THE INFLUENCE OF NEIGHBORHOOD PERCEPTION AND SATISFACTION ON TRAVEL BEHAVIOR

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ABSTRACT

Residing in a high-density, diverse and accessible neighbourhood tends to be associated with less car use, more public transport and more cycling and walking. However, this does not hold for all people because of differences in personal perceptions and preferences. This paper, therefore, analyzes spatial (mis)match, or the correspondence between perceptions of someone's residence and the objectively measured spatial characteristics of that residence. Based on a sample for Flanders, Belgium, we found that people tend to overrate the urbanized character of their residence. Among urbanites, (mis)matched spatial perceptions do not influence mode choice. Mode choices remain mainly influenced by the urban characteristics and not by personal perceptions as such. However, the influence of spatial (mis)match becomes more important among ruralites and, especially, suburbanites. The travel consequences of (mis)matched spatial perceptions thus clearly depend on the residential neighbourhood type.

Keywords: spatial perceptions, residential satisfaction, (mis)match, built environment, mode choice, hierarchical logistic regression, Belgium

1. INTRODUCTION

Many studies have analysed the relationship between the built environment and mode choice, but the underlying behavioural mechanisms remain somewhat less well understood. Higher densities, more diversity and better local accessibility are often believed to result in less car use, more public transport and more cycling and walking (for a more comprehensive review, see, e.g., Handy 2002, 2005, van Wee 2002, Van Acker and Witlox 2005, Bartholomew and Ewing 2009). However, not all people that reside in high-density, diverse and accessible neighbourhoods travel by definition by public transport or walk and bike instead of using their cars. This is (partly) due to differences in more subjective and behavioural influences such as perceptions (Van Acker et al. 2010). It might be possible that one person perceives the built environment as unsafe preventing him or her to walk, whereas another person feels it is relatively safe to walk around. Only recently, attempts are made to incorporate such subjective influences into land use-travel behaviour interaction models (e.g., Kitamura et al. 1997, Bagley and Mokhtarian 2002, van Wee et al. 2002, Scheiner and Holz-Rau 2007). However, almost none of these studies questions whether these subjective influences correspond to the objective reality. For example, a neighbourhood is objectively evaluated as pedestrian friendly (e.g., low motorized traffic levels, availability of sidewalks), but an individual with a specific lifestyle might still consider this neighbourhood as unsafe. Therefore, it would be interesting to balance objective variables against more subjective variables.

One exception is the series of studies by Schwanen and Moktharian (2003, 2005a, b) which focuses on the concept of residential neighbourhood type dissonance, or mismatch between preferred and actual type of residential location. They found that travel behaviour of the mismatched individuals corresponds to the matched residents of the actual neighbourhoods, suggesting that the influence of the built environment remains important despite mismatched spatial preferences. However, it might be interesting to know also how people perceive their current residence and how this corresponds with the objectively measured spatial characteristics of that residential neighbourhood. This would offer insights in the accuracy of someone’s spatial knowledge about their actual residential neighbourhood. For example, the distance between the residence and the nearest bus stop can objectively be measured but there are no guarantees that a short distance is also perceived as such. Especially non-public transport users might not be aware that a bus stop is within close distance of their residence. In this chapter, we will focus on the travel consequences of such (mis)matched spatial perceptions. It is important to know whether travel decisions are influenced by the design and lay-out of the residential neighbourhood (e.g., pedestrian friendly neighbourhoods that actually encourage walking) or whether personal influences such as perceptions are more important. The issue of spatial (mis)match thus questions the sustainability of spatial planning policies aiming at, e.g., densifying and mixing of land uses.

The analysis reported in this chapter is based on data from an Internet survey on lifestyles and leisure mobility in Flanders (Belgium) which also questioned the respondents’ perceptions of their current residential neighbourhood. By adding spatial information from other land use databases, spatial perceptions can be balanced against the objective spatial characteristics of the respondents’ current residential neighbourhood. Doing so, the consequences of the (mis)matched spatial perceptions on mode choices for leisure activities will be evaluated.

2. DATA

Current travel surveys generally lack information on subjective influences such as perceptions. Therefore, we conducted an Internet survey between May 2007 and October 2007. The survey was made known to students and staff members of the University of Antwerp and the Faculty of Sciences at Ghent University, and an announcement was published in regional information magazines of several villages in the larger urban region of Ghent (Flanders, Belgium). In total, 2,363 persons completed the survey, of which 1,626 were retained after data cleaning for further analyses. Figure 1 illustrates the residential locations of these respondents.

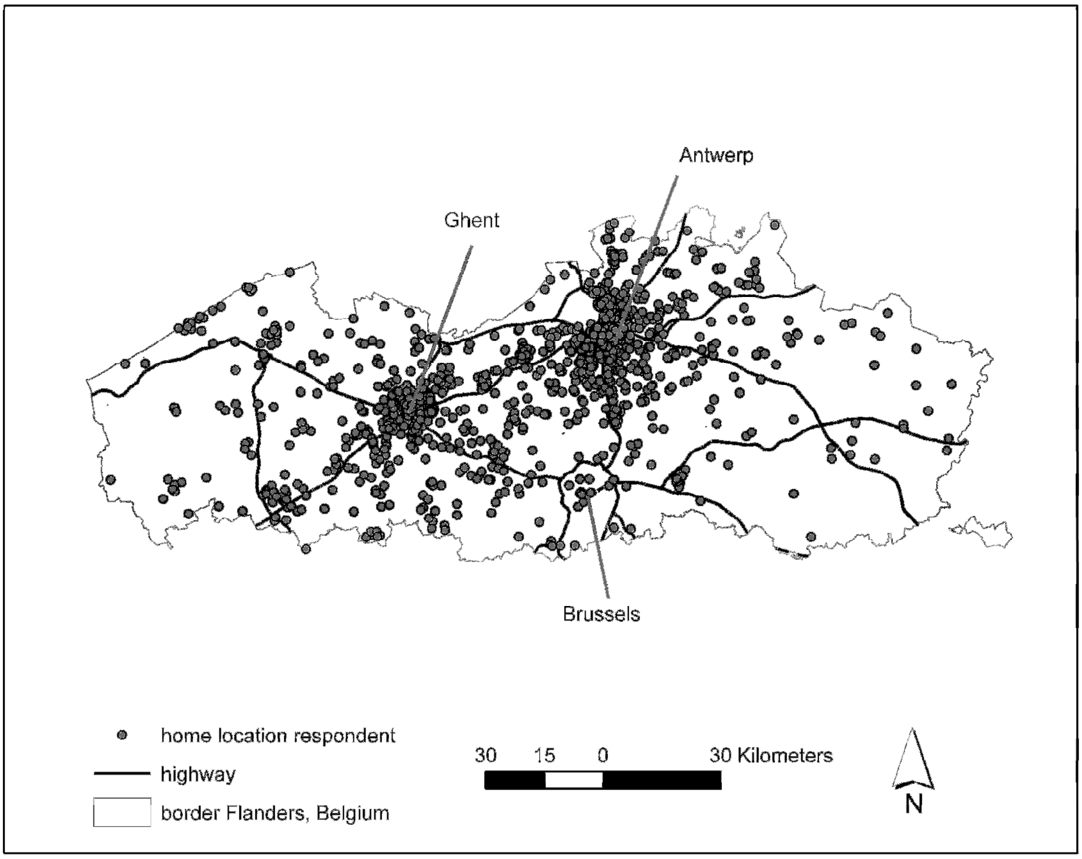

Figure 1 – Locations of respondents in Flanders

Despite our efforts, we did not obtain a well-balanced sample. Women, married couples, people with full-time employment and younger people are overrepresented. But the most remarkable difference is in education. Highly-educated respondents are heavily overrepresented in the sample: 66% has a college or university degree, which is considerably higher than the average of 25% for Flanders. Although the sample is not representative of the entire population of Flanders, we feel that this does not devalue it for our research purposes and results. Our purpose is to model relationships among variables, not to ascertain the univariate distributions of variables in isolation. Our analysis can still properly capture the conditional influence of having a given level of education on travel behaviour, even if the proportion of people having that amount of education differs between our sample and the population. The sample also permits demonstration of our premise that, conditional on a given level of education, subjective variables such as personal perceptions can still explain a significant additional amount of variance in mode choices.

3. SPATIAL MISMATCH

This section describes how spatial mismatch is determined by balancing the spatial characteristics of the respondent's current residential neighbourhood against his/her subjective spatial perceptions.

3.1 Subjective spatial perceptions and residential satisfaction

Although the survey was not designed to question perceptions and satisfaction, it contained 16 statements on how respondents perceive their current residential neighbourhood. Respondents were first asked to indicate which aspects except price (e.g., quietness, presence of green areas, close to work, traffic safety, …) would influence a *supposed* residential location choice. Then, they had to indicate on a five-point Likert scale how satisfied they are with these importantly-rated aspects in their *current* residential neighbourhood. From these 16 statements, we selected only those seven statements that are relevant and can be related to the physical characteristics of the residential neighbourhood: (i) close to public transport, (ii) close to shops and groceries, (iii) close to leisure activities, (iv) close to family and friends, (v) close to work, (vi) quietness and (vii) presence of green areas.

A correlation analysis revealed significant correlations between the greater part of the statements on perceptions of the residential neighbourhood. This indicates that factor analysis might be useful to reduce the dimensionality and retrieve the underlying factors (Hair *et al.*, 1998). The scores on these statements were therefore factor analysed (principal axis factoring, promax rotation, 39.4% variance explained) into two underlying dimensions that influence how respondents perceive their residence: (i) having access to various facilities (probably reflecting urban perceptions), and (ii) the presence of open space and quietness (probably reflecting suburban or rural perceptions). The number of factors in our analysis is chosen based on interpretation of the scree plot, eigenvalues larger than one, and especially, interpretation of the factors (for detailed information, see Van Acker et al. 2013).

In a subsequent step, respondents with similar scores on these two perception factors were grouped together by means of a cluster analysis (Ward's method, squared Euclidean distance). The number of clusters is based on the interpretation of a graph in which the within-cluster sum of squares is plotted against the number of clusters (a sharp change may be indicative of the best solution) and especially, interpretation of the clusters. Doing so, we found three clusters reflecting whether respondents perceive their residential neighbourhoods as urban, suburban or rural. Urban perceptions are characterized by high ratings of accessibility and low ratings of open space and quietness, whereas the opposite holds for rural perceptions. A third cluster combines high ratings of accessibility with high ratings of open space and quietness. This refers to a combination of urban as well as rural perceptions, which we labelled "suburban". This suburban perception obtains higher ratings of accessibility and open space and quietness compared to urban respectively rural perceptions which might seem awkward. However, we should keep in mind that the ratings refer to *perceptions* which does not mean that overall accessibility is better in suburban areas compared to urban neighbourhoods or that suburban areas have more open spaces than rural neighbourhoods. Furthermore, the survey questioned how *satisfied* respondents are with their current residential neighbourhood. It might be possible that suburban residents are more satisfied and enjoy the mix of positive urban and rural aspects (i.e. accessibility, respectively open space and quietness) to a greater extent than their urban and rural counterparts (for detailed information, see Van Acker et al. 2013).

3.2 Objective spatial characteristics

By geocoding the respondent's address, we could add spatial information from various land use and transportation databases in order to calculate several spatial characteristics of the respondent's residence. For determining spatial mismatch, we calculated two additional spatial characteristics that can be directly related to the seven statements on spatial perception of the residential neighbourhood: (i) local potential accessibility by car, and (ii) the built-up index.

Accessibility can be measured in various ways, but always refers to the ability "to reach activities or locations by means of a (combination of) travel mode(s) (Geurs and van Wee 2004). We used a "potential accessibility" measure which is a simple but commonly-used accessibility measure. It calculates the number of activities which can be reached in a certain amount of time, weighted for travel time. We used the number of people that can be reached by car within 5 minutes as a proxy for local potential accessibility. For each residence, accessibility is calculated using the regional travel demand forecasting model Multimodal Model Flanders. It is basically the sum of the number of people of every census tract in the region, weighted by the travel time from the residence to these census tracts. Travel time is calculated in ArcGIS 9.2 as the fastest path by car along the road network. We restricted this travel time to 5 minutes in order to detect differences in local accessibility. After all, our study area has a limited geographical scale so that differences in accessibility are more important on a local level (e.g., within 5 minutes) than a regional level (e.g., within 60 minutes). We are aware that accessibility is more than just having access to people. However, we lacked detailed and geocoded information on e.g. the location of leisure activities (which would be more relevant for our analysis of mode choices for leisure trips). Consequently, we limit our potential accessibility measure to having access to people. The built-up index equals the percentage of built-up surface at the census tract level. It can be considered as a proxy for built-up density. It is derived from the land use database of the Agency of Spatial Information Flanders which offers a categorization between built-up surfaces and open surfaces.

By performing a cluster analysis (Ward's method, squared Euclidean distance), neighbourhoods with similar scores on these two spatial characteristics are grouped together so that the clusters describe various residential neighbourhood types. The number of clusters is based on the interpretation of a graph in which the within-cluster sum of squares is plotted against the number of clusters (a sharp change may be indicative of the best solution) and especially, interpretability of the clusters. Doing so, we found three clusters which also reflected a continuum ranging from urban, suburban and rural neighbourhoods. Urban neighbourhoods are characterized by high levels of accessibility (i.e., many people can be reached by car within 5 minutes) and high percentages of built-up area, whereas the opposite holds for rural neighbourhoods. A third cluster falls in-between with moderate levels of accessibility and moderate percentages of built-up area. Or in other words, local accessibility and built-up density increases with increasing urbanization as could be expected (for detailed information, see Van Acker et al. 2013).

3.3 Spatial mismatch

After having specified the respondents' spatial perceptions and the diverse neighbourhood types, we can balance these two against each other and determine whether respondents perceive their residence in a correct way.

Table 1 illustrates that almost 40% of all respondents correctly perceive their residential neighbourhood (see figures in grey, on the diagonal) and have, what we call, a spatial match. The large amount of spatial mismatch is thus striking. Moreover, respondents tend to overrate the urbanized character of their residence (see larger figures below the diagonal in grey compared to figures above this diagonal). For example, more than half of all respondents who reside in a rural neighbourhood perceive their residence as suburban (469 of the 814 rural respondents), whereas this figure is only 10% in the reverse situation (i.e., 53 of the 494 respondents residing in a suburban neighbourhood but perceiving it as rural). This urbanized perception can be explained by the long-lasting tradition of suburbanization that exists in Belgium and goes back to the nineteenth century. After all, influenced by its housing policy and transport policy, a commuting culture has always existed in Belgium. Due to inexpensive public transport season tickets and a well-established network of railways and tramways, people were no longer compelled to reside nearby their jobs located within the city and they moved toward green, safe and quiet residential neighbourhoods outside the city centre. This was even more encouraged by the housing policy which promoted inexpensive social house-construction in garden cities, and provided subsidies and fiscal compensations for individual home-ownership. As a consequence, some form of suburbanization already existed in Belgium from the second half of the nineteenth century (Lauwers 1991, Kesteloot 2003, Verhetsel et al. 2007, Boussauw et al. 2009). This process of extensive suburbanization led to a highly fragmented urbanized space evoking the impression that every square meter is densely built-up.

Table 1 – Size of spatial (mis)match

Perception cluster → **Spatial cluster ↓**		**Urban**	**Suburban**	**Rural**	**Total**
Urban	N % of Total	170 10.5%	121 7.4%	27 1.7%	**318** **19.6%**
Suburban	N % of Total	202 12.4%	239 14.7%	53 3.3%	**494** **30.4%**
Rural	N % of Total	138 8.5%	469 28.8%	207 12.7%	**814** **50.1%**
Total	**N** **% of Total**	**510** **31.4%**	**829** **51.0%**	**287** **17.7%**	**1,626** **100.0%**

One might argue that any association between spatial mismatch and mode choice is the result of various sample biases (e.g., the overrepresentation of highly educated people). However, we found no statistically significant socio-economic and demographic differences exist between matched and mismatched respondents (for detailed information, see Van Acker et al. 2013).

4. SPATIAL MISMATCH AND ITS TRAVEL CONSEQUENCES

4.1 Descriptive analysis

Respondents were also asked what kind of leisure trips they perform on a monthly basis and which travel mode they generally use for this. In a previous study (Van Acker et al. 2013) we described how these mode choices for leisure activities differ between respondents with matched and mismatched spatial perceptions. We hypothesized that if spatial perceptions are crucial to mode choices, then it would be plausible that respondents with mismatched perceptions choose for those travel modes that correspond with their spatial perceptions. However, if perceptions are not crucial to mode choices, the influence of the residential neighbourhood itself might become more important so that all inhabitants within a particular neighbourhood type make similar mode choices, despite any (mis)matched spatial perception. We found evidence for both hypotheses.

For example, residing in an urban neighbourhood seems to discourage car use (left side of Figure 2). Car use is almost equally high for all respondents residing in an urban neighbourhood. Whether someone perceives this neighbourhood as urban or not, it seems not to influence the decision to use the car. However, this does not hold for a suburban or rural neighbourhood. Perceptions become more important. A suburban resident but who perceives his/her residence as urban (rural), tends to act as a matched urbanite (matched ruralite) and uses less often (more often) the car.

At first sight it also seems that an urban neighbourhood encourages the use of public transport (centre of Figure 2), and walking/cycling (right side of Figure 2). Even though some mismatched urbanites perceive their urban residence as suburban, they rather behave as matched urbanites and are more likely to use public transport and walk/cycle more often than they actually would do so by virtue of their spatial perception. This association is less clear for mismatched urbanites who perceive their neighbourhood as rural (instead of urban). Their share of public transport and walking/cycling is lower than that of a matched urbanite (suggesting that it is not only about the spatial environment), yet still considerably higher than a matched ruralite (suggesting that perceptions are not the only influences either). More or less similar patterns are found for rural dwellers, but mode choices of suburban dwellers are possibly more influenced by spatial perceptions than by the suburban neighbourhood itself. Mismatched suburbanites tend to make similar mode choices than their matched counterparts. For example, the evidence suggests that someone who perceives his/her suburban residence as urban (rural) also behaves as a matched urbanite (ruralite) and choose more frequently (less frequently) to use public transport, and to walk/cycle.

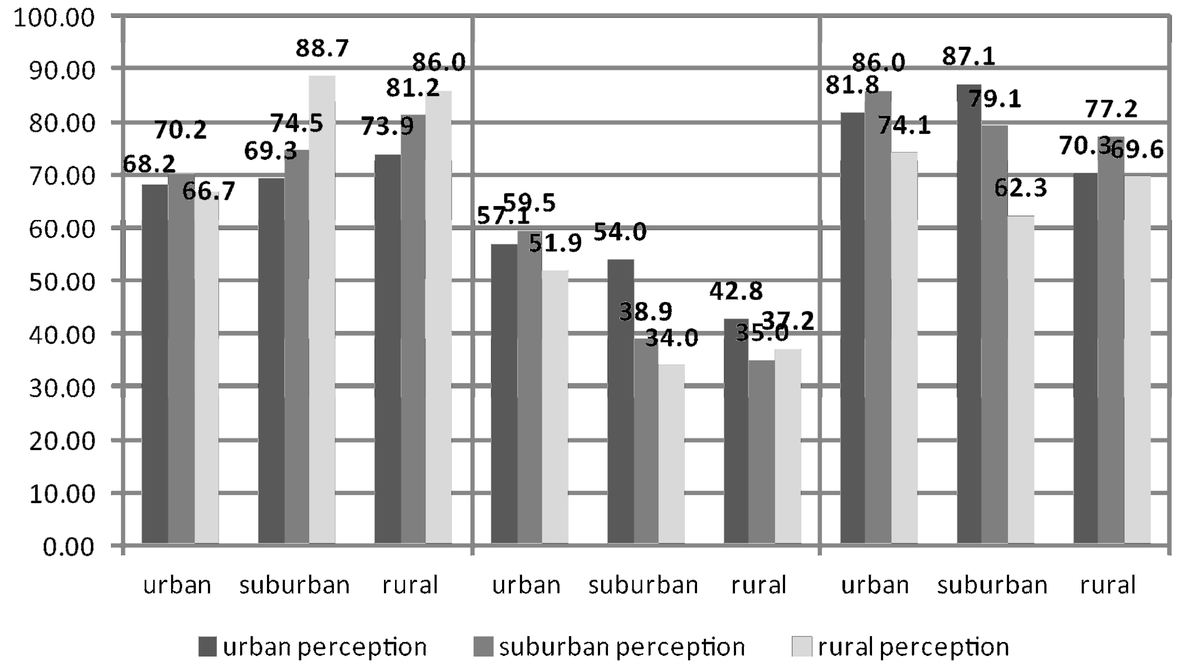

Figure 2 – Influence of (mis)matched spatial perceptions on mode choices

4.2 Hierarchical logistic regression analysis

The descriptive analysis in section 4.1 depicts a possible *association* between mode choice for leisure activities and (mis)matched spatial perceptions. However, this at first sight interesting association should be controlled for socio-economic and demographic influences. After all, association is not the same as *causation*. For example, previous research has found that car ownership mediates the relationship between the built environment, attitudes and mode choices (Van Acker and Witlox 2010, Van Acker et al. 2011). Our first impressions based on Figure 2 might thus be biased because of the interaction with car ownership. Consequently, we extended our previous study by statistically testing the possible effect of spatial (mis)match on mode choices for leisure activities while controlling for differences in socio-economic and demographic background variables. This can be done by means of a hierarchical regression analysis. The difference with a regular regression analysis is that in a hierarchical regression analysis independent variables are entered in blocks. Independent variables that you want to control for are usually first included in the regression model.

In this analysis, we are interested in the effect of the built environment and spatial (mis)match on mode choices but we are concerned that other variables like car ownership might be associated with the built environment, spatial (mis)match ánd mode choice as well. To make sure that car ownership do not explain away the entire association between the built environment and spatial (mis)match on one hand and mode choice on the other hand, we put variables such as car ownership first in the regression model. This ensures that controlling variables such as car ownership will get "credit" for any shared variability that they may have with the predictors that we are really interested in (i.e., the built environment and spatial (mis)match). Any observed effect of these predictors can then be said to be "independent of" the effects of the other variables that we have already controlled for. This procedure thus allows us to test the effects of certain predictors independent of the influence of others. Since car use, public transport and cycling/walking is in our study each time defined as a binary variable, we estimated three separate hierarchical logistic regression analyses in SPSS Statistics 20.

In this analysis, we controlled the interaction between the built environment, spatial (mis)match and mode choice for the personal characteristics gender, marital status, the presence of young children aged below 12 years in the household, education, employment status, household income, possession of a driving license and car ownership. These personal characteristics are thus entered in the first block of the three hierarchical logistic regression analyses. Moreover, these controlling variables are entered into the model by using the conditional forward method. This means that the procedure starts with no variables in the model, tests the addition of each variable using a chosen model comparison criterion, adds the variable (if any) that improves the model the most, and repeats this process until no further improvements can be made to the model.

Residential neighbourhood type (with three categories – urban, suburban, rural as described in section 3.2) is entered in a second block. Spatial (mis)match is entered in a final third block. The results of Table 1 were translated into a new categorical variable measuring spatial (mis)match by three categories: (i) respondents with correct spatial perceptions (corresponding to the figures on the diagonal in grey in Table 1), (ii) respondents who overrate the urbanized character of their residence (corresponding to the figures below the diagonal in Table 1), and (iii) respondents who underrate the urbanized character of their residence (corresponding to the figures above the diagonal in Table 1).

Results of the three hierarchical logistic regression analyses are summarized in Table 2. We are primarily interested in the effect of the built environment on mode choices for leisure activities compared to the effect of spatial (mis)match. Therefore, the discussion of the results will mainly focus on these effects.

Given the same personal background variables, respondents residing in a suburban and rural neighbourhood are more likely to use their cars for leisure activities compared to respondents residing in an urban neighbourhood. The opposite holds for public transport and cycling / walking. Spatial (mis)match has also the expected effect on mode choice. Respondents overrating the urbanized character of their residence tend to use their cars less frequently and use public transport and cycle / walk more frequently compared to respondents with correct spatial perceptions of their residence. The opposite holds for respondents underrating the urbanized character of their residence (more car use, less public transport and less cycling / walking). This seems to confirm our finding of the descriptive analysis that the built environment as well as spatial perceptions both influence mode choices for leisure activities.

However, the effects of residential neighbourhood type and spatial (mis)match are in many cases statistically not significant. Whereas the descriptive analysis suggested that car use is influenced by the built environment (especially for residents of an urban neighbourhood) as well as spatial perceptions (especially for residents in a suburban and rural neighbourhood), the hierarchical logistic regression analysis points out that no significant effects exist from both. On the contrary, car ownership seems to be the most important predictor of car use for leisure activities (and also for other mode choices). The Wald statistic has the largest value for car ownership indicating that car ownership contributes the most to the regression model. Contrary to car use, the residential neighbourhood type has a significant effect on the use of public transport and cycling / walking. Especially, the effect of residing in a rural neighbourhood compared to an urban neighbourhood was found to be significant. The question remains to which degree public transport and cycling / walking are also significantly influenced by how people perceive their residence. Spatial (mis)match was found to be statistically significant for cycling / walking only, especially for residents who underrate the urbanized character of their residence compared to residents who perceive their residence correctly.

Table 3 summarizes different model fit measures of the three hierarchical logistic regression analyses. The results of the Chi^2-test illustrate that all three analyses (car use, public transport, cycling / walking) obtain a good model fit: no significant differences exist between the observed and estimated data. This Chi^2-test compares the log likelihood of the estimated model (831.533 for car use, 1199.614 for public transport, 970.314 for cycling / walking) with the log likelihood of the model without any predictors. Logistic regression analysis does not report the proportion of explained variance (R^2) such as for an OLS linear regression analysis. However, some pseudo R^2-measures are reported. Cox & Snell R^2 and Nagelkerke R^2 increases, although slightly, for each block of predictors that is added to the hierarchical logistic regression models. Residential neighbourhood type and spatial (mis)match thus adds some explanatory power to the models, but its influences remain limited.

Table 2 – Three hierarchical logistic regression analyses of mode choices for leisure activities

	B	Std. Error	Wald	Sig.	Exp (B)
CAR USE					
constant	-0.733	0.294	6.223	0.013	0.481
female	0.829	0.182	20.728	0.000	2.290
no driving license	-1.115	0.204	29.840	0.000	0.328
unemployed (ref.)			16.631	0.000	
part-time employed	0.337	0.330	1.045	0.307	1.401
full-time employed	0.864	0.212	16.625	0.000	2.372
car ownership	1.138	0.131	75.273	0.000	3.121
urban neighbourhood (ref.)			0.532	0.767	
suburban neighbourhood	0.106	0.266	0.158	0.691	1.112
rural neighbourhood	0.199	0.276	0.518	0.472	1.220
spatial match (ref.)			2.519	0.284	
overrated	-0.193	0.205	0.891	0.345	0.824
underrated	0.274	0.272	1.014	0.314	1.315
PUBLIC TRANSPORT					
constant	1.213	0.330	13.499	0.000	3.364
age	-0.016	0.009	3.164	0.075	0.985
female	0.685	0.147	21.803	0.000	1.985
no driving license	0.408	0.189	4.645	0.031	1.503
children -12 years	-0.523	0.205	6.505	0.011	0.593
unemployed (ref.)			15.783	0.000	
part-time employed	-0.890	0.314	8.015	0.005	0.411
full-time employed	-0.731	0.191	14.626	0.000	0.481
car ownership	-0.459	0.093	24.315	0.000	0.632
urban neighbourhood (ref.)			7.483	0.024	
suburban neighbourhood	-0.312	0.222	1.977	0.160	0.732
rural neighbourhood	-0.615	0.231	7.110	0.008	0.541
spatial match (ref.)			0.445	0.800	
overrated	0.098	0.161	0.370	0.543	1.103
underrated	-0.026	0.222	0.013	0.908	0.975

Table 2 – Three hierarchical logistic regression analyses of mode choices for leisure activities (*continued*)

	CYCLING / WALKING				
constant	3.560	0.369	93.076	0.000	35.180
age	-0.017	0.009	3.791	0.052	0.983
unemployed (ref.)			15.354	0.000	
part-time employed	-0.208	0.323	0.415	0.520	0.812
full-time employed	-0.756	0.209	13.152	0.000	0.469
car ownership	-0.483	0.103	21.742	0.000	0.617
urban neighbourhood (ref.)			8.811	0.012	
suburban neighbourhood	-0.317	0.275	1.326	0.250	0.728
rural neighbourhood	-0.811	0.295	7.569	0.006	0.444
spatial match (ref.)			10.213	0.006	
overrated	0.014	0.183	0.006	0.940	1.014
underrated	-0.811	0.265	9.358	0.002	0.444

Table 3 – Model summary statistics

	Chi² (df) p	**-2 Log Likelihood**	**Cox & Snell R^{22}**	**Nagelkerke R^2**
		CAR USE		
block 1	209.089 (5) 0.000	834.135	0.190	0.292
block 2	209.119 (7) 0.000	834.105	0.190	0.292
block 3	211.670 (9) 0.000	831.553	0.192	0.295
		PUBLIC TRANSPORT		
block 1	157.277 (7) 0.000	1208.501	0.146	0.196
block 2	165.719 (9) 0.000	1200.059	0.154	0.206
block 3	166.164 (11) 0.000	1199.614	0.154	0.206
		CYCLING / WALKING		
block 1	62.712 (4) 0.000	983.057	0.061	0.094
block 2	65.219 (6) 0.000	980.550	0.064	0.098
block 3	75.455 (8) 0.000	970.314	0.073	0.112

5. CONCLUSIONS

This paper contributes to the research on the interaction between the built environment and travel behaviour by evaluating the objective and subjective spatial influences on mode choices for leisure activities. Recent land use-travel behaviour interaction studies are aware of the influence of subjective aspects such as perceptions beside the objectively measured characteristics of the built environment, but tend to neglect the question whether these subjective influences correspond to the objective reality. Therefore, this paper aimed at describing the size of spatial (mis)match between perceptions and reality in the first place.

Spatial mismatch occurs to a large degree in Flanders. Only 40% of all respondents perceive his/her residence in a correct way. Moreover, due to the long-lasting tradition of suburbanization which resulted in the ubiquitous impression of Flanders as one densely built-up area, many respondents tend to overrate the urbanized character of their residential neighbourhood. Based on a descriptive analysis one might conclude that these spatial perceptions are crucial to mode choices for leisure activities, especially for suburbanites. Among all suburbanites, public transport, cycling and walking (car use) is highest among mismatched suburbanites who perceive their residence as urban (rural). Within the suburbs, it seems that residents are able to choose for those travel modes that fit within their perception of the residence. However, the results of three hierarchical logistic regressions reveal that hardly any significant effect of spatial (mis)match can be found on mode choices for leisure activities. Only cycling / walking was statistically influenced by the spatial perceptions.

Spatial perceptions are not the only predictors of mode choices. The descriptive analysis suggested that in some cases the residential neighbourhood itself becomes more important. Especially in urban neighbourhoods, it seems that high densities and high local accessibility almost automatically result in a lower car share, a higher public transport share and more walking and cycling. Differences in how respondents perceive their urban residence seemed less important: matched and mismatched urbanites tend to make similar mode choices. However again, the influence of residential neighbourhood type was found significant only for the use of public transport and cycling / walking.

Consequently, the results of the hierarchical logistic regressions illustrate that the association between mode choice and (mis)matched spatial perceptions depicted in the descriptive analysis not automatically translates into causation. When controlling for socio-economic and demographic characteristics, it seems that the built environment and perceptions add only little explanatory power to the models. The question thus remains which mechanisms underlie the travel decision process: is it really a question of balancing the spatial characteristics with personal perceptions while controlling for socio-economic and demographic background variables ? Or to what extent are mode choices for leisure activities also irrational decisions determined by, e.g., habits repeated over time, impulsive decisions or a general lifestyle ? More research is thus needed to disentangle causation from association so that a behavioural approach can be elaborated in land use-travel behaviour interaction research.

Based on our findings, important recommendations can be made for spatial planning policies. Spatial planning policies aimed at densifying and providing facilities at neighbourhood level can contribute to a more sustainable mobility. The results of the three hierarchical logistic regression analyses indicate that such spatial planning policies would significantly result in more use of public transport and more cycling / walking, but not in less car use. Car use is mainly determined by car ownership. Besides making cars directly more expensive to own and operate, i.e. through registration fees, gasoline taxes and road pricing, spatial planning policies should develop residential neighbourhood types that do not necessitate owning a car. This should be supplemented by general promotion campaigns to raise awareness among people that owning and driving a car is not something self-evident as it seems today. Campaigns should promote the attractiveness of other modes such as public transport and cycling / walking, but should also promote the advantages of living in high-density, diverse and well accessible urban neighbourhoods. An urban revival is still needed. This need is also supported by our finding that not everybody will use public transport more frequently or will cycle / walk more often when facing increased densities and levels of local accessibility. Such planning policies will remain unsuccessful for respondents who underrate the urbanized character of their residence and who thus misperceive their residence as non-urban. Underrating the urbanized character of the residence result in less cycling / walking.

The findings of this chapter thus illustrate that the effect of spatial planning policies can only be correctly understood when subjective influences such as perceptions are also accounted for. Otherwise, one might have too high expectations. Furthermore, the fact that car use for leisure activities remains high even in urban neighbourhoods suggest that car ownership has an important role in mode choices. Once people own a car, they tend to use it more often. Urban planning policies should therefore not only focus on influencing mode choices directly by measures of increasing density and diversity, but also on indirect measures through car ownership.

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