, pharmacy, convenient store, clothing store, government office, farmers' market, child-care facility, social services centre, hardware, museum.
Traffic safety	Pedestrian infrastructure	There are sidewalks on most of the streets in my neighbourhood.
		There is a grass/dirt strip that separates the streets from the sidewalk in my neighbourhood.
		There are crosswalks and pedestrian signals to help walkers crossing busy streets in my neighbourhood.
Surveillance	Ability of people to be seen in the streets	My neighbourhood streets are well lit at night.
		The buildings are located close to the street in my neighbourhood.
Experience	Aesthetics	There is trash/litter in my neighbourhood.
		There are many attractive natural sights in my neighbourhood to look at while walking.
	Slope	There are attractive buildings and homes in my neighbourhood.
	Wayfinding	Possible interactions with wildlife make it attractive to go on walks in my neighbourhood.
		Most streets are hilly, making it difficult to walk or bike in my neighbourhood.

		It is easy to get lost while walking in my neighbourhood. Clear signage or landmarks are present that help me find my way in my neighbourhood. There is enough shade to walk comfortably in my neighbourhood. There are trees along the streets in my neighbourhood.
Greenspace	Proximity to greenspace	Green space is located within a 10-min walk from home in my neighbourhood. It is easy to walk to green space from my home.
Community	Availability of spaces for community interaction	There is a mosque close to home in my neighbourhood.

5.3. PROCEDURE

First, Ayranci neighbourhood was observed, photographed, and analysed by the authors to determine what actually existed in the neighbourhood. Then, the authors conducted the questionnaire. Later, data were screened for normality and missing values, and the normality for all items was moderate (skewness<2 and kurtosis<7) with reference to Flora and Curran (2004). Finally, statistical analyses were performed using the IBM SPSS Statistics 22.0 software package for the confirmatory factor analysis to test that each item is adequately explained by the latent variable, and the IBM AMOS 24.0 software package for Structural Equation Modelling (SEM) to explore direct and indirect effects of TPB constructs and healthy urban performance variables on walking behaviour. Six indices are used to measure whether the results of the SEM model fit well; chi-square (χ^2), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), root-mean-square error of approximation (RMSEA) and cronbach- α. This study considered that the model fit well when (χ^2)<3, CFI>0.90 and RMSEA<0.08.

6. FINDINGS and DISCUSSION

6.1. DESCRIPTIVE STATISTICS and CONFIRMATORY FACTOR ANALYSIS

Overall, the participants have a positive attitude toward the walking behaviour (M=3.84, SD= 1.242). Means of subjective norm (M=3.67, SD= 1.242) indicated that they have a moderate level of social support to perform the walking behaviour (See Appendix B for the descriptive statistics for the measured items). Regarding perceived control, the perceived ease of

performing walking is moderately high (M=4.064, SD=1.195), and the participants have moderately high intention to walking (M=4.052, SD=1.174). However, healthy urban performance items have lower mean values. Means of 2.58 (SD=1.480), 2.71 (M=1.516), 2.79 (M=1.569), 2.94 (M= 1.447) and 2.75 (M=1.586) for experience and traffic safety, respectively, indicated that participants have a lower level of satisfaction with the healthy urban performance of their neighbourhood. Moreover, mean of 4.08 for walking in the neighbourhood naturally without thinking indicated that participants have moderately a high agreement for the walking behaviour. Moreover, a confirmatory factor analysis (CFA) was conducted for the model. The model was tested as reliable, and all the loadings on latent variables were significant (Table 4). The fit indices for the model were all above the recommended levels.

Table 4. The results of CFA for the scales of attitude (AT), subjective norm (SN), perceived behaviour control (PBC), healthy urban performance (HUP), intention (INT) and behaviour (B).

	χ^2/df	GFI	AGFI	CFI	RMSEA	Cronbach-α
AT	2.945	0.995	0.918	0.998	0.057	0.916
SN	1.045	0.998	0.976	0.999	0.014	0.859
PBC	1.475	0.997	0.959	0.999	0.047	0.939
HUP	2.645	0.911	0.874	0.930	0.067	0.936
INT	2.639	0.988	0.938	0.995	0.059	0.915
B	1.641	0.995	0.970	0.999	0.054	0.929

6.2. STRUCTURAL EQUATION MODELING

In order to test the hypotheses and the model, Structural Equation Modeling (SEM) was conducted. The structural model presented satisfactory fit indices ($\chi^2/df = 2.928$, GFI= 0.917; AGFI= 0.889; CFI= 0.940; RMSEA= 0.054). Figure 5 illustrates the standardized path coefficients for the structural model. According to the model, all the variables presented significant positive relationships with the intention and behaviour. Both intention (β = 0.52, $p < 0.01$) and healthy urban performance (β = 0.48, $p < 0.01$) had significant direct effects on walking behaviour. So, the first hypothesis (H1), 'Both intention and healthy urban performance variables strongly mediate the relationship between the core TPB constructs and walking behaviour', was supported. In addition, the direct effects of the three constructs,

attitude, subjective norm and perceived behavioural control, on walking intention were found statically significant, as well as the direct effects of walking intention and healthy urban performance on walking behaviour (Table 5). So, the second hypothesis (H2) was supported. Moreover, the mediating effect of healthy urban performance variables through intention on walking behaviour was also tested, and a lower indirect effect was found ($\beta = 0.11$, $p < 0.01$) compared to its direct effect on walking behaviour. Thus, hypothesis two (H3) was also supported.

Insert Figure 5 here.

Figure 5. The standardized path coefficients for the structural model.

Table 5. Hypothesis testing of the relationship of AT, SN, PBC, HUP, INT and B

Paths			Std. Coef. Estimate	S.E.	t-value	p*
Attitudes	→	Intention	0.426	0.062	6.097	0.000
Subjective Norm	→	Intention	0.282	0.076	4.017	0.000
Perceived Behavioral Control	→	Intention	0.289	0.058	4.380	0.000
Healthy Urban Performance	→	Behaviour	0.482	0.100	6.471	0.000
Intention	→	Behaviour	0.520	0.083	7.875	0.000

* All coefficient estimates are significant at $p < 0.05$.

The study provided a deep understanding in predicting the effects of connectivity, density, land use, traffic safety, surveillance, experience and greenspace as healthy urban performance variables on Turkish people's walking behaviour. Previous studies identified perceived behaviour control as a significant determinant of healthy behaviour (Rhodes et al., 2007; Shibata et al., 2009). However, the present study proved that the inclusion of walkable aspects of neighbourhood design were stronger correlated with walking behaviour than walking intention. Hence, it is possible to discuss the findings from the two points of view. First is the intention-behaviour gap. Although people could develop an intention to change their behaviour in general, they might not take any action (Sniehotta, Scholz and Schwarzer, 2005). Even the neighbourhood residents' knowledge of sustainable living or considering health issues pointing out active transportation might not be correlated with actual walking behaviour. Ajzen et al. (2011) focused on the energy-saving behaviour, including walking and cycling, and environmental knowledge. Environmental knowledge was introduced as a new

predictor for the TPB, and environmental intentions and behaviours had almost no correlations; because environmental knowledge had no influence on the main predictors of the TPB.

In this study, the direct effects of healthy urban performance variables on walking behaviour also confirm this discrepancy. Results showed that these variables were associated with lower levels of walking behaviour, if their relationship was mediated through intention. It means that the spatial and social practices of urban environment influences walking behaviour, but the key question returns policy makers and discipline experts to the way they define urban activities and land planning to bridge the gap between walking intention and behaviour. Land use planners, architects, even interior architects could employ sustainable decisions and mechanisms. As Barton et al. (2015) suggested, in Turkey sustainable land use policies such as countryside and parkland protection, conservation areas, housing and employment zoning, mixed-use centres, density and affordable housing guidelines, site selection, local and natural land investments could be also developed. Designers, investors and developers need to get people walking rather than driving their cars, both intentionally and behaviourally. Thus, planning based on the three constructs of TPB should not neglect the measured and experienced urban performance. In that respect, second point of view is that planning for a walkable neighbourhood needs both a collaborative and experiential approach (Barton et al., 2015). Today, most of the studies and diverse urban activities (Cerin et al. 2017; Saelens and Handy, 2008) are focused on promoting either healthy intentions or behaviours for a walking-friendly neighbourhood, but rarely both at the same time. Utilizing pedestrian environment for walking as fully as possible requires a multi-parameter decision-making process, which is closely related with observations of walking behaviour both in the present day and in future. Physical, social and cultural urban environment choice parameters could be replicated in the future (Barton et al., 2015). Likewise, the results of this study highlights that the predictors of walking behaviour could also differ independently from walking intention. Hence, the broadened TPB with these healthy urban variables in the present study could help designers and others involved in the decision-making process of walking to develop healthy residential neighbourhoods that reflect why, where and how people choose to walk, intent to walk and just walk automatically without thinking.

7. CONCLUSION

Similar to the studies mentioned in the walkability literature section, this study also considers that a walkable neighbourhood leads healthy lives for people, which is the most meaningful

indicator for healthy urban performance of a neighbourhood design. Consequently, there are several gaps in elaborating the relationships between the complexity of walking behaviour and measured physical and social walkability characteristics of urban environments. Getting people physically active on daily basis is not easy. It requires comprehensive walkability framework developments, which explore strategies for optimal behaviour-intention-environment fits. The optimal fit among the three core constructs of TPB and urban environment is design, planning, public health and governance issue.

There are several limitations of the study. First limitation is the sample size. Larger representative samples could present different findings. Second limitation is that the influence of neighbourhood design and street layout are not analysed. This can lead to results that would differ if the study will be conducted in suburban development, gated community or cluster housing neighbourhood.

Future studies could focus on other social interactions with neighbourhoods, such as beliefs, motivation, familiarity, place attachment, sense of community, along behaviour and intention. Future research could include diverse respondent groups and differences among them, such as elderly, disabled people and youth populations. Moreover, cross-cultural and longitudinal studies could also help to gain a better understanding of the relationship between perceived environmental qualities of urban environments (spatial-physical and social) and predictions of walking practices.

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