Research Paper

In plain sight: green views and urbanites' neighborhood satisfaction

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Abstract

The past decades have generated both theoretical and empirical support for a positive relationship between exposure to nature and human well-being. However, exposure to nature is diverse: it can, for example, stem from actually spending time in green spaces, or simply from being able to observe greenery, even from inside one's residence. The extent to which green views as a specific type of nature exposure contribute to satisfaction and well-being in urban areas has received scarce attention in the literature. The objective of this paper is therefore to shed light on whether having satisfactory green views from an urban residence is positively associated with the residents' overall neighborhood satisfaction. We used survey data from a large probability sample (n=32,552) of respondents from thirteen cities in the Flanders region of Belgium to run four binary logistic regression models estimating different levels of neighborhood satisfaction. Each model statistically controlled for the general perceived amount of greenery in the neighborhood, 47 other self-reported neighborhood attributes, personal characteristics, and socio-demographic information. Our findings support the hypothesis that simply viewing greenery improves neighborhood satisfaction. Small-scale green infrastructure, such as street trees and green façades, offers a flexible solution to increase the amount of natural views in cities.

Keywords

Urban greening, livability, well-being, ecosystem services

1. Introduction

As the global urbanization trend continues, it becomes increasingly important to know how to design high-quality, livable neighborhoods for the growing number of urban residents (Mouratidis and Yiannakou, 2022, p.1). Shaping livable cities is a goal for both urban planners and policy makers (Mouratidis and Yiannakou, 2022, p.1; van Kamp et al., 2003, p.6; Wu et al., 2022, p.2). Consequently, urban livability has garnered much interest from academia (Mouratidis and Yiannakou, 2022, p.2; van Kamp et al., 2003, p.6), as studying and understanding how the urban environment influences health and well-being is essential in order to make successful housing policies and improve urbanites' quality of life (Lu, 1999, p.264; Mouratidis and Yiannakou, 2022, p.1; van Kamp et al., 2003, p.15).

Subjective urban livability is typically assessed with satisfaction measures, representing residents' cognitive evaluations of their living environment (Cao, 2016, p.68; van Kamp et al., 2003, p.10; Wu et al., 2022, p.2). Satisfaction could be defined as "the extent to which needs are met" (Lovejoy, Handy and Mokhtarian, 2010, p.38). Residential satisfaction, therefore, is closely related to the concept of livability,

representing the connection between the social and spatial urban environment on the one hand, and the needs and preferences of its inhabitants on the other (Moor, Hamers and Mohammadi, 2022, p.1).

Among various livable city initiatives, greening of the urban landscape is one of the key dimensions that have consistently been embraced and promoted (Wu et al., 2022, p.2). Evidence generally suggests that residential green space has beneficial health effects through reduced harm of environmental stressors, increased opportunities for physical activity and social interaction (the so-called 'instoration'-pathway), and psychological restoration (Hartig et al., 2014, p.213; Markevych et al., 2017, p.302). However, urban nature is diverse and not all types of urban nature can be expected to contribute to human health through each of those three pathways. Whereas green spaces such as parks and gardens are suited for physical activity and social interaction, smaller-scale greenery such as street trees and green façades does not offer these opportunities for instoration. Nonetheless, theories such as the psychoevolutionary theory (also called stress reduction theory) (Ulrich, 1983), the attention restoration theory (Kaplan and Kaplan, 1989), and the biophilia hypothesis (Kellert and Wilson, 1993) suggest that simply being able to view greenery may be sufficient to benefit mental well-being through psychological restoration. Given that individuals may spend 80 to 90 percent of their time indoors or in closed transit (US EPA, 1989, p.11), the role that green views may play for urban livability and well-being warrants specific attention.

As Bratman et al. (2019, p.3) point out, crucial decisions must be made about how to preserve and enhance opportunities for nature experience in an increasingly urbanized world. Mouratidis (2021, p.1) proposes to "integrate various forms of urban nature as much as possible" as one strategy for improving subjective well-being through urban planning. While there is a general consensus in the literature that common types of nature experience are associated with increased psychological well-being (Bratman et al., 2019, p.3), the evidence is not currently sufficient or specific enough to guide planning decisions (Houlden et al., 2018, p.2). Most of the existing research on the well-being benefits of urban green seems to have been focused on green spaces, largely neglecting potential contributions of smaller green infrastructure that can be seen, but cannot be visited. Moreover, Houlden et al. (2018, p.1) found evidence for associations between mental well-being and green views to be inadequate.

The aim of this study is to shed light on the potential of small-scale green infrastructure to contribute to urban livability and well-being by offering restoration through natural views, without offering instoration through opportunities for physical activity and social interaction. We do this by investigating whether having satisfactory green views from an urban residence is positively associated with the residents' overall neighborhood satisfaction, while controlling for the general perceived amount of greenery in the neighborhood. As a component of residential satisfaction, neighborhood satisfaction is a cognitive measure of urban livability at the neighborhood scale, which is among the most widely accepted scales for urban planning (Mouratidis and Yiannakou, 2022, p.1). Furthermore, it represents a domain of general life satisfaction, and is associated with respondents' subjective well-being (Mouratidis, 2020, p.1; OECD, 2013, p.33). The analysis is performed on data from a large probability sample (n=32,552) representative of the urban population of 13 cities in the Flanders region of Belgium. The results therefore provide a unique, population-level insight into the relationship between two aspects of neighborhood greenery on the one hand, and neighborhood satisfaction and livability on the other.

The next section of this paper contains a brief literature review, followed by a section describing the data and method of analysis. The results are presented in section 4 and discussed in section 5. Finally, section 6 presents the conclusions of this study.

2. Literature review

In line with Campbell's model (1976, p.16), empirical research into residential satisfaction follows the premise that satisfaction is largely shaped by physical and perceived characteristics at the dwelling, neighborhood, or city level (Lee et al., 2017, p.138-139; Lovejoy et al., 2010, p.45-47; Mouratidis and Yiannakou, 2022, p.2-3). Often studies focus on either housing characteristics or neighborhood characteristics, depending on the scale of the living environment that is being investigated. In general, perceived neighborhood characteristics have been found to better explain the variation in neighborhood satisfaction than objectively measured characteristics (Cao and Wang, 2016, p.27; van Kamp et al., 2003, p.10), which is to be expected based on the mediating role of perceived characteristics between objective characteristics and satisfaction as described in Campbell's model (1976, p.16).

Lovejoy et al. (2010, p.45-47) present an overview of variables that have been found to be statistically associated with neighborhood satisfaction, organized into physical, social, and economic environmental attributes; locational attributes such as (proximity to) facilities and services; and personal respondent characteristics. They conclude that variables such as safety, upkeep, neighboring and social ties, quietness, greenery, and age and income levels of respondents were consistently associated with neighborhood satisfaction, while most other sociodemographic variables were consistently found to have no significant relationship with neighborhood satisfaction (Lovejoy et al., 2010, p.39).

Some studies have focused specifically on the relationship between greenery and neighborhood satisfaction. The objectively measured presence of trees and shrubs in the neighborhood has been found to be positively associated with neighborhood satisfaction (Ellis, Lee, and Kweon, 2006, p.76). Moreover, Lee et al. (2008, p.67) found that specific vegetation patterns may contribute to better neighborhood satisfaction. Studying a sample of homeowners, Hur, Nasar, and Chun (2010, p.56) found that the objectively measured vegetation rate was positively associated with overall neighborhood satisfaction through residents' perceived naturalness of the neighborhood and their satisfaction with the presence of trees and open space in the neighborhood. Furthermore, Wu et al. (2021, p.5) found that objectively measured street-level visible greenery in the neighborhood was negatively associated with the probability of reporting low life satisfaction, while a similar association in the workplace environment could not be found.

Other studies investigated which aspects or qualities of greenery were associated with neighborhood satisfaction. Jorgensen, Hitchmough, and Dunnett (2007, p.281) found that 'birds and wildlife' and 'trees and greenery' were among the most valued street aspects of the residents of Warrington, UK. Moreover, sixty-three percent of the study participants chose green spaces as their favorite places in the local area, even though respondent interviews revealed that some perceived these green spaces to be unsafe (Jorgensen et al., 2007, p.281). Björk et al. (2008, p.4) and de Jong et al. (2012, p.1374) found that respondents living in suburban and rural areas of Scania, in southern Sweden, reported better neighborhood satisfaction when the green areas in their neighborhood offered a larger array of green qualities (e.g. sounds of nature, large species diversity, cultural significance etc.).

Zhang et al. (2017, p.1) studied the neighborhood satisfaction of 223 residents of two neighborhoods in Groningen, the Netherlands, and found that better accessibility and usability of green spaces was associated with higher neighborhood satisfaction. Hadavi, Kaplan, and Hunter (2018, p.372) found that the perceived amount of green features and having green/social space nearby were positively associated with two subdomains of neighborhood satisfaction (quality of public space and neighborhood comfort). However, the presence of sports fields and playgrounds was found to be negatively associated with the neighborhood comfort subdomain, which mainly represented satisfaction with the safety and peacefulness of the neighborhood (Hadavi et al., 2018, p.372). According to Wu et al. (2020, p.6), park

accessibility and regular visits to parks on weekends (at least three times a month) were associated with better neighborhood satisfaction.

A recent study by Ta et al. (2021, p.7) investigated whether green space quality in terms of plant community structure and foliar habits was associated with neighborhood satisfaction in suburban Shanghai. The authors found that the quantity of green space in the neighborhood became non-significant once plant community structure and foliar habits were incorporated into the model (Ta et al., 2021, p.7). Specifically, the presence of herb and herb-tree plant communities and of deciduous plants was found to be associated with increased neighborhood satisfaction (Ta et al., 2021, p.7-8).

A few studies have looked specifically into the relationship between natural views and neighborhood satisfaction. In the 1980s, Kaplan (1985, p.121) studied how natural and unnatural views, the number of trees near the residence, and the adequacy of the residential environment to meet certain nature-related needs were associated with four sub-domains of neighborhood satisfaction (satisfaction with physical facilities, satisfaction with nature, satisfaction with population size, and satisfaction with sense of community). A notable result was that having views of open space (large mowed areas) was found to be unrelated to any of the neighborhood satisfaction sub-domains, whereas all other predictors (including views of trees, woods, landscaped areas, and gardens) were found to be significantly associated with at least one of the four neighborhood satisfaction sub-domains (Kaplan, 1985, p.121). In a later study, Kaplan (2001, p.523-525) investigated whether window views, including views of natural elements, were associated with three well-being domains (effective functioning, at peace, distracted) and two neighborhood satisfaction domains (nature satisfaction and satisfaction with other neighborhood characteristics, unfortunately labeled 'satisfaction with neighborhood'). The results are difficult to judge, as the regression models simultaneously include verbal and visual ratings of window views that represent similar view content. However, one could conclude that views of both landscaped and untended nature were positively associated with the nature satisfaction domain, and that views of landscaped nature were positively associated with the remaining (not nature-related) neighborhood satisfaction domain (Kaplan, 2001, p.533-534).

Kearney (2006, p.129-133) studied a sample of residents (n=261) of nine subdivisions of a master-planned community on the Sammamish Plateau outside Seattle, Washington, and found that natural views from one's home were not associated with satisfaction with sense of community or concern about regional density, but were associated with satisfaction with nearby nature, satisfaction with shared outdoor space, and concern about local density. Specifically, views of landscaping or a garden and views of a forest were found to be most consistently associated with higher satisfaction and lower concern (Kearney, 2006, p.129-133).

Lastly, Van Herzele and de Vries (2012, p.176-178) surveyed a sample of respondents (n=190) in two neighborhoods in Ghent, Belgium, that differed in terms of availability and accessibility of greenery. The authors found that respondents in the greener neighborhood reported higher happiness scores, and that this relationship was mediated by neighborhood satisfaction (Van Herzele and de Vries, 2012, p.182-185). Furthermore, having a green view from the living room was found to be significantly positively associated with neighborhood satisfaction (Van Herzele and de Vries, 2012, p.186). In a separate regression model testing the relationships between perceived (or, rather, evaluated) neighborhood characteristics and neighborhood satisfaction, perceived presence of sufficient greenery was found to be the neighborhood attribute most strongly associated with neighborhood satisfaction (Van Herzele and de Vries, 2012, p.186).

This review of the literature shows that the link between greenery and neighborhood satisfaction has received some attention, with most evidence suggesting a positive relationship between the two. A few studies have specifically investigated the links between natural views and neighborhood satisfaction.

However, each of these studies was based on small and/or unrepresentative samples (the largest one being the sample of Kaplan's 1985 study (n=268), of which the majority of respondents was in their 20s and only ten percent were over age 40). Moreover, certain modeling choices (splitting up neighborhood satisfaction into several subdomains, running regression models with specific subsets of predictors to determine which ones to include in a final model) make it hard to judge how strongly green views are associated with overall neighborhood satisfaction.

The present study addresses these issues by (1) analyzing data from a large probability sample (n=32,552) representative of the urban population of 13 cities in the Flanders region of Belgium, and (2) investigating the association between overall neighborhood satisfaction and having satisfactory green views from the residence by estimating models that simultaneously include the general perceived amount of greenery in the neighborhood, 47 other self-reported neighborhood attributes, personal characteristics, and socio-demographic information.

3. Method

3.1 Data

The data of this study was collected by the Domestic Affairs Agency of Flanders, Belgium, in the context of a municipality and city monitoring program ("Gemeente- en Stadsmonitor") to support local governments' policy development. In May-June 2017, a questionnaire was distributed among residents of 13 Flemish cities aged 16 or above, according to a stratified sampling design. Of the 90,175 residents that were contacted about 38% replied, resulting in a sample of 32,585 respondents after data cleaning. As this is a probability sample, the sample design can be accounted for during the data analysis and the weighted results are representative for the urban population of these 13 cities (N=1,344,327). Dutch-language versions of both the questionnaire and a report with further details on the sampling design are available online (Agentschap Binnenlands Bestuur, 2018a, 2018b).

Neighborhood satisfaction was measured on a five-point Likert scale, with answers ranging from "very dissatisfied" to "very satisfied". Respondents also evaluated fifty neighborhood attributes using Likert scales (five-point Likert scales ranging from "never" to "all the time", "completely dissatisfied" to "completely satisfied", or "completely agree" to "completely disagree" – the latter sometimes expanded with a sixth option, "not applicable / don't know / no opinion"). These fifty neighborhood attributes fall into three categories: neighborhood environment and services, nuisance in the neighborhood, and social cohesion in the neighborhood. One additional neighborhood attribute – ethnic makeup of the neighborhood – was also measured on a five-point Likert scale, ranging from "nearly only people of Belgian descent live in this neighborhood" to "nearly only people of non-Belgian descent live in this neighborhood".

Furthermore, the questionnaire included questions about multiple aspects of respondents' lives. Some of these were deemed to be relevant statistical control variables: the number of years a respondent has lived on their address, their reported monthly housing cost, whether or not a respondent had trouble paying the monthly housing cost, whether the respondent was involved in organizing and/or partook in neighborhood activities, the frequency with which they used active transportation (walking, bicycling), motorized transportation (motorcycle, car), public transportation (bus, tram, train), or other modes of transportation, their commuting time to work, and whether or not the respondent experienced hindrance during daily activities due to a chronic illness.

Lastly, a set of socio-demographic control variables were included in the analyses: respondent's age and sex as officially registered, whether they have the Belgian nationality and/or a migratory background,

their household size, whether or not underage children were present in the household, the respondent's education and professional status, their perceived financial status, and, finally, their net monthly household income.

Figures 1 to 3 present descriptive information of the core variables of interest of this study: neighborhood satisfaction, satisfaction with green views from the residence, and general perceived amount of greenery in the neighborhood. All other variables discussed above are considered to be statistical controls that need to be incorporated into the regression models (discussed below) in order to avoid bias in the estimated associations between the neighborhood greenery variables and neighborhood satisfaction.

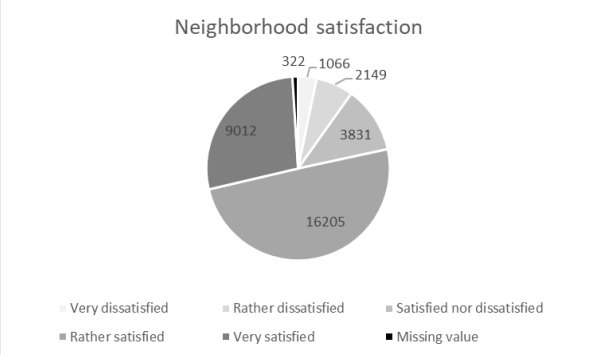

Figure 1: Reported neighborhood satisfaction levels

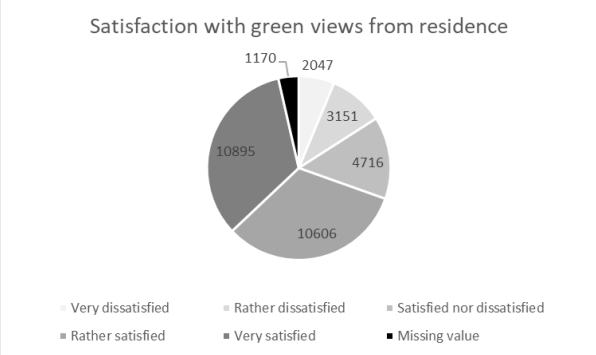

Figure 2: Reported levels of satisfaction with green views from the residence

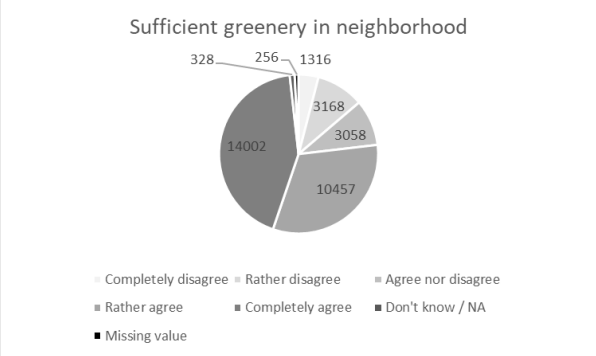

Figure 3: Reported general perceived amount of greenery in the neighborhood

3.2 Preparation for analyses

Across the variables mentioned above, there was missing data in about two thirds of the observations in the data set. Multiple imputation was chosen as the best way to deal with the missing data (see van Buuren (2018) for an introduction). In order to make the multiple imputation process run more efficiently, we decided to apply a data reduction step first. Using categorical principal component analysis (CATPCA) in SPSS version 27, we derived 11 principal components from the 50 neighborhood attributes mentioned above. Next, cases with extremely large proportions of missing data (at least 80% of model variables missing) were removed from the data set to avoid inaccurate imputations. This reduced the number of observations available for further analyses to 32,552. The final survey weights provided with the data were adjusted so they would still sum to the total age and sex subpopulations in each stratum.

Multiple imputation of missing variables was performed using the R package MICE (van Buuren and Groothuis-Oudshoorn, 2011). MICE's predictor matrix was set up such that individual neighborhood

attributes were used as predictors where necessary, and the component scores resulting from the CATPCA-step were used as predictors where possible (see Section 6.4.5 in van Buuren (2018) for an explanation of this procedure). We generated 10 completed data sets for further analyses.

3.3 Analyses

Given that neighborhood satisfaction was measured using a five-point Likert scale, the common approach would be to use an ordered logistic regression model to estimate associations between neighborhood satisfaction and the predictors of interest. However, in order to lift the proportional odds assumption, we used another modelling approach in which one estimates a binary logistic regression model for each cumulative level of the outcome variable.

We estimated four binary logistic regression models (Stata version 12), accounting for the stratified sample design and pooling results across the 10 multiply imputed data sets. The four models' dependent variables correspond to the cumulative levels of the outcome, neighborhood satisfaction: (M1) "Very dissatisfied with the neighborhood", (M2) "At best rather dissatisfied with the neighborhood" (i.e. very or rather dissatisfied), (M3) "At best satisfied nor dissatisfied with the neighborhood" (i.e. very or rather dissatisfied or satisfied nor dissatisfied), and (M4) "At best rather satisfied with the neighborhood" (i.e. very or rather dissatisfied, satisfied nor dissatisfied, or rather satisfied). Notice that the probabilities resulting from M3 and M4 can be inverted to represent the neighborhood satisfaction levels "At least rather satisfied with the neighborhood" (i.e. rather or very satisfied) and "Very satisfied with the neighborhood", respectively. The same set of predictor variables was used in each model. Before estimating the regression models in Stata, we used SPSS's collinearity diagnostics function to check for potential multicollinearity problems. Using a variance inflation factor threshold of 2.5, it was decided to remove five predictor variables from the analyses (two "neighborhood environment and services" variables regarding playgrounds and activities for teens, commuting time to work, nationality, and age). All other variables described in section 3.1 were included in the models.

Goodness-of-fit of the estimated regression models was tested by applying the Hosmer-Lemeshow test to 1000 random draws of size 1000 from the larger data set, for each of the 10 multiply imputed data sets (following a suggestion by Paul, Pennell and Lemeshow (2013) for applying the Hosmer-Lemeshow test to large samples). The null hypothesis of good model fit was not rejected at the 5% significance level in the majority of the random draws (67.4% for M1, 72.7% for M2, 82.6% for M3, and 85.2% for M4), so we conclude that model fit is acceptable.

4. Results

Tables 1 through 4 present excerpts of the regression results of the models described in section 3.3, focusing on the core variables of interest of this study. For categorical predictors, the mode of the variable (i.e. the level representing the largest group of the population) was chosen as the reference category (indicated in the tables by dashes).

Neither of the neighborhood greenery variables was found to be significantly associated with reporting high dissatisfaction with the neighborhood (table 1). However, table 2 shows that (1) being very dissatisfied with the green views from one's residence and (2) not agreeing to the statement that there is sufficient greenery present in the neighborhood were associated with an increased probability of being dissatisfied with the neighborhood.

Table 3 shows that residents who were very dissatisfied with the green views from their home were significantly more likely to report a lack of neighborhood satisfaction (i.e. very dissatisfied, rather dissatisfied, or satisfied nor dissatisfied) and that, in contrast, those feeling very satisfied with the green

views from their home were significantly less likely to report a lack of neighborhood satisfaction. Similar to the results of model 2, not agreeing with the statement that there is sufficient greenery in the neighborhood was found to be associated with an increased probability to report a lack of neighborhood satisfaction.

Model 1: Very dissatisfied with the neighborhood						
		Coef.	Std. Err.	P >|t|	[95% Conf.	Interval]
Satisfaction with green views from residence						
	Very dissatisfied	0.2714	0.1676	0.1060	-0.0576	0.6003
	Rather dissatisfied	-0.0923	0.2460	0.7080	-0.5765	0.3919
	Satisfied nor dissatisfied	-0.0297	0.1768	0.8670	-0.3777	0.3183
	Rather satisfied	-	-	-	-	-
	Very satisfied	0.0345	0.1390	0.8040	-0.2385	0.3075
Sufficient greenery						
	Completely disagree	0.2581	0.2302	0.2620	-0.1930	0.7093
	Rather disagree	-0.0067	0.1983	0.9730	-0.3955	0.3821
	Agree nor disagree	0.2894	0.1715	0.0920	-0.0468	0.6256
	Rather agree	-0.0945	0.1306	0.4700	-0.3507	0.1617
	Completely agree	-	-	-	-	-
	Don't know / NA	-0.0348	0.3286	0.9160	-0.6805	0.6108

Table 1: Excerpt of the results of a binary logistic regression model regressing "being very dissatisfied with the neighborhood" on a range of neighborhood characteristics, personal characteristics, and socio-demographic variables.

Model 2: At best rather dissatisfied with the neighborhood						
		Coef.	Std. Err.	P >|t|	[95% Conf.	Interval]
Satisfaction with green views from residence						
	Very dissatisfied	0.2822	0.1180	0.0170	0.0506	0.5139
	Rather dissatisfied	0.0096	0.1061	0.9280	-0.1985	0.2178
	Satisfied nor dissatisfied	-0.0576	0.0997	0.5630	-0.2534	0.1382
	Rather satisfied	-	-	-	-	-
	Very satisfied	-0.0887	0.0927	0.3390	-0.2706	0.0931
Sufficient greenery						
	Completely disagree	0.2969	0.1446	0.0400	0.0135	0.5804
	Rather disagree	0.3721	0.1080	0.0010	0.1605	0.5838
	Agree nor disagree	0.3820	0.1097	0.0000	0.1670	0.5969
	Rather agree	0.1473	0.0845	0.0810	-0.0183	0.3129
	Completely agree	-	-	-	-	-
	Don't know / NA	0.2361	0.3143	0.4530	-0.3832	0.8554

Table 2: Excerpt of the results of a binary logistic regression model regressing "being at best rather dissatisfied with the neighborhood" on a range of neighborhood characteristics, personal characteristics, and socio-demographic variables.

According to the results of model 4 (table 4), urbanites who were very satisfied with the green views from their residence were found to be significantly less likely to report being at best rather satisfied with their neighborhood. In other words, those who were very satisfied with the green views from their residence were significantly more likely to be very satisfied with their neighborhood. Residents reporting that they are rather or very dissatisfied with the green views from their home were found to be significantly less likely to be very satisfied with their neighborhood (i.e. more likely to report being at best

rather satisfied). However, for the group reporting high dissatisfaction with their green views this association was not found to be statistically significant at the 5% significance level due to a larger standard error. Regarding the general perceived amount of greenery in the neighborhood, a joint-hypothesis test across the levels of this variable could not reject the hypothesis that all coefficients were equal to zero (adjusted Wald F-test: F(5, 40260.8) = 1, p-value = 0.4158), leading us to conclude that general perceived amount of greenery was not associated with reporting high satisfaction with the neighborhood.

Model 3: At best satisfied nor dissatisfied with the neighborhood					
		Coef.	Std. Err.	P >|t|	[95% Conf. Interval]
Satisfaction with green views from residence					
	Very dissatisfied	0.3267	0.1009	0.0010	0.1289 0.5245
	Rather dissatisfied	0.1480	0.0834	0.0760	-0.0155 0.3115
	Satisfied nor dissatisfied	0.1351	0.0743	0.0700	-0.0109 0.2811
	Rather satisfied	-	-	-	- -
	Very satisfied	-0.2178	0.0717	0.0020	-0.3584 -0.0772
Sufficient greenery					
	Completely disagree	0.2732	0.1298	0.0350	0.0188 0.5276
	Rather disagree	0.2779	0.0900	0.0020	0.1015 0.4544
	Agree nor disagree	0.3299	0.0853	0.0000	0.1627 0.4972
	Rather agree	0.0965	0.0647	0.1360	-0.0304 0.2233
	Completely agree	-	-	-	- -
	Don't know / NA	0.3280	0.2586	0.2060	-0.1825 0.8386

Table 3: Excerpt of the results of a binary logistic regression model regressing "being at best satisfied nor dissatisfied with the neighborhood" on a range of neighborhood characteristics, personal characteristics, and socio-demographic variables.

Model 4: At best rather satisfied with the neighborhood					
		Coef.	Std. Err.	P >|t|	[95% Conf. Interval]
Satisfaction with green views from residence					
	Very dissatisfied	0.2316	0.1272	0.0690	-0.0176 0.4809
	Rather dissatisfied	0.2282	0.0996	0.0220	0.0329 0.4235
	Satisfied nor dissatisfied	0.0659	0.0781	0.3990	-0.0872 0.2190
	Rather satisfied	-	-	-	- -
	Very satisfied	-0.5245	0.0540	0.0000	-0.6305 -0.4184
Sufficient greenery					
	Completely disagree	0.0239	0.1945	0.9020	-0.3573 0.4051
	Rather disagree	0.0971	0.1087	0.3720	-0.1159 0.3101
	Agree nor disagree	0.1033	0.0948	0.2760	-0.0825 0.2890
	Rather agree	0.1199	0.0552	0.0300	0.0117 0.2282
	Completely agree	-	-	-	- -
	Don't know / NA	0.0502	0.2346	0.8310	-0.4099 0.5103

Table 4: Excerpt of the results of a binary logistic regression model regressing "being at best rather satisfied with the neighborhood" on a range of neighborhood characteristics, personal characteristics, and socio-demographic variables.

5. Discussion

Our results indicate that satisfaction with green views from the residence is associated with the neighborhood satisfaction of urban dwellers, independently from the general perceived amount of greenery in the neighborhood. Moreover, satisfaction with green views from the residence seems to be mainly associated with whether urbanites report high neighborhood satisfaction, whereas general perceived amount of greenery in the neighborhood seems to be mainly associated with differentiating between neighborhood satisfaction and dissatisfaction. Nonetheless, being highly dissatisfied with green views from the residence was also found to be associated with increased probabilities of being dissatisfied with the neighborhood.

These population-level results provide evidence that for the average urbanite, more greenery is associated with better evaluations of the livability of their neighborhood. While it is important to have access to urban green space (Zhang et al., 2017, p.1; Wu et al., 2020, p.6), the contribution of purely visible greenery to satisfaction and well-being should not be ignored. As Smardon pointed out many years ago: "the particular promise of urban vegetation is that it can be one of the most cost effective and rapid improvements in the aesthetic quality of degraded urban environments" (Smardon, 1988, p.103). While urban planners and designers should be mindful of potential gentrification-inducing effects of greening urban neighborhoods (Wolch, Byrne and Newell, 2014, p.1), Mouratidis' (2021, p.1) call to "integrate various forms of urban nature as much as possible" seems to be justified. In densely built-up urban landscapes, it might be difficult to introduce new green spaces such as parks. Smaller-scale green infrastructure such as street trees and green façaces, on the other hand, offers a flexible solution to increase the amount of natural views in cities.

6. Conclusion

After analyzing data from a large probability sample (n=32,552) representative of the urban population of 13 cities in the Flanders region of Belgium, we conclude that satisfaction with green views from the residence is associated with neighborhood satisfaction, independently of general perceived presence of greenery in the neighborhood. Urbanites that are more satisfied with their green views from the residence were more likely to report high neighborhood satisfaction. In order to meet the needs of the ever-growing urban population and design livable neighborhoods, the potential of greenery that can be seen but cannot be visited, should not be ignored.

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